STATE ROUTE 163/FRIARS ROAD IMPROVEMENT PROJECT ACOUSTICAL ASSESSMENT REPORT

(11-SD-163 KP 6.2/9.3 (PM 3.8/5.8) EA 085780)

Prepared for:

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JULY 2005
Revised January 2010

Addendum to
State Route 163/Friars Road
Improvement Project
Acoustical Assessment Report
(11-SD-163 KP 6.2/9.3 [PM 3.8/5.8] EA-85780)

1.0 INTRODUCTION

Subsequent to completion of the State Route (SR) 163/Friars Road Improvement Project Acoustical Assessment Report (Pacific Noise Control [PNC] 2005), the Fashion Walk Apartments were constructed adjacent to the northern side of Friars Road, across from the Fashion Valley Shopping Center. The Assessor's Parcel Number (APN) is 437-612-18-00 and the parcel address is 7148 Friars Rd (Figure 1).

This addendum provides a review and determination of noise impacts to the Fashion Walk apartments, due to the SR 163/Friars Road Interchange Project. This addendum relates to California Department of Transportation (Caltrans) and Federal Highways Administration (FHWA) requirements to analyze future roadway noise levels at existing uses. Under the California Environmental Quality Act (CEQA) and related City of San Diego (City) requirements, analysis of this recently constructed development is not required because the proposed project would not result in any change in roadway configuration or traffic volumes in the vicinity of this development and therefore would not result in an impact.

2.0 METHODOLOGY AND EQUIPMENT

2.1 <u>Procedures</u>

The sound level meter was field-calibrated immediately prior to the noise measurement to ensure accuracy. In accordance with the regulations, all sound level measurements conducted and presented in this report were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 [R2001]). All instruments were maintained with National Bureau of Standards traceable calibration, per the manufacturer's standards. Noise measurements were taken during the site visit with a Larson Davis Model 820, Type 1 Sound Level Meters (with windscreen), and Larson Davis Model CA200 Calibrator. The microphone was placed at approximately five feet above the existing project site grade.

2.2 <u>Roadway Noise Calculation</u>

The TNM software Version 2.5, released in February 2004 by the U.S. Department of Transportation, was used for all traffic modeling in the preparation of this report. TNM calculates the daytime average Hourly Noise Level (HNL) (equivalent to the L_{EQ}) from traffic data including road alignment, elevation, lane configuration, projected traffic volumes, estimated truck composition percentages and vehicle speeds. The HNL for traffic volumes of 8 percent to

10 percent of total traffic (normal P.M. peak hour traffic) is approximately equivalent to CNEL (+/- 2 dB) (Caltrans "Technical Noise Supplement" October 1988).

3.0 ENVRONMENTAL CONDITIONS

3.1 <u>Noise Measurements</u>

An on-site inspection and traffic noise measurement were conducted between 2:00 and 3:00 p.m. on Tuesday September 1, 2009. Weather conditions during the inspection included a light breeze (2 to 5 miles per hour) from the south, moderately high humidity (less than 90 percent), and temperatures in the mid 80s. Two "one-hour" equivalent measurements were taken at locations near the Fashion Walk Apartments (see P1 and P2 on Figure 1). During the on-site noise measurements, start and end times were recorded. Vehicle counts were made for automobiles (cars and pickups), buses, motorcycles, medium trucks (double-tires/two axles), and heavy trucks (three or more axles) during one of the measurements.

Table 1 SITE VISIT NOISE MEASUREMENT INFORMATION						
Tuesday September 1st, 2009						
P1	**2:00 p.m.**	**69.3 dBA L_{EQ}**		**20-minute Measurement**		
		Cars	Buses	Motorcycles	MT	HT
20-minute		887	11	3	3	0
One-hour Equivalent		2661	33	9	9	0
P2	**2:30 p.m.**	**73.7 dBA L_{EQ}**		**20-minute Measurement**		

MT-medium trucks; HT-heavy trucks

3.2 <u>Traffic Information</u>

Roadway information and descriptions for this analysis were based on the Traffic Impact Analysis prepared by Linscott, Law, and Greenspan for the SR 163/Friars Road Interchange (2008).

The current vehicle percentages for all roadways were obtained based on the original Exterior Noise Technical Report for the Fashion Walk Apartments (RECON 2000) and the on-site measurement. Future Peak Hour Traffic Volumes and roadway modeling volumes are presented in Table 2.

Table 2 FUTURE TRAFFIC VOLUMES AND VEHICLE PLANNING INFORMATION						
		Planning Percentages and Modeling Traffic Volumes				
		Cars	**Buses**	**Motorcycles**	**MT**	**HT**
2010 Traffic Volumes						
Friars Road	Hourly Peak	97.75%	1.25%	0.50%	0.50%	0.00%
Westbound Friars	1630	1593	20	8	8	0
Eastbound Friars	1910	1867	24	10	10	0
All Other Lanes	Hourly Peak	99.50%	0.00%	0.50%	0.00%	0.00%
EB Friars Road LT to Avenida De Las Tiendas	10	10	0	0	0	0
WB Friars Road LT Avenida De Las Tiendas	700	697	0	4	0	0
SB Avenida De Las Tiendas	770	766	0	4	0	0
NB Avenida De Las Tiendas	390	388	0	2	0	0
2030 Traffic Volumes						
Friars Road	Hourly Peak	97.75%	1.25%	0.50%	0.50%	0.00%
Westbound Friars	1900	1857	24	10	10	0
Eastbound Friars	2230	2180	28	11	11	0
All Other Lanes	Hourly Peak	99.50%	0.00%	0.50%	0.00%	0.00%
EB Friars Road LT to Avenida De Las Tiendas	10	10	0	1	0	0
WB Friars Road LT Avenida De Las Tiendas	770	766	0	4	0	0
SB Avenida De Las Tiendas	830	826	0	4	0	0
NB Avenida De Las Tiendas	430	428	0	2	0	0

Source: Linscott, Law, and Greenspan 2008
LT-left-turn; MT-medium trucks; HT-heavy trucks

3.3 Calculated Noise Level

Noise levels were calculated for the site using the methodology described in Section 3.2, Methodology, for the location, conditions, and traffic volumes counted during the noise measurements. The calculated noise levels (L_{EQ}) were compared with the measured on-site noise level to determine if adjustments or corrections (calibration) should be applied to the traffic noise prediction model in the Computer-aided Noise Abatement (Cadna) modeling software. Adjustments are intended to account for site-specific variances in overall reflectivity or absorption, which may not be accurately represented by the default settings in the model.

The measured noise levels of 69.3 dBA L_{EQ} and 73.7 dBA L_{EQ} at the two measurement locations were compared to the calculated (modeled) noise level of 72.1 dBA and 73.2 dBA for the measured time period traffic count at the posted speed limit of 45 miles per hour (mph). No adjustment was deemed necessary to model future noise levels.

4.0 IMPACTS AND COMPARISON WITH FASHION WALK PLANNING

4.1 Fashion Walk Observed Noise Control

General exterior observation during the site visit revealed noise barriers along the outer edge of the between-building opening of eight feet or greater in height. Likewise, the apartment balconies had a clear noise barrier material (no verification of material type or thickness was possible) of at least six feet or greater height.

Figure 2, West and South Building Elevations, from the City of San Diego Final Mitigated Negative Declaration shows the lowest living floor elevation as approximately 22.5 feet higher than the sidewalk. All calculated receiver elevation levels are based on this as well as the base of all noise barriers.

4.2 Exterior Impacts

Caltrans Standards

The previous Exterior Noise Technical Report for the Fashion Walk Apartments (RECON 2000) indicates that the maximum exterior noise levels expected at the façade of the (then-future) Fashion Walk apartments might reach 74 CNEL. The peak L_{EQ} for traffic volumes (normal p.m. peak hour traffic) is approximately equivalent to CNEL (+/- 2) (Caltrans "Technical Noise Supplement" October 1988).

The current modeled exterior noise levels at the existing building facades at peak Level of Service "C" (45 mph) in the Existing+Project condition (projected 2010 traffic volumes) range from 73.4 to 74.7 dB L_{EQ}. Modeled exterior noise levels based on projected 2030 traffic volumes range from 74.3 to 75.8 dB L_{EQ} (Table 3).

Under projected 2010 traffic conditions, the modeled exterior noise in the pool area 10 feet behind the noise control barrier is 55 dB L_{EQ} and reduces to 52.8 dB L_{EQ} inside the narrower opening areas. The modeled noise level behind the balcony noise control barriers is 56.2 dB L_{EQ}[1]. The modeled exterior noise level at these locations under 2030 conditions are 55.7, 53.5, and 57.0 dB L_{EQ}, respectively (Table 3). With the existing noise attenuation features, therefore, the modeled exterior noise levels are within the NAC. No impact is identified.

[1] This is based on a hypothetical location 10 feet behind the barrier due to constraints of the modeling software. The actual balcony appears to be only 4 or 5 feet deep between the barrier and the doors.

Table 3 MODELED NOISE LEVELS			
Receiver	**Description of Location**	**2010 Noise Level (dB L_{EQ})**	**2030 Noise Level (dB L_{EQ})**
1	Eastern Usable Exterior Space	55.0	55.7
2	Middle Eastern Usable Space	52.8	53.5
3	Middle Western Usable Space	53.0	53.7
4	Western Usable Space	52.4	53.1
5	First Floor Balcony	56.2	57.0
6	Eastern First Floor Exterior	74.7	75.8
7	First Floor Exterior	73.9	74.9
8	First Floor Exterior	73.6	74.6
9	First Floor Exterior	73.4	74.4
10	First Floor Exterior	73.4	74.5
11	First Floor Exterior	73.2	74.3
12	First Floor Exterior	73.6	74.6
13	First Floor Exterior	73.4	74.5
14	First Floor Exterior	73.6	74.6
15	Western First Floor Exterior	74.1	75.2

City Standards

The CNEL for these units is probably slightly less than the L_{EQ} due to the unusual nature of the local traffic conditions. Overall and peak hour traffic conditions are increased during the daytime hours by the Fashion Valley shopping center. After 10 p.m., shopping center traffic essentially falls to zero and does not restart until well into the following day, which is an unusual traffic flow. This means that traffic noise during the weighted nighttime hours would be lower than would normally be expected based on peak hour traffic volumes. The CNEL therefore would be slightly lower than the modeled L_{EQ}. Regardless, as the modeled exterior noise levels (L_{EQ}) at the shielded exterior use areas are below 65 dB, the CNEL also would be within City standards.

4.3 Interior Impacts

Caltrans Standards

In situations where exterior activities are physically shielded in a manner that prevents an impact on exterior activities, the Activity Category E (52 dB) interior criterion is used as the basis for determining noise impacts in accordance with 23 Code of Federal Regulations 772.

A Structural Acoustical Analysis was prepared for the Fashion Walk project by Investigative Science and Engineering (March 2006; Attachment A). The study analyzed compliance of the development with the California Code of Regulations (CCR), State Building Code, Part 2, Title

24, Appendix Chapter 35: Noise Insulation Standards for Multifamily Housing. A previous Exterior Technical Report (RECON 2000) had been conducted using the STAMINA 2.0 computer model. The model was run based on year 1998 traffic volumes for Friars Road (these were higher than the 2015 volumes projected by SANDAG at the time) and traffic mix observed during the noise measurements. Calculations were completed for a daytime hour and the resulting hourly average noise levels were weighted and combined into CNEL values. This model predicted a future exterior noise level of 74 CNEL. This exterior analysis was confirmed by a subsequent exterior analysis prepared by Davy and Associates (2004). The Structural Acoustical Analysis relied upon these earlier analyses for projected exterior noise levels.

The Structural Acoustical Analysis modeled sound transmission of the structure and resultant interior noise levels as described in the American Society of Testing and Materials (ASTM) guidelines Volume 04.06 entitled, "Thermal Insulation: Environmental Acoustics," Test Designation E 413-87. The surface areas and materials for the structure were obtained from architectural drawings prepared for the project. The sound transmission class ratings for roofs, walls and glass assemblies were reported as being satisfactory under the CCR requirement. Specifically, based on the analyzed exterior noise level of 74 CNEL, the interior noise level was predicted at 45.4 CNEL as a worst-case scenario. Thus, the noise attenuation was considered to be 28.6 dB L_{EQ}.

As noted above, current modeling based on updated traffic forecasts indicates that exterior noise would be 75.8 dB L_{EQ}. Given the expected attenuation of 28.6 dB L_{EQ}, the interior noise level would be approximately 47.2 dB L_{EQ}. With the existing noise attenuation features, therefore, the modeled interior noise levels are within the NAC. No impact is identified.

City Standards

Future interior noise levels may exceed the City standard for interior noise. This standard, however, is applicable to planning for new residential development, as opposed to the impact of roadway noise on existing development. Because the proposed project would not result in a change in roadway configuration or traffic noise levels, no impact is identified.

5.0 CONCLUSIONS

For multi-unit residential uses, the FHWA and Caltrans use a NAC of 67 dB L_{EQ} for exterior usable spaces, and 52 dB L_{EQ} for interiors. The City considers traffic noise significant if exterior noise levels exceed 65 dB CNEL. The modeled noise levels at the Fashion Walk exterior usable spaces, with the existing noise attenuation features, range from 53.8 to 57.3 dB L_{EQ} under 2030 traffic conditions. Modeled interior noise levels, with existing noise attenuation features, are approximately 47.2 dB L_{EQ}. These noise levels are below the referenced thresholds. Thus, no impact is identified and no additional mitigation is required.

References

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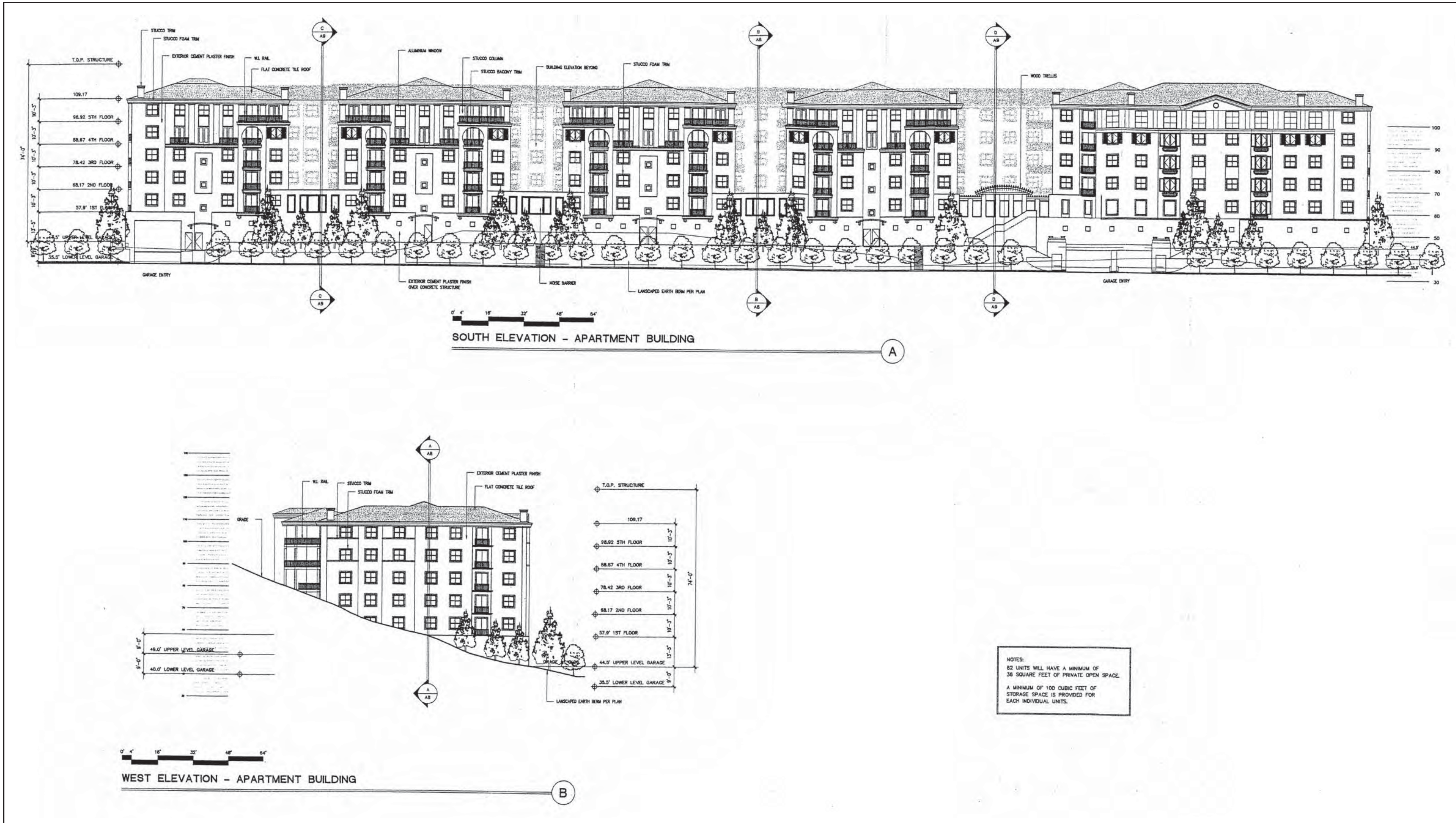
Fashion Walk Noise Measurement/Receptor Locations

SR 163/FRIARS ROAD INTERCHANGE PROJECT

HELIX

Figure 1



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Fashion Walk West and South Building Elevations

SR 163/FRIARS ROAD INTERCHANGE PROJECT

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Figure 2

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INVESTIGATIVE SCIENCE AND ENGINEERING, INC.
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March 25, 2006 (Revised)

Scott Patterson
DR Horton Inc.
5790 Fleet Street, Suite 210
Carlsbad, CA 92008

RE: STRUCTURAL ACOUSTICAL ANALYSIS / CCR TITLE 24 SURVEY FASHION WALK RESIDENTIAL DEVELOPMENT, SAN DIEGO CA ISE REPORT #05-090

Dear Mr. Patterson:

At your request, Investigative Science and Engineering (ISE), has performed a structural acoustical survey for the proposed Fashion Walk residential development located in San Diego, CA. The purpose of the survey is to ascertain estimated interior noise levels within the structure and recommend mitigation measures for compliance with guidelines set forth by Title 24 of the California Code of Regulations.

INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The project site consists of approximately 10.0 acres located in the City of San Diego. The site is bordered by Friars to the south, Ulric Street to the east and a large hillside to the north. Interstate 8 and SR 163 provide regional access to the project area (refer to Figure 1 on the following page).

Project Description

The development plans for the construction of 161 condominium units located within five separate buildings on an approximate 1.8 acre portion of the aforementioned 10.0-acre project site. Amenities would include a pool and spa area as well as several outdoor recreation spaces throughout the proposed development. The proposed project site configuration can be seen in Figure 2 on Page 3 of this report. Areas requiring mitigation under this report are highlighted in red within this figure.

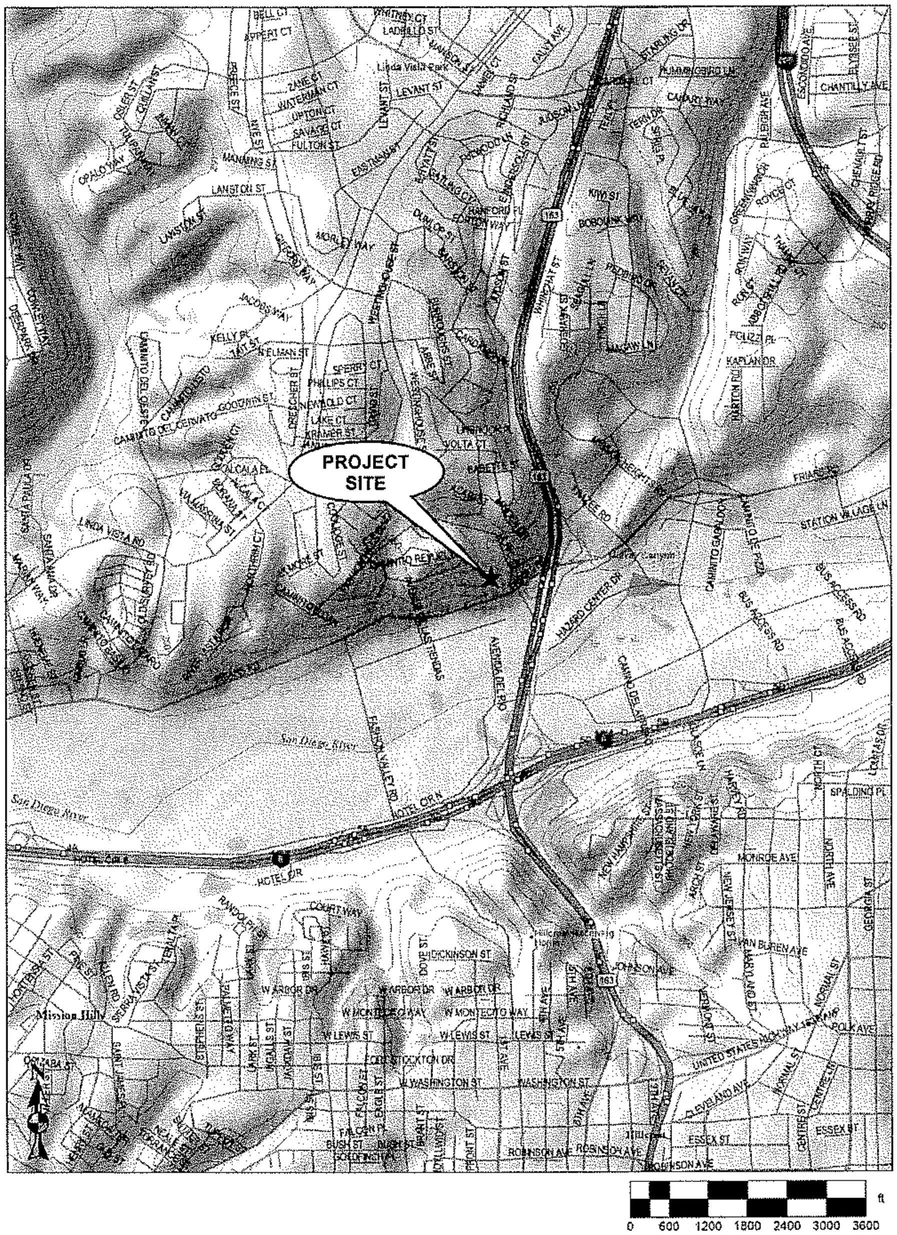

FIGURE 1: Project Vicinity Map – Fashion Walk Residential Development (ISE 10/05)

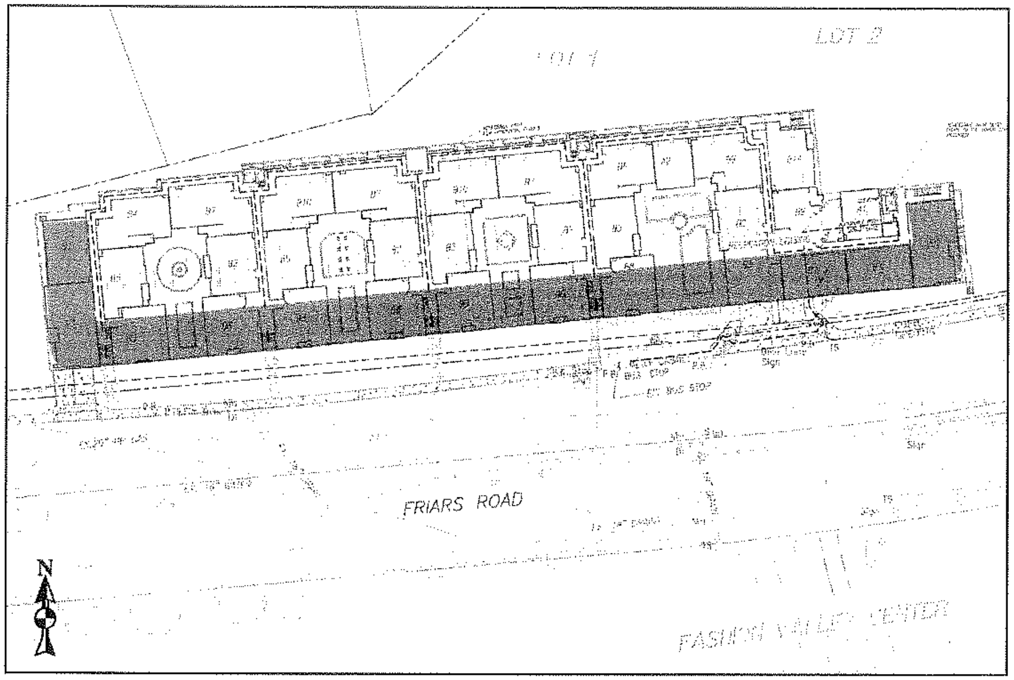

FIGURE 2: Fashion Walk Site Configuration (Leppert Engineering 3/29/04)

Acoustical Definitions

Noise is generally defined as unwanted or annoying sound that is typically associated with human activity and which interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the individual.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB). Most of the sounds one hears in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in level. The intensities of each frequency add to generate sound. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound according to a weighting system that reflects the fact that human hearing is less sensitive at low and extremely high frequencies than at the mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that create a relatively stable background noise in which no particular source is identifiable. A single descriptor called the Leq (or equivalent sound level) is used. Leq is the energy-mean A-weighted sound level during a measured time interval. It is the 'equivalent' constant sound level that would have to be produced by a given source to equal the fluctuating level measured.

Another sound measure employed by the State of California and the City of San Diego is known as the Community Noise Equivalence Level (or CNEL) is defined as the "A" weighted average sound level for a 24-hour day. It is calculated by adding a 5-decibel penalty to sound levels in the evening (7:00 p.m. to 10:00 p.m.), and a 10-decibel penalty to sound levels in the night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours.

Finally, a sound insulation parameter known as the *Sound Transmission Class* (or STC) of a wall, window, or ceiling assembly is defined as the acoustic transmission of a structural assembly at a frequency of 500 Hertz with respect to a reference transmission curve. The use of a single-number transmission rating (such as the STC) correlates in a general way with subjective impressions of sound transmission for speech, radio, television, and similar sources of noise in buildings. The "reference curve" to which the actual transmission is compared, is based upon the above noise sources.

The STC rating can be used to compare the potential sound insulation of structural assemblies tested in a laboratory or between different rooms in a building. The rating for a partition built and tested in a building may be lower than that obtained for a partition tested in a laboratory because of flanking transmission and construction errors. Typical STC ratings and their effectiveness are shown below in Table 1.

TABLE 1: Common STC Ratings and Insulation Effectiveness

STC Rating	Privacy Afforded
25	Normal speech understood at close distances
30	Normal speech audible, but unintelligible
35	Loud speech understood
40	Loud speech audible, but unintelligible
45	Loud speech barely audible
50	Shouting barely audible
55	Shouting not audible

GENERAL APPROACH AND METHODOLOGY

The analysis methodology used to examine sound transmission and resultant interior noise levels is identified in the American Society of Testing and Materials (ASTM) guidelines Volume 04.06 entitled, "*Thermal Insulation; Environmental Acoustics*" Test Designation: E 413-87. Acoustical modeling of the project was performed in accordance with the above guidelines and included corrections for the following parameters:

- Exterior noise level adjustment in front of each building element.
- Exterior noise spectrum placement in front of each building element.
- Correction for building facade reflection (per ASTM E 966-84).
- Incident angle source correction (per ASTM E 966-84).
- Room absorption correction.
- Building element correction and adjustment (per ASTM E 413-87).
- Geometric (sizing) and workmanship (construction error) corrections.

The exterior noise level at the proposed structures are calculated in terms of decibels A-weighted (dBA) and converted to six octave band sound pressure levels at: 125, 250, 500, 1000, 2000 and 4000 Hertz. The interior noise level is a function of the sound transmission loss qualities of the construction material and the surface area of each element (wall, window, door, etc.). The interior noise level also depends upon the room's sound absorption characteristics (in Sabins). Mathematically, this can be expressed as shown in Equation 1 below.

$$L_{\text{int}_i} = L_{ext_i} - TL_i - 10\log_{10}(S) - 10\log_{10}(A_i) + F_{corr} - A_{corr} + Q_{corr} \quad (1)$$

where, L_{int_i} is the interior A-weighted sound level at the ith octave band,

L_{ext_i} is the exterior A-weighted sound level at the ith octave band,

TL_i is the sound transmission loss at the ith octave band,

S is the size of the room façade in square feet,

A_i is the total room absorption in Sabins at the ith octave band, and,

F_{corr}, A_{corr}, Q_{corr} are correction factors for the building façade reflection, incident angle, and construction quality.

ISE assumed that the exterior noise levels were calculated for free-field conditions with no interaction between existing structures. A 3-dBA building facade reflection correction was applied to the as-built structure to simulate local reflection effects. The necessary calculations were performed using the ISE *STC-Calc 5.7* interior noise computation program.

APPLICABLE NOISE STANDARDS

The California Code of Regulations (CCR), State Building Code, Part 2, Title 24, Appendix Chapter 35; "*Noise Insulation Standards for Multifamily Housing*" requires that multi-family dwellings, hotels, and motels located where the CNEL exceeds 60 dBA require an acoustical analysis showing that the proposed design will limit interior noise to less than 45 dBA CNEL. Worst-case noise levels, either existing or future, must be used. Future noise levels must be predicted at least ten years from the time of building permit application. The City of San Diego has adopted the CCR Title 24 regulations and applies them equally to all residential dwelling units.

PREDICTED EXTERIOR NOISE LEVELS

The proposed Fashion Walk residential development is located within the City of San Diego. The primary source of future traffic noise near the project site would be from traffic along Friars Road. The worst-case exterior noise levels were identified in the project's exterior noise assessment prepared by Davy and Associates, dated 11/04/04. Based upon these earlier findings, identified future worst-case traffic related noise levels at the project site could be as high as 74 dBA CNEL for <u>all floor areas having line-of-sight to Friars Road</u>.

CONSTRUCTION ASSUMPTIONS

The following general construction assumptions were applied to each of the units to determine their sound insulation characteristics:

- The roof/ceiling construction should have a minimum STC rating of 46.
- All living spaces examined (i.e., living rooms and bedrooms) were assumed to have carpet and pad (i.e., Floor Multiplication Parameter (FMP = 0.9)) for the purposes an airborne sound isolation calculation.
- Bathroom and closet areas were not examined and thus have no construction limitations.

The surface areas and materials for the proposed project were obtained from architectural drawings prepared by Togawa & Smith Inc, Architects (*Fashion Walk, 9/26/05*). When the interior noise level was found to be greater than 45 dBA CNEL, the value was recalculated for a closed window condition. Further recalculation was done to determine the minimum window-glazing requirement.

Construction practices may degrade the calculated acoustical performance of walls and window assembles. The interior noise levels have been predicted in accordance with generally accepted acoustical methods and assume good construction techniques.

FINDINGS AND MITIGATION

Based upon the model results, the estimated interior noise levels would be as high as 60 dBA CNEL with the windows open and would require a closed window condition to comply with the CCR Title 24 requirements. Mechanical ventilation would be required and should meet specific City requirements for these units. The specific units requiring this mitigation were previously detailed in Figure 2 above.

The required acoustical treatments for the proposed Fashion Walk residential developments are summarized below in Table 2 for the all floor areas. The table shows STC ratings for all assemblies within the development. The necessary octave-band transmission losses are given in Table 3. The complete modeled results are provided as an attachment to this report.

TABLE 2: Structural Acoustical Requirements – All Floor Areas

Room	Building Element	STC Rating
All Rooms/All Units	Roof/ Wall Assembly	46
	All Glass Assemblies	33

Source: ISE STC-Calc 5.7

TABLE 3: Octave Band Transmission Loss in dB – Fashion Walk Residential

Octave Band (Hz)	125	250	500	1000	2000	4000
STC 46 (Roof/ Walls)	27	42	44	46	49	54
STC 33 (All Glass Assemblies)	24	27	31	32	35	38

No further mitigation beyond that listed in Table 2 above is required. Should you have any questions regarding the findings identified herein, please do not hesitate to contact me at (858) 451-3505.

Sincerely,

Rick Tavares

Rick Tavares, Ph.D.
Project Principal
Investigative Science and Engineering, Inc.

Attachments: Interior Noise Calculation Spreadsheets

1 Room Type:	A1 - Liv/Din - Floor 1
Floor Area:	120
Ceiling Height:	9
Room Volume:	1080
FMP:	1
Room Absorption (Sabins):	120
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	162.0	39.6	39.6
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	42.2	57.2
				Sum (Σ):	44.1	57.3

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

2 Room Type:	A1 - BDRM - Floor 1
Floor Area:	143
Ceiling Height:	9
Room Volume:	1287
FMP:	1
Room Absorption (Sabins):	143
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	167.9	39.0	39.0
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.4	56.4
				Sum (Σ):	43.4	56.5

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

3 Room Type:	A2 - Living - Floor 1
Floor Area:	208
Ceiling Height:	9
Room Volume:	1872
FMP:	1
Room Absorption (Sabins):	208
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	17.8	27.6	27.6
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	90.3	43.8	58.8
				Sum (Σ):	43.9	58.8

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

4 Room Type:	A2 - BDRM - Floor 1
Floor Area:	149.24
Ceiling Height:	9
Room Volume:	1343.16
FMP:	1
Room Absorption (Sabins):	149.24
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	180.0	39.1	39.1
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.3	56.2
				Sum (Σ):	43.3	56.3

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

5 Room Type:	A3 - Liv/Din - Floor 1
Floor Area:	193.75
Ceiling Height:	9
Room Volume:	1743.75
FMP:	1
Room Absorption (Sabins):	193.75
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	123.0	36.4	36.4
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	57.0	42.1	57.1
				Sum (Σ):	43.1	57.1

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

6 Room Type:	A3 - BDRM - Floor 1
Floor Area:	143
Ceiling Height:	9
Room Volume:	1287
FMP:	1
Room Absorption (Sabins):	143
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	139.0	38.2	38.2
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	44.2	59.2
				Sum (Σ):	45.2	59.2

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

7 Room Type:	B1/B5 - Living - Floor 1
Floor Area:	182
Ceiling Height:	9
Room Volume:	1638
FMP:	1
Room Absorption (Sabins):	182
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	211.5	39.0	39.0
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	40.4	55.4
				Sum (Σ):	42.8	55.5

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

8 Room Type:	B1/B5 - BDRM 1 - Floor 1
Floor Area:	126.5
Ceiling Height:	9
Room Volume:	1138.5
FMP:	1
Room Absorption (Sabins):	126.5
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	51.0	34.4	34.4
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	57.0	44.0	58.9
				Sum (Σ):	44.4	59.0

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

9 Room Type:	B1/B5 - BDRM 2 - Floor 1
Floor Area:	144
Ceiling Height:	9
Room Volume:	1296
FMP:	1
Room Absorption (Sabins):	144
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	157.0	38.7	38.7
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	44.2	59.1
				Sum (Σ):	45.3	59.2

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

10 Room Type:	B2/B3 - Liv/Din - Floor 1
Floor Area:	263.25
Ceiling Height:	9
Room Volume:	2369.25
FMP:	1
Room Absorption (Sabins):	263.25
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	35.8	29.7	29.7
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	90.3	42.8	57.8
				Sum (Σ):	43.0	57.8

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

11 Room Type:	B2/B3 - BDRM 1 - Floor 1
Floor Area:	154
Ceiling Height:	9
Room Volume:	1386
FMP:	1
Room Absorption (Sabins):	154
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	180.0	39.0	39.0
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.1	56.1
				Sum (Σ):	43.2	56.2

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

12 Room Type:	B2/B3 - BDRM 2 - Floor 1
Floor Area:	170.5
Ceiling Height:	9
Room Volume:	1534.5
FMP:	1
Room Absorption (Sabins):	170.5
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	189.0	38.8	38.8
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	40.7	55.6
				Sum (Σ):	42.8	55.7

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

13 Room Type:	B4/B6 - BDRM 1 - Floor 1
Floor Area:	143
Ceiling Height:	9
Room Volume:	1287
FMP:	1
Room Absorption (Sabins):	143
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	144.0	38.4	38.4
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.4	56.4
				Sum (Σ):	43.2	56.5

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

14 Room Type:	B4/B6 - BDRM 2 - Floor 1
Floor Area:	154
Ceiling Height:	9
Room Volume:	1386
FMP:	1
Room Absorption (Sabins):	154
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	Contribution (dBA) (Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	194.9	39.4	39.4
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.1	56.1
				Sum (Σ):	43.3	56.2

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

15 Room Type:	B4/B6 - Living - Floor 1
Floor Area:	195
Ceiling Height:	9
Room Volume:	1755
FMP:	1
Room Absorption (Sabins):	195
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	44.8	31.9	31.9
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	90.3	44.1	59.1
				Sum (Σ):	44.3	59.1

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

16 Room Type:	B7/B11 - Living - Floor 1
Floor Area:	240
Ceiling Height:	9
Room Volume:	2160
FMP:	1
Room Absorption (Sabins):	240
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	58.3	32.2	32.2
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	90.3	43.2	58.2
				Sum (Σ):	43.5	58.2

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

17 Room Type:	B7/B11 - BDRM 1 - Floor 1
Floor Area:	210
Ceiling Height:	9
Room Volume:	1890
FMP:	1
Room Absorption (Sabins):	210
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	216.0	38.5	38.5
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	39.8	54.7
				Sum (Σ):	42.2	54.8

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

18 Room Type:	B7/B11 - BDRM 2 - Floor 1
Floor Area:	161.26
Ceiling Height:	9
Room Volume:	1451.34
FMP:	1
Room Absorption (Sabins):	161.26
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	144.0	37.8	37.8
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	40.9	55.9
				Sum (Σ):	42.7	56.0

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

19 Room Type:	B8/B9 - BDRM 1 - Floor 1
Floor Area:	187.92
Ceiling Height:	9
Room Volume:	1691.28
FMP:	1
Room Absorption (Sabins):	187.92
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	202.5	38.7	38.7
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	40.3	55.2
				Sum (Σ):	42.5	55.3

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

20 Room Type:	B8/B9 - BDRM 2 - Floor 1
Floor Area:	132
Ceiling Height:	9
Room Volume:	1188
FMP:	1
Room Absorption (Sabins):	132
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	180.0	39.7	39.7
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.8	56.8
				Sum (Σ):	43.9	56.8

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

21 Room Type:	B8/B9 - Liv/Din - Floor 1
Floor Area:	345
Ceiling Height:	9
Room Volume:	3105
FMP:	1
Room Absorption (Sabins):	345
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	185.5	35.6	35.6
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	37.6	52.6
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	57.0	39.6	54.6
7	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	40.4	55.4
				Sum (Σ):	44.7	59.1

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

22 Room Type:	B10 - BDRM 1 - Floor 1
Floor Area:	126.5
Ceiling Height:	9
Room Volume:	1138.5
FMP:	1
Room Absorption (Sabins):	126.5
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	153.0	39.2	39.2
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	42.0	56.9
				Sum (Σ):	43.8	57.0

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

23 Room Type:	B10 - BDRM 2 - Floor 1
Floor Area:	139.92
Ceiling Height:	9
Room Volume:	1259.28
FMP:	1
Room Absorption (Sabins):	139.92
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	184.5	39.5	39.5
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.5	56.5
				Sum (Σ):	43.7	56.6

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

24 Room Type:	B10 - Living - Floor 1
Floor Area:	144
Ceiling Height:	9
Room Volume:	1296
FMP:	1
Room Absorption (Sabins):	144
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	4.0	22.7	22.7
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	44.2	59.1
				Sum (Σ):	44.2	59.1

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

25 Room Type:	C1 - BDRM 1 - Floor 1
Floor Area:	159.5
Ceiling Height:	9
Room Volume:	1435.5
FMP:	1
Room Absorption (Sabins):	159.5
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	202.5	39.4	39.4
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	41.0	55.9
				Sum (Σ):	43.3	56.0

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

26 Room Type:	C1 - BDRM 2 - Floor 1
Floor Area:	120.75
Ceiling Height:	9
Room Volume:	1086.75
FMP:	1
Room Absorption (Sabins):	120.75
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	72.0	36.1	36.1
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	42.2	57.1
				Sum (Σ):	43.1	57.2

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

27 Room Type:	C1 - BDRM 3 - Floor 1
Floor Area:	187.5
Ceiling Height:	9
Room Volume:	1687.5
FMP:	1
Room Absorption (Sabins):	187.5
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	45.9	32.2	32.2
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	43.0	58.0
				Sum (Σ):	43.4	58.0

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

28 Room Type:	C1 - Dining - Floor 1
Floor Area:	168.75
Ceiling Height:	9
Room Volume:	1518.75
FMP:	1
Room Absorption (Sabins):	168.75
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	49.0	33.0	33.0
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	43.5	58.5
				Sum (Σ):	43.9	58.5

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

29 Room Type:	C1 - Living - Floor 1
Floor Area:	200
Ceiling Height:	9
Room Volume:	1800
FMP:	1
Room Absorption (Sabins):	200
Noise Source:	Traffic (NBS Spectrum, 1978)
Level @ Façade (dBA CNEL):	74
Incident Angle Correction:	-3
Building Façade Correction:	3
Quality Correction:	1

Assembly #	Construction	STC Rating	Operable %	Area (sq-ft)	Contribution (dBA) (Closed)	(Open)
1	Stucco Wall (NBS W-50-71)	46.0	0.0	166.0	37.5	37.5
2	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	36.0	40.0	55.0
6	Window - 5/16 Laminated glass(Monsanto)	33.0	50.0	68.0	42.7	57.7
				Sum (Σ):	45.4	59.6

Construction	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Stucco Wall (NBS W-50-71)	27.0	42.0	44.0	46.0	49.0	54.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0
Window - 5/16 Laminated glass(Monsanto)	24.0	27.0	31.0	32.0	35.0	38.0

Addendum to
State Route 163/Friars Road
Improvement Project
Acoustical Assessment Report
(11-SD-163 KP 6.2/9.3 [PM 3.8/5.8] EA-85780)

Introduction

The City of San Diego (City) has identified a Project construction requirement for nighttime construction activities required throughout the State Route 163/Friars Road Interchange Project due to high daytime traffic volumes on Friars Road and State Route 163. Temporary elimination of lanes during the day is unacceptable since significant traffic impacts could result.

It is anticipated that night work would be required where new roadway sections join into existing pavement. In addition, other specific examples of nighttime construction include areas where paving, grading, bridge demolition, bridge false work, utility relocation, signing and striping operations would occur. Nighttime construction activities also would be required when mainline and ramp traffic needs to be shifted during construction staging or for the opening of new lanes.

Applicable Regulations

Construction noise is governed by the City's Municipal Code. This ordinance restricts the allowable hours of construction activities to 7:00 a.m. through 7:00 p.m., Monday through Saturday excluding legal holidays. Further, the noise levels associated with construction activities at residential properties are not to exceed an average sound level of 75 dBA during the 12-hour period from 7:00 a.m. to 7:00 p.m.

The City's Municipal code further specifies that the nighttime noise impacts to single-family residences shall not exceed a property line impact of 40 dBA (hourly) between 10 p.m. and 7 a.m. and 45 dBA for the same hours for multi-family residential.

No specific code requirements for non-emergency nighttime construction are provided; normal planning is based on compliance with the property line ordinance requirements.

Constraint

No impact or vibratory piling placement would take place outside the daytime hours of 7 a.m. to 7 p.m.

Analysis

The typical hourly average noise level associated with the anticipated nighttime construction activity would range from approximately 65 to 70 dBA at a distance of 50 feet to as high as 90 dBA. The existing ambient nighttime hourly noise level ranges from approximately 65 to 75 dBA L_{eq} at residences without noise barriers adjacent to SR 163.

Analysis of the listed equipment shows that sensitive receivers within 135 feet may be impacted by noise up to 75 dBA, 65 dBA L_{eq} at 400 feet, and up to 60 dBA L_{eq} as far as 700 feet from the construction.

A barrier would need to be constructed of very thick material to reduce noise transmission through the barrier and in excess of 250 feet in height (estimated, normal barrier analysis is not applicable to this height of barrier) to reduce the noise impacts to below 40 dBA L_{eq}.

Although the ambient nighttime noise levels at area residences are already elevated with a normal lowest level nighttime impact of 64 to 66 dBA L_{eq} (see Tables 4 and 5), nighttime construction would not comply with the City's allowable hours for construction activities and some people may experience irritation or annoyance during the nighttime construction.

Mitigation of noise impacts to the typical worst-case hourly nighttime existing conditions of 65 dBA L_{eq} is feasible with barriers placed on the level portions of the residential areas facing the construction. If a residence is between 100 and 125 feet of an active nighttime construction zone, a 16-foot high barrier should reduce noise impacts to 65 dBA L_{eq} or less. This noise barrier height may be reduced to 8 feet in height for residences located 225 to 400 feet from the active construction. These barrier heights are for first floor impacts only and would only reduce nighttime construction noise to the approximate level of the ambient noise. Control of noise impacts to second-floor windows would typically require that the barrier be 10 feet taller than those barriers specified above.

Conclusion

Roadway construction is linear in nature. Impacts in any one area typically occur for a limited time frame, sometimes for a matter of hours sometimes for days or longer. The duration of a significant noise impact in any one area will be dependent on construction requirements and scheduling that are unknown at this time.

As noted above, the City's noise ordinance requirement is 40 dBA L_{eq} at nighttime. Given the size of the barriers necessary to mitigate to existing nighttime conditions, no form of reasonable mitigation is available that would reduce noise impacts to less than 40 dBA L_{eq} at impacted residences. Control of construction noise impacts to some of the sensitive receivers to the approximate ambient levels may be feasible.

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EXECUTIVE SUMMARY

This acoustical assessment report evaluates existing and future traffic noise levels associated with the proposed SR 163/Friars Road Improvement project in the City of San Diego, California. In general, the project proposes to improve the highway by adding additional northbound and southbound lanes, on-ramp and off-ramp improvements, as well as increasing the number of lanes along Friars Road at the interchange. Four project alternatives are discussed in this report. They are identified as Alternative 6, Alternative 13, No Project Alternative and No Build Alternative. Existing land uses along nearly the entire project alignment generally consist of residential uses north of Friars Road with some commercial uses along the east side. South of Friars Road, land uses are generally commercial, office and the San Diego River. Fletcher Elementary School is located on the east side of SR 163 and south of Genesee Avenue. Also, a church is located at the southwest corner of SR 163 and Genesee Avenue. The terrain along the project site ranges from flat with areas of sloping embankments. Homes are mostly located above SR 163; however, several areas have homes that are at approximately the same elevation as SR 163.

The existing worst-hour average noise levels adjacent to the roads generally range from approximately 63 to 80 dBA L_{eq} along SR 163. Background noise levels generally range from approximately 45 to 50 dBA L_{eq} at areas within approximately 1/4-mile of the site. Future noise levels would generally increase by two to three dBA adjacent to SR 163. Future worst-hour noise levels would range from approximately 65 to 83 dBA L_{eq} at the adjacent land uses.

Existing noise levels currently exceed the Federal Highway Administration (FHWA) and California Department of Transportation (Department) noise criteria at the backyard areas of nearly all the homes adjacent to SR 163. In the future, traffic noise levels will continue to exceed the noise abatement criteria. Noise abatement has been evaluated for receivers that would exceed the noise abatement criteria. Sound barriers ranging in height from approximately 1.8 to 4.3 meters (6 to 14-feet) would reduce the noise levels by at least five dBA at the majority of residences. The preliminary barrier heights, lengths and number of benefitted residences to achieve an insertion loss of at least five dBA (Barriers B1-B9) are shown in *Table S-1*. One noise barrier would also be required to reduce the noise level to meet the City's noise criteria (B8).

Nine noise barriers are preliminarily considered feasible and reasonable based on the FHWA/Department Noise Abatement Criteria (Barriers B1-B9). The preliminary reasonableness finding does not account for public and private input which may alter the preliminary reasonable determination. Also, the ultimate determinations of barrier feasibility, reasonableness and design (including type, location and height) will be determined as a result of a Noise Abatement Decision Report and final project design efforts.

Construction activities would result in short-term noise and vibration impacts. However, with implementation of noise abatement measures, the associated impact would not be substantially adverse.

TABLE S-1

SUMMARY OF NOISE BARRIERS

Barrier	Height (meters)	Length (Meters)	Insertion Loss (dBA)	Number of Benefited Receivers
B1	2.4m (8')	220	5	5
B2	2.4m (8')	208	6	6
B3	2.4m (8')	322	5	22
B4	2.4m (8')	315	6	14
B5/E3	4.3m (14')	570	5	31
B6	2.4m (8')	630	6	26
B7	2.4m (8')	670	6	28
B8	1.8m (6') Alt. 6 2.4m (8') Alt. 13	325 325	6 6	10 10
B9	1.8m (6')	110	5	Tennis Cts.

1.0 INTRODUCTION

This acoustical assessment report evaluates existing and future traffic noise levels associated with the proposed State Route 163/Friars Road Improvement project in the City of San Diego, California. The principal objective of this study is to assist the City of San Diego and Department staff in planning and design efforts for the proposed project, as they relate to acoustical issues. Specifically, this report is intended to identify applicable FHWA, Department and City noise criteria; document existing noise conditions in applicable locations within the project study area; determine future noise conditions for the proposed development alternatives using appropriate modeling methods; identify proposed noise abatement measures (e.g., barriers) for applicable areas where necessary to achieve applicable noise criteria; and provide preliminary input on the feasibility and reasonableness (per FHWA and Department guidelines) of proposed noise abatement measures.

2.0 PROJECT DESCRIPTION

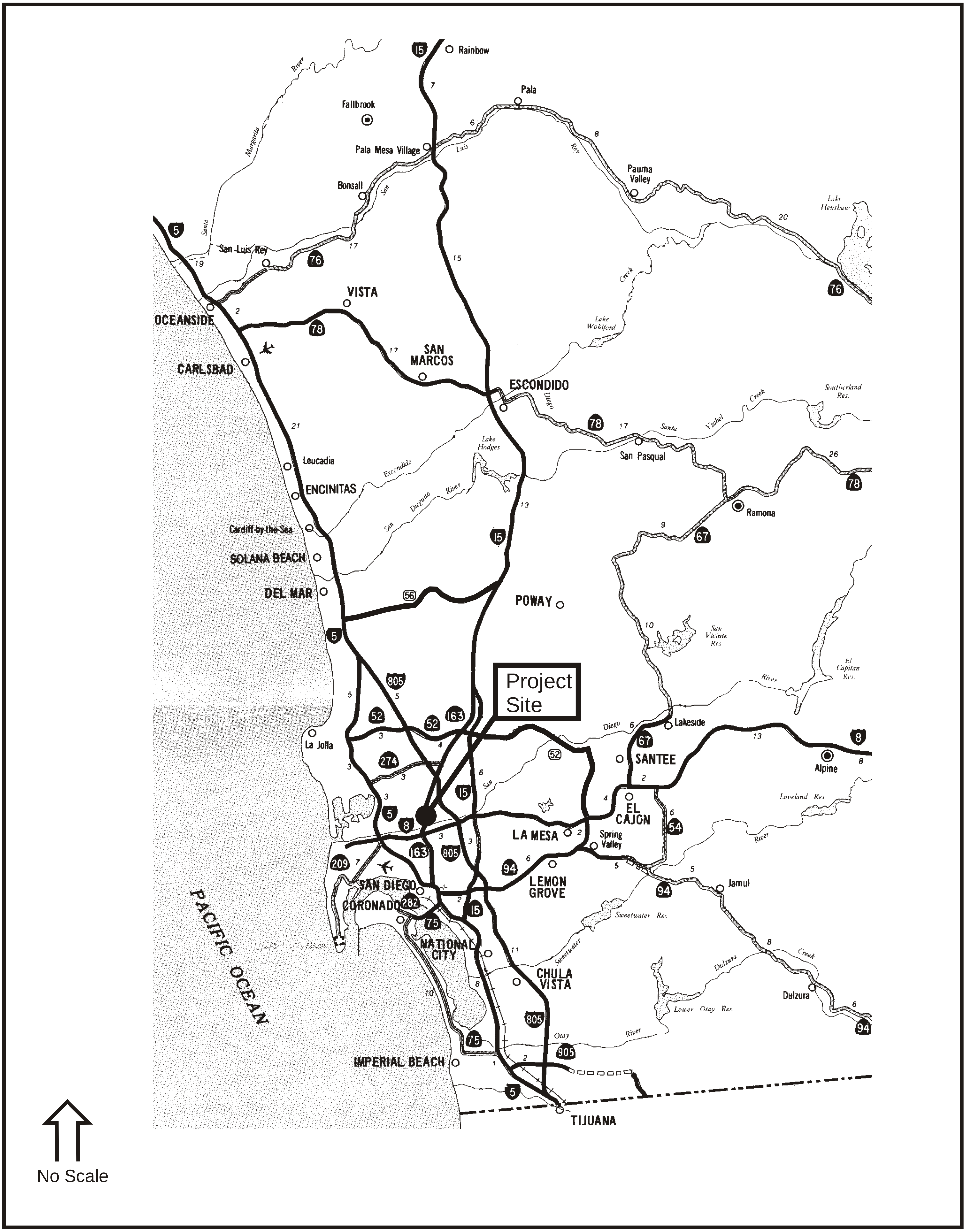
The City, in cooperation with the Department and the FHWA, proposes to improve traffic operations in the vicinity of the SR 163 and Friars Road interchange (*Figures 1 and 2*). The project study area encompasses the Friars Road corridor between Fashion Valley Road and Frazee Road, and the current SR 163 merge with I-8 in the south to the SR 163/Genesee Avenue interchange in the north. The project includes reconfiguration of Friars Road to accommodate additional traffic, including provision of an additional eastbound lane, extension of the eight-lane section, provision for additional left turn lanes and storage lanes, exclusive right turn lanes, widening of on- and off-ramps, and improvements to Frazee Road at the intersection with Friars Road. The project also includes construction of a new off-ramp and improvements to Ulric Street, and reconstruction of the existing southbound off-ramp. In addition, the final stages of the project would include widening of the SR 163 overcrossing to eight lanes, a center median for dual left turns, and a third westbound lane from Ulric Street to Fashion Valley Road. The total length of the project along the SR 163 mainline is approximately 3.4 kilometers (2.1 miles) and 1.1 kilometers (0.7 mile) on Friars Road. The construction would involve standard roadway construction equipment, materials and methods.

Four alternatives are under consideration for the SR163/Friars Road interchange. These alternatives include the following:

·1 No Build Alternative

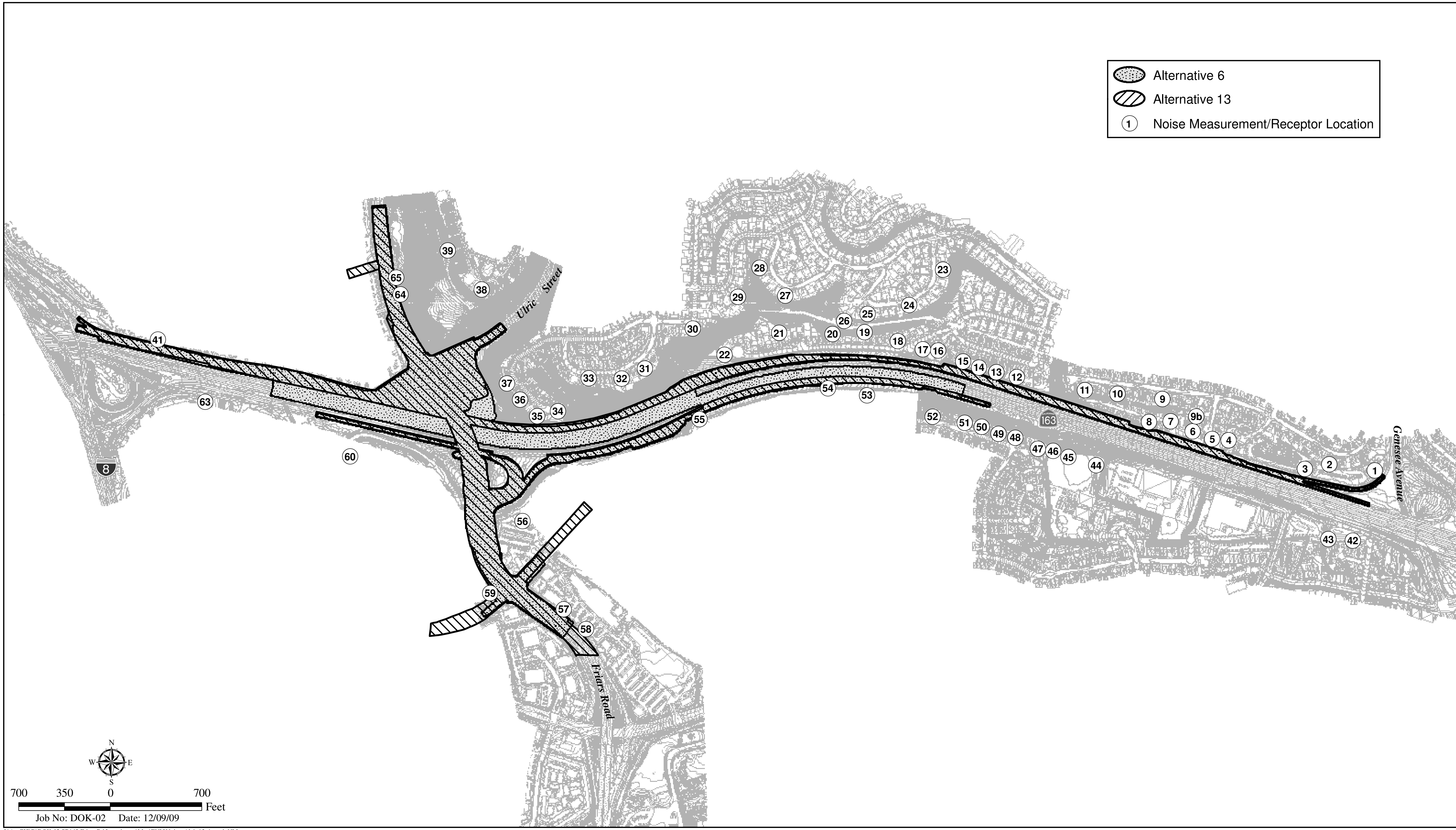
·2 No Project Alternative: The No Project Alternative assumes that the Ulric Street southbound on-ramp would be constructed and that improvements to the Friars Road bridge would be made to widen Friars Road. No other improvements would be made.

·3 SB6/NB4 Alternative: Provides an elevated collector-distributor over Friars Road, connecting Interstate 8 west and Hotel Circle. The ramps from Friars Road access this collector-distributor, eliminating the current weave at interchange ramps and freeway mainlines south of Friars.



Regional Location

FIGURE 1



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Project Location

Figure 2

4. SB13/NB4 Alternative: Provides an at-grade collector-distributor under Friars Road, connecting to Interstate 8 west and Hotel Circle. The collector-distributor has an off-ramp separate from the Friars Road off-ramp.

3.0 FUNDAMENTALS OF TRAFFIC NOISE

The following is a brief discussion of fundamental traffic noise concepts.

Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid, and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to a hearing organ, such as a human ear. For traffic sound, the medium is air.

Sound is actually a process that consists of three components: the sound source, the sound path, and the sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Likewise, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by, sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

Frequency and Hertz

A continuous sound can be described by its frequency (pitch) and its amplitude (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch, like the low notes on a piano, whereas high-frequency sounds are high in pitch, like the high notes on a piano. Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). A frequency of 250 cycles per second is referred to as *250* Hz. High frequencies are sometimes more conveniently expressed in units of kilo-Hertz (kHz), or thousands of Hertz. The extreme range of frequencies that can be heard by the healthiest human ear spans from 16—20 Hz on the low end to about 20,000 Hz (or 20 kHz) on the high end.

Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases and decreases with increasing and decreasing amplitude. Sound pressure amplitude is measured in units of micro-Newton per square meter (N/rn^2), also called micro-Pascal (µPa). One µPa is approximately one-hundred billionth (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million µPa, or 10 million times the pressure of the weakest audible sound (20 µPa). Because expressing sound levels in terms of µPa would be very cumbersome, sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressures to a reference pressure squared. These units are called Bels, named after Alexander Graham Bell. To provide a finer resolution, a Bel is subdivided into 10 decibels, abbreviated dB.

A-Weighted Decibels

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. 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 not only in the range of audible frequencies but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency-dependent.

The A-scale 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 of those sounds. Other weighting networks have been devised to address high noise levels or other special situations (e.g., B-scale, C-scale, D-scale), but these scales are rarely, if ever, used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels (dBA). All sound levels discussed in this report are A-weighted. Examples of typical noise levels for common indoor and outdoor activities are depicted in *Table 1*. The basic terminology and concepts of noise are described below, with technical terms defined in *Attachment 1*.

Addition of Decibels

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces a sound level of 70 dBA when it passes an observer, two cars passing simultaneously would not produce 140 dBA; they would, in fact, combine to produce 73 dBA. When two sounds of equal sound level are combined, they will produce a combined sound level 3 dBA greater than the original individual sound level. In other words, sound energy must be doubled to produce a three dBA increase. If two sound levels differ by 10 dBA or more, the combined sound level is equal to the higher sound level; in other words, the lower sound level does not increase the higher sound level.

TABLE 1
Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 300 m (1000 ft)	100	
Gas Lawn Mower at 1 m (3 ft)	90	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	80	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower at 30 m (100 ft)	70	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	60	Normal Speech at 1 m (3 ft)
Quite Urban Daytime	50	Large Business Office Dishwasher Next Room
Quite Urban Nighttime	40	Theater, Large Conference Room (Background)
Quite Suburban Nighttime	30	Library
Quite Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 1998

Human Response to Changes in Noise Levels

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of one dBA when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of two dBA in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of three dBA. A change of five dBA is readily perceptible, and a change of 10 dBA is perceived as twice or half as loud. As discussed above, a doubling of sound energy results in a three dBA increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Noise Descriptors

Additional units of measure have also been developed to evaluate the long-term characteristics of sound. The equivalent sound level (L_{eq}), is also referred to as the time-average sound level. It is the equivalent steady state sound level which in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. The one-hour A-weighted equivalent sound level, L_{eq}(h), is the energy average of the A-weighted sound levels occurring during a one-hour period and is the basis for noise abatement criteria (NAC) used by Caltrans and FHWA.

People are generally more sensitive and annoyed by noise occurring during the evening and nighttime hours. Thus, another noise descriptor used in community noise assessments termed the Community Noise Equivalent Level (CNEL) was introduced. The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted sound level. CNEL accounts for the increased noise sensitivity during the evening (7:00 p.m. to 10:00 p.m.) and nighttime hours (10:00 p.m. to 7:00 a.m.) by adding five and ten decibels, respectively, to the average sound levels occurring during these hours.

Sound Propagation

Sound propagation (i.e., the passage of sound from a noise source to a receiver) is influenced by several factors. These factors include geometric spreading, ground absorption and atmospheric effects, as well as shielding by natural and/or manmade features, as described below.

Geometric spreading Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of six dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that results from a point source. The change in sound level from a line source is three dBA per doubling of distance.

Ground absorption Most often the noise path between the highway and the observer is 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 done for simplification only; for distances of less than 60 meters (200 feet) prediction results based on this scheme are sufficiently accurate. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source.

Atmospheric effects Research by Caltrans and others has shown that atmospheric conditions can have a significant effect on noise levels. The most significant meteorological parameters are wind speed and direction, and temperature gradients. Humidity and air turbulence also can have significant effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion conditions (i.e., increasing temperature with elevation).

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 this 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 five dB of noise reduction. A taller barrier may provide as much as 20 dB of noise reduction.

4.0 NOISE CRITERIA

The California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) provide guidelines for determining adverse environmental effects associated with various types of projects. The proposed project is located within the City of San Diego (City). The City anticipates using federal funds to aid in project construction. Therefore, FHWA/Department noise criteria are applicable in addition to the City's noise criteria. This report complies with the standards established in the Code of Federal Regulations (23 CFR 772) *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, as well as noise criteria and policies established in the City of San Diego Progress Guide and General Plan (City of San Diego 1989) and Acoustical Report Guidelines (City of San Diego 2003). These standards establish procedures for noise studies regarding traffic noise prediction, noise analyses and noise abatement criteria.

Noise levels in this report are evaluated in terms of the noise peak hour average sound level. The hourly average sound level [Leq (h)] is the noise descriptor typically used by the FHWA and

Department when evaluating traffic noise as described in Section 3. The City evaluates noise levels in terms of the CNEL. Therefore, noise levels are also evaluated in terms of the CNEL.

4.1 FHWA/STATE NOISE CRITERIA

The FHWA follows the noise abatement procedures established in the Code of Federal Regulations (23 CFR 772). The Department also follows the noise abatement procedures, as well as policies contained in the Caltrans Highway Design Manual Chapter 1100, Traffic Noise Analysis Protocol (Caltrans 1998), and Street and Highway Code Section 216. Also, this noise report follows methodologies and procedures contained in the Technical Noise Supplement (TeNS) manual (Caltrans 1998).

Federal and state regulations, standards, and policies relating to traffic noise are discussed in detail in the Traffic Noise Analysis Protocol. Transportation projects affected by the Traffic Noise Analysis Protocol are referred to as Type 1 projects. A Type 1 project is defined in 23 CFR 772 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. FHWA has clarified its interpretation of Type 1 projects by stating that a Type 1 project is any project that has the potential to increase noise levels at adjacent receptors. This includes projects to add interchange, ramp, auxiliary, or truck-climbing lanes to an existing highway. A project to widen an existing ramp by a full lane width is also considered to be a Type 1 project. The Department extends this definition to include state-funded highway projects. The proposed project build alternatives evaluated in this report are considered to be Type 1 because they involve federal funding and would increase the number of through traffic lanes.

The following is a brief discussion of applicable federal and state regulations, standards, and policies.

National Environmental Policy Act

NEPA is a federal law that establishes environmental policy for the nation, provides an interdisciplinary framework for federal agencies to prevent environmental damage, and contains action-forcing procedures to ensure that federal agency decision-makers take environmental factors into account. Under NEPA, impacts and measures to mitigate adverse impacts must be identified, including the identification of impacts for which no mitigation or only partial mitigation is available. The FHWA regulations discussed below constitute the federal noise standard. Projects complying with this standard are also in compliance with the requirements stemming from NEPA.

FHWA Regulations

Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) provides procedures for conducting highway-project noise studies and implementing noise abatement measures to help protect the public health and welfare, supply noise abatement criteria (NAC), and establish requirements for information to be given to local officials for use in planning and designing highways. Under this regulation, noise abatement must be considered for a Type 1 project if the project is predicted to result in a traffic noise impact. A traffic noise impact is considered to occur when the project results in a substantial noise increase or when the predicted noise levels approach or exceed NAC specified in the regulation. Title 23, Part 772 of the Code of Federal Regulations does not specifically define what constitutes a substantial increase or the term approach; rather, it leaves interpretation of these terms to the states.

Before adoption of a final environmental impact statement or finding of no significant impact, the Department shall identify noise abatement measures that are feasible and reasonable as well as noise impacts for which no apparent solution is available. Noise abatement measures which are feasible and reasonable are then incorporated into the project's plans and specifications to reduce or eliminate the noise impact on existing activities, developed lands, or undeveloped lands for which development is planned, designed and programmed.

FHWA Noise Abatement Criteria categorize different activities and land uses for the purposes of assessing noise impacts, as shown in *Table 2*. These criteria are based on the peak hour (noisiest) L_{eq} that regularly occurs during a 24-hour period. The peak hour L_{eq} (defined in this study as the traffic characteristics which yield the worst hourly traffic noise impact on a regular basis) varies at representative receivers adjacent to the project alignment. This peak hour condition generally corresponds to the highest traffic volume which the road can sustain at LOS C. When traffic volumes exceed LOS C traffic speeds decrease, typically lowering the noise and more than compensating for an increased volume of traffic. The federal noise abatement criteria for outdoor noise exposure are typically applied where frequent human use occurs at facilities such as swimming pools and common use areas at multi-family residences, and the backyards of single-family homes.

TABLE 2
FHWA Noise Abatement Criteria

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

The FHWA considers that a traffic noise impact occurs when the predicted traffic noise levels approach or exceed the Noise Abatement Criteria. The FHWA specifies that the Noise Abatement

Criteria (i.e., 67 dBA for Category B), when approached or exceeded, requires the consideration of traffic noise abatement measures. The FHWA also indicates that local state highway agencies should use a definition of "approach" that is at least one dBA less than the Noise Abatement Criteria. The Department also defines approach as one dBA lower than the Noise Abatement Criteria (i.e., 66 dBA for Category B). Federal criteria also identify a traffic noise impact if there is a substantial noise increase. A noise increase is substantial when the predicted noise level exceeds the existing noisiest hourly average level by 12 dBA.

California Environmental Quality Act

CEQA is the foundation of environmental law and policy in California. The main objectives of CEQA are to disclose to decision-makers and the public the significant environmental effects of proposed activities and to identify ways to avoid or reduce those effects by requiring implementation of feasible alternatives or mitigation measures. Under CEQA, a substantial noise increase may result in a significant adverse environmental effect; if so, the noise increase must be mitigated or identified as a noise impact for which it is likely that only partial (or no) mitigation measures are available. Specific economic, social, environmental, legal, and technological conditions may make noise mitigation measures infeasible.

California Streets and Highways Code, Section 216

Section 216 of the California Streets and Highways Code relates to the noise level produced by the traffic on, or by the construction of, a state freeway measured in the classrooms, libraries, multipurpose rooms, and spaces used for pupil personnel services of a public or private elementary or secondary school. The code states that if the interior noise level produced by freeway traffic or the construction of a freeway exceeds 52 dBA L_{eq}, the department shall undertake a noise abatement program in any such classroom, library, multipurpose room, or space used for pupil personnel services to reduce the freeway traffic noise level therein to 52 dBA L_{eq} or less by measures including, but not limited to, installing acoustical materials, eliminating windows, installing air conditioning, or constructing sound baffle structures.

4.2 CITY OF SAN DIEGO NOISE CRITERIA

The City of San Diego has established exterior noise guidelines in the Transportation Element of the City's adopted General Plan (City of San Diego 1989). These guidelines identify compatible exterior noise levels for various land use types. Exterior noise levels shall not exceed a CNEL of 65 dB for residential, hotel and school land uses. Exterior usable areas do not include residential front yards or balconies, unless the areas such as balconies are part of required usable open space calculation for multi-family units. Exterior noise levels for office uses should not exceed 70 dB CNEL and retail uses should not exceed a CNEL of 75 dB. The City's land use compatibility chart for various land uses and noise levels is depicted in *Table 3*. Also, it should be noted that California Building Code (Part 2, Title 24, CCR) interior noise criteria are not applicable to existing developments.

If the ambient noise level is currently at or exceeds the significance thresholds for traffic noise described above and noise levels would result in a less than three dB increase, then the impact is not considered significant (City of San Diego 2004).

Construction noise is governed by the City's Municipal Code (City of San Diego 2000). This ordinance restricts the allowable hours of construction activities to 7:00 a.m. through 7:00 p.m., Monday through Saturday excluding legal holidays. Further, the noise levels associated with construction activities at residential properties are not to exceed an average sound level of 75 dBA during the 12-hour period from 7:00 a..m. to 7:00 p.m. In order to deviate from these criteria, a permit from the Noise Abatement and Control Administrator would be required.

TABLE 3

City of San Diego Noise Land Use Compatibility Chart

Land Use	Annual Community Noise Equivalent Level (dBA)					
	50	55	60	65	70	75
Outdoor amphitheaters						
Schools, libraries						
Nature preserves, wildlife preserves						
Residential single-family, multi-family, mobile homes, transient housing						
Retirement homes, intermediate care facilities, convalescent homes						
Hospitals						
Parks, playgrounds						
Office buildings, business and professional						
Auditoriums, concert halls, indoor arenas, churches						
Riding stables, water recreation facilities						
Outdoor spectator sports, golf courses						
livestock farming, animal breeding						
Commercial-retail, shopping centers, restaurants, movie theaters						
Commercial-wholesale, industrial manufacturing, utilities						
Agriculture (except livestock), extractive industry, farming						
Cemeteries						

Source: City of San Diego Progress Guide and General Plan (Transportation Element), 1989

5.0 METHODOLOGIES AND INSTRUMENTATION

To assist in determining existing noise levels and potential noise impacts, a noise monitoring survey was conducted along the project site. Long-term (i.e., 24-hour) noise measurements were conducted at two sites that had unobstructed views of the highway (i.e., no intervening walls, buildings, vegetation etc.). The purpose of these noise measurements is to determine the typical peak noisiest hour L_{eq} associated with traffic along SR 163 and the corresponding relationship between the noisiest hour and CNEL. Short-term noise measurement sites were selected to represent frequent use areas, acoustical equivalence areas, or to calibrate the noise model; *i.e.*, the sites were clear of major obstructions between the source and receiver as well as reflecting building/wall surfaces. Land uses in the area consist of single family residences, multi-family residences, one elementary school, commercial uses and a church. Noise receptor sites generally consisted of the backyards of the single family homes, either the facades or outdoor patio areas of commercial buildings, and the common area or frequent outdoor use areas of multi-family developments.

Noise measurements were conducted using a Larson-Davis Laboratories Model 700 (S.N. 2132) integrating sound level meter equipped with a Type 2551 1.25-centimeter (0.5-inch) pre-polarized condenser microphone with pre-amplifier. When equipped with this microphone, the sound level meter meets the current American National Standards Institute Standard for a Type 1 sound level meter. Also, a Larson-Davis Model 700 (S. N. 700-20) with a 1/4-inch microphone was used. This sound level meter is a Type 2 sound level meter. The sound level meters were calibrated before and after each measurement and the measurements were conducted with the microphones positioned 1.52 meters (5 feet) above the ground. The noise monitoring survey and selection of receiver sites are discussed in more detail in the existing conditions section (Section 6.0). Also, *Attachment 2* includes additional background and supporting data.

The results of the noise monitoring survey were used as input for the Caltrans' SOUND32 noise prediction model. The model was used to determine existing and future noise levels. The SOUND32 program is based on the FHWA's Stamina 2.0 traffic noise prediction model. The SOUND32 noise model accepts as input the number and types of vehicles on the roadway, vehicle speeds, and physical characteristics of the road and topography; as well as receiver and noise barrier heights and locations. The CALVENO vehicle noise emission levels were used in the noise model. To verify the input used in the noise model, the same traffic volume and vehicle composition ratios counted during the noise measurements were used with a vehicle speed of 105 kilometers per hour (65 miles per hour) along SR 163 and 80 kilometers per hour (50 miles per hour) along Friars Road. These speeds correlated well with the results of the noise measurement and were used in the noise modeling for the existing conditions. The modeled values were generally within one to two dBA of the measured noise levels. However, at several sites the measured noise levels were several dBA less than the modeled noise levels. The difference most likely results from excess attenuation provided by shielding of walls or intervening topography.

The noise model was used to determine the peak noisiest hour L_{eq} using existing peak hour traffic volumes provided by the project traffic engineer (LLG 2004). The truck percentage used for vehicles along SR 163 in the noise model for the peak (noisiest) hour average sound level was 2.4 percent medium trucks and 1.3 percent heavy trucks. This mix is based on the traffic mix information for this segment of SR 163 (Caltrans 2004). The future truck mix is assumed to remain the same. The existing peak hour traffic volume ranges up to 14,600 vph along SR 163 (LLG 2004). Year 2030 peak hour volume is projected to range up to 19,600 vph along SR 163. Current traffic volumes range from approximately 147,000 to 165,000 average daily traffic (ADT) along SR 163. Future traffic volumes are projected to range from approximately 206,000 to 221,000 ADT along SR 163 by the year 2030.

6.0 EXISTING CONDITIONS

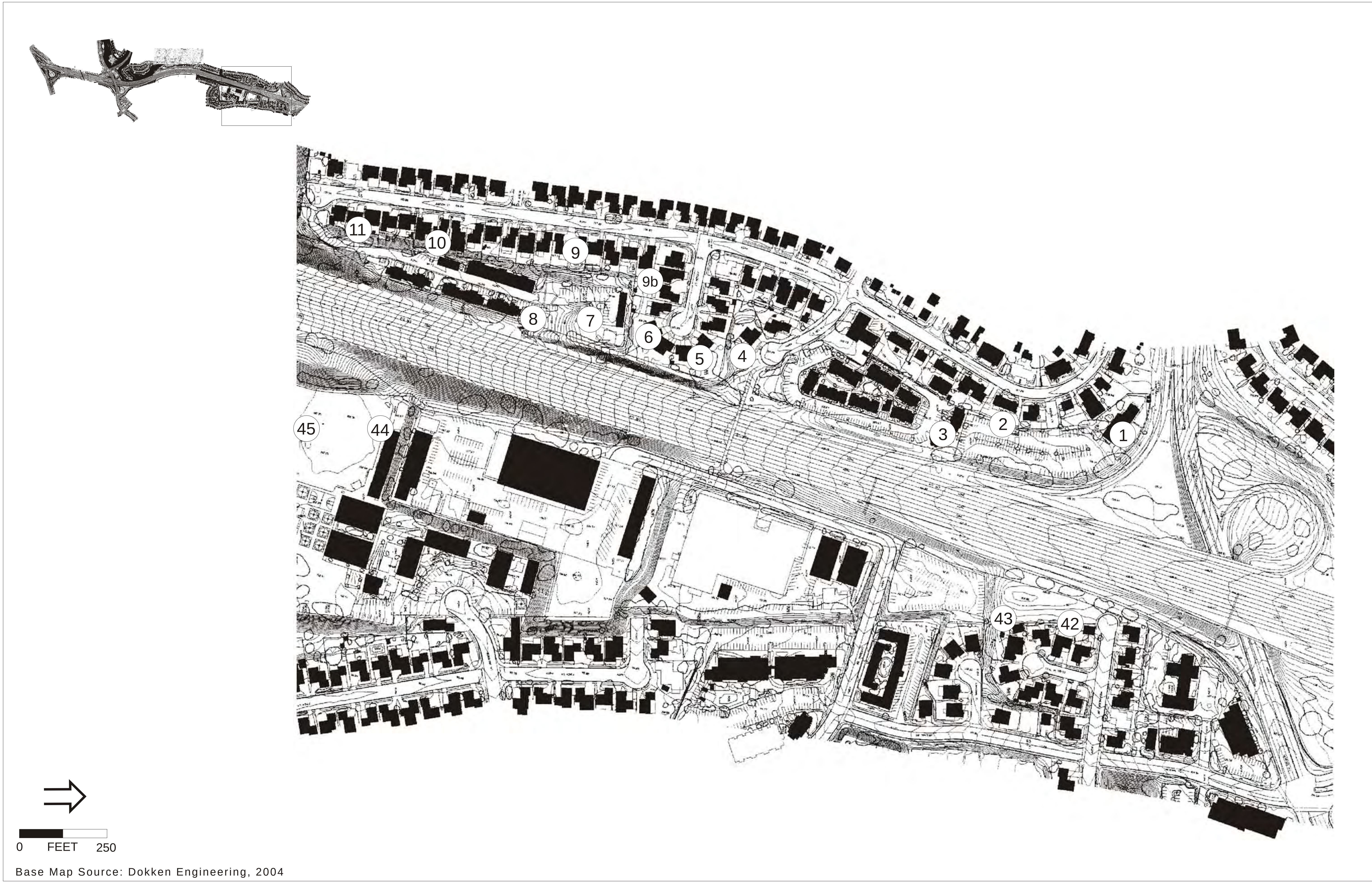
6.1 ADJACENT LAND USES

Existing land uses adjacent to the project are characterized by urban development including commercial, office and industrial structures, as well as multi-family residential land uses, and single-family residential land use. Fletcher Elementary school is located along the east side of SR 163 and is situated at the top of slope above the freeway. Fashion Valley Shopping Center, a primary commercial use in the valley, is located in the southwestern quadrant of the SR 163 and Friars Road interchange. Hazard Center is located to the east of the same interchange. The terrain varies from level to land sloping both above and below the road. The primary noise source in the area is traffic along SR 163 and Friars Road. Background noise sources include various roads such as Ulric Street, Frazee Road and Genesee Avenue as well as local roads in the area. The noise effects from these other background noise sources are generally slight and are localized to the immediate areas adjacent to these roads. Background noise levels generally range from approximately 45 to 50 dBA within residential areas located approximately 402 meters (0.25 mile) from the project roadways.

There are four general areas that have existing sound walls adjacent to residences. These areas are located on the west side of SR 163 along Hanford Drive, near the southwest and southeast quadrants of SR 163 and Genesee Avenue, and at the northwest quadrant of SR 163 and Genesee Avenue. Several areas also have existing berms. Many of the homes adjacent to the project site have wooden fences along the backyards.

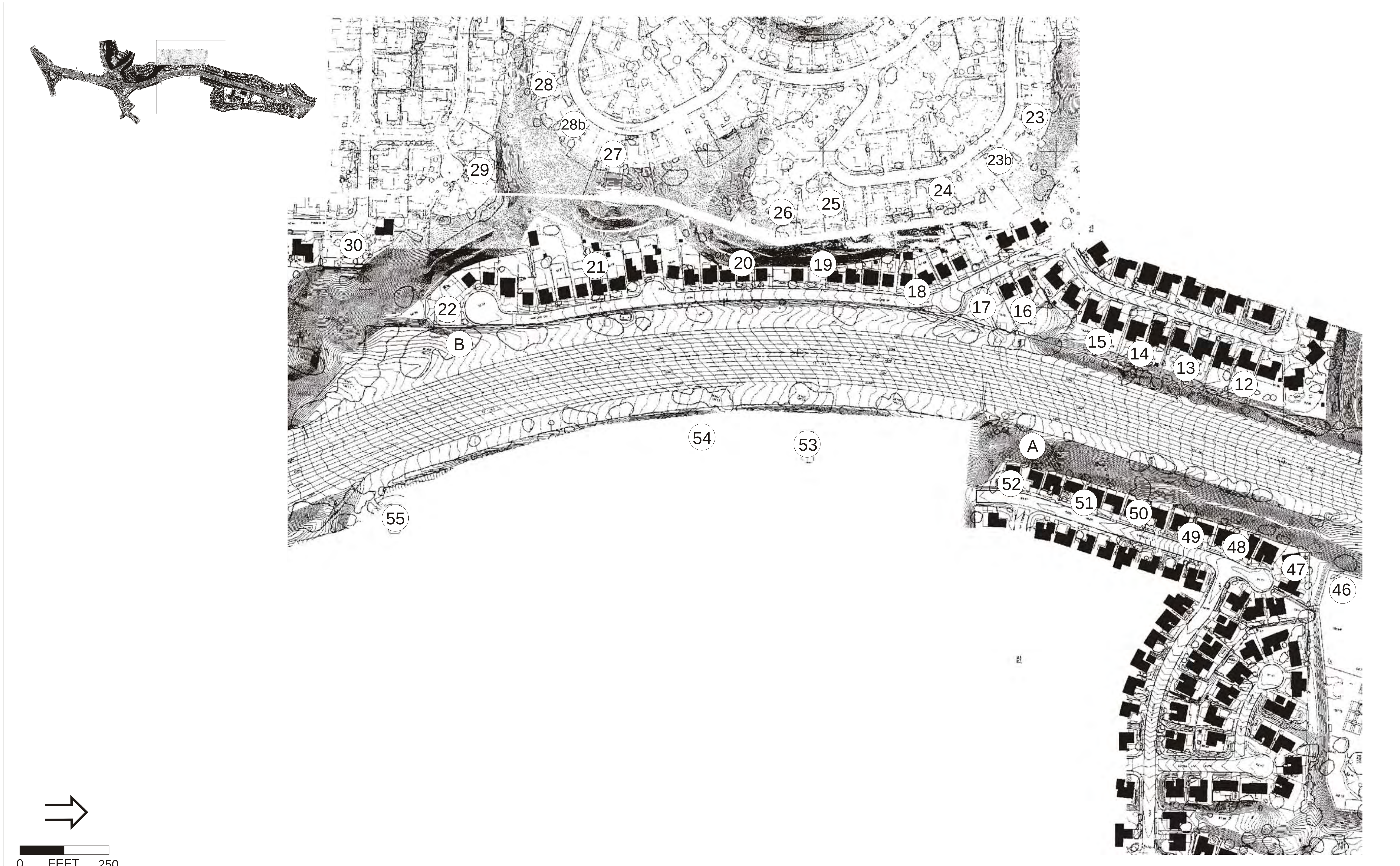
6.2 NOISE MONITORING SURVEY

Existing land uses adjacent to the project are characterized by urban development including commercial, office and industrial structures, as well as approximately 160 single family residences, two hotels and 32 multi-family residences, an elementary school and church. To quantify the noise environment within the SR 163 corridor, noise measurements were made at various locations identified in coordination with City and Caltrans staff in July 2003 and shown in *Figures* 3A to 3D. Noise levels were measured continuously for a one-day period at two locations (Sites A and B). Also, noise measurements were conducted for short time periods (10 to 20 minutes) at 14 additional locations. Two background noise measurements were also conducted outside the SR 163 corridor.



Noise Measurement and Receptor Locations

Figure 3A



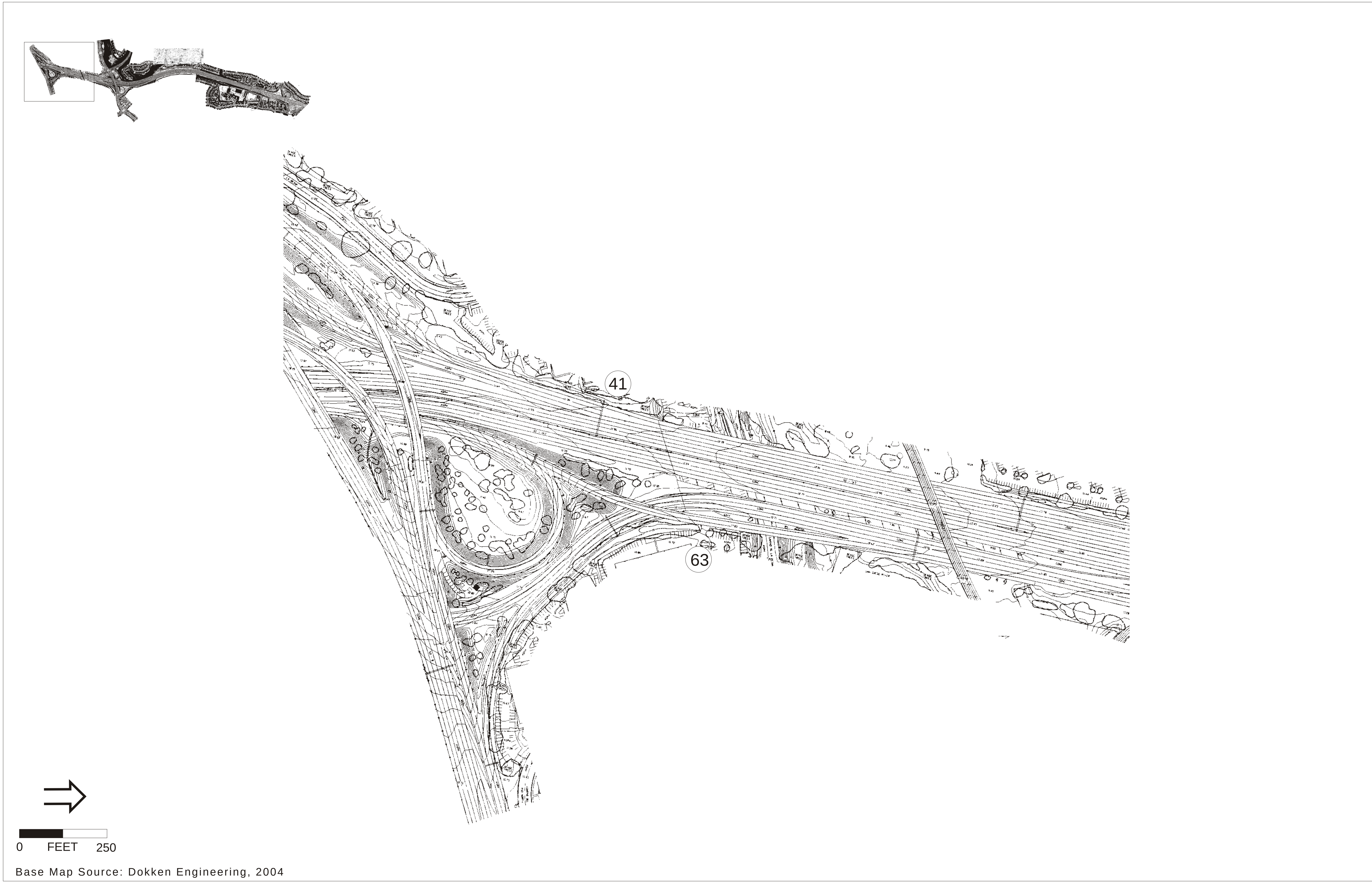
Base Map Source: Dokken Engineering, 2004

Noise Measurement and Receptor Locations

Figure 3B

Noise Measurement and Receptor Locations

Figure 3C



Noise Measurement and Receptor Locations

Figure 3D

Sites A and B were selected to provide an unobstructed view of the highway (i.e., no intervening walls, buildings, vegetation etc.). The purpose of these noise measurements is to determine the typical peak noisiest hour L_{eq} associated with traffic along SR 163 and the corresponding relationship between the noisiest hour and CNEL. Site A was monitored from 11:00 a.m. on April 27, 2004, to 2:00 p.m. on April 28, 2004. The hourly L_{eq} measured at Sites A and B are depicted in *Tables 4 and 5,* respectively. The noisiest hour L_{eq} was 80 dBA at Site A and 78 dBA at Site B. Based on the long-term noise measurement, the resulting CNEL is equivalent to the noisiest hour L_{eq} plus two dBA.

Each of the short-term noise measurement locations was selected to represent frequent human use areas, acoustical equivalence areas, or to calibrate the noise model; *i.e.*, the sites were clear of major obstructions between the source and receiver as well as reflecting building/wall surfaces. The measured noise levels varied from 62 dBA to 80 dBA L_{eq} at the short-term noise measurement sites adjacent to SR 163. The results of the noise level measurements and corresponding traffic counts are depicted in *Table 6*. Counts were made of traffic along SR 163, Friars Road and ramps where they are significant noise sources at the adjacent receiver site. When adjusted to the worst hourly noise level, the noise level typically ranges from approximately 63 to 80 dBA L_{eq} at the receivers. The existing (noisiest) one-hour average sound levels for various receiver locations are depicted in *Table 7*. The table shows both the modeled noise level and the measured noise level after adjustment to the worst-hour traffic characteristics.

As indicated in *Table 7*, receiver Sites 2, 38, and 39 have measured and calculated differences ranging from six to seven dBA. At each of these sites, noise measurements were taken on at least two different days, with the similar results. These differences were attributed to several factors including increasing complexity such as shielding from various obstacles (i.e., walls, buildings, topography), variable ground types (i.e., hard and soft) rather than homogenous conditions assumed by the model, as well as exceeding the normal accuracy prediction distance limits for the noise model at Sites 38 and 39 which are approximately 305 meters (1,000 feet) or more feet from SR 163. In all these situations the noise model cannot calculate traffic noise as accurately as in areas closer to the noise source or with fewer intervening structures and homogeneous ground conditions. Thus, K-constant adjustments (the difference between measured and calculated noise levels) were used for Sites 2, 38, and 39. The K-constant is applied due to the inability of the model to adequately account for existing obstacles or other site features that provide excess noise attenuation.

Several of the residences have existing sound walls located between the homes and SR 163. These residences are located along the north side of Fulton Street (Site 3), west side of Teal Place (Sites 42 and 43) and on the west side of Hanford Drive (Sites 17-22). In addition, an approximately 270 meter (886 feet) long earthen berm provides noise attenuation for approximately 12 residences along a portion of Judson Street (Sites 12-15). Several homes adjacent to the project site also have wooden fences along the backyards.

Background noise measurements also were conducted (Sites BG1 and BG2 in *Table 6*). The noise level was approximately 50 dBA L_{eq} along Mission Valley Road and 45 dBA L_{eq} along Crandall Drive.

TABLE 4

Existing Measured Hourly Average Noise Levels
(Site A Approximately 59.5 meters [195 Feet] from the Centerline of SR 163)

Day	Start Time	L_{eq}
4/27/04	11:00 A.M.	79 dB
	12:00 Noon	79 dB
	1:00 P.M.	80 dB
	2:00 P.M.	80 dB
	3:00 P.M.	80 dB
	4:00 P.M.	80 dB
	5:00 P.M.	79 dB
	6:00 P.M.	79 dB
	7:00 P.M.	78 dB
	8:00 P.M.	77 dB
	9:00 P.M.	77 dB
	10:00 P.M.	76 dB
	11:00 P.M.	72 dB
4/28/04	12:00 Midnight	70 dB
	1:00 A.M.	68 dB
	2:00 A.M.	67 dB
	3:00 A.M.	67 dB
	4:00 A.M.	70 dB
	5:00 A.M.	75 dB
	6:00 A.M.	79 dB
	7:00 A.M.	80 dB
	8:00 A.M.	79 dB
	9:00 A.M.	78 dB
	10:00 A.M.	78 dB
	11:00 A.M.	78 dB
	12:00 Noon	78 dB
	1:00 P.M.	79 dB
	CNEL	82 dB

TABLE 5

Existing Measured Hourly Average Noise Levels
(Site B Approximately 59.5 meters [195 Feet] from the Centerline of SR 163)

Day	Start Time	L_{eq}
4/27/04	12:00 Noon	75 dB
	1:00 P.M.	76 dB
	2:00 P.M.	76 dB
	3:00 P.M.	76 dB
	4:00 P.M.	77 dB
	5:00 P.M.	76 dB
	6:00 P.M.	77 dB
	7:00 P.M.	76 dB
	8:00 P.M.	74 dB
	9:00 P.M.	74 dB
	10:00 P.M.	72 dB
	11:00 P.M.	70 dB
4/28/04	12:00 Midnight	67 dB
	1:00 A.M.	66 dB
	2:00 A.M.	64 dB
	3:00 A.M.	65 dB
	4:00 A.M.	70 dB
	5:00 A.M.	75 dB
	6:00 A.M.	77 dB
	7:00 A.M.	78 dB
	8:00 A.M.	77 dB
	9:00 A.M.	77 dB
	10:00 A.M.	76 dB
	11:00 A.M.	76 dB
	12:00 Noon	77 dB
	1:00 P.M.	77 dB
	2:00 P.M.	76 dB
	CNEL	80 dB

TABLE 6

Measured Average Noise Level and Concurrent Traffic Volumes

Site	Description	Date/Time	L_{eq}[1] (dBA)	Cars	MT[2]	HT[3]
2	2573 N. Judson, Backyard	3/9/05 7:00 to 7:10 AM	69	998/1371	23/20	8/16
8	2219 Judson St., Patio equivalent	4/28/04 1:25 to 1:35 PM	80	1268/870	21/17	12/12
18	1924 Hanford Dr., Front yard	4/28/04 1:55 to 2:05 PM	71	1132/885	20/22	15/7
26	1903 Cardigan Way, Backyard	8/18/04 10:55 to 11:05 AM	73	884/1127	15/18	14/14
38	7163 Cm Degrazia, Common area	3/9/05 7:45 -7:55 AM	63	863/1162	18/29	10/17
39	7067 Cm Degrazia, Near patio	3/9/05 7:45 - 7:55 AM	62	863/1162	18/29	10/17
41	123 Cm del la Reina, Near office building	5/12/04 12:55 to 1:05 PM	77	500/1110	7/18	6/14
43	2650 Teal Pl., Edge of backyard	4/28/04 10:05 - 10:15 AM	67	1025/785	17/19	17/12
46	Fletcher Elementary School, Edge of slope	4/28/04 2:40 to 2:50 PM	78	1415/917	16/18	19/3
54	7444 Mission Valley Rd., Homestead Suites Hotel, near west end unit	4/28/04 12:35 to 12:45 PM	62	1157/901	22/20	13/11
58	Friars Rd., Near right-of-way	4/27/04 1:30 to 1:50 PM	69	1081	6	24
BG1	Mission Valley Road	8/18/04 10:00 to 10:15 AM	50	-	-	-
BG2	Crandall Drive	8/18/04 12:30 to 12:45 PM	45	-	-	-

Notes: [1]Equivalent continuous A-weighted sound pressure level
[2]Medium trucks
[3]Heavy trucks
Lane direction (i.e., northbound or eastbound)/Lane direction (i.e., southbound or westbound)

TABLE 7
Existing Noise Levels

Site	Location	Land Use	Number of Units Represented	Activity Category and NAC Leq(h)	Existing Worst Hour Noise Level, Leq(h), dBA	
					Measured	Calculated
A	Whinchat St., near right-of-way	U	-	D (--)	80	79
B	Hanford Dr., near right-of-way	U	-	D (--)	78	79
1	2585 Judson St., Patio	Ch	--	B (67)		77
2	2573 Judson St., Backyard	SF	4	B (67)	69	76
3	7580 Fulton St., Patio	MF	12	B (67)		66
4	7547 Fulton St., Backyard	SF	1	B (67)		75
5	7552 Judson Ct., Backyard	SF	2	B (67)		73
6	7541 Judson Ct., Backyard	SF	2	B (67)		71
7	2219 Judson St., Seating area	MF	outdoor use	B (67)	74	75
8	2219 Judson St., near building	MF	12	B (67)	80	80
9	2347 Judson St., Backyard	SF	4	B (67)		73
9b	Judson St., Backyard	SF	5	B (67)		71
10	2263 Judson St., Backyard	SF	8	B (67)		76
11	2223 Judson St., Backyard	SF	5	B (67)		75
12	2129 Judson St., Backyard	SF	3	B (67)		65
13	2113 Judson St., Backyard	SF	3	B (67)		63
14	2073 Judson St., Backyard	SF	2	B (67)		64
15	2045 Judson St., Backyard	SF	2	B (67)		66
16	1975 Hanford Dr., Backyard	SF	2	B (67)		75
17	1949 Hanford Dr., Backyard	SF	2	B (67)		75
18	1924 Hanford Dr., Front yard	SF	1	B (67)	71	73
19	1880 Hanford Dr., Backyard	SF	7	B (67)		67
20	1844 Hanford Dr., Backyard	SF	6	B (67)		67

Notes: All measurements shown reflect worst hour noise levels, *i.e.*, they are adjusted to worst hour traffic characteristics based on Section N–3312 (TeNS).
SF = single family home; MF = multi-family; H = hotel/motel; C = commercial use; Ch = church; S = school; U= undeveloped land, O = Office

TABLE 7
Existing Noise Levels

Site	Location	Land Use	Number of Units Represented	Activity Category and NAC Leq(h)	Existing Worst Hour Noise Level, Leq(h), dBA	
					Measured	Calculated
21	1772 Hanford Dr., Backyard	SF	12	B (67)		66
22	1704 Hanford Dr., Backyard	SF	1	B (67)		74
23	7228 Tait St., Backyard	SF	3	B (67)		62
23b	Tait St. Backyard	SF	2	B (67)		67
24	7260 Tait St., Backyard	SF	4	B (67)		73
25	7296 Tait St., Backyard	SF	4	B (67)		71
26	1903 Cardigan Way, Backyard	SF	5	B (67)	73	74
27	7255 Courtney Dr., Backyard	SF	8	B (67)		72
28	7225 Courtney Dr., Backyard	SF	4	B (67)		62
28b	Courtney Dr., Backyard	SF	3	B (67)		68
29	7314 Linbrook Ct., Backyard	SF	6	B (67)		68
30	1747 Volta Ct., Backyard	SF	6	B (67)		74
31	1651 Regulus St., Backyard	SF	4	B (67)		70
32	1627 Regulus St., Backyard	SF	5	B (67)		68
33	1561 Regulus St., Backyard	SF	7	B (67)		68
34	Minden Dr., Backyard	SF	2	B (67)		71
35	1312 Minden Dr., Backyard	SF	1	B (67)		79
36	1332 Minden Dr., Backyard	SF	2	B (67)		74
37	1372 Minden Dr., Backyard	SF	5	B (67)		73
38	7163 Cm Degrazia, Common area	MF	4	B (67)	63	69
39	7067 Cm Degrazia, Near patio	MF	4	B (67)	62	69
41	123 Cm del la Reina, Near building	O	--	C (72)	77	77
42	2680 Teal Pl., Backyard	SF	2	B (67)		70

Notes: All measurements shown reflect worst hour noise levels, *i.e.*, they are adjusted to worst hour traffic characteristics based on Section N–3312 (TeNS).
SF = single family home; MF = multi-family; H = hotel/motel; C = commercial use; Ch = church; S = school; U= undeveloped land, O = Office

TABLE 7
Existing Noise Levels

Site	Location	Land Use	Number of Units Represented	Activity Category and NAC Leq(h)	Existing Worst Hour Noise Level, Leq(h), dBA	
					Measured	Calculated
43	2650 Teal Pl., Edge of backyard	SF	2	B (67)	68	70
44	Fletcher School, Classroom Bldg.	S	--	B (67)/E (52)		63
45	Fletcher School, Playground	S	--	B (67)		64
46	Fletcher School, Edge of slope	S	--	D (--)	79	77
47	2144 Whinchat St., Backyard	SF	2	B (67)		72
48	2128 Whinchat St., Backyard	SF	2	B (67)		77
49	2112 Whinchat St., Backyard	SF	2	B (67)		71
50	2046 Whinchat St., Backyard	SF	2	B (67)		74
51	2030 Whinchat St., Backyard	SF	3	B (67)		75
52	1982 Whinchat St., Backyard	SF	3	B (67)		76
53	7460 Mission Valley Rd., Patio	O	--	C (72)		62
54	7444 Mission Valley Rd., West end unit	H	4	B (67)	63	63
55	7420 Mission Valley Rd., Edge of building	O	--	C (72)		74
56	1450 Frazee Rd., Edge of building	O	--	C (72)		70
57	5624 Friars Rd., Edge of building	C	--	C (72)		73
58	Friars Rd., Near right-of-way	C	-	D (--)	69	71
59	7600 Friars Rd., Edge of building	C	--	C (72)		74
60	7450 Hazard Center Dr., Tennis court	H	Tennis Cts.	B (67)		70
63	591 Cm del la Reina, Edge of building	O	--	C (72)		77

Notes: All measurements shown reflect worst hour noise levels, *i.e.*, they are adjusted to worst hour traffic characteristics based on Section N–3312 (TeNS).
SF = single family home; MF = multi-family; H = hotel/motel; C = commercial use; Ch = church; S = school; U= undeveloped land, O = Office

7.0 FUTURE CONDITIONS

The prediction of future noise levels and the significance of potential noise impacts at land uses adjacent to the project site were calculated using the SOUND32 noise model. The noise modeling included the future year 2030 traffic information and the physical improvements and grading shown on the design plans for the development project alternatives. Future traffic information was previously discussed in Section 5.0.

7.1.1 Noise Impacts based on FHWA/Department Noise Criteria

Alternative 6

The noise modeling calculations indicated that with the implementation of Alternative 6, the future peak noisiest hour L_{eq} would generally increase by one to two dBA compared to the existing noise level at receivers where the road alignments and grading would remain similar to the existing conditions. The noise level would increase by up to five dBA at several locations where greater grading, road alignment or elevation changes occur. The existing and future peak noisiest hour L_{eq} are depicted in *Table 8*. Following the table, text is provided that identifies the abutting land use types, summarizes project noise levels and assess whether those levels comply with the FHWA/Department noise abatement criteria.

As noted in Section 6, the existing noisiest hour L_{eq} ranges from approximately 63 dBA to 80 dBA adjacent to SR 163. The future noisiest hour L_{eq} generally would range from approximately 70 to 80 dBA at the backyards of residences without existing sound walls or berms located adjacent to SR 163. The future noise level would exceed FHWA/Department noise abatement criteria at nearly all the residences along SR 163. Where residences have existing sound walls or berms along the backyards facing SR 163 (Sites 12-17 and 42 and 43), the noisiest hour L_{eq} at the backyards would range from approximately 66 to 78 dBA. These noise levels would approach or exceed the noise abatement criteria.

There are several areas where the front yards of homes face SR 163 (i.e., Sites 18-21). The homes partly shield the backyard areas from the traffic noise. The peak noisiest hour L_{eq} would range from approximately 68 to 69 dBA at the backyards of these homes. These noise levels would exceed the FHWA/Department noise abatement criteria.

The exterior of the three-story multi-unit residential building on Judson Street (Site 8) is not representative of a frequent outdoor use area; therefore, no impact is assessed under NAC Category B. In situations where there are no exterior activities, however, Activity Category E (52 dBA) interior criterion is used as the basis for determining noise impacts. Assuming a standard 20 dB exterior-to-interior attenuation, the interior noise level at these units would be approximately 63 dBA, which would exceed the FHWA/Department noise abatement criteria.

The tennis courts of the Double Tree Hotel are located southeast of the SR 163 and Friars Road interchange (Site 60). The future noisiest hour L_{eq} would be approximately 71 dBA. This noise level would exceed the noise abatement criteria.

TABLE 8
Predicted Traffic Noise Impacts
(Based on FHWA/Department Criteria)

Site	Location	Development Predates 1978	Existing Noise Level, Leq(h), dBA	Alternative 6 Predicted Noise Level, Leq(h), dBA	Alternative 13 Predicted Noise Level, Leq(h), dBA	Activity Category and NAC Leq(h)	Impact Type
A	Whinchat St., near right-of-way	N/A	79	80	80	D (--)	None
B	Hanford Dr., near right-of-way	N/A	79	81	81	D (--)	None
1	2585 Judson St., Patio	Yes	77	78	78	B (67)	AE
2	2573 Judson St., Backyard	Yes	69	70	70	B (67)	AE
3	7580 Fulton St., Patio	No	66	68	68	B (67)	AE
4	7547 Fulton St., Backyard	Yes	75	78	78	B (67)	AE
5	7552 Judson Ct., Backyard	Yes	73	76	76	B (67)	AE
6	7541 Judson Ct., Backyard	Yes	71	73	73	B (67)	AE
7	2219 Judson St., Seating area	No	75	77	77	B (67)	AE
8	2219 Judson St., Near building	No	80	83	83	B (67)/E(52)	AE[1]
9	2347 Judson St., Backyard	Yes	73	75	75	B (67)	AE
9b	Judson St., Backyard	Yes	71	73	73	B (67)	AE
10	2263 Judson St., Backyard	Yes	76	78	78	B (67)	AE
11	2223 Judson St., Backyard	Yes	75	77	77	B (67)	AE
12	2129 Judson St., Backyard	Yes	65	67	67	B (67)	AE
13	2113 Judson St., Backyard	Yes	63	65	65	B (67)	None
14	2073 Judson St., Backyard	Yes	64	66	66	B (67)	AE
15	2045 Judson St.,	Yes	66	68	68	B (67)	AE

Notes: [1] Receptor site is not representative of a frequent outdoor use area.
N/A Not Applicable
AE Approach or Exceeds
75 (52) = Exterior noise level (Interior Noise level)

TABLE 8
Predicted Traffic Noise Impacts
(Based on FHWA/Department Criteria)

Site	Location	Development Predates 1978	Existing Noise Level, Leq(h), dBA	Alternative 6 Predicted Noise Level, Leq(h), dBA	Alternative 13 Predicted Noise Level, Leq(h), dBA	Activity Category and NAC Leq(h)	Impact Type
	Backyard						
16	1975 Hanford Dr., Backyard	No	75	78	78	B (67)	AE
17	1949 Hanford Dr., Backyard	No	75	78	78	B (67)	AE
18	1924 Hanford Dr., Front yard	No	73	75	75	B (67)	AE
19	1880 Hanford Dr., Backyard	No	67	69	69	B (67)	AE
20	1844 Hanford Dr., Backyard	No	67	69	69	B (67)	AE
21	1772 Hanford Dr., Backyard	No	66	68	68	B (67)	AE
22	1704 Hanford Dr., Backyard	No	74	76	76	B (67)	AE
23	7228 Tait St., Backyard	Yes	62	64	64	B (67)	None
23b	Tait St., Backyard	Yes	67	69	69	B (67)	AE
24	7260 Tait St., Backyard	Yes	73	75	75	B (67)	AE
25	7296 Tait St., Backyard	Yes	71	73	73	B (67)	AE
26	1903 Cardigan Way, Backyard	Yes	74	76	76	B (67)	AE
27	7255 Courtney Dr., Backyard	Yes	72	75	75	B (67)	AE
28	7225 Courtney Dr., Backyard	Yes	62	64	64	B (67)	None
28b	Courtney Dr.,	Yes	68	70	70	B (67)	AE
29	7314 Linbrook Ct., Backyard	Yes	68	70	70	B (67)	AE
30	1747 Volta Ct., Backyard	Yes	74	76	76	B (67)	AE
31	1651 Regulus St.,	Yes	70	72	72	B (67)	AE

Notes: [1] Receptor site is not representative of a frequent outdoor use area.
N/A Not Applicable
AE Approach or Exceeds
75 (52) = Exterior noise level (Interior Noise level)

TABLE 8
Predicted Traffic Noise Impacts
(Based on FHWA/Department Criteria)

Site	Location	Development Predates 1978	Existing Noise Level, Leq(h), dBA	Alternative 6 Predicted Noise Level, Leq(h), dBA	Alternative 13 Predicted Noise Level, Leq(h), dBA	Activity Category and NAC Leq(h)	Impact Type
	Backyard						
32	1627 Regulus St., Backyard	Yes	68	70	70/69	B (67)	AE
33	1561 Regulus St., Backyard	Yes	68	70	70	B (67)	AE
34	Minden Dr., Backyard	Yes	71	77	73	B (67)	AE
35	1312 Minden Dr., Backyard	Yes	79	81	81	B (67)	AE
36	1332 Minden Dr., Backyard	Yes	74	77	76	B (67)	AE
37	1372 Minden Dr., Backyard	Yes	73	76	75	B (67)	AE
38	7163 Cm Degrazia, Common area	No	63	65	65	B (67)	None
39	7067 Cm Degrazia, Near patio	No	62	64	64	B (67)	None
41	123 Cm del la Reina, Near building	Yes	77	81	81	C (72)	AE
42	2680 Teal Pl., Backyard	Yes	70	72	72	B (67)	AE
43	2650 Teal Pl., Edge of backyard	Yes	70	72	72	B (67)	AE
44	Fletcher School, Classroom Bldg.		63	65	65	B(67)/E (52)	None
45	Fletcher School, Playground		64	65	65	B (67)	None
46	Fletcher School, Edge of slope		77	79	79	D (--)	None
47	2144 Whinchat St., Backyard	Yes	72	74	74	B (67)	AE
48	2128 Whinchat St., Backyard	Yes	77	79	79	B (67)	AE
49	2112 Whinchat St.,	Yes	71	73	73	B (67)	AE

Notes: [1] Receptor site is not representative of a frequent outdoor use area.
N/A Not Applicable
AE Approach or Exceeds
75 (52) = Exterior noise level (Interior Noise level)

TABLE 8
Predicted Traffic Noise Impacts
(Based on FHWA/Department Criteria)

Site	Location	Development Predates 1978	Existing Noise Level, Leq(h), dBA	Alternative 6 Predicted Noise Level, Leq(h), dBA	Alternative 13 Predicted Noise Level, Leq(h), dBA	Activity Category and NAC Leq(h)	Impact Type
	Backyard						
50	2046 Whinchat St., Backyard	Yes	74	76	76	B (67)	AE
51	2030 Whinchat St., Backyard	Yes	75	77	77	B (67)	AE
52	1982 Whinchat St., Backyard	Yes	76	78	78	B (67)	AE
53	7460 Mission Valley Rd., Patio		62	64	64	C (72)	None
54	7444 Mission Valley Rd., West end unit	No	63	65	65	B (67)	None
55	7420 Mission Valley Rd., Edge of building	No	74	76	76	C (72)	AE
56	1450 Frazee Rd., Edge of building	Yes	70	72	72	C (72)	AE
57	5624 Friars Rd., Edge of building	No	73	74	74	C (72)	AE
58	Friars Rd., Near right-of-way	No	71	72	72	D (--)	None
59	7600 Friars Rd., Edge of building	No	74	75	75	C (72)	AE
60	7450 Hazard Center Dr., Tennis court	No	70	71	71	B (67)	AE
63	591 Camino del la Reina, Edge of building		77	79	79	C (72)	AE

Notes: [1] Receptor site is not representative of a frequent outdoor use area.
N/A Not Applicable
AE Approach or Exceeds
75 (52) = Exterior noise level (Interior Noise level)

A church is located along Genesee Avenue (Site 1). The future peak noisiest hour L_{eq} at the church would be approximately 78 dBA. This noise level would exceed the noise abatement criteria.

The playground (Site 45) at Fletcher Elementary School would be subject to an exterior future peak noisiest hour L_{eq} approximately 65 dBA. This noise level would be below the noise abatement criteria. Section 216 of the Streets and Highways Code also requires Department to abate interior noise that intrudes into specified areas of elementary or secondary schools when the levels within these areas exceed a one-hour average sound level of 52 dBA. The classrooms at the school adjacent to SR 163 have air conditioning. This condition allows the classrooms to shut their windows, operate the air conditioners and reduce roadway noise in the classrooms. The future noisiest hour L_{eq} at Site 44, the closest classroom to SR 163, would be 65 dBA. Assuming a minimum noise reduction of 20 dBA with closed windows (standard attenuation as specified in the USDOT FHWA 1995 Highway Traffic Noise Analysis and Abatement Policy and Guidance), the interior future noisiest hour L_{eq} would be approximately 45 dBA at the closest classrooms. This noise level would be below the noise abatement criteria with Section 216 standards and outlined in the Traffic Noise Analysis Protocol.

The Homestead Suites hotel is located below an embankment on the east side of SR 163 (Site 54). The future noisiest hour L_{eq} would be approximately 65 dB. This noise level would be below the noise abatement criteria.

Commercial uses are located along Friars Road (Sites 57 and 59). The future noisiest hour L_{eq} would range from 74 to 75 dBA at the facade of these buildings facing Friars Road. The noise levels would exceed the noise abatement criteria.

Office uses are generally located along the east side of SR 163, north of Friars Road (Sites 53, 55 and 56). Also, offices are located along the east and west sides of SR 163, north of I-8 (Sites 41 and 63). The future noisiest hour L_{eq} would reach 71 dB or greater at Sites 41, 55, 56, 61 and 63 at the facade of the buildings facing SR 163. Thus, the noise levels would approach or exceed the noise abatement criteria at Sites 41, 55, 56, 61 and 63.

Alternative 13

Noise effects generally would be similar to those assessed for Alternative 6 and noise levels would be about the same for the receivers in this area. The same receivers located in areas that would exceed the FHWA/Department noise abatement criteria with Alternative 6 are located in areas that also would exceed the noise abatement criteria with Alternative 13. The noise level would, however, be approximately one to four dBA less when compared to Alternative 6 at the homes located at the northwest corner of SR 163 and Friars Road. The proposed collector road would be lower in elevation at this location, resulting in slightly less traffic noise exposure as compared to Alternative 6. The future noise levels associated with Alternative 13 are shown in *Table 8*.

No Project Alternative

The No Project Alternative involves roadway upgrades consistent with the existing adopted Community Plan. Upgrades would include construction of a southbound on-ramp from Ulric Street to SR 163 and widening of Friars Road. It is assumed that year 2030 volumes would be the same as are projected for the development alternatives. Also, it is anticipated that this alternative will not be considered fully responsive to the project purpose and need under NEPA. Therefore, it is anticipated that federal monies would not be released to fund this alternative, and design plans, grading plans and traffic volume projections have not been provided. Thus, the noise levels associated with the No Project Alternative are qualitatively assessed.

The physical improvements associated with the No Project Alternative would only affect receptors in the immediate area of SR 163 and Friars Road (i.e., 34-39 and 56-60) because no road improvements are identified beyond the interchange. Thus, beyond the interchange area, the No Project Alternative noise levels would be the same as the No Build Alternative. The No Project Alternative noise levels generally would be higher than the existing conditions in the immediate area of SR 163 and Friars Road, and could be similar to Alternatives 6 and 13 due to the SR 163 southbound off-ramp that would alter the existing topography and move traffic closer to abutting uses. The noise levels would exceed the noise abatement criteria at residences abutting the No Project Alternative improvement limits.

No Build Alternative

With the No Build Alternative, the year 2030 traffic volume along SR 163 would increase by the same amount as anticipated for development Alternatives 6 and 13 (LLG 2004). The future additional traffic volume would result in a noisiest hour L_{eq} noise level increase of one dBA or less as compared to the existing conditions. Noise abatement walls would not be provided with the No Build Alternative. Thus, the areas that currently exceed the FHWA/Department noise abatement criteria would continue to exceed these noise thresholds in the future.

7.1.2 Noise Impacts based on City of San Diego Noise Criteria

Alternative 6

Traffic noise levels at the rear yards of residences adjacent to the project site exceed the 65 dBA CNEL standard of the City's General Plan. Exceeding the City's noise criteria is an existing condition. With implementation of the project, the future noise level would continue to exceed 65 dBA CNEL at the homes immediately adjacent to SR 163. With the exception of Sites 34 and 41, Alternative 6 would result in a CNEL increase of two dBA or less as compared to the No Build conditions. This noise level increase is less than significant under CEQA because it does not exceed the City's three dBA significance threshold for areas that are currently at or exceed the City's noise criteria. At Sites 34 and 41 the noise level increase would be five and three dBA, respectively. The resulting noise level at Site 34 would result in a CEQA significant noise impact. The noise level increase at Site 41 would be less than significant because the outdoor usable area at this office building site is shielded from SR 163 traffic by intervening buildings and would be subject to noise levels less than 70 dB CNEL. The future CNEL at representative receiver locations are depicted in *Table 9*.

Alternative 13

With the exception of Site 34, where the noise level increase would be approximately one dB rather than five dBA, noise impacts generally would be similar to those assessed under Alternative 6. The noise level increase would be less than significant under CEQA at all the receptor sites.

No Project Alternative

As discussed under FHWA/Department criteria, with the No Project Alternative, the year 2030 traffic volumes along SR 163 are assumed to increase by the same amount as anticipated for the development alternatives.

The physical improvements associated with the No Project Alternative would only affect receptors in the immediate area of SR 163 and Friars Road (i.e., 34-39 and 56-60) because no road improvements are identified beyond the interchange. Thus, beyond the interchange area, the No Project Alternative noise levels would be the same as the No Build Alternative. The No Project Alternative noise levels generally would be higher than the existing conditions and could be similar to Alternatives 6 and 13 due to the SR 163 southbound off-ramp that would alter the existing topography and move traffic closer to abutting uses. The noise level increase represented by Site 34 could be similar to that noted for Alternative 6. Thus, a significant noise impact under CEQA could result.

No Build Alternative

With the No Build Alternative the year 2030 traffic volume along SR 163 would increase by the same amount as anticipated for the development Alternatives (LLG 2004). The future additional traffic volume would result in an increase by approximately one dBA CNEL or less as compared to the existing conditions. Noise abatement walls would not be provided with the No Build Alternative. Thus, the areas that currently exceed the City's noise criteria would continue to exceed the noise level threshold in the future.

TABLE 9
Predicted Traffic Noise Impacts
(Based on City of San Diego Noise Criteria)

Site	No Build CNEL, dBA[1]	Alternative 6 Future CNEL, dBA[1]	Noise Increase or Decrease, dBA	Alternative 13 Future CNEL, dBA[1]	Noise Increase or Decrease, dBA	Exceed City Noise Significance Criteria?
A	82	82	0	82	0	No
B	82	83	1	83	1	No
1	80	80	0	80	0	No
2	72	72	0	72	0	No
3	69	70	1	70	1	No
4	78	80	2	80	**2**	No
5	76	78	2	78	2	No
6	74	75	1	75	1	No
7	78	79	1	79	1	No
8	83	85	2	85	2	No
9	76	77	1	76	0	No
9b	74	75	1	74	0	No
10	79	80	1	80	1	No
11	78	79	1	79	1	No
12	68	69	1	69	1	No
13	66	67	1	67	1	No
14	67	68	1	68	1	No
15	69	70	1	70	1	No
16	78	80	2	80	2	No
17	78	80	2	80	2	No
18	76	77	1	77	1	No
19	69	71	2	71	2	No
20	69	71	2	71	2	No
21	68	70	2	70	2	No
22	77	78	1	78	1	No
23	66	66	0	66	0	No
23b	69	69	0	69	0	No
24	76	77	1	77	1	No
25	75	75	0	75	0	No

Notes: [1] The future CNEL is assumed to be equal to the peak hour level plus 2 dB based on existing 24-hour noise measurement.
[2] Alternative 6/Alternative 13
[3] Receptor site not representative of the outdoor usable space area (i.e., backyards of single family homes, common outdoor use area of multi-family homes, outdoor lunch areas office/commercial uses).

TABLE 9
Predicted Traffic Noise Impacts
(Based on City of San Diego Noise Criteria)

Site	No Build CNEL, dBA[1]	Alternative 6 Future CNEL, dBA[1]	Noise Increase or Decrease, dBA	Alternative 13 Future CNEL, dBA[1]	Noise Increase or Decrease, dBA	Exceed City Noise Significance Criteria?
26	78	78	0	78	0	No
27	76	77	1	77	1	No
28	66	66	0	66	0	No
28b	70	70	0	70	0	No
29	71	72	1	72	1	No
30	77	78	1	78	1	No
31	73	74	1	74	1	No
32	71	72	1	72	1	No
33	71	72	1	72	1	No
34	74	79	5	75	1	Yes/No[2]
35	82	83	1	83	1	No
36	77	79	2	78	1	No
37	76	78	2	77	1	No
38	66	67	1	67	1	No
39	65	66	1	66	1	No
41	80	83	3	83	3	No[3]
42	73	74	1	74	1	No
43	73	74	1	74	1	No
44	66	67	1	67	1	No
45	67	67	0	67	0	No
46	80	81	1	81	1	No
47	75	76	1	76	1	No
48	80	81	1	81	1	No
49	74	75	1	75	1	No
50	77	78	1	78	1	No
51	78	79	1	79	1	No
52	79	80	1	80	1	No
53	65	66	1	66	1	No
54	66	67	1	67	1	No
55	77	78	1	78	1	No
56	73	74	1	74	1	No
57	76	76	0	76	0	No

Notes: [1] The future CNEL is assumed to be equal to the peak hour level plus 2 dB based on existing 24-hour noise measurement.
[2] Alternative 6/Alternative 13
[3] Receptor site not representative of the outdoor usable space area (i.e., backyards of single family homes, common outdoor use area of multi-family homes, outdoor lunch areas office/commercial uses).

TABLE 9
Predicted Traffic Noise Impacts
(Based on City of San Diego Noise Criteria)

Site	No Build CNEL, dBA[1]	Alternative 6 Future CNEL, dBA[1]	Noise Increase or Decrease, dBA	Alternative 13 Future CNEL, dBA[1]	Noise Increase or Decrease, dBA	Exceed City Noise Significance Criteria?
58	74	74	0	74	0	No
59	77	77	0	77	0	No
60	73	73	0	73	0	No
63	80	81	1	81	1	No

Notes: [1] The future CNEL is assumed to be equal to the peak hour level plus 2 dB based on existing 24-hour noise measurement.
[2] Alternative 6/Alternative 13
[3] Receptor site not representative of the outdoor usable space area (i.e., backyards of single family homes, common outdoor use area of multi-family homes, outdoor lunch areas office/commercial uses).

8.0 NOISE ABATEMENT

8.1.1 Noise Abatement based on FHWA/Department Noise Criteria

The exterior noisiest hour L_{eq} would approach or exceed 67 dBA at most homes adjacent to SR 163. The Code of Federal Regulations (23 CFR 772) requires an evaluation of noise abatement measures on all major construction or widening of highways if projected noise levels approach or exceed the noise abatement criteria for activities occurring on adjacent lands, or if the project will cause a substantial increase in noise levels (i.e., 12 or more dBA above the existing hourly average).

Preliminary noise abatement measures (i.e., noise barriers) for the affected homes have been evaluated to provide noise abatement and design information. The noise barriers typically may consist of walls, berms or a combination of both. The Department takes into account, where it is feasible and reasonable, the FHWA noise abatement criteria. Federal standard design guidelines require that a barrier must provide a minimum 5 dBA of noise attenuation for impacted receptors. The Department design standards recommend that the barrier intercept the line-of-sight from a receiver 1.52 meters (5 feet) above the ground (located 1.52 meters [5 feet] from the adjacent residence) to a truck exhaust stack located at a height of 3.5 meters (11.5 feet) above the pavement.

The noise measurement survey and modeling identified those areas where the FHWA noise abatement criteria would be exceeded. Each of these areas was evaluated to determine whether noise levels could be feasibly abated. Preliminary noise barrier locations for Alternatives 6 and 13 are the same and are shown on *Figures 4A through 4C*.

A comparison of the noise reduction provided by various barrier heights is shown in *Table 10* for those sites where the Noise Abatement Criteria are exceeded. The proposed walls are located on both private property, City and Caltrans rights-of-way. Also, noted in the table is the minimum barrier height that achieves both a minimum 5 dBA noise attenuation and intercepts the line-of-sight from a truck exhaust stack and the receiver.

It should be noted that noise insulation is not normally provided in private residential dwellings, and may be provided only when severe traffic noise impacts are anticipated and normal abatement measures are either physically infeasible or economically unreasonable. When considering interior noise abatement measures, it must be demonstrated that the affected structures experience traffic noise impacts to a far greater degree than other similar structures adjacent to roadway facilities. That is, private residential dwelling units would have exterior noise levels of 75 dBA or greater, or a project would cause a noise level increase of 30 dBA or more over predicted noise levels if no project were to be constructed (Caltrans 1997). The noise levels generally would be less than 75 dBA at the first floor level of the adjacent residences with the proposed noise barriers described below. The exception would be at the multi-family units represented by Site 8. Future noise levels at the three-story structure are calculated to be approximately 83 dBA L_{eq}. Because these units are considered to be severely impacted (the structures were built in 1989 and are not expected to have construction adequate to reduce exterior sound levels to the 52 dBA interior NAC) attenuation must be considered. Due to the proximity of the structures to the SR 163 right-of-way, any wall built to attenuate sound would result in a "closing in" of the building. In addition, wall height adequate to address all floors of the structure would result in a multiple-story sound barrier that would be difficult to landscape, and could be problematic in terms of engineering and ultimate maintenance. These combined considerations resulted in the determination by the Project Development Team (representatives of the City, Caltrans, project environmental consultants and project engineers) that a wall would not best serve the residents of these units. As a result, consideration of interior abatement is being recommended. It is anticipated that the specific design criteria (wall and window thickness, presence of ducted HVAC, etc.) of the existing structure will be determined during final design efforts for the project. As appropriate and necessary, and in coordination with the property owner(s), feasible attenuation will be identified and installed sufficient to meet a minimum reduction of five dBA. Potential measures to be reviewed for feasibility would include wall insulation and installation of double-paned windows. This evaluation will be contained within the Mitigation Reporting Program completed for the project.

The commercial uses at Sites 57 and 59 do not have exterior use areas where frequent human use that would benefit from a reduced noise level (i.e., outdoor eating areas, etc.). Therefore, the commercial uses do not have an exterior use area of frequent human use that would benefit from a reduced noise level.

The office uses at Sites 41, 55, 56 and 63 do not have exterior use areas where frequent human use that would benefit from a reduced noise level (i.e., outdoor eating areas, etc.) facing SR 163. Therefore, the office uses do not have an exterior use area of frequent human use that would benefit from a reduced noise level.

TABLE 10

Future Predicted Noise Levels with and without Noise Abatement Wall
(Alternatives 6 and 13)

Site	Without Noise Abatement Wall	With Noise Abatement Wall												
		1.8m (6')		2.4m (8')		3m (10')		3.7 m (12')		4.3 m (14')		4.9 m (16')		
		Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Sound Wall I.D
1	78	**72**	6	71	7	70	8	69	9	68	10	67	11	B1
2	70	65	4	**64**	5	63	6	62	7	61	8	59	10	B1
3	68	--		--		--		--		68	0	65	3	NF
4	78	**72**	6	70	8	68	10	67	11	66	12	64	14	B2
5	76	72	4	**70**	6	68	8	67	9	66	10	65	11	B2
6	73	71	2	70	3	**68**	5	67	6	66	7	65	8	B2
7	77	74	3	73	4	73	4	**72**	5	72	5	72	5	B2
9	75	71	4	**70**	5	68	7	66	9	65	10	63	12	B3
9b	73	69	4	**68**	5	67	6	66	7	65	8	65	8	B3
10	78	**72**	6	69	9	66	12	64	14	63	15	61	17	B3
11	77	**71**	6	68	9	66	11	64	13	62	15	61	16	B3
12	67	66	1	65	2	64	3	64	3	63	4	63	4	NF
13	65	65	0	64	1	64	1	63	2	63	2	63	2	NF
14	66	66	0	65	1	64	2	63	3	63	3	63	3	NF
15	68	68	0	67	1	67	1	66	2	65	3	65	3	NF
16	78	75	3	74	4	**73**	5	71	7	69	9	68	10	B5
17	78	77	1	74	4	**72**	6	69	9	68	10	66	12	B5
18	75	75	0	73	2	71	4	**70**	5	68	7	67	8	B5/E3
19	69	69	0	68	1	66	3	65	4	**64**	5	63	6	B5/E3
20	69	68	1	67	2	66	3	65	4	**64**	5	63	6	B5/E3
21	68	68	0	67	1	66	2	64	4	**63**	5	62	6	B5/E3
22	76	73	3	72	4	**71**	5	69	7	68	8	67	9	B5
23b	69	**64**	5	61	8	59	10	57	12	56	13	55	14	B6
24	75	**65**	10	60	15	57	18	56	19	56	9	56	19	B6
25	73	**67**	6	63	10	61	12	59	14	58	15	57	16	B6
26	76	**69**	7	65	11	62	14	60	16	59	17	57	19	B6
27	75	71	4	**69**	6	67	8	63	12	61	14	59	16	B6
28b	70	**64**	6	61	9	60	10	58	12	57	13	56	14	B6
29	70	**64**	6	61	9	59	10	57	12	56	13	55	14	B7
30	76	**70**	6	67	9	63	13	61	15	60	16	59	17	B7

Notes: [1] Receptor site is not representative of a frequent outdoor use area.
N/A Not Applicable
AE Approach or Exceeds
75 (52) = Exterior noise level (Interior Noise Level)

Bold Achieves FHWA minimum 5 dBA reduction and breaks line of sight between truck stack and 5' receiver.
I.L. Insertion Loss
[1b] Alternative 6/Alternative 13
NF = Not Feasible

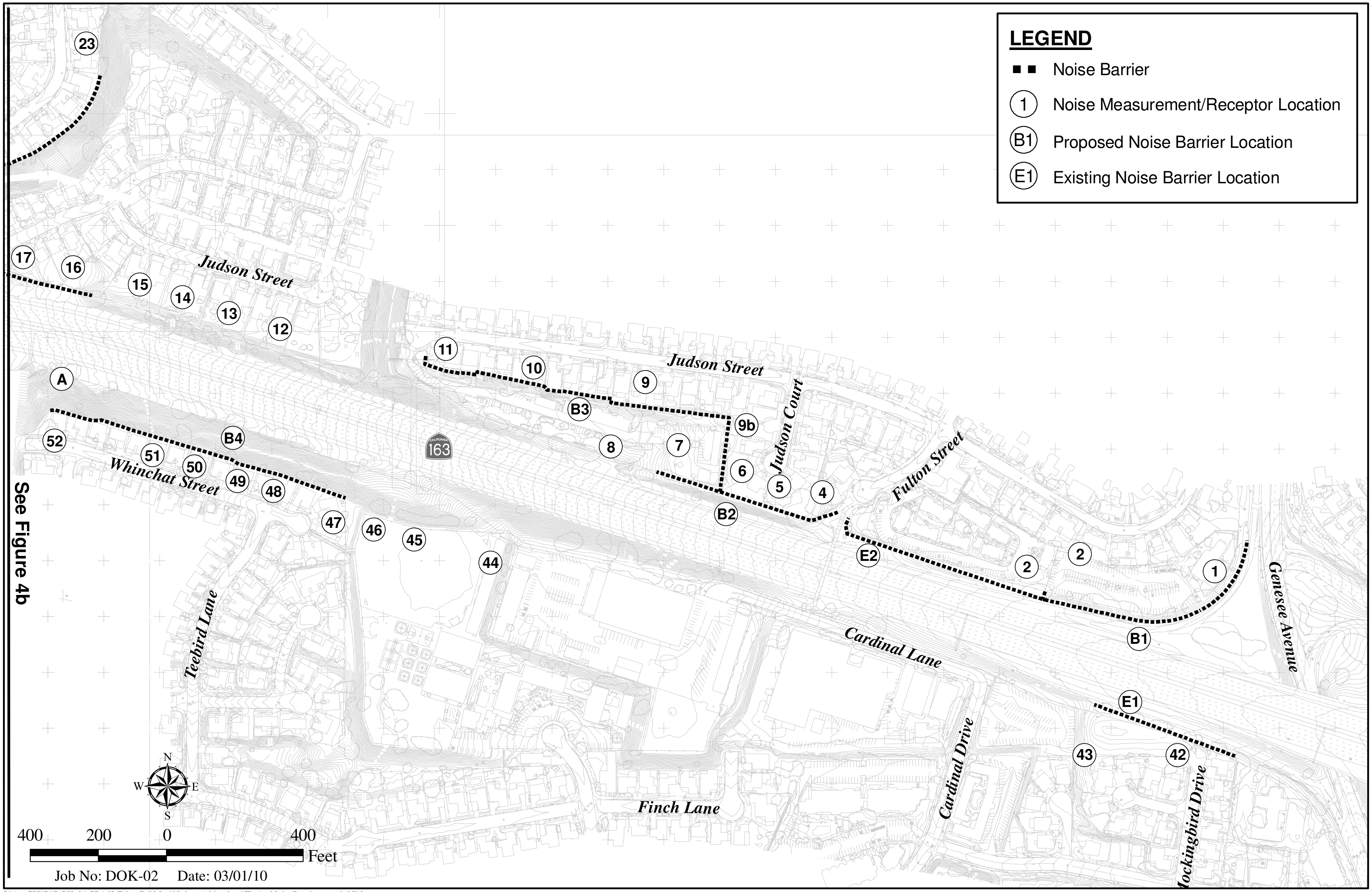
TABLE 10

Future Predicted Noise Levels with and without Noise Abatement Wall
(Alternatives 6 and 13)

Site	Without Noise Abatement Wall	With Noise Abatement Wall												
		1.8m (6')		2.4m (8')		3m (10')		3.7 m (12')		4.3 m (14')		4.9 m (16')		
		Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Leq(h), dBA	I.L., dBA	Sound Wall I.D
31	72	**67**	5	64	8	62	10	61	11	61	11	60	12	B7
32	70	67	3	**65**	5	64	6	62	8	62	8	61	9	B7
33	70	66	4	**64/63 [1]**	6/7 [1]	62	8	61	9	60	10	60	10	B7
34	77/73 [1]	**72**/ 69 [1]	5/4[1]	69/**67** [1]	8/6[1]	67/65 [1]	10/8[1]	66/64 [1]	11/9[1]	64/63 [1]	13/10[1]	63 [1]	14/10[1]	B8
35	81	**75/73 [1]**	6/8 [1]	71/70 [1]	10/11 [1]	69/67 [1]	12/14 [1]	67/66 [1]	14/15 [1]	65	16	64	17	B8
36	77/76	**71/70 [1]**	6/6 [1]	69/68 [1]	8/8 [1]	68/67 [1]	9/9 [1]	67/66 [1]	10/10 [1]	66/65 [1]	11/11 [1]	65/64 [1]	12/12 [1]	B8
37	76/75	**71/70 [1b]**	5/5 [1b]	69/68 [1b]	7/7 [1b]	68/66 [1b]	8/9 [1b]	67/65 [1b]	9/10 [1b]	67/64 [1b]	9/11 [1b]	67/64 [1b]	9/11 [1b]	B8
42	72	--		--		70	2	69	3	69	3	68	4	NF
43	72	--		--		71	1	71	1	70	2	70	2	NF
47	74	71	3	**68**	6	66	8	64	10	63	11	63	11	B4
48	79	71	8	68	11	66	12	65	13	64	14	63	15	B4
49	73	69	4	**68**	5	66	7	65	8	64	9	64	9	B4
50	76	**70**	6	67	9	65	11	64	12	64	13	63	14	B4
51	77	**71**	6	68	9	66	11	65	12	64	13	63	14	B4
52	78	**71**	7	68	10	66	12	64	14	63	15	62	16	B4
60	71	**66**	5	64	7	63	8	62	9	61	10	60	11	B9

Notes: [1] Receptor site is not representative of a frequent outdoor use area.
N/A Not Applicable
AE Approach or Exceeds
75 (52) = Exterior noise level (Interior Noise Level)

Bold Achieves FHWA minimum 5 dBA reduction and breaks line of sight between truck stack and 5' receiver.
I.L. Insertion Loss
[1b] Alternative 6/Alternative 13
NF = Not Feasible



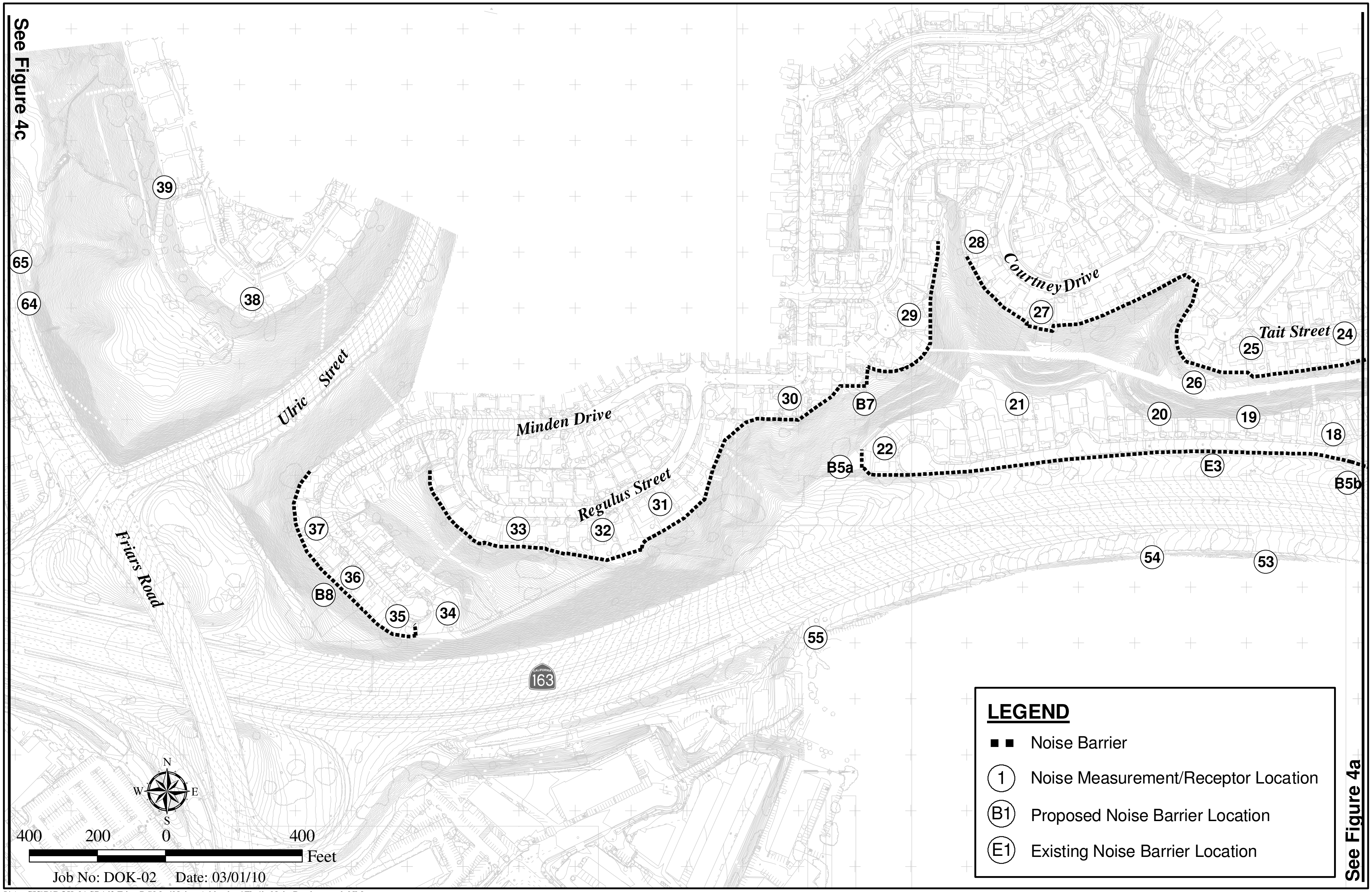
I:\ArcGIS\D\DOK-01 SR163 FriarsRd\Map\Noise_Addendum\Fig4a_NoiseBarriers.mxd -NM

Proposed/Existing Noise Barriers and Noise Measurement Sites

SR 163/FRIARS ROAD INTERCHANGE PROJECT

HELIX

Figure 4a



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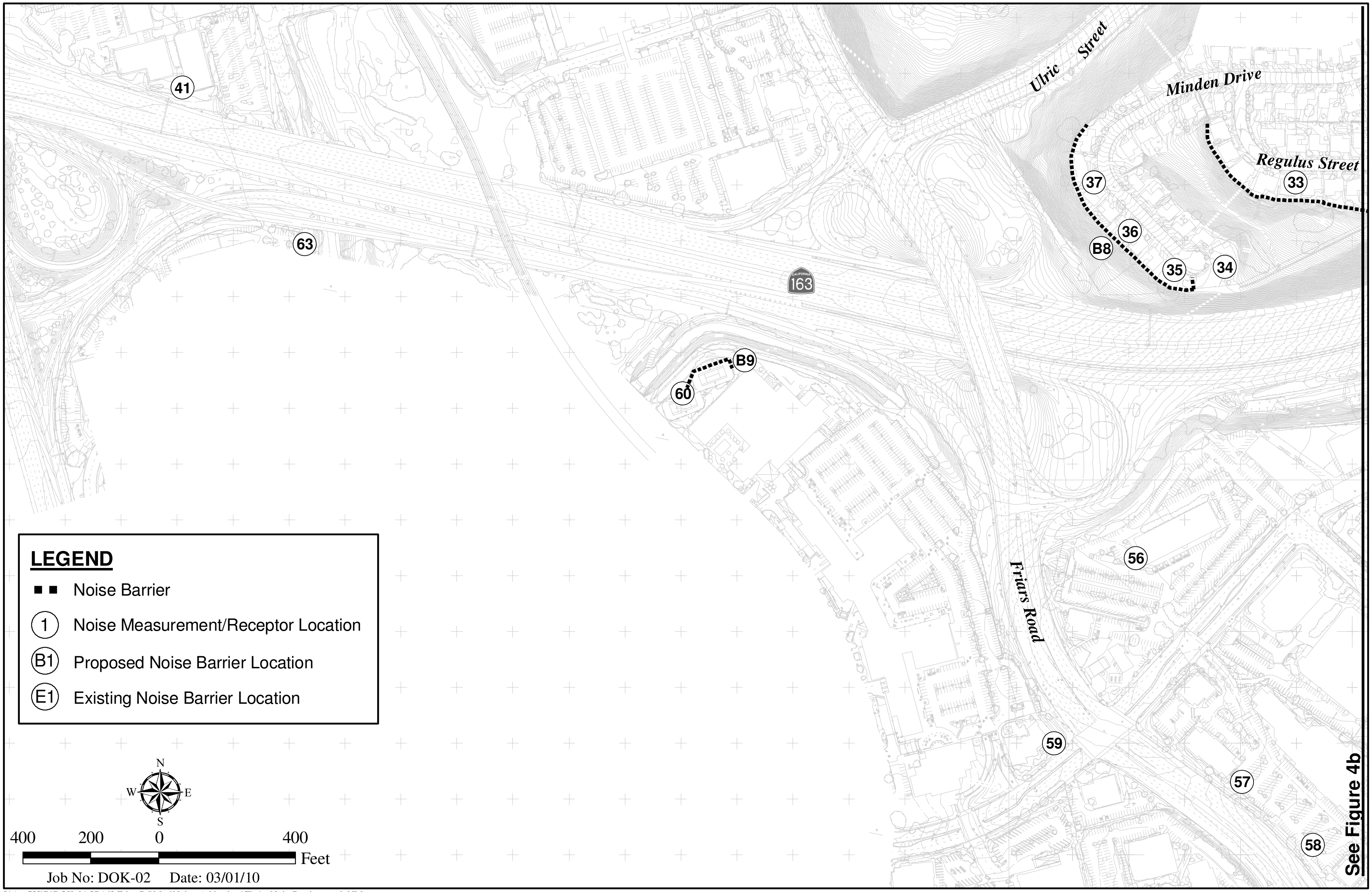
Proposed/Existing Noise Barriers and Noise Measurement Sites

SR 163/FRIARS ROAD INTERCHANGE PROJECT

HELIX

Figure 4b



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Proposed/Existing Noise Barriers and Noise Measurement Sites

SR 163/FRIARS ROAD INTERCHANGE PROJECT

HELIX

Figure 4c

Alternative 6

The following sound walls have been identified for Alternative 6: A critical receiver is the design receiver(s) that is (are) impacted and for which the absolute noise levels, build vs. existing noise levels, or achievable noise reduction will be at a maximum where noise abatement is considered. The definition is primarily used in the determination of noise abatement reasonableness. A minimum of 5 dBA noise reduction must be achieved at the impacted receivers in order for the proposed noise abatement measure to be considered feasible.

Barrier B1 would extend for approximately 220 meters (722 feet). The sound wall would be located adjacent to the area represented by receivers Sites 1 and 2. The height of the sound wall to achieve a five dBA or more insertion loss at the critical receiver would be 2.4 meters (eight feet) at the critical receiver. The wall would be located along the edge of right-of-way. The wall would benefit four residences and a church and is considered feasible.

Barrier B2 would extend for approximately 208 meters (682 feet) with returns. The sound wall would be located adjacent to the area represented by receivers Sites 4-7. The height of the sound wall to achieve a five dBA or more insertion loss would be 3.7 meters (12 feet) at the critical receiver. The wall generally would be located along the edge of right-of-way with a return on private property. The wall would benefit five residences and a multi-family common use area and is considered feasible.

Barrier B3 would extend for approximately 322 meters (1,056 feet) with a return. The sound wall would be located adjacent to the area represented by receiver Sites 9, 9b, 10 and 11. The height of the sound wall to achieve a minimum five dBA insertion loss would be 3.0 meters (10 feet) at the critical receiver. The wall would be located along private property and would benefit 22 residences. The sound wall could preclude access to some lower level backyards. Also, several homes have existing outdoor decks that extend beyond the top of the slope, or sloping yards which could preclude the construction of sound walls for these homes. These land use and engineering feasibility issues would need to be resolved.

Barrier B4 would extend for approximately 315 meters (1,033 feet). The sound wall would be located adjacent to the area represented by receiver Sites 47-52. The height of the sound wall to achieve a minimum five dBA insertion loss would be 2.4 meters (eight feet). The wall generally would be located along the top of slope and private property. The wall would benefit 14 residences and is considered feasible.

Barrier B5 would extend for approximately 570 meters (1,870 feet) with a return. The sound wall would be located adjacent to the area represented by receiver Sites 16-22. There is an existing sound wall that extends for most of the proposed sound wall length. The existing sound wall is approximately four to five feet in height. The height of a new sound wall to achieve a minimum five dBA insertion loss would be 4.3 meters (14 feet). The wall generally would be located along the top of slope and private property. The wall would benefit 31 residences and is considered feasible.

Barrier B6 would extend for approximately 630 meters (2,066 feet). The sound wall would be located adjacent to the area represented by receiver Sites 23b, 24-27, and 28b. The homes are second tier homes located above the first tier of homes. The height of the sound wall to achieve a minimum five dBA insertion loss would be 2.4 meters (eight feet). The wall generally would be located along the top of slope on private property. The wall would benefit 26 residences and is considered feasible.

Barrier B7 would extend for approximately 670 meters (2,198 feet). The sound wall would be located adjacent to the area represented by receiver Sites 29-33. The height of the sound wall to achieve a minimum five dBA insertion loss would be 2.4 meters (eight feet). The wall would be located along private property. The wall would benefit 28 residences. The sound wall could preclude access to some lower level backyards. Also, several homes along the mesa tops have existing outdoor decks that extend beyond the top of the slope, or sloping yards which could preclude the construction of sound walls for these homes. These land use and engineering feasibility issues would need to be resolved.

Barrier B8 would extend for approximately 325 meters (1,066 feet). The sound wall would be located adjacent to the area represented by receiver Sites 34-37. The height of the sound wall to achieve a minimum five dBA insertion loss would be 1.8 meters (six feet). However, the height should be eight feet to reduce the noise level to less than 75 dBA L_{eq} at all the residences. The wall would be located along the SR 163 right-of-way and along private property. The wall would benefit 10 residences and is considered feasible.

Barrier B9 would extend for approximately 110 meters (361 feet). The sound wall would be located adjacent to the area represented by receiver Site 60. The height of the sound wall to achieve a minimum five dBA insertion loss would be 1.8 meters (six feet) relative to the elevation of the tennis courts. The wall would be located along private property. Based on frontage units, the wall is equivalent to two benefitted residences. The wall would benefit the hotel users of the two tennis courts and is considered feasible.

Barrier E1 is an existing sound wall ranging from approximately 2.4 to 3.4 meters (8 to 11-feet) in height. Increasing the height of the sound wall would not feasibly reduce the noise level by five dBA or more represented by receptor Sites 42 and 43.

Barrier E2 is an existing sound wall ranging from approximately 3.4 to 4.9 meters (11 to 16 feet) in height. Increasing the height of the sound wall would not feasibly reduce the noise level by five dBA or more represented by receptor Site 3.

Earth Berm. An existing earth berm provides noise attenuation for receptor Sites 12-15. Placing a 4.9-meter (16 feet) sound wall on top of the existing berm would not feasibly reduce the noise level by five dBA.

Alternative 13

With the exception of Barrier B8, Alternative 13 would result in the same sound wall heights and locations as identified for Alternative 6. With Alternative 13, the minimum sound wall height to achieve a 5 minimum dBA insertion loss at Barrier B8 would be 2.4 meters (eight feet). The actual insertion loss achieved would be 6 dBA.

No Project Alternative

Noise abatement walls would not be constructed with the No Project Alternative because it is anticipated that this alternative would not qualify for federal funds. Thus, the areas that currently exceed the FHWA/Department noise abatement criteria would continue to exceed the noise abatement criteria in the future.

No Build Alternative

Noise abatement walls would not be provided with the No Build Alternative. Thus, the areas that currently exceed the FHWA/Department noise abatement criteria would continue to exceed the noise abatement criteria in the future.

8.1.2 Mitigation Based on City of San Diego Noise Criteria

Alternative 6

To mitigate the noise impact based on the City's noise criteria would require a noise barrier (i.e., either a berm, sound wall or combination) adjacent to the area represented by Site 34. A 4.9 meter (16 foot) high noise barrier constructed along the top-of-slope and/or edge of right-of-way of the homes as previously identified as Barrier B8 in *Figure 4B* would reduce the noise level to 65 dBA CNEL or less. A 2.4 meter (eight foot) high noise barrier would be required to mitigate noise levels to the existing noise level and, thus, reduce the project noise impacts to less than significant levels under CEQA. A comparison of the barrier heights required to achieve either the City's significance noise criteria or the City's 65 CNEL noise guideline are shown in *Table 11*.

TABLE 11
Noise Barrier Heights to Achieve City Noise Criteria

Site	Existing CNEL	Future with Project CNEL	Future w/o Project CNEL	Minimum Wall Height to Achieve Existing CNEL	Wall Height to Achieve City's 65 CNEL Guideline
34	73	79	74	8'	16'

Alternative 13

Alternative 13 would not result in CEQA significant noise impacts, thus mitigation measures are not required.

No Project Alternative

The No Project Alternative could result in CEQA significant noise impact represented by Site 34. Therefore, noise mitigation similar to that described for Alternative 6 could be required.

No Build Alternative

The project would not implement noise mitigation measures with the No Build Alternative.

8.2 PRELIMINARY FEASIBILITY AND REASONABLENESS ANALYSIS (Based on FHWA/Department Noise Criteria)

All identified noise abatement barriers (including design and abatement elements) will be evaluated for feasibility and reasonableness in a Noise Abatement Decision Report (NADR) to be conducted by the project engineers. That feasibility assessment will review the ability of individual abatement measures to achieve a minimum five dBA noise level reduction, as well as engineering considerations such as topography, access/maintenance requirements and structural considerations such as footing and grading specifications. Based on preliminary engineering and location data, all identified noise abatement barriers are considered feasible, with the noted potential exceptions discussed above regarding homes with existing outdoor decks and sloping yards. This preliminary assumption will be verified in the NADR.

The determination of reasonableness is based on a number of physical, economic, environmental and social criteria, including costs, noise levels, life cycle of abatement measures, construction-related environmental impacts (e.g., visual and cultural issues) and input from local agencies and residents. If proposed abatement measures can be constructed for a reasonable cost allowance, a final decision on reasonableness will be made on applicable physical, social (i.e., community input) and environmental factors. If, during final design, conditions have substantially changed, noise barriers may not be provided. The final decision on the noise barriers will be made upon completion of the project design, the public involvement process and City negotiations with the affected property owners.

A summary of the current information for reasonableness allowances is shown in *Table 12* for various barrier heights. As noted above, the ultimate determinations of barrier feasibility, reasonableness and design (including type, location and height) will be determined as a result of the noted NADR and final project design efforts.

TABLE 12

Summary of Data for Reasonableness Determination

Sound Wall I.D.:	B1					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	70					
Build Vs. Existing, dBA*	1					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	4	5	6	7	8	10
Number of Benefitted Residences	0	5	5	5	5	5
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$45,000	N/A	N/A	N/A	N/A

Sound Wall I.D.:	B2					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	77					
Build Vs. Existing, dBA*	2					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	4	6	8	9	10	11
Number of Benefitted Residences	0	6	6	6	6	6
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$47,000	N/A	N/A	N/A	N/A

Sound Wall I.D.:	B3					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	75					
Build Vs. Existing, dBA*	2					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	4	5	7	9	10	12
Number of Benefitted Residences	0	22	22	22	22	22
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$47,000	N/A	N/A	N/A	N/A

TABLE 12

Summary of Data for Reasonableness Determination

Sound Wall I.D.:	B4					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	74					
Build Vs. Existing, dBA*	2					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	3	6	8	10	11	11
Number of Benefitted Residences	0	14	14	14	14	14
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$47,000	N/A	N/A	N/A	N/A

Sound Wall I.D.:	B5/E3					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	69					
Build Vs. Existing, dBA*	2					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	1	2	3	4	5	6
Number of Benefitted Residences	0	0	0	0	31	31
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	No	No	No	No	No	No
Reasonable Allowance Per Benefitted Residence	N/A	N/A	N/A	N/A	$33,000	N/A

Sound Wall I.D.:	B6					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	75					
Build Vs. Existing, dBA*	3					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	4	6	8	12	14	16
Number of Benefitted Residences	0	26	26	26	26	26
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$51,000	N/A	N/A	N/A	N/A

TABLE 12

Summary of Data for Reasonableness Determination

Sound Wall I.D.:	B7					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	70					
Build Vs. Existing, dBA*	2					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	4	6	8	9	10	10
Number of Benefitted Residences	0	28	28	28	28	28
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$47,000	N/A	N/A	N/A	N/A

Sound Wall I.D.:	B8 (Alternative 13)					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	73/81					
Build Vs. Existing, dBA*	2					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	4	6	8	9	10	10
Number of Benefitted Residences	10	10	10	10	10	10
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefitted Residence	N/A	$53,000	N/A	N/A	N/A	N/A

Sound Wall I.D.:	B9					
Predicted Without Sound Wall						
Absolute Noise Level, Leq(h), dBA*	71					
Build Vs. Existing, dBA*	1					
Predicted with Sound Wall	H=1.8 m	H=2.4 m	H=3.0 m	H=3.7 m	H=4.3 m	H=4.9 m
Insertion Loss, dBA*	5	7	8	9	10	11
Number of Benefitted Residences	4	4	4	4	4	4
New Highway, or More than 50% of residences Predate 1978? (Yes or No)	No	No	No	No	No	No
Reasonable Allowance Per Benefitted Residence	$35,000	N/A	N/A	N/A	N/A	N/A

*** At critical receiver(s)**

9.0 CONSTRUCTION NOISE AND VIBRATION

Noise generated by construction equipment on this project would occur with varying intensities and durations during the different phases of construction: clear and grub, earthwork, retaining wall structures, base preparation, paving and cleanup. These activities generally would be the same regardless of the development alternative and the discussion below pertains to all three of the build alternatives. Construction noise specifically associated with bridge structures etc., that vary by alternative are addressed further below. Potential noise impacts to noise-sensitive biological species are discussed in the project's Natural Environment Study and environmental document. No "construction" noise beyond routine maintenance would occur with the No Build Alternative and, thus, no noise impacts are assessed.

Construction Elements Common for all Build Alternatives

Approximately 2.7 hectares (6.6 acres) would be graded and it is anticipated that primary grading activities would be completed within a six-month time period, with maximum daily grading totaling approximately 0.4 hectare (1 acre) per day. Heavy equipment for roadway preparation and improvement is expected to include one earthmover/dozer, two graders, one water truck, four asphalt/concrete trucks/mixers, two pavers and two roller compactors. Maximum noise levels at 15.2 meters (50 feet) would range from approximately 75 to 90 dB for the type of equipment normally used for this type of project. The heavy equipment has been estimated conservatively to be in operation eight hours per day and six days per week. The construction contractor may mobilize more than one crew. Approximately 10 to 15 workers per crew are anticipated to be on site at any one time, with their individual transportation being parked along the roadway or at designated staging areas, as appropriate. These individuals would include approximately three-to-four people in the clearing/grubbing crew, three-to-five in the grading crew, six-to-eight in the base or core construction crew (working with utilities, preparation of the subgrade, curb and gutter, etc.) and six-to-eight in the paving crew.

Nighttime construction activities would occur along SR 163 at the end of a phase when the highway would be briefly closed. The activities would not exceed two nights in any one location. It is anticipated that a backhoe would be required for some minor grading activity, but no additional major grading would occur. Mostly, night work would address paving operations associated with connecting existing roadway to new pavement. A small area of pavement would be removed and new pavement connections installed prior to opening the new connection the next morning. The typical hourly average noise level associated with the anticipated nighttime construction activity would be approximately 65 to 70 dBA at a distance of 50 feet. The existing ambient nighttime hourly noise level ranges from approximately 65 to 75 dBA L_{eq} at residences without noise barriers adjacent to SR 163.

Although relatively minor in duration and extent, the nighttime construction would not comply with the City's allowable hours for construction activities and some people may experience irritation or annoyance during the nighttime construction. The noise impact would be considered adverse. It would, however, be less than significant because the construction noise would not substantially exceed the existing ambient nighttime hourly average noise level, and the construction activity would be temporary, not exceeding two nights in any one area. The City's Noise Abatement and Control

Administrator would consider these factors in making the necessary findings for issuance of a noise control permit to allow nighttime construction.

A number of staging areas have been identified within the project construction area. Not all of the staging areas are anticipated to be used. The contractor would determine one or more ultimate locations among evaluated alternatives following negotiations and agreement between the contractor and City or private party. The project's environmental document discusses the staging areas in detail. Staging areas closest to existing residences may occur at the northwest quadrant of SR 163 and Friars Road. Another staging area near existing residences would be located south of Genesee Avenue and west of SR 163 within the southbound on-ramp cloverleaf. Noise associated with staging areas is typically less than that associated with construction activities because staging areas generally are used for storage of materials and vehicles.

Alternative 6

Development of Alternative 6 would include caisson drilling for the collector lanes/bypass structure. The collector lanes/bypass structure would extend approximately 960 meters (3,150 feet) in length and be supported by approximately 19 large diameter single columns and cast-in-drilled hole piles. The piles would be installed using vibratory pile methods. Vibratory pile installation generally consists of attaching a vibrating apparatus to a metal casing and vibrating the casing into the ground. After the casings are installed, a drill rig would be used with an auger bit to remove the slurry within each of the inner casings. The displaced soil would be hauled away from the site. Rebar cages would be installed in the holes and concrete poured into the holes.

The specific location of the pile footings has not been determined. Therefore, a worst-case is assumed; that piles would be located immediately adjacent to the closest residences. Thus, the closest residences to the vibratory pile installing and drilling area would be located along Minden Drive, approximately 13 meters (43 feet) west of the flyover lanes. Vibratory pile installation can generate maximum noise levels of 96 dBA at 15.2 meters (50 feet) (FTA 1995). These noise levels would vary, however, as Pacific Noise Control has measured noise levels of 79 dBA at 15.2 meters associated with vibratory pile installation. Assuming the upper range of noise levels, the maximum noise level at the closest residence would be approximately 97 dBA. The 12-hour average noise level would be less because vibratory pile installation can, at times, be completed in less than an hour. The time to complete the installation would vary depending on factors such as the pile depth and soil conditions. Therefore, the noise associated with the vibratory pile installation could exceed the City's construction noise level criterion at receivers located near the intersection of Friars Road and SR 163 depending on both timing and noise emission of the selected equipment.

Vibration levels associated with the vibratory pile installation and drilling would vary. Ground-borne vibration is influenced by the soil conditions and the receiving building. Vibration source levels associated with vibratory pile installation is typically a PPV of approximately 4.3 mm per second (0.170 inches per second) and drilling is a PPV of approximately 2.3 mm per second (0.089 inches per second) (FTA 1995). At the closest building, the PPV would be approximately 2.0 mm per second (0.08 inches per second) at a distance of 13 meters (43 feet). This vibration level typically is considered acceptable for all building structures (Caltrans 2002). This vibration level would be readily perceptible to people, but below the level at which continuous vibrations begin to annoy most people (Caltrans 2002).

Construction of the bridge crossings at the San Diego River would be similar in both full development alternatives. It is most likely that the bridges would be constructed with wooden formwork supported by temporary wooden falsework. The falsework would most likely be supported by a wooden foundation that rests directly on graded earth. The earth would be graded by earthmoving equipment in flat pad areas to construct wooden foundation. There is possibility that a temporary trestle structure would be constructed within the river floodway. The trestle structure could be supported by steel driven piles.

Impact pile driving can generate maximum noise levels of up to approximately 98 dBA at a distance of 15.2 meters (50 feet) (FTA 1995). The average noise level of the pile driving would depend on several factors including the maximum noise level of the impact, and time interval between impacts. Assuming pile driving occurs for an hour, with a time interval of three seconds between impacts, the sound level would be approximately 93 dBA L_{eq} at a distance of 15.2 meters (50 feet). The closest existing residences are located approximately 1,500 feet from the San Diego River. At this distance, the sound level would be approximately 63 dBA L_{eq}. This noise level would result in a less than significant noise impact. Similarly, vibratory pile installation at the San Diego River, discussed below in Alternatives 6 and 13, would result in a less than significant noise impact at the closest residences.

Vibration source levels associated with impact pile driving is typically a Peak Particle Velocity (PPV) of approximately 16.4 mm per second (0.644 inches per second). The PPV would be approximately 5.0 mm per second (0.2 inches per second) at 55 feet and 2.0 mm per second (0.08 inches per second) at 100 feet. This indicates that care must be taken when sustained pile driving is within approximately 55 feet of any building and 100 feet of a historical building or building in poor condition.

<u>Alternative 13</u>

The noise and vibration associated with pile installation for Alternative 13 would be similar to Alternative 6. However, the length of the ramp structure and number of piles would be less. The Alternative 13 proposed ramp structure would be approximately 550 meters (1,805) feet in length and supported by approximately 11 large diameter single columns and cast-in-drilled hole piles.

The discussion in Alternative 6 regarding the San Diego River crossing also applies to Alternative 13.

9.1 Construction Noise Abatement

Construction noise impacts can be reduced by the following:

Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler.

If vibratory pile installation equipment is proposed to be used within 500 feet of a residence, the contractor will baffle the equipment and/or reduce the number of hours per day the equipment is proposed to be used to achieve a 12-hour noise level of 75 dBA L_{eq} or less at the closest home.

The contractor shall comply with all appropriate vibration and noise level standards, regulations and ordinances which apply to any work performed pursuant to the contract.

Construction noise would be regulated by Caltrans Standard Specifications Section 7-1.01 (Sound Control Requirements).

Residents within 500 feet of the nighttime construction operation should be notified in advance of the planned dates and duration of this temporary impact. Also, residents within 200 feet of proposed daytime construction should be noticed by mail prior to the start of work.

Implementation of the above noise abatement measures would reduce construction noise impacts to less than substantial levels.

10.0 REFERENCES

California Department of Transportation (Caltrans), June 1983. *User's Instructions for SOUND32 (FHWA/CA/TL-83/06).*

California Department of Transportation (Caltrans), October 1998a. *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects.*

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ATTACHMENT 1

DEFINITIONS

ATTACHMENT 1
DEFINITIONS

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Community Noise Equivalent Level, CNEL	CNEL is the A-weighted equivalent continuous sound exposure level for a 24-hour period with a ten dB adjustment added to sound levels occurring during nighttime hours (10 pm to 7 am) and a five dB adjustment added to the sound levels occurring during the evening hours (7pm to 10 pm).
Decibel, dB	A unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Equivalent Continuous Sound Level (L_{eq})	The sound level corresponding to a steady state sound level containing the same total energy as a varying signal over a given sample period. L_{eq} is designed to average all of the loud and quiet sound levels occurring over a time period.
Maximum A-weighted Sound Level, (L_{max})	The greatest sound level measured on a sound level (L_{max}) meter during a designated time interval or event using fast time-averaging and A-weighting.
Sound Transmission Class, STC	A single number rating of the noise reduction of a building element.

ATTACHMENT 2
BACKGROUND INFORMATION/SUPPORTING DATA

1.0 INSTRUMENTATION

Noise measurements were conducted using a Larson-Davis Laboratories Model 700 (S.N. 2132) integrating sound level meter equipped with a Type 2551 1.25-centimeter (0.5-inch) pre-polarized condenser microphone with pre-amplifier. When equipped with this microphone, the sound level meter meets the current American National Standards Institute Standard for a Type 1 sound level meter. Also, a Larson-Davis Model 700 (S. N. 700-20) with a 1/4-inch microphone was used. This sound level meter is a Type 2 sound level meter. The sound level meters were calibrated before and after each measurement and the measurements were conducted with the microphones positioned 1.52 meters (5 feet) above the ground.

2.0 MEASUREMENT LOCATIONS AND INSTRUMENT SETUPS

Short-term noise measurements were typically selected to provide an unobstructed view to SR 163 or Friars Road. However, Sites 18 and 43 were conducted behind existing noise walls. Site 54 was at the toe of a berm. Noise measurements were conducted a minimum of ten feet from any vertical reflecting surface such as a wall or building.

The long-term noise measurement sites were situated along SR 163. These sites were selected to maximize the angle of view to SR 163.

3.0 MEASUREMENT PROCEDURES, DURATIONS AND REPETITIONS

To quantify the noise environment within the SR 163 and Friars Road corridor, noise measurements were made at 13 locations. Also, two background noise measurements were conducted outside the SR 163 corridor. Noise levels were measured continuously for a one-day period at two sites (Sites A and B). In addition, noise measurements were conducted for short time periods (10 to 20 minutes) adjacent to the road at 11 additional locations. All of these locations involved a single measurement repetition except as described in Section 3.3. Summary descriptions of long-term and short-term measurements are provided in the following three sub-sections.

3.1 Long-Term Noise Measurements

Noise levels were measured continuously for a one-day period at Sites A and B. Site A was monitored from 11:00 a.m. on April 27, 2004 to 2:00 p.m. on April 28, 2004. Site B was measured from 12:00 p.m. on April 27, 2004 to 3:00 p.m. on April 28, 2004. The purpose of these noise measurements is to determine the typical peak noisiest hour L_{eq} associated with traffic along SR 163 and the corresponding relationship between the noisiest hour and CNEL.

3.2 Short-Term Noise Measurements

Each of the short-term noise measurement locations was selected to represent frequent use areas, acoustical equivalence areas, or to calibrate the noise model; *i.e.*, the sites were clear of major obstructions between the source and receiver as well as reflecting building/wall surfaces.

Background noise measurements were also conducted.

3.3 Secondary Noise Measurements

Secondary noise measurements were conducted on August 18, 2004 (Sites 38 and 39) and March 9, 2005 (Sites 2, 38 and 39) and March 17, 2005 (Site 2), due to observed differences in measured and modeled noise levels at Sites 2, 38 and 39. These differences (i.e., 8, 7, and 7 dBA, respectively) were attributed to several factors including increasing complexity such as shielding from various obstacles (i.e., walls, buildings, topography), variable ground types (i.e., hard and soft) rather than homogenous conditions assumed by the model, as well as exceeding the normal accuracy prediction distance limits for the noise model at Sites 38 and 39 which are approximately 305 meters (1,000 feet) or more feet from SR 163.

The noise measurements indicated that excess noise attenuation does occur at these sites. Thus, a K-factor adjustment was used for these sites to account for the excess noise attenuation.

4.0 MEASURED NOISE DATA

As noted in Section 3.0 noise measurements included long-term and short-term measurements with the data summarized in Tables A-1 through and A-3.

TABLE A-1

Existing Measured Hourly Average Noise Levels
(Site A Approximately 59.5 meters [195 Feet] from the Centerline of SR 163)

Day	Start Time	L_{eq}
4/27/04	11:00 A.M.	79 dB
	12:00 Noon	79 dB
	1:00 P.M.	80 dB
	2:00 P.M.	80 dB
	3:00 P.M.	80 dB
	4:00 P.M.	80 dB
	5:00 P.M.	79 dB
	6:00 P.M.	79 dB
	7:00 P.M.	78 dB
	8:00 P.M.	77 dB
	9:00 P.M.	77 dB
	10:00 P.M.	76 dB
	11:00 P.M.	72 dB
4/28/04	12:00 Midnight	70 dB
	1:00 A.M.	68 dB
	2:00 A.M.	67 dB
	3:00 A.M.	67 dB
	4:00 A.M.	70 dB
	5:00 A.M.	75 dB
	6:00 A.M.	79 dB
	7:00 A.M.	80 dB
	8:00 A.M.	79 dB
	9:00 A.M.	78 dB
	10:00 A.M.	78 dB
	11:00 A.M.	78 dB
	12:00 Noon	78 dB
	1:00 P.M.	79 dB
	CNEL	82 dB

TABLE A-2

Existing Measured Hourly Average Noise Levels
(Site B Approximately 59.5 meters [195 Feet] from the Centerline of SR 163)

Day	Start Time	L_{eq}
4/27/04	12:00 Noon	75 dB
	1:00 P.M.	76 dB
	2:00 P.M.	76 dB
	3:00 P.M.	76 dB
	4:00 P.M.	77 dB
	5:00 P.M.	76 dB
	6:00 P.M.	77 dB
	7:00 P.M.	76 dB
	8:00 P.M.	74 dB
	9:00 P.M.	74 dB
	10:00 P.M.	72 dB
	11:00 P.M.	70 dB
4/28/04	12:00 Midnight	67 dB
	1:00 A.M.	66 dB
	2:00 A.M.	64 dB
	3:00 A.M.	65 dB
	4:00 A.M.	70 dB
	5:00 A.M.	75 dB
	6:00 A.M.	77 dB
	7:00 A.M.	78 dB
	8:00 A.M.	77 dB
	9:00 A.M.	77 dB
	10:00 A.M.	76 dB
	11:00 A.M.	76 dB
	12:00 Noon	77 dB
	1:00 P.M.	77 dB
	2:00 P.M.	76 dB
	CNEL	80 dB

TABLE A-3

Measured Average Noise Level and Concurrent Traffic Volumes

Site	Description	Date/Time	L_{eq}[1] (dBA)	Cars	MT[2]	HT[3]
2	2573 N. Judson, Backyard	3/9/05 7:00 to 7:10 AM	69	998/1371	23/20	8/16
8	2219 Judson St., Patio equivalent	4/28/04 1:25 to 1:35 PM	80	1268/870	21/17	12/12
18	1924 Hanford Dr., Front yard	4/28/04 1:55 to 2:05 PM	71	1132/885	20/22	15/7
26	1903 Cardigan Way, Backyard	8/18/04 10:55 to 11:05 AM	73	884/1127	15/18	14/14
38	7163 Cm Degrazia, Common area	3/9/05 7:45 -7:55 AM	63	863/1162	18/29	10/17
39	7067 Cm Degrazia, Near patio	3/9/05 7:45 - 7:55 AM	62	863/1162	18/29	10/17
41	123 Cm del la Reina, Near office building	5/12/04 12:55 to 1:05 PM	77	500/1110	7/18	6/14
43	2650 Teal Pl., Edge of backyard	4/28/04 10:05 - 10:15 AM	67	1025/785	17/19	17/12
46	Fletcher Elementary School, Edge of slope	4/28/04 2:40 to 2:50 PM	78	1415/917	16/18	19/3
54	7444 Mission Valley Rd., Homestead Suites Hotel, near west end unit	4/28/04 12:35 to 12:45 PM	62	1157/901	22/20	13/11
58	Friars Rd., Near right-of-way	4/27/04 1:30 to 1:50 PM	69	1081	6	24
BG1	Mission Valley Road	8/18/04 10:00 to 10:15 AM	50	-	-	-
BG2	Crandall Drive	8/18/04 12:30 to 12:45 PM	45	-	-	-

Notes: [1]Equivalent continuous A-weighted sound pressure level
[2]Medium trucks
[3]Heavy trucks
Lane direction (i.e., northbound or eastbound)/Lane direction (i.e., southbound or westbound)

5.0 METEOROLOGICAL CONDITIONS

The noise measurements were conducted during periods of stable atmospheric conditions.

Measurement conducted on April 27, 2004

During the short-term noise measurement the temperature was approximately 78 degrees Fahrenheit and the relative humidity was approximately 50 percent. The wind was west at 5 miles per hour. The sky was partly cloudy.

Measurements conducted on April 28, 2004

During these noise measurements the temperature was approximately 65 to 75 degrees Fahrenheit and the relative humidity was approximately 50 to 65 percent. The wind was southwest at 5 to 10 miles per hour. The sky was partly cloudy.

Measurements conducted on May 12, 2004

During these noise measurements the temperature was approximately 65 to 68 degrees Fahrenheit and the relative humidity was approximately 45 percent. The wind was west at 5 miles per hour. The sky was partly cloudy.

Measurements conducted on August 18, 2004

During this noise measurements the temperature was 79 degrees Fahrenheit and the relative humidity was approximately 50 percent. The wind was 2 mph from the west. The sky was partly cloudy.

Measurements conducted on March 9, 2005

During this noise measurements the temperature was 62 degrees Fahrenheit and the relative humidity was approximately 63 percent. The wind was 1 to 2 mph and from variable directions. The sky was cloudy.

6.0 TRAFFIC DATA AND SPEEDS

The existing traffic volume data and future year 2030 traffic data for the project was obtained from Linscott Law & Greenspan *(Traffic Evaluation Report Friars Road/SR 163 Interchange,* August 31, 2004). The relevant traffic data figures from the traffic study are included as attachments to this Appendix.

Travel speeds utilized for the project acoustical report consisted of 65 miles per hour for SR 163 and 50 mile per hour for Friars Road. These speeds correlated well with the results of the noise measurements and were used in the noise modeling. The SR 163 truck percentage used in the noise model for the peak (noisiest) hour average sound level was 2.4 percent medium trucks and 1.3 percent heavy trucks. This mix is based on the traffic mix estimates by Caltrans (Caltrans, February 2004, *2002 Annual Average Daily Truck Traffic on the California State Highway System*).

7.0 DATA REDUCTION, MEASUREMENT RESULTS

The measured noise levels and the noise levels calculated by the model are shown in Table A-4. Adjustments were also made to the measured noise levels to provide values corresponding to the noisiest hours as indicated in Section 9 of this Appendix.

TABLE A-4
Existing Noise Levels

Site	Location	Land Use	Number of Units Represented	Activity Category and NAC Leq(h)	Existing Worst Hour Noise Level, Leq(h), dBA	
					Measured	Calculated
A	Whinchat St., near right-of-way	U	-	D (--)	80	79
B	Hanford Dr., near right-of-way	U	-	D (--)	78	79
1	2585 Judson St., Patio	Ch	--	B (67)		77
2	2573 Judson St., Backyard	SF	4	B (67)	69	76
3	7580 Fulton St., Patio	MF	12	B (67)		66
4	7547 Fulton St., Backyard	SF	1	B (67)		75
5	7552 Judson Ct., Backyard	SF	2	B (67)		73
6	7541 Judson Ct., Backyard	SF	2	B (67)		71
7	2219 Judson St., Seating area	MF	outdoor use	B (67)	74	75
8	2219 Judson St., near building	MF	12	B (67)	80	80
9	2347 Judson St., Backyard	SF	4	B (67)		73
9b	Judson St., Backyard	SF	5	B (67)		71
10	2263 Judson St., Backyard	SF	8	B (67)		76
11	2223 Judson St., Backyard	SF	5	B (67)		75
12	2129 Judson St., Backyard	SF	3	B (67)		65
13	2113 Judson St., Backyard	SF	3	B (67)		63
14	2073 Judson St., Backyard	SF	2	B (67)		64
15	2045 Judson St., Backyard	SF	2	B (67)		66
16	1975 Hanford Dr., Backyard	SF	2	B (67)		75
17	1949 Hanford Dr., Backyard	SF	2	B (67)		75
18	1924 Hanford Dr., Front yard	SF	1	B (67)	71	73
19	1880 Hanford Dr., Backyard	SF	7	B (67)		67
20	1844 Hanford Dr., Backyard	SF	6	B (67)		67
21	1772 Hanford Dr., Backyard	SF	12	B (67)		66

TABLE A-4
Existing Noise Levels

Site	Location	Land Use	Number of Units Represented	Activity Category and NAC Leq(h)	Existing Worst Hour Noise Level, Leq(h), dBA	
					Measured	Calculated
22	1704 Hanford Dr., Backyard	SF	1	B (67)		74
23	7228 Tait St., Backyard	SF	3	B (67)		62
23b	Tait St., Backyard	SF	2	B (67)		67
24	7260 Tait St., Backyard	SF	5	B (67)		73
25	7296 Tait St., Backyard	SF	4	B (67)		71
26	1903 Cardigan Way, Backyard	SF	5	B (67)	73	74
27	7255 Courtney Dr., Backyard	SF	8	B (67)		72
28	7225 Courtney Dr., Backyard	SF	4	B (67)		62
28b	Courtney Dr., Backyard	SF	3	B (67)		68
29	7314 Linbrook Ct., Backyard	SF	4	B (67)		68
30	1747 Volta Ct., Backyard	SF	3	B (67)		74
31	1651 Regulus St., Backyard	SF	3	B (67)		70
32	1627 Regulus St., Backyard	SF	3	B (67)		68
33	1561 Regulus St., Backyard	SF	4	B (67)		68
34	Minden Dr., Backyard	SF	1	B (67)		71
35	1312 Minden Dr., Backyard	SF	1	B (67)		79
36	1332 Minden Dr., Backyard	SF	2	B (67)		74
37	1372 Minden Dr., Backyard	SF	5	B (67)		73
38	7163 Cm Degrazia, Common area	MF	4	B (67)	63	69
39	7067 Cm Degrazia, Near patio	MF	4	B (67)	62	69
40	Not Used					
41	123 Cm del la Reina, Near building	O	--	C (72)	77	77
42	2680 Teal Pl., Backyard	SF	2	B (67)		70
43	2650 Teal Pl., Edge of backyard	SF	2	B (67)	68	70

TABLE A-4
Existing Noise Levels

Site	Location	Land Use	Number of Units Represented	Activity Category and NAC Leq(h)	Existing Worst Hour Noise Level, Leq(h), dBA	
					Measured	Calculated
44	Fletcher School, Classroom Bldg.	S	--	B (67)/E (52)		63
45	Fletcher School, Playground	S	--	B (67)		64
46	Fletcher School, Edge of slope	S	--	D (--)	79	77
47	2144 Whinchat St., Backyard	SF	2	B (67)		72
48	2128 Whinchat St., Backyard	SF	2	B (67)		77
49	2112 Whinchat St., Backyard	SF	2	B (67)		71
50	2046 Whinchat St., Backyard	SF	2	B (67)		74
51	2030 Whinchat St., Backyard	SF	3	B (67)		75
52	1982 Whinchat St., Backyard	SF	3	B (67)		76
53	7460 Mission Valley Rd., Patio	O	--	C (72)		62
54	7444 Mission Valley Rd., West end unit	H	4	B (67)	63	63
55	7420 Mission Valley Rd., Edge of building	O	--	C (72)		74
56	1450 Frazee Rd., Edge of building	O	--	C (72)		70
57	5624 Friars Rd., Edge of building	C	--	C (72)		73
58	Friars Rd., Near right-of-way	C	-	D (--)	69	71
59	7600 Friars Rd., Edge of building	C	--	C (72)		74
60	7450 Hazard Center Dr., Tennis court	H	Tennis Cts.	B (67)		70
61	Not Used					
62	Not Used					
63	591 Cm del la Reina, Edge of building	O	--	C (72)		77

Notes: All measurements shown reflect worst hour noise levels, *i.e.*, they are adjusted to worst hour traffic characteristics based on Section N–3312 (TeNS).
SF = single family home; MF = multi-family; H = hotel/motel; C = commercial use; Ch = church; S = school; U= undeveloped land, O = Office

8.0 MODEL CALIBRATION CONSTANT

Noise model calibration is generally defined as the process of adjusting calculated noise levels by adding a calibration constant derived from the difference between measured and calculated noise levels at representative sites. The difference called the calibration constant, is defined as measured noise level minus calculated noise level. A calibration constant was utilized for Sites 2, 38, and 39. As indicated in Table A-4, receiver Sites 2, 38, and 39 have measured and calculated differences ranging from seven to eight dBA. These sites are either located in relatively complex environments with multiple intervening barriers (i.e., walls, topography or buildings) or very distant from the freeway. In all these situations the noise model cannot calculate traffic noise as accurately as in areas closer to the noise source or with fewer intervening structures and homogeneous ground conditions. Thus, calibration constant (K-constant) adjustments (the difference between measured and calculated noise levels) were used for Sites 2, 38 and 39. The K-constant is applied due to the inability of the model to adequately account for existing obstacles or other site features that provide excess noise attenuation. The model was checked for accuracy as far as inclusion of natural barriers, locations and elevations of receptors, barriers, roads, etc.

9.0 MEASUREMENT ADJUSTMENT IF NOT TAKEN DURING THE WORST NOISE HOUR

Short-term noise measurements were adjusted to the worst noise hour value as outlined in Section N–3312 of the Technical Noise Supplement (Caltrans, October 1998). Table A-5 shows the adjusted values.

TABLE A-5
Summary of Model Input Validation and Adjusting Other-Than-Noisiest-Hour

Site A	Traffic Volume During Noise Measurment[1] B	Hourly Equivalent Traffic During Noise Measurement[1] C	Measured Leq, dBA D	Calculated Leq, dBA E	Difference between E and F, dBA (E-D) F	Calculated Worst Hour Leq, dBA G	Difference between F and H, dBA (G-E) H	Measured Noise Level adjusted to worst Hour, dBA (D+H) I
2	853/19/11 (NB) 964/27/12 (SB)	5118/114/66 (NB) 5784/162/72 (SB)	67	75	+8	76	+1	68
	998/23/8 (NB) 1371/20/16 (SB)	5988/138/48 (NB) 8226/120/96 (SB)	69	76	+7	76	0	69
8	1268/21/12 (NB) 870/17/12 (SB)	7608/126/72 (NB) 5220/102/72 (SB)	80	80	0	80	0	80
18	1132/20/15 (NB) 885/22/7 (SB)	6792/120/90 (NB) 5310/132/42 (SB)	71	73	+2	73	0	71
26	884/15/14 (NB) 1127/18/14 (SB)	5304/90/84 (NB) 6792/108/84 (SB)	73	74	+1	74	0	73
38	-	-	60	67	+7	69	+2	62
	863/18/10 (NB) 1162/29/17 (SB)	5178/108/60 (NB) 6972/174/102 (SB)	63	69	+6	69	0	63
39	-	-	60	67	+7	69	+2	62
	863/18/10 (NB) 1162/29/17 (SB)	5178/108/60 (NB) 6972/174/102 (SB)	62	69	+6	69	0	62
41	500/7/6 (NB) 1110/18/14 (SB)	3000/42/36 (NB) 6660/108/84 (SB)	77	77	0	77	0	77
43	1025/17/17 (NB) 785/19/12 (SB)	6150/102/102 (NB) 4710/114/72 (SB)	67	69	+2	70	+1	68
46	1415/16/19 (NB) 917/18/3 (SB)	8490/96/114 (NB) 5502/108/18 (SB)	78	76	-2	77	+1	79

54	1157/22/13 (NB) 901/20/11 (SB)	6942/132/78 (NB) 5406/120/66 (SB)	62	62	0	63	+1	63
58	1081/6/24	3243/18/72	69	71	+2	71	0	69
62	971/17/13 (NB) 977/12/12 (SB)	5826/102/78 (NB) 5862/72/72 (SB)	74	75	+1	76	+1	75

[1] cars/medium trucks/heavy trucks

NOISE MEASUREMENT LOCATIONS

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68
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ASPH
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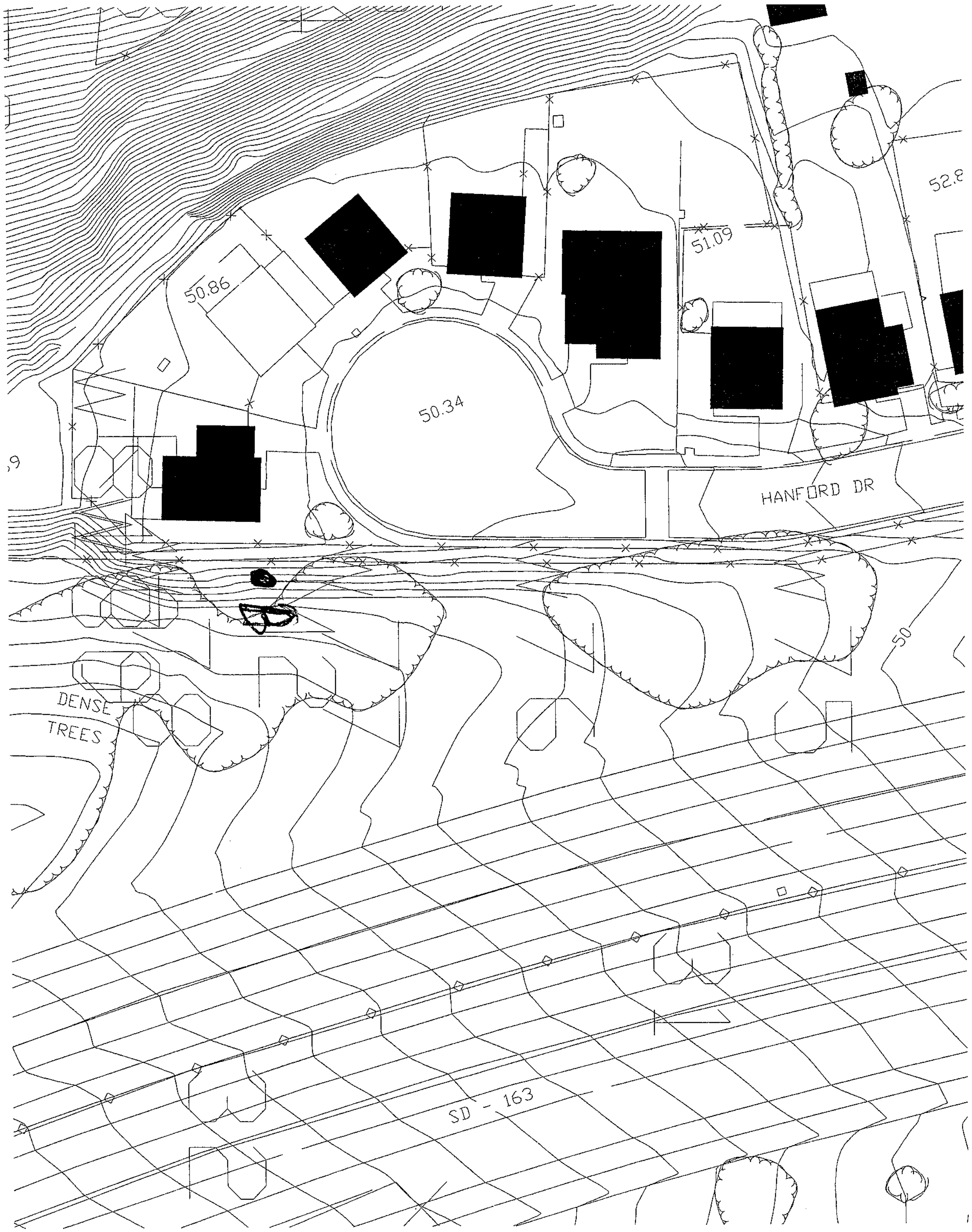
89.97
HORNBILL AV
DENSE
TREES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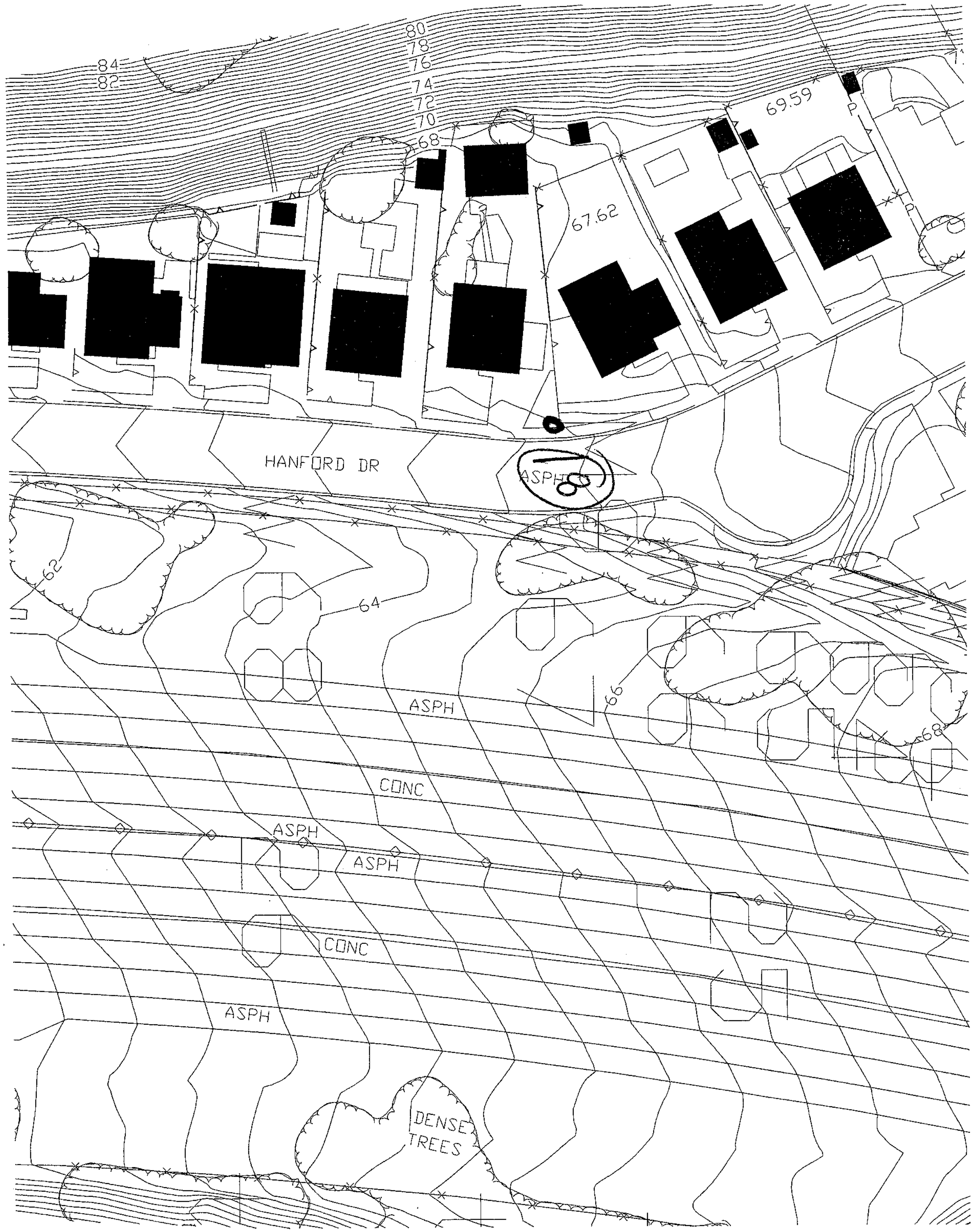

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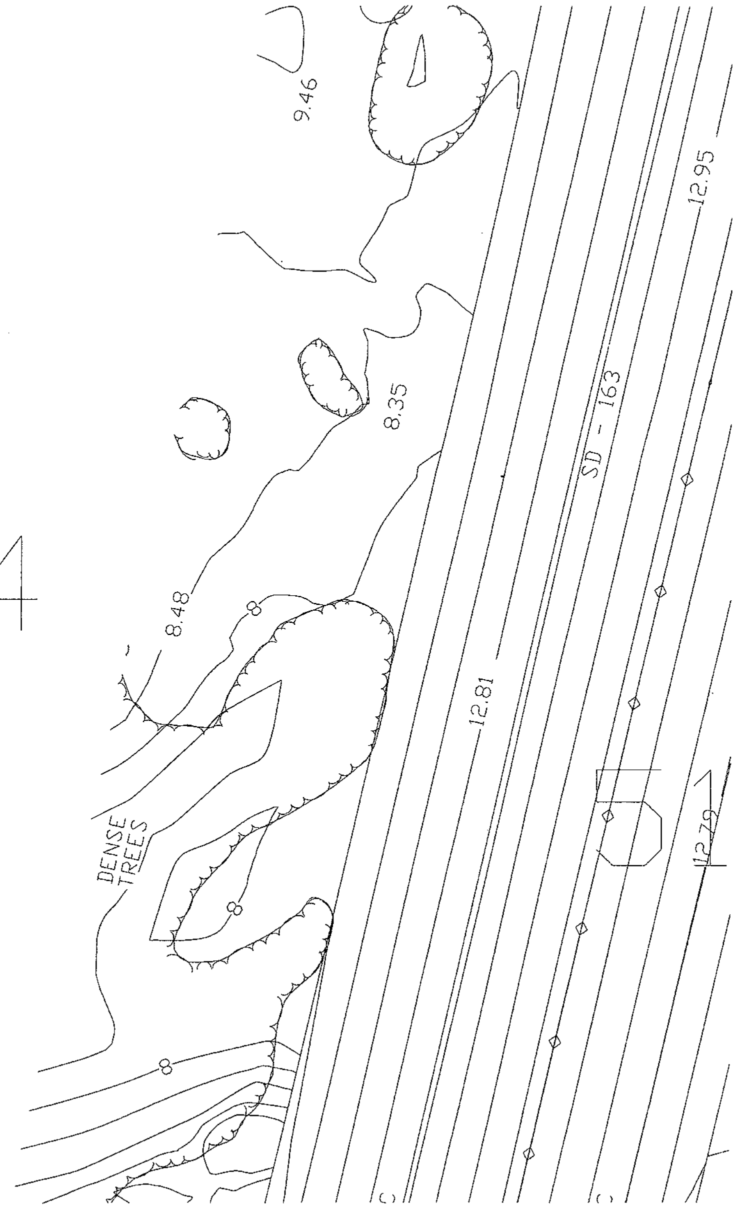

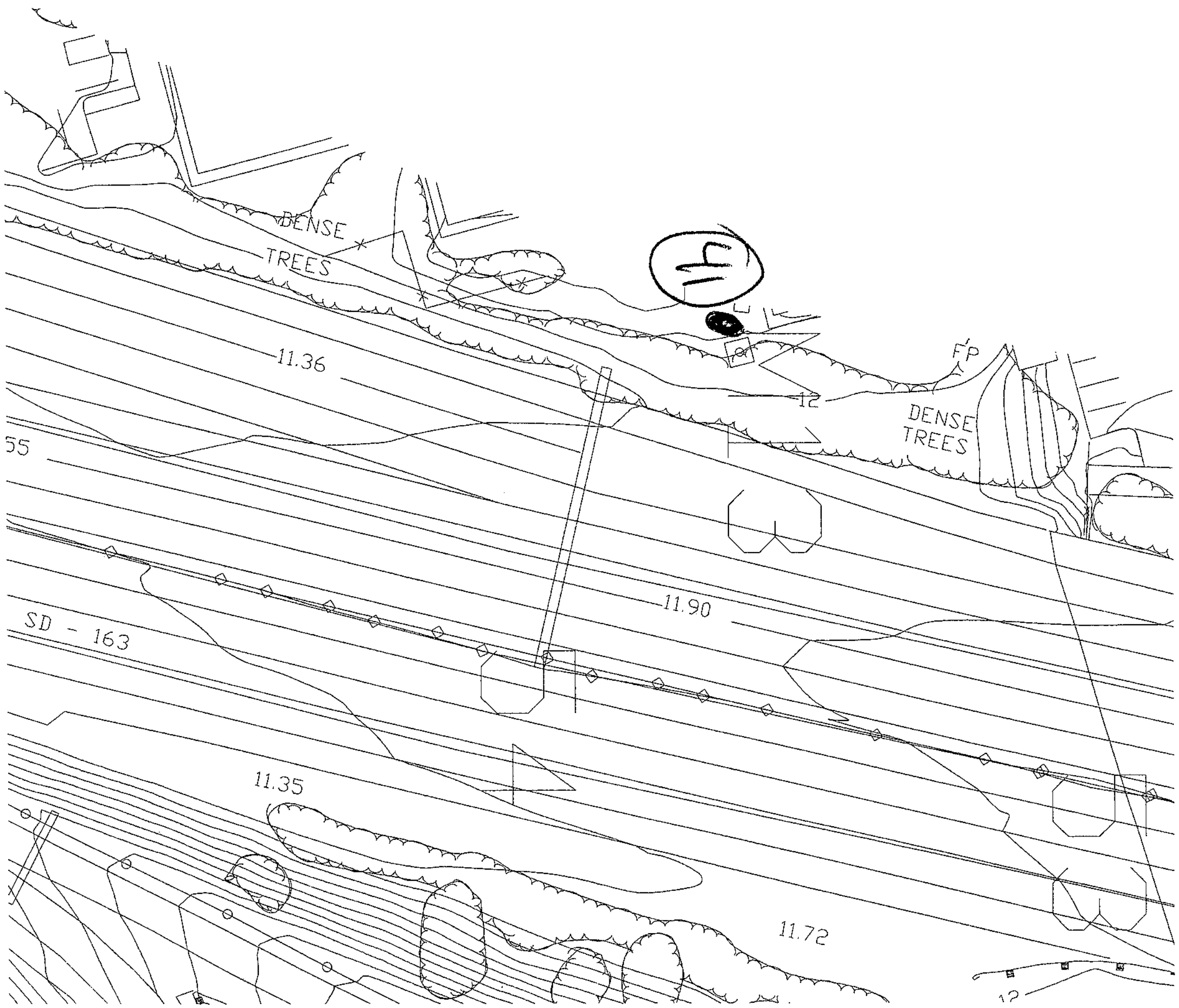
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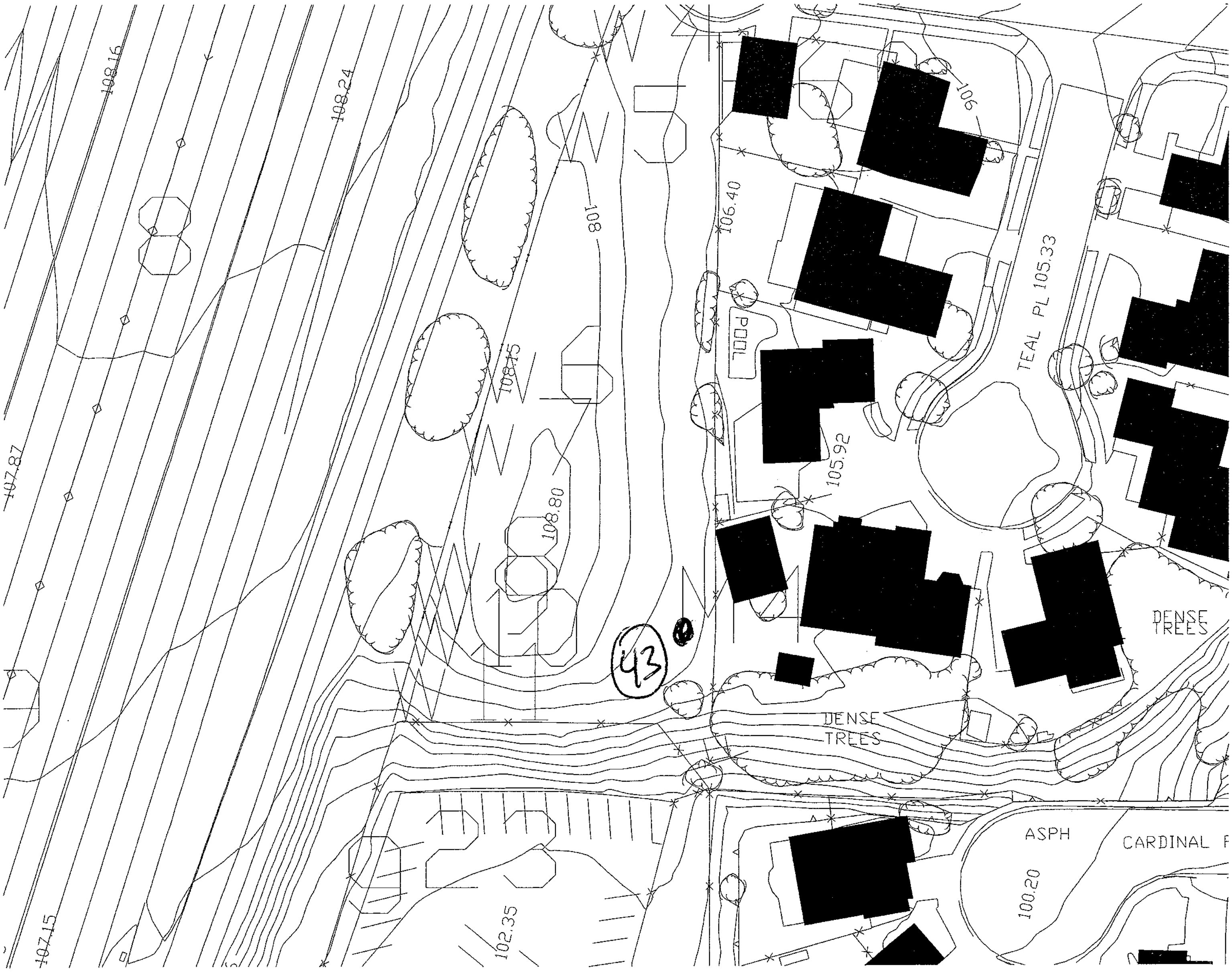
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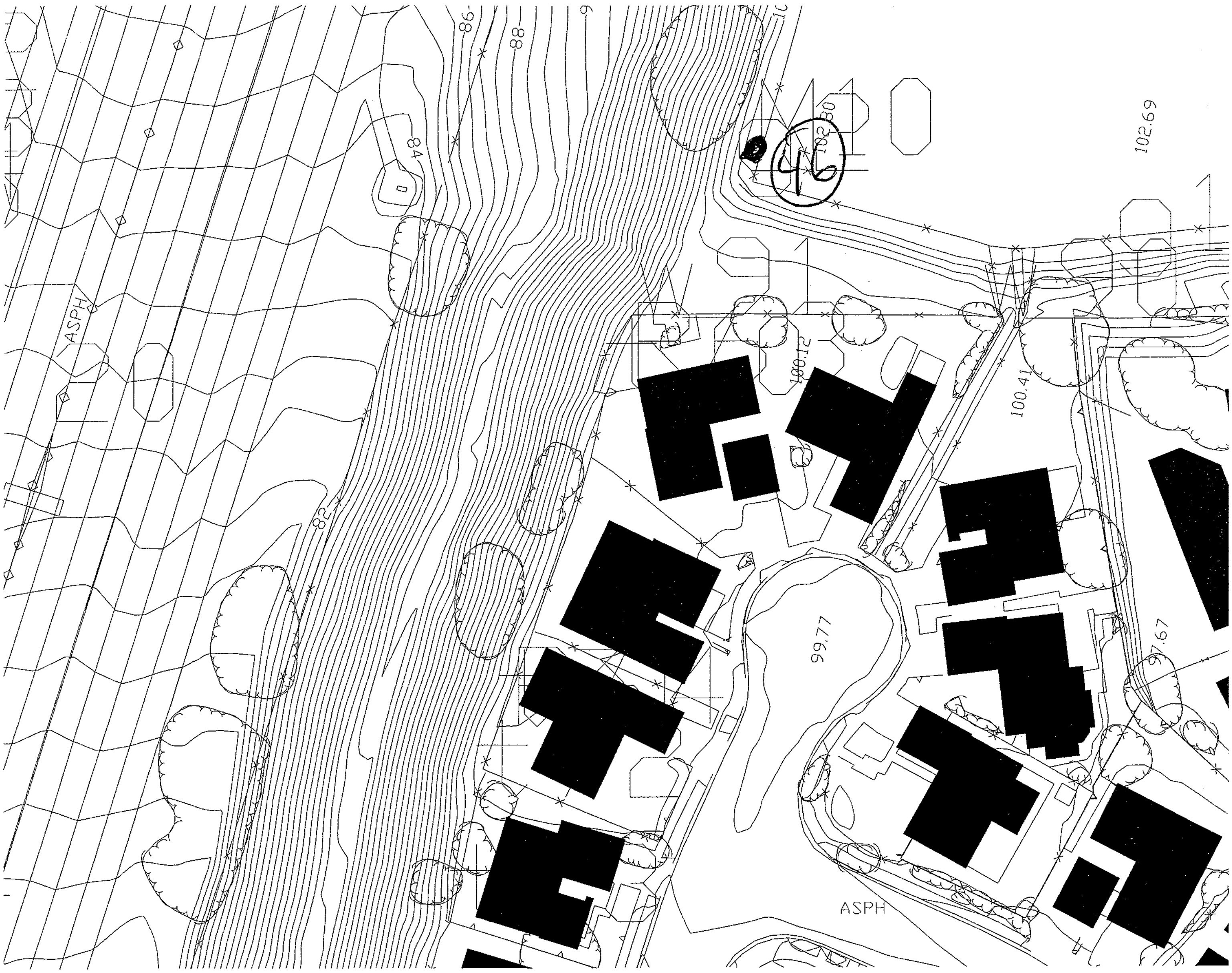

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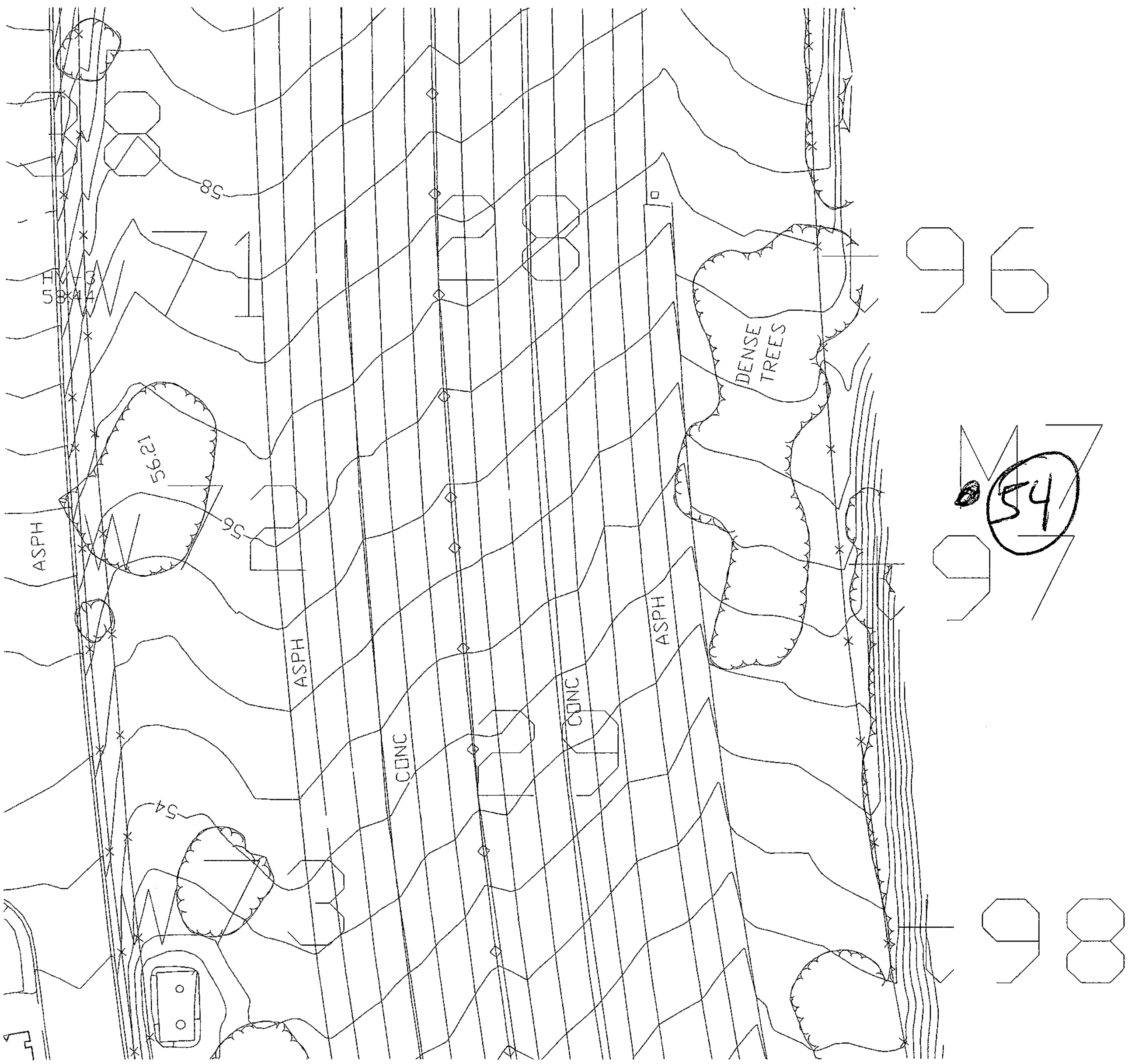
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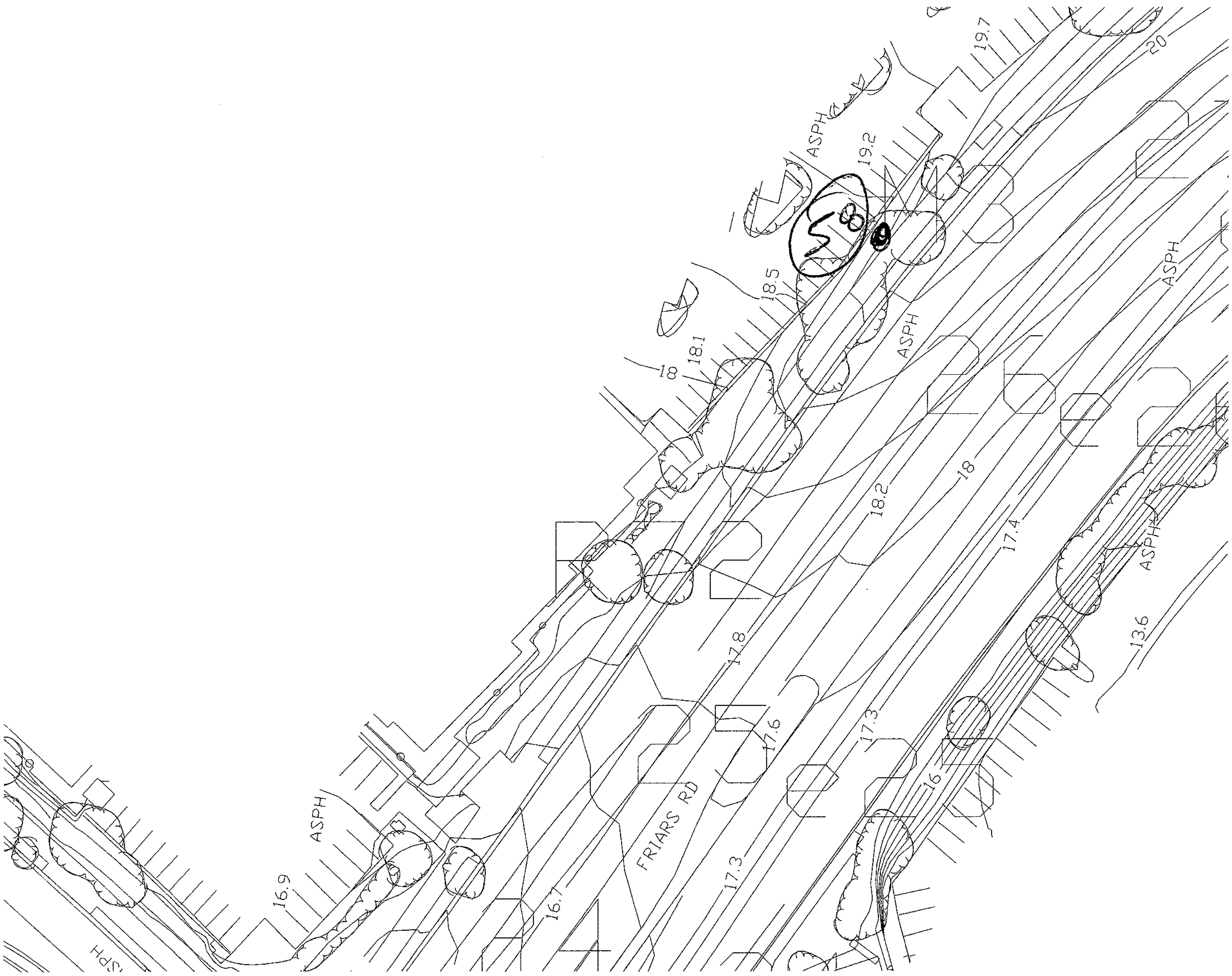
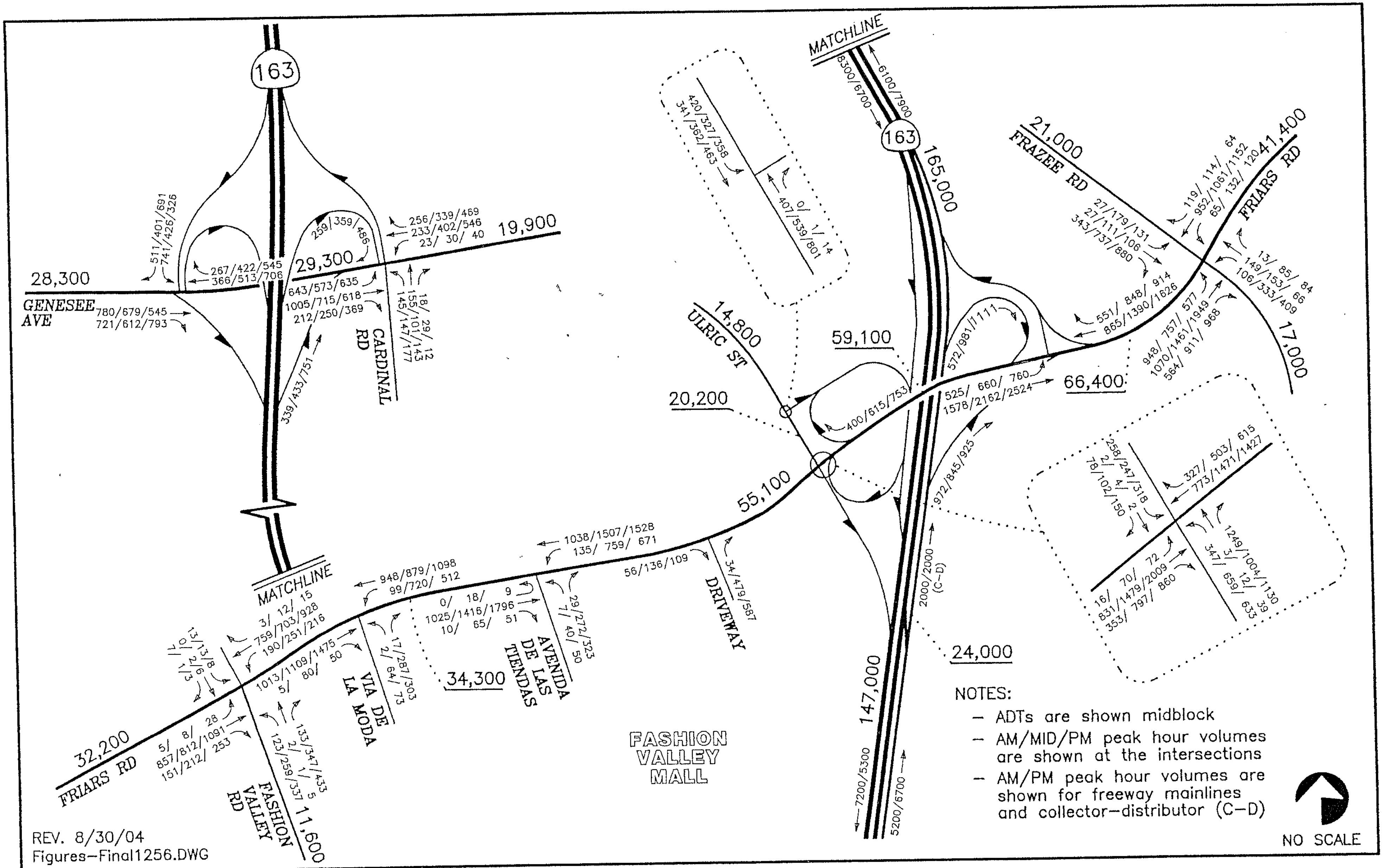
98
54



FRIARS RD
ASPH
ASPH
ASPH
ASPH
ASPH
19.7
20
19.2
18.5
18.1
18
18.2
18
17.4
17.8
17.6
17.3
17.3
16.9
16.7
16
13.6


M12
61
M11
62
10.42
10
9.45

TRAFFIC DATA

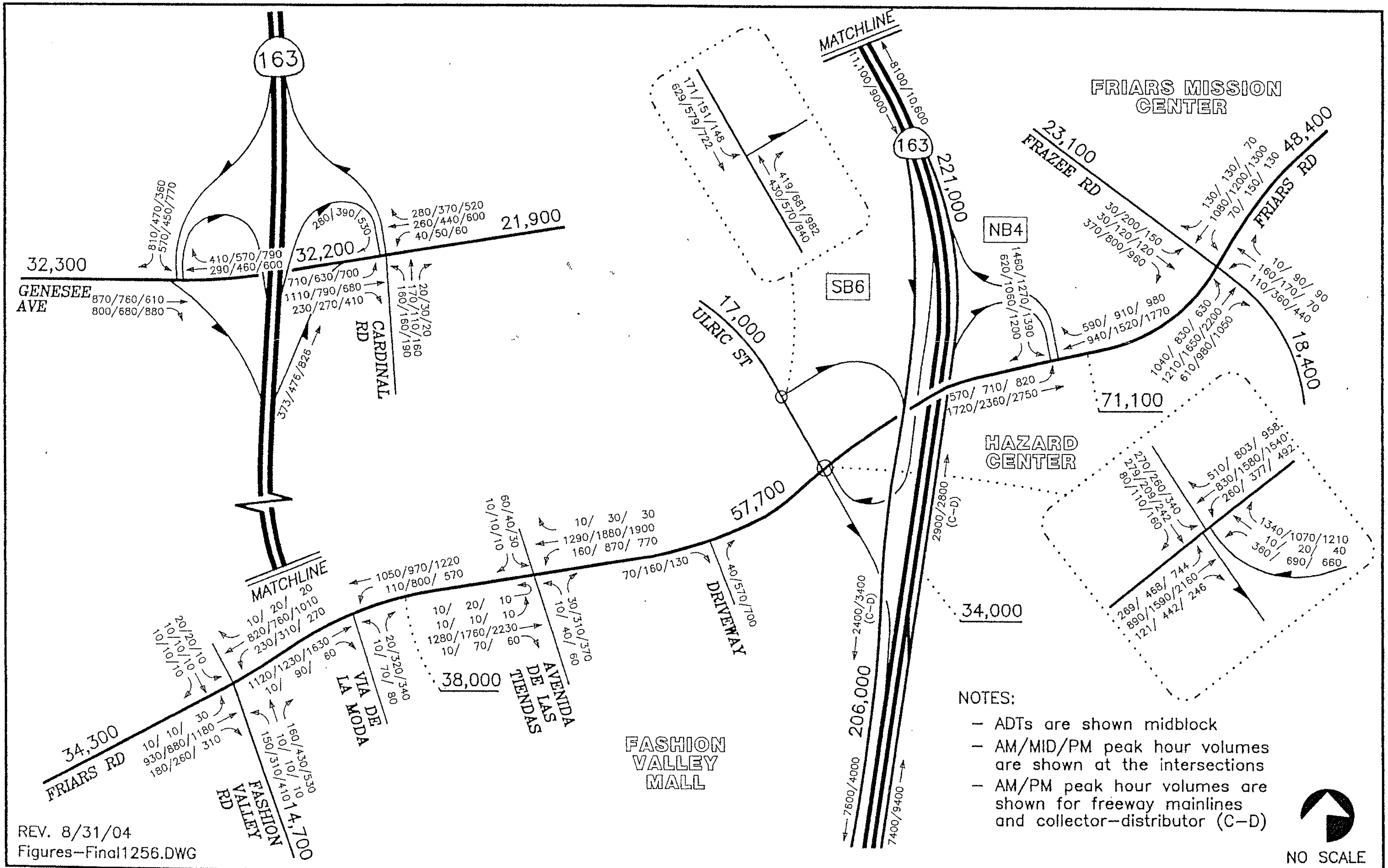


LINSCOTT LAW & GREENSPAN engineers

Figure 2-2

EXISTING TRAFFIC VOLUMES AM/MIDDAY/PM PEAK HOURS & ADTs

FRIARS RD/SR-163 INTERCHANGE

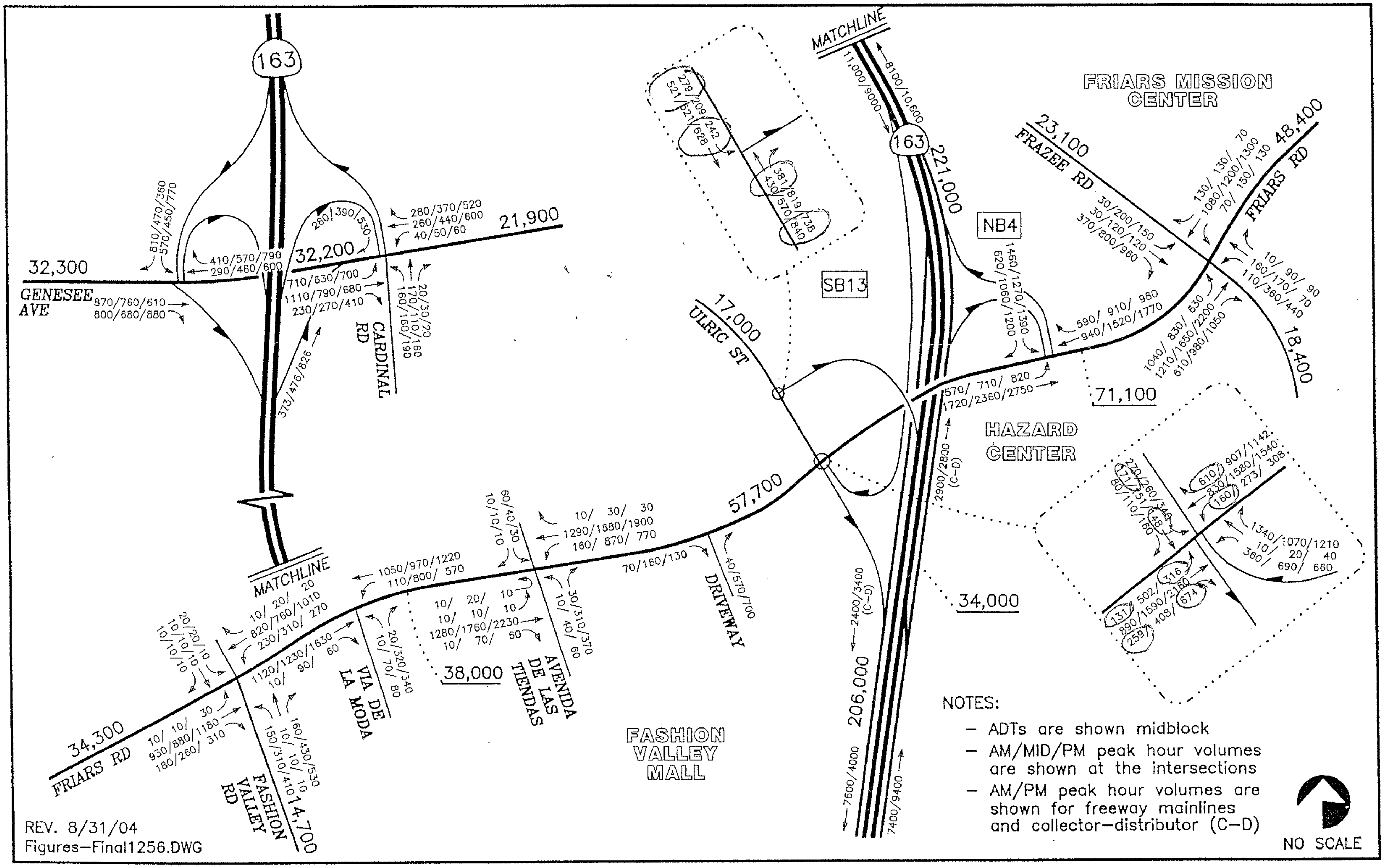


LINSCOTT LAW & GREENSPAN engineers

Figure 8–5

SB6/NB4 TRAFFIC VOLUMES YEAR 2030

FRIARS RD/SR–163 INTERCHANGE



LINSCOTT LAW & GREENSPAN engineers

Figure 11–5

SB13/NB4 TRAFFIC VOLUMES YEAR 2030

FRIARS RD/SR–163 INTERCHANGE

ATTACHMENT 3

SOUND32 INPUT/OUTPUT

SR 163/Friars Road West Side, South End existing conditions (S163WS.EX)

```
T-SR 163, 1
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 2
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 3
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 4
 5104 , 65 , 127 , 65 , 69 , 65
T-SR 163, 5
 5104 , 65 , 127 , 65 , 69 , 65
T-SR 163, 6
 7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 7
 7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 8
 7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 9
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 10
 6452 , 65 , 161 , 65 , 87 , 65
T-FRIAR'S ROAD, 11
 1960 , 50 , 41 , 50 , 41 , 50
T-Friars Road, 12
 2438 , 50 , 51 , 50 , 51 , 50
T-FRIARS ROAD, 13
 3319 , 50 , 69 , 50 , 69 , 50
T-Friars Road, 14
 3354 , 50 , 70 , 50 , 70 , 50
T-SR 163, 15
 1070 , 35 , 27 , 35 , 14 , 35
T-SR 163, 16
 1735 , 35 , 43 , 35 , 23 , 35
T-SR 163, 17
 880 , 55 , 22 , 55 , 12 , 55
T-SR 163 COLLECTOR, 18
 2806 , 65 , 70 , 65 , 38 , 65
T-SR 163, 19
 891 , 55 , 22 , 55 , 12 , 55
T-SR 163 COLLECTOR, 20
 1577 , 65 , 39 , 65 , 21 , 65
T-WB I-8 RAMP (FROM SR 163), 21
 1 , 55 , 1 , 55 , 1 , 55
T-WB I-8, 22
 1 , 65 , 1 , 65 , 1 , 65
L-SOUTHBOUND A, 1
N,16153,32682,370,S1
N,16090,32484,366,S2
N,16026,32284,365,S3
N,15964,32084,363,S4
N,15901,31884,360,S5
N,15837,31684,359,S6
N,15775,31483,357,S7
N,15711,31284,354,S8
N,15647,31083,353,S9
N,15583,30883,350,S10
N,15520,30683,347,S11
N,15457,30483,342,S12
N,15394,30283,337,S13
```

N,15329,30083,330,S14
N,15265,29882,321,S15
15202,29682,312,S16
L-SOUTHBOUND B, 2
N,15202,29682,312,S16
N,15139,29482,302,S17
N,15075,29282,291,S18
N,15013,29082,280,S19
N,14949,28882,269,S20
N,14885,28681,258,S21
N,14823,28481,248,S22
N,14760,28280,239,S23
N,14706,28078,229,S24
N,14668,27876,218,S25
N,14644,27673,207,S26
N,14632,27471,198,S27
N,14636,27268,187,S28
N,14652,27066,177,S29
N,14682,26864,167,S30
14726,26662,157,S31
L-SOUTHBOUND C, 3
N,14726,26662,157,S31
N,14785,26460,146,S32
N,14859,26258,135,S33
N,14941,26058,123,S34
N,15023,25859,112,S35
N,15098,25661,100,S36
N,15151,25465,89,S37
N,15182,25268,79,S38
N,15195,25072,69,S39
N,15187,24876,59,S40
N,15161,24679,51,S41
L-SB N/O FRIARS ROAD, 4
N,15161.,24679,51,S41
N,15117.,24480,47,S42
N,15072.,24280,42,S43
N,15025.,24080,39,S44
N,14980.,23880,39,S45
N,14934.,23680,39,S46
N,14888.,23480,39,S47
N,14842.,23280,40,S48
N,14798.,23080,41,S49
N,14751.,22880,42,S50
N,14705.,22680,42,S51
N,14659.,22479,41,S52
N,14613.,22280,40,S53
N,14569.,22080,38,S54
L-SOUTHBOUND D, 5
N,14569.,22080,38,S54
N,14517.,21880,38,S55
N,14469.,21677,38,S56
N,14446.,21474,38,S57
14436.,21273,38,S58
L-NORTHBOUND A, 6
N,16222,32661,370,N1
N,16159,32462,366,N2
N,16095,32262,365,N3
N,16032,32062,363,N4
N,15969,31862,360,N5
N,15906,31662,359,N6

N,15843,31462,357,N7
N,15780,31262,354,N8
N,15716,31062,353,N9
N,15652,30861,350,N10
N,15589,30661,347,N11
N,15526,30461,342,N12
N,15463,30261,337,N13
N,15398,30061,330,N14
N,15334,29861,321,N15
15271,29660,312,N16
L-NORTHBOUND B, 7
N,15271,29660,312,N16
N,15208,29460,302,N17
N,15144,29260,291,N18
N,15081,29060,280,N19
N,15017,28860,269,N20
N,14954,28660,258,N21
N,14892,28460,248,N22
N,14829,28260,236,N23
N,14777,28062,226,N24
N,14739,27865,215,N25
N,14715,27667,205,N26
N,14705,27469,195,N27
N,14708,27272,185,N28
N,14724,27074,175,N29
N,14753,26877,165,N30
14796,26680,154,N31
L-NORTHBOUND C, 8
N,14796,26680,154,N31
N,14853,26482,144,N32
N,14926,26284,133,N33
N,15008,26085,123,N34
N,15090,25885,113,N35
N,15166,25683,103,N36
N,15221,25480,93,N37
N,15254,25277,82,N38
N,15267,25073,72,N39
N,15259,24869,62,N40
N,15232,24666,54,N41
L-NB (N/O FRIARS), 9
N,15232.,24666,54,N41
N,15188.,24465,49,N42
N,15142.,24264,42,N43
N,15096.,24064,39,N44
N,15050.,23864,39,N45
N,15004.,23664,39,N46
N,14958.,23464,39,N47
N,14913.,23264,40,N48
N,14868.,23064,41,N49
N,14821.,22864,42,N50
N,14775.,22664,42,N51
N,14729.,22463,41,N52
N,14684.,22264,39,N53
N,14639.,22063,38,N54
L-NORTHBOUND D, 10
N,14639.,22063,38,N54
N,14587.,21863,37,N55
N,14540.,21665,37,N56
N,14518.,21468,38,N57
14508.,21269,38,N58

L-WESTBOUND (West Segment), 11
N,13443,23865,39,1
N,13703,23889,37,2
N,13950,23921,35,3
N,14080,23945,35,4
N,14204,23982,34,5
N,14327,24028,34,6
N,14451,24091,39,7
N,14576,24167,48,8
L-Westbound (Middle Segment), 12
N,14576.,24167,48,8
N,14675.,24229,54,9
N,14779.,24295,61,10
N,14880.,24360,67,11
N,15004.,24433,74,12
N,15121.,24487,77,13
N,15246.,24534,78,14
N,15368.,24571,77,15
N,15492.,24599,74,16
N,15634.,24613,65,17
N,15749.,24624,59,18
N,15887.,24642,52,19
N,16015.,24667,49,20
N,16141.,24723,49,21
16261.,24799,49,22
L-EASTBOUND (West Segment), 13
N,13447,23805,40,E1
N,13706,23828,38,E2
N,13964,23862,37,E3
N,14101,23890,36,E4
N,14228,23925,35,E5
N,14358,23976,36,E6
N,14463,24031,39,E7
N,14617,24127,48,E8
L-Eastbound (Middle Segment), 14
N,14617.,24127,48,E8
N,14706.,24185,52,E9
N,14831.,24265,59,E10
N,14945.,24336,66,E11
N,15056.,24396,71,E12
N,15163.,24445,73,E13
N,15266.,24484,74,E14
N,15374.,24516,73,E15
N,15501.,24544,70,E16
N,15658.,24568,64,E17
N,15772.,24579,59,E18
N,15905.,24593,54,E19
N,16062.,24629,51,E20
N,16180.,24678,51,E21
N,16329.,24774,52,E22
L-SB ON-RAMP (@NW Friars), 15
N,14849,24373,67,X1
N,14757,24325,61,X2
N,14643,24361,59,X3
N,14621,24455,64,X4
N,14705,24564,69,X5
N,14866,24658,57,X6
N,15020,24620,46,X7
15055,24539,44,X8
L-SB OFF-RAMP (S/O Friars), 16

N,14986,24227,39,X9
N,14941,24067,39,X10
N,14848,24019,37,X11
N,14774,24055,43,X12
14735,24111,49,X13
L-NB ON-RAMP (NE Friars), 17
N,15823,24657,54,X20
N,15725,24709,61,X22
N,15672,24845,67,X23
N,15486,25003,77,X24
N,15357,25221,84,X25
L-COLLECTOR/NB ON-RAMP (N/O FRI, 18
N,15310.,25369,90,X47
N,15295.,25497,97,X26
N,15232.,25725,109,X27
N,15037.,26143,125,X28
N,14867.,26559,144,X29
L-NB OFF-RAMP (S/O FRIARS), 19
N,15119,23754,37,X30
N,15198,24006,38,X31
N,15292,24257,44,X32
N,15403,24411,59,X33
15591,24526,65,X34
L-Collector Lane (N/O I-8), 20
N,14812,22297,39,X40
N,14808,22447,39,X41
N,14941,23057,41,X42
N,15064,23547,38,X43
N,15244,24414,44,X44
N,15314,24829,66,X45
N,15329,25136,79,X46
15310,25369,90,X47
L-WESTBOUND I-8 ON-RAMP (FROM S, 21
N,13637,20906,47,X50
N,13921,21106,50,X51
N,14249,21491,46,X52
14438,21800,37,X53
L-WESTBOUND I-8, 22
N,13665,20820,51,X60
N,14045,20994,56,X61
N,14444,21222,61,X62
N,14836,21443,61,X63
N,15210,21597,52,X64
15718,21744,41,X65
B-Existing Wall 4, 1 , 2 , 0 ,0
14611,28074,228,232,W60
14599,28031,228,232,W61
14577,27965,225,229,W62
14569,27941,225,229,W63
14564,27922,221,225,W64
14560,27891,220,224,W65
14553,27844,218,222,W66
14545,27788,215,220,W67
14534,27672,210,215,W68
14525,27498,203,208,W69
14523,27406,200,205,W70
B-Existing Wall 4, 2 , 2 , 0 ,0
14523,27406,200,205,W70
14527,27257,190,195,W71
14533,27158,184,189,W72

14548,27012,177,183,W73
14573,26853,171,176,W74
14598,26724,164,169,W75
14596,26613,164,169,W76
14594,26530,166,171,W77
14593,26449,167,172,W78
14575,26427,169,169,W79
14575,26423,170,170,W80
B-Existing Wall 4, 3 , 2 , 0 ,0
14575,26423,170,170,W80
14519,26425,170,170,W81
B-Topography, 4 , 1 , 0 ,0
13501,24315,216,216,F1
13716,24378,216,216,F2
13791,24399,213,213,F3
13801,24406,215,215,F4
13978,24449,215,215,F5
14112,24582,215,215,F6
14123,24605,216,216,F7
14132,24627,216,216,F8
14139,24647,216,216,F9
14109,24721,216,216,F10
14062,24798,216,216,F11
B-Topography, 5 , 1 , 0 ,0
14062,24798,216,216,F11
14011,24861,216,216,F12
13920,24938,215,215,F13
13820,24989,215,215,F14
B-Topography, 6 , 1 , 0 ,0
14484,24937,192,192,F20
14496,24918,192,192,F21
14498,24912,189,189,F22
14529,24878,185,185,F23
14550,24844,175,175,F24
14603,24788,175,175,F25
14622,24774,175,175,F26
14660,24763,175,175,F27
14706,24757,171,171,F28
14755,24771,167,167,F29
14779,24777,166,166,F30
B-Topography, 7 , 1 , 0 ,0
14779,24777,166,166,F30
14820,24799,162,162,F31
14878,24850,153,153,F32
14910,24880,149,149,F33
14942,24911,144,144,F34
14983,24951,138,138,F35
15023,24993,131,131,F36
15053,25035,130,130,F37
15075,25075,126,126,F38
15072,25120,128,128,F39
15077,25238,130,130,F40
B-Topography, 8 , 1 , 0 ,0
15077,25238,130,130,F40
15044,25243,131,131,F41
15040,25246,133,133,F42
14949,25251,133,133,F43
14920,25222,133,133,F44
14844.,25109,139,139,F44b
14675.,24969,185,185,F44c

B-Topography, 9 , 1 , 0 ,0
14784,25286,238,238,F50
14802,25363,239,239,F51
14805,25429,243,243,F52
14813,25501,246,246,F53
14824,25561,248,248,F54
14824,25575,248,248,F55
14838,25636,253,253,F56
14847,25676,254,254,F57
14850,25730,256,256,F58
14822,25782,256,256,F59
14784,25793,256,256,F60
B-Topography, 10 , 1 , 0 ,0
14784,25793,256,256,F60
14760,25839,259,259,F61
14720,25905,259,259,F62
14666,25963,259,259,F63
14576,25989,261,261,F64
14512,26017,261,261,F65
14441,26086,262,262,F66
14431,26096,264,264,F67
14430,26156,264,264,F68
14432,26245,264,264,F69
14395,26275,266,266,F70
B-Topography, 11 , 1 , 0 ,0
14395,26275,266,266,F70
14373,26319,266,266,F71
14333,26365,267,267,F72
14282,26443,274,274,F73
14289,26512,274,274,F74
14280,26551,276,276,F75
14256,26588,276,276,F76
B-Topography, 12 , 1 , 0 ,0
14790,28673,279,279,T40
14765,28598,274,274,T41
14743,28524,271,271,T42
14719,28449,267,267,T43
14697,28379,262,262,T44
14680,28326,259,259,T45
14667,28282,256,256,T46
14651,28226,254,254,T47
14645,28199,253,253,T48
14637,28171,246,246,T49
14629,28143,238,238,T50
B-Topography, 13 , 1 , 0 ,0
14629,28143,238,238,T50
14623,28121,231,231,T51
14621,28115,230,230,T52
14611.,28074,228,228,T52b/W60
R, 1 , 67 ,500
14610,26503,164.,M2/B
R, 2 , 67 ,500
13773,24373,212.,M6/39
R, 3 , 67 ,500
14129,24638,222.,M6B/38
R, 4 , 67 ,500
14504,27807,221.,M9/18
R, 5 , 67 ,500
14493,22158,46.,M13/41
R, 6 , 67 ,500

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14471,22752,35.,M14/40
R, 7 , 67 ,500
14562,28076,236.,R35/16
R, 8 , 67 ,500
14583,28026,233.,R36/17
R, 9 , 67 ,500
14475,27524,212.,R37/19
R, 10 , 67 ,500
14475,27311,202.,R38/20
R, 11 , 67 ,500
14509,26913,179.,R39/21
R, 12 , 67 ,500
14548,26435,174.,R40/22
R, 13 , 67 ,500
14423,26241,271.,R41/30
R, 14 , 67 ,500
14681,25930,264.,R42/31
R, 15 , 67 ,500
14827,25732,262.,R43/32
R, 16 , 67 ,500
14796,25433,248.,R44/33
R, 17 , 67 ,500
15040,25227,135.,R45/34
R, 18 , 67 ,500
15063,25062,133.,R46/35
R, 19 , 67 ,500
14954,24934,146.,R47/36
R, 20 , 67 ,500
14815,24808,167.,R48/37
R, 21 , 67 ,500
14581,24825,182.,R49/
D, 4.5
ALL,4,5,6
C,C
```

97	-	0.*
98	-	0.*
99	-	0.*

T50	23.9	BERM
T51	6.4	BERM
T52	42.2	BERM

0 1 2 3 4 5 6 7

1

REC	REC ID	DNL	PEOPLE	LEQ(CAL)	
1	M2/B	67.	500.	78.6	
2	M6/39	67.	500.	69.1	-7 = 62
3	M6B/38	67.	500.	69.3	-7 = 62
4	M9/18	67.	500.	72.9	
5	M13/41	67.	500.	76.8	
6	M14/40	67.	500.	71.3	-9 = 62
7	R35/16	67.	500.	75.4	
8	R36/17	67.	500.	75.4	
9	R37/19	67.	500.	73.3	
10	R38/20	67.	500.	73.4	
11	R39/21	67.	500.	72.6	
12	R40/22	67.	500.	73.6	
13	R41/30	67.	500.	74.0	
14	R42/31	67.	500.	70.1	
15	R43/32	67.	500.	67.7	
16	R44/33	67.	500.	68.0	
17	R45/34	67.	500.	70.7	
18	R46/35	67.	500.	78.7	
19	R47/36	67.	500.	74.3	
20	R48/37	67.	500.	73.3	
21	R49/	67.	500.	67.4	

BARRIER TYPE	COST
BERM	0.
MASONRY	72443.
MASONRY/JERSEY	0.
CONCRETE	0.

TOTAL COST = $ 72000.

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION

4. 4. 4. 4. 4. 4. 5. 5. 5. 5. 5. 5. 6. 6. 5. 5. 5. 5. 3. 0. 0. 0. 0. 0. 0
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

SR 163/Friars Road West Side, North End existing conditions (S163WN.EX)
T-SR 163, 1
6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 2
6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 3
7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 4
7608 , 65 , 190 , 65 , 103 , 65
T-GENESEE AVENUE, 5
1284 , 45 , 27 , 45 , 27 , 45
T-GENESEE AVENUE, 6
1341 , 45 , 28 , 45 , 28 , 45
T-SR 163, 7
764 , 55 , 19 , 55 , 10 , 55
T-SR 163, 8
723 , 55 , 18 , 55 , 10 , 55
T-SR 163, 9
525 , 35 , 13 , 35 , 7 , 35
L-SOUTHBOUND (N/O FRIARS), 1
N,16153,32682,370,S1
N,16090,32484,366,S2
N,16026,32284,365,S3
N,15964,32084,363,S4
N,15901,31884,360,S5
N,15837,31684,359,S6
N,15775,31483,357,S7
N,15711,31284,354,S8
N,15647,31083,353,S9
N,15583,30883,350,S10
N,15520,30683,347,S11
N,15457,30483,342,S12
N,15394,30283,337,S13
N,15329,30083,330,S14
N,15265,29882,321,S15
15202,29682,312,S16
L-SOUTHBOUND (N/O FRIARS), 2
N,15202,29682,312,S16
N,15139,29482,302,S17
N,15075,29282,291,S18
N,15013,29082,280,S19
N,14949,28882,269,S20
N,14885,28681,258,S21
N,14823,28481,248,S22
N,14760,28280,239,S23
N,14706,28078,229,S24
N,14668,27876,218,S25
N,14644,27673,207,S26
N,14632,27471,198,S27
N,14636,27268,187,S28
N,14652,27066,177,S29
N,14682,26864,167,S30
14726,26662,157,S31
L-NORTHBOUND (N/O FRIARS), 3
N,16222.,32661,370,N1
N,16159,32462,366,N2
N,16095,32262,365,N3
N,16032,32062,363,N4
N,15969,31862,360,N5

N,15906,31662,359,N6
N,15843,31462,357,N7
N,15780,31262,354,N8
N,15716,31062,353,N9
N,15652,30861,350,N10
N,15589,30661,347,N11
N,15526,30461,342,N12
N,15463,30261,337,N13
N,15398,30061,330,N14
N,15334,29861,321,N15
15271,29660,312,N16
L-NORTHBOUND (N/O FRIARS), 4
N,15271,29660,312,N16
N,15208,29460,302,N17
N,15144,29260,291,N18
N,15081,29060,280,N19
N,15017,28860,269,N20
N,14954,28660,258,N21
N,14892,28460,248,N22
N,14829,28260,236,N23
N,14777,28062,226,N24
N,14739,27865,215,N25
N,14715,27667,205,N26
N,14705,27469,195,N27
N,14708,27272,185,N28
N,14724,27074,175,N29
N,14753,26877,165,N30
14796,26680,154,N31
L-EASTBOUND, 5
N,15191,31642,358,E1
N,15345,31639,354,E2
N,15494,31656,347,E3
N,15740,31727,336,E4
16358,31951,348,E5
L-WESTBOUND, 6
N,15192,31614,358,W1
N,15407,31616,354,W2
N,15508,31630,349,W3
N,15771,31713,336,W4
16350,31912,348,W5
L-SB ON-RAMP (S/O Genesee), 7
N,15272,31582,358,1
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N,15479,31535,357,3
N,15542,31480,356,4
N,15602,31380,356,5
N,15618,31271,354,6
N,15564,31024,351,7
15386,30362,339,8
L-NB OFF-RAMP (S/O GENESEE), 8
N,15744,30943,350,9
N,15914,31417,351,10
16049,31717,341,11
L-SB ON RAMP (N/O GENESEE), 9
N,15705.,31752,336,12
N,15625.,31802,339,13
N,15596.,31879,344,14
N,15616.,31956,349,15
N,15698.,32026,356,16
N,15813.,31999,359,17

N,15859.,31917,359,18
B-Existing Wall 2, 1 , 2 , 0 ,0
16006,32544,376,387,W20
15965,32446,376,387,W21
15940,32386,374,385,W22
15915,32327,371,382,W23
15882,32248,369,380,W24
15872,32221,367,378,W25
15834,32183,367,378,W26
15672,32111,369,380,W27
15627,32092,371,379,W28
15555,32048,372,380,W29
15512,32003,372,380,W30
B-Existing Wall 2, 2 , 2 , 0 ,0
15512,32003,372,380,W30
15476,31933,372,380,W31
15451,31894,369,377,W32
15426,31853,366,374,W33
15406,31821,364,372,W34
15354,31741,361,369,W35
15338,31718,360,368,W36
15278,31676,360,368,W37
15190,31675,359,367,W38
B-Existing Wall 3, 3 , 2 , 0 ,0
15379,31004,349,361,W40
15506,30966,349,361,W41
15482,30870,349,361,W42
15476,30845,349,361,W43
15434,30712,348,359,W44
15412,30641,346,357,W45
15392,30580,345,356,W46
15368,30506,343,356,W47
15358,30471,343,357,W48
15329,30380,338,357,W49
15279,30395,339,357,W50
B-Existing Wall, 4 , 2 , 0 ,0
14611.,28074,228,232,W60
14599.,28031,228,232,W61
14577.,27965,225,229,W62
14569.,27941,225,229,W63
14564.,27922,221,225,W64
14560.,27891,220,224,W65
14553.,27844,218,222,W66
14545.,27788,215,220,W67
14534.,27672,210,215,W68
14525.,27498,203,208,W69
14523.,27406,200,205,W70
B-Topography, 5 , 1 , 0 ,0
14841,29158,344,344,H1
14866,29251,339,339,H2
14872,29299,339,339,H3
14884,29401,348,348,H4
14915,29505,346,346,H5
14926,29596,349,349,H6
14955,29746,351,351,H7
14961,29794,351,351,H8
14971,29843,349,349,H9
14980,29892,348,348,H10
14993,29998,346,346,H11
B-Topography, 6 , 1 , 0 ,0

14993,29998,346,346,H11
14995,30041,349,349,H12
15212.,30006,346,346,T10
B-Topography, 7 , 1 , 0 ,0
15108,30321,349,349,T1
15273,30285,349,349,T2
15289,30282,348,348,T3
15292,30258,348,348,T4
15287,30240,349,349,T5
15282,30226,351,351,T6
15258,30150,351,351,T7
15238,30086,349,349,T8
15225,30044,348,348,T9
15212,30006,346,346,T10
15201,29971,343,343,T11
B-Topography, 8 , 1 , 0 ,0
15201,29971,343,343,T11
15188,29932,339,339,T12
15183,29916,338,338,T13
15174,29886,336,336,T14
B-Topography, 9 , 1 , 0 ,0
14632,29101,346,346,T20
14797,29076,344,344,T21
14832,29096,344,344,T22
14892,29147,335,335,T23
14920,29233,326,326,T24
B-Topography, 10 , 1 , 0 ,0
14832.,29096,344,344,T22
14870.,29069,331,331,T30
14887.,29040,310,310,T31
14887.,29012,302,302,T32
14885.,28984,298,298,T33
14881.,28965,295,295,T34
14879.,28953,292,292,T35
14869.,28919,289,289,T36
14858.,28888,287,287,T37
14838.,28824,285,285,T38
14813.,28745,282,282,T39
B-Topography, 11 , 1 , 0 ,0
14813.,28745,282,282,T39
14790.,28673,279,279,T40
14765.,28598,274,274,T41
14743.,28524,271,271,T42
14719.,28449,267,267,T43
14697.,28379,262,262,T44
14680.,28326,259,259,T45
14667.,28282,256,256,T46
14651.,28226,254,254,T47
14645.,28199,253,253,T48
14637.,28171,246,246,T49
B-Topography, 12 , 1 , 0 ,0
14637.,28171,246,246,T49
14629.,28143,238,238,T50
14623.,28121,231,231,T51
14621.,28115,230,230,T52
14611.,28074,228,232,W60
R, 1 , 67 ,500
15422,31119,353.,M5/2
R, 2 , 67 ,500
15113,29713,320.,M8/8

R, 3 , 67 ,500
15175,29937,343.,M8B/7
R, 4 , 67 ,500
15448,31951,376.,R20/
R, 5 , 67 ,500
15479,31428,356.,R21/1
R, 6 , 67 ,500
15473,30895,353.,R22/3
R, 7 , 67 ,500
15242,30326,348.,R23/4
R, 8 , 67 ,500
15258,30198,354.,R24/5
R, 9 , 67 ,500
15158,30046,353.,R25/6
R, 10 , 67 ,500
14956,29885,357.,R26/9
R, 11 , 67 ,500
14891,29461,353.,R27/10
R, 12 , 67 ,500
14852,29229,346.,R28/11
R, 13 , 67 ,500
14695,29098,351.,R29/
R, 14 , 67 ,500
14754,28713,276.,R30/12
R, 15 , 67 ,500
14709,28551,264.,R31/13
R, 16 , 67 ,500
14649,28392,256.,R32/14
R, 17 , 67 ,500
14605,28277,248.,R33/15
R, 18 , 67 ,500
14547,28218,246.,R34/
C,C

51	-	0.*
52	-	0.*
53	-	0.*
54	-	0.*
55	-	0.*
56	-	0.*
57	-	0.*
58	-	0.*
59	-	0.*
60	-	0.*
61	-	0.*
62	-	0.*
63	-	0.*
64	-	0.*
65	-	0.*
66	-	0.*
67	-	0.*
68	-	0.*
69	-	0.*
70	-	0.*
71	-	0.*
72	-	0.*
73	-	0.*
74	-	0.*
75	-	0.*
76	-	0.*
77	-	0.*
78	-	0.*
79	-	0.*
80	-	0.*
81	-	0.*
82	-	0.*
83	-	0.*
84	-	0.*
85	-	0.*
86	-	0.*
87	-	0.*
88	-	0.*
89	-	0.*
90	-	0.*
91	-	2.*

T1	168.9	BERM
T2	16.3	BERM
T3	24.2	BERM
T4	18.7	BERM
T5	15.0	BERM
T6	79.7	BERM
T7	67.1	BERM
T8	44.0	BERM
T9	40.2	BERM
T10	36.8	BERM
T11	41.3	BERM
T12	16.8	BERM
T13	31.4	BERM
T20	166.9	BERM
T21	40.3	BERM
T22	79.3	BERM
T23	90.9	BERM
T22	48.4	BERM
T30	39.6	BERM
T31	29.1	BERM
T32	28.4	BERM
T33	19.6	BERM
T34	12.5	BERM
T35	35.6	BERM
T36	33.0	BERM
T37	67.1	BERM
T38	82.9	BERM
T39	75.6	BERM
T40	79.2	BERM
T41	77.3	BERM
T42	78.8	BERM
T43	73.5	BERM
T44	55.7	BERM
T45	46.0	BERM
T46	58.3	BERM
T47	27.7	BERM
T48	29.9	BERM
T49	30.2	BERM
T50	23.9	BERM
T51	6.4	BERM
T52	42.2	BERM

0 1 2 3 4 5 6 7

1

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	M5/2	67.	500.	76.2 -8 = 68
2	M8/8	67.	500.	80.4
3	M8B/7	67.	500.	74.8
4	R20/	67.	500.	65.5
5	R21/1	67.	500.	76.8
6	R22/3	67.	500.	66.4
7	R23/4	67.	500.	75.3
8	R24/5	67.	500.	73.4
9	R25/6	67.	500.	71.0

10	R26/9	67.	500.	72.7
11	R27/10	67.	500.	75.9
12	R28/11	67.	500.	74.5
13	R29/	67.	500.	69.8
14	R30/12	67.	500.	65.1
15	R31/13	67.	500.	63.3
16	R32/14	67.	500.	63.9
17	R33/15	67.	500.	65.8
18	R34/	67.	500.	68.7

BARRIER TYPE	COST
BERM	370.
MASONRY	227045.
MASONRY/JERSEY	0.
CONCRETE	0.

TOTAL COST = $ 227000.

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION

```
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
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CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION

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11.11.11.11.11.11.11.10. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.12.12.12.12.11.11.12.
14.17.19. 4. 4. 4. 4. 4. 4. 5. 5. 5. 5. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 2.
```

SR 163/FRIARS ROAD--east side, existing conditions (S163E.EX)

```
T-SR 163, 1
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 2
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 3
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 4
 5104 , 65 , 127 , 65 , 69 , 65
T-SR 163, 5
 5104 , 65 , 127 , 65 , 69 , 65
T-SR 163, 6
 7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 7
 7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 8
 7608 , 65 , 190 , 65 , 103 , 65
T-SR 163, 9
 6452 , 65 , 161 , 65 , 87 , 65
T-SR 163, 10
 6452 , 65 , 161 , 65 , 87 , 65
T-GENESEE, 11
 612 , 45 , 13 , 45 , 13 , 45
T-GENESEE AVE., 12
 1161 , 45 , 24 , 45 , 24 , 45
T-SR 163 ON RAMP, 13
 764 , 55 , 19 , 55 , 10 , 55
T-SR 163 Off Ramp, 14
 723 , 55 , 18 , 55 , 10 , 55
T-SR 163, 15
 525 , 35 , 13 , 35 , 7 , 35
T-Friars Road, 16
 2438 , 50 , 51 , 50 , 51 , 50
T-FRIARS ROAD, 17
 1283 , 50 , 27 , 50 , 27 , 50
T-Friars Road, 18
 3354 , 50 , 70 , 50 , 70 , 50
T-FRIARS ROAD, 19
 2077 , 50 , 43 , 50 , 43 , 50
T-SR 163, 20
 880 , 55 , 22 , 55 , 12 , 55
T-SR 163, 21
 2806 , 65 , 70 , 65 , 38 , 65
T-SR 163, 22
 891 , 55 , 22 , 55 , 12 , 55
T-SR 163, 23
 1577 , 65 , 39 , 65 , 21 , 65
T-I-8, 24
 1 , 65 , 1 , 65 , 1 , 65
L-SOUTHBOUND (N/O FRIARS), 1
N,16153.,32682,370,S1
N,16090,32484,366,S2
N,16026,32284,365,S3
N,15964,32084,363,S4
N,15901,31884,360,S5
N,15837,31684,359,S6
N,15775,31483,357,S7
N,15711,31284,354,S8
N,15647,31083,353,S9
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N,15583,30883,350,S10
N,15520,30683,347,S11
N,15457,30483,342,S12
N,15394,30283,337,S13
N,15329,30083,330,S14
N,15265,29882,321,S15
15202,29682,312,S16
L-SOUTHBOUND (N/O FRIARS), 2
N,15202,29682,312,S16
N,15139,29482,302,S17
N,15075,29282,291,S18
N,15013,29082,280,S19
N,14949,28882,269,S20
N,14885,28681,258,S21
N,14823,28481,248,S22
N,14760,28280,239,S23
N,14706,28078,229,S24
N,14668,27876,218,S25
N,14644,27673,207,S26
N,14632,27471,198,S27
N,14636,27268,187,S28
N,14652,27066,177,S29
N,14682,26864,167,S30
14726,26662,157,S31
L-SOUTHBOUND (N/O FRIARS), 3
N,14726,26662,157,S31
N,14785,26460,146,S32
N,14859,26258,135,S33
N,14941,26058,123,S34
N,15023,25859,112,S35
N,15098,25661,100,S36
N,15151,25465,89,S37
N,15182,25268,79,S38
N,15195,25072,69,S39
N,15187,24876,59,S40
N,15161,24679,51,S41
L-SOUTHBOUND (S/O FRIARS), 4
N,15161.,24679,51,S41
N,15117.,24480,47,S42
N,15072.,24280,42,S43
N,15025.,24080,39,S44
N,14980.,23880,39,S45
N,14934.,23680,39,S46
N,14888.,23480,39,S47
N,14842.,23280,40,S48
N,14798.,23080,41,S49
N,14751.,22880,42,S50
N,14705.,22680,42,S51
N,14659.,22479,41,S52
N,14613.,22280,40,S53
N,14569.,22080,38,S54
L-Southbound (S/O FRIARS), 5
N,14569.,22080,38,S54
N,14517.,21880,38,S55
N,14469.,21677,38,S56
N,14446.,21474,38,S57
N,14436.,21273,38,S58
L-NORTHBOUND (N/O FRIARS), 6
N,16222,32661,370,N1
N,16159,32462,366,N2

N,16095,32262,365,N3
N,16032,32062,363,N4
N,15969,31862,360,N5
N,15906,31662,359,N6
N,15843,31462,357,N7
N,15780,31262,354,N8
N,15716,31062,353,N9
N,15652,30861,350,N10
N,15589,30661,347,N11
N,15526,30461,342,N12
N,15463,30261,337,N13
N,15398,30061,330,N14
N,15334,29861,321,N15
15271,29660,312,N16
L-NORTHBOUND (N/O FRIARS), 7
N,15271,29660,312,N16
N,15208,29460,302,N17
N,15144,29260,291,N18
N,15081,29060,280,N19
N,15017,28860,269,N20
N,14954,28660,258,N21
N,14892,28460,248,N22
N,14829,28260,236,N23
N,14777,28062,226,N24
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N,14715,27667,205,N26
N,14705,27469,195,N27
N,14708,27272,185,N28
N,14724,27074,175,N29
N,14753,26877,165,N30
14796,26680,154,N31
L-NORTHBOUND (N/O FRIARS), 8
N,14796,26680,154,N31
N,14853,26482,144,N32
N,14926,26284,133,N33
N,15008,26085,123,N34
N,15090,25885,113,N35
N,15166,25683,103,N36
N,15221,25480,93,N37
N,15254,25277,82,N38
N,15267,25073,72,N39
N,15259,24869,62,N40
N,15232,24666,54,N41
L-NORTHBOUND (S/O FRIARS), 9
N,15232.,24666,54,N41
N,15188.,24465,49,N42
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N,15096.,24064,39,N44
N,15050.,23864,39,N45
N,15004.,23664,39,N46
N,14958.,23464,39,N47
N,14913.,23264,40,N48
N,14868.,23064,41,N49
N,14821.,22864,42,N50
N,14775.,22664,42,N51
N,14729.,22463,41,N52
N,14684.,22264,39,N53
N,14639.,22063,38,N54
L-NORTHBOUND (S/O FRIARS), 10
N,14639.,22063,38,N54

N,14587.,21863,37,N55
N,14540.,21665,37,N56
N,14518.,21468,38,N57
N,14508.,21269,38,N58
L-EASTBOUND, 11
N,15345.,31639,354,E2
N,15494.,31656,347,E3
N,15740.,31727,336,E4
16358.,31951,348,E5
L-WESTBOUND, 12
N,15407.,31616,354,W2
N,15508.,31630,349,W3
N,15771.,31713,336,W4
16350.,31912,348,W5
L-SB ON-RAMP (S/O Genesee), 13
N,15272,31582,358,1
N,15385,31570,358,2
N,15479,31535,357,3
N,15542,31480,356,4
N,15602,31380,356,5
N,15618,31271,354,6
N,15564,31024,351,7
15386,30362,339,8
L-NB OFF-RAMP (S/O Genesee)723, 14
N,15744.,30943,350,9
N,15914.,31417,351,10
N,16049.,31717,341,11
L-SB ON-RAMP (N/O Genesee), 15
N,15705,31752,336,12
N,15625,31802,339,13
N,15596,31879,344,14
N,15616,31956,349,15
N,15698,32026,356,16
N,15813,31999,359,17
15859,31917,359,18
L-Westbound (Middle Segment), 16
N,14880.,24360,67,11
N,15004.,24433,74,12
N,15121.,24487,77,13
N,15246.,24534,78,14
N,15368.,24571,77,15
N,15492.,24599,74,16
N,15634.,24613,65,17
N,15749.,24624,59,18
N,15887.,24642,52,19
N,16015.,24667,49,20
N,16141.,24723,49,21
N,16261.,24799,49,22
L-WESTBOUND (East of Frazee), 17
N,16261.,24799,49,22
N,16351.,24884,51,23
N,16425.,24993,53,24
N,16492.,25074,57,25
N,16614.,25230,61,26
N,16703.,25331,62,27
16799.,25410,62,28
L-Eastbound (Middle Segment), 18
N,14831.,24265,59,E10
N,14945.,24336,66,E11
N,15056.,24396,71,E12

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N,15374.,24516,73,E15
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N,15772.,24579,59,E18
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N,16180.,24678,51,E21
N,16329.,24774,52,E22
L-EASTBOUND FRIAR'S ROAD B, 19
N,16329.,24774,52,E22
N,16422.,24871,54,E23
N,16494.,24970,56,E24
N,16555.,25060,57,E25
N,16671.,25217,57,E26
N,16739.,25298,58,E27
16831.,25369,59,E30
L-NB ON-RAMP, 20
N,15823,24657,54,X20
N,15725,24709,61,X22
N,15672,24845,67,X23
N,15486,25003,77,X24
N,15357,25221,84,X25
L-COLLECTOR/NB ON-RAMP (N/O FRI, 21
N,15310.,25369,90,X47
N,15295.,25497,97,X26
N,15232.,25725,109,X27
N,15037.,26143,125,X28
N,14867.,26559,144,X29
L-NB OFF-RAMP (S/O Friars), 22
N,15119.,23754,37,X30
N,15198,24006,38,X31
N,15292,24257,44,X32
N,15403,24411,59,X33
15591,24526,65,X34
L-NB COLLECTOR LANE (N/O I-8), 23
N,14812,22297,39,X40
N,14808,22447,39,X41
N,14941,23057,41,X42
N,15064,23547,38,X43
N,15244,24414,44,X44
N,15314,24829,66,X45
N,15329,25136,79,X46
15310,25369,90,X47
L-WESTBOUND, 24
N,14444.,21222,61,X62
N,14836.,21443,61,X63
N,15210.,21597,52,X64
15718.,21744,41,X65
B-Existing Wall 1, 1 , 2 , 0 ,0
16020,31560,354,359,W1
16002,31523,353,360,W2
15954,31402,353,360,W3
15939,31363,353,362,W4
15924,31320,354,362,W5
15893,31218,354,362,W6
15884,31187,354,362,W7
15869,31137,353,362,W8
15865,31120,351,360,W9

15861,31107,349,358,W10
15855,31084,344,353,W11
B-Existing Wall 5, 2 , 2 , 0 ,0
15377,28915,330,336,W90
15231,28915,328,334,W91
15217,28882,328,328,T70
B-Topography, 3 , 1 , 0 ,0
15435,28942,336,336,G1
15273,28977,336,336,G2
15314,29119,336,336,G3
15323,29212,336,336,G4
15332,29295,336,336,G5
15332,29311,335,335,G6
15334,29338,338,338,G7
15334,29352,338,338,G8
15343,29395,343,343,G9
15356,29437,353,353,G10
15437,29782,354,354,G11
B-Topography, 4 , 1 , 0 ,0
15437,29782,354,354,G11
15474,29954,354,354,G12
15478,29985,353,353,G13
15478,30021,351,351,G14
15502,30100,351,351,G15
15511,30128,349,349,G16
15533,30191,344,344,G17
15562,30257,338,338,G18
15596,30355,333,333,G19
15666,30577,335,335,G20
15704,30686,336,336,G21
B-Topography, 5 , 1 , 0 ,0
15704,30686,336,336,G21
15802,30919,336,336,G22
15836,31012,338,338,G23
B-Topography, 6 , 1 , 0 ,0
15217,28882,328,328,T70
15171,28741,328,328,T71
15161,28711,326,326,T72
15151,28659,325,325,T73
15132,28600,321,321,T74
15122,28588,316,316,T75
15103,28536,315,315,T76
15093,28529,306,306,T77
15086,28467,305,305,T78
15081,28449,300,300,T79
15066,28405,298,298,T80
B-Topography, 7 , 1 , 0 ,0
15066,28405,298,298,T80
15063,28396,297,297,T81
15035,28301,297,297,T82
15016,28240,297,297,T83
15003,28201,297,297,T84
15001,28179,295,295,T85
14979,28101,295,295,T86
14973,28063,294,294,T87
14975,28050,294,294,T88
15034,28004,294,294,T89
14856,27956,221,221,T90
B-Topography, 8 , 1 , 0 ,0
14856,27956,221,221,T90

14840,27821,213,213,T91
14832,27749,210,210,T92
14822,27646,203,203,T93
14815,27510,197,197,T94
14813,27380,190,190,T95
14821,27257,184,184,T96
14832,27138,177,177,T97
14851,26997,171,171,T98
14894,26778,157,157,T99
14964,26534,144,144,T100
B-Topography, 9 , 1 , 0 ,0
14964,26534,144,144,T100
14990,26442,138,138,T101
15041,26331,133,133,T102
15050,26272,130,130,T103
15060,26195,125,125,T104
15149,26001,118,118,T105
15244,25793,112,112,T106
15296,25651,105,105,T107
15328,25512,98,98,T108
15340,25396,93,93,T109
15396,25274,93,93,T110
B-Topography, 10 , 1 , 0 ,0
15396,25274,93,93,T110
15443,25216,79,79,T111
15436,25173,77,77,T112
15436,25130,76,76,T113
15446,25097,77,77,T114
15527,25019,75,75,T115
15635,24946,72,72,T116
15716,24868,66,66,T117
15718,24800,66,66,T118
R, 1 , 67 ,500
14957,28128,279,M1/A
R, 2 , 67 ,500
16596,25303,69,M3/58
R, 3 , 67 ,500
15978,31116,355,M4/43
R, 4 , 67 ,500
15991,31442,356,M4B/
R, 5 , 67 ,500
14875,27181,159.,M7/54
R, 6 , 67 ,500
15283,28983,342,M10/46
R, 7 , 67 ,500
15190,23251,139.,M11/62
R, 8 , 67 ,500
15448,23395,139.,M12/61
R, 9 , 67 ,500
15994,31338,354.,R60/42
R, 10 , 67 ,500
15432,29330,342.,R61/44
R, 11 , 67 ,500
15400,29071,341.,R62/45
R, 12 , 67 ,500
15230,28888,333.,R63/47
R, 13 , 67 ,500
15179,28742,333.,R64/48
R, 14 , 67 ,500
15132,28577,321.,R65/49

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R, 15 , 67 ,500
15086,28436,304.,R66/50
R, 16 , 67 ,500
15040,28285,302.,R67/51
R, 17 , 67 ,500
14984,28057,300.,R68/52
R, 18 , 67 ,500
14893,27483,169.,R69/53
R, 19 , 67 ,500
15104,26321,136.,R70/55
R, 20 , 67 ,500
15805,24927,57.,R71/56
R, 21 , 67 ,500
16456,25152,64.,R72/57
R, 22 , 67 ,500
16333,24666,61.,R73/59
R, 23 , 67 ,500
14925,22363,40.,R74/63
R, 24 , 67 ,500
15377,23662,143.,R80/60
D, 4.5
ALL,2,3,8,24
C,C
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61	-	0.*
62	-	0.*
63	-	0.*
64	-	0.*
65	-	0.*
66	-	0.*
67	-	0.*
68	-	0.*
69	-	0.*
70	-	0.*
71	-	0.*
72	-	0.*
73	-	0.*
74	-	0.*
75	-	0.*
76	-	0.*
77	-	0.*
78	-	0.*
79	-	0.*
80	-	0.*
81	-	0.*
82	-	0.*

T96	119.7	BERM
T97	142.4	BERM
T98	223.6	BERM
T99	254.2	BERM
T100	95.8	BERM
T101	122.3	BERM
T102	59.8	BERM
T103	77.8	BERM
T104	213.6	BERM
T105	228.7	BERM
T106	151.4	BERM
T107	142.8	BERM
T108	116.7	BERM
T109	134.2	BERM
T110	76.0	BERM
T111	43.6	BERM
T112	43.0	BERM
T113	34.5	BERM
T114	112.5	BERM
T115	130.4	BERM
T116	112.6	BERM
T117	68.0	BERM

0 1 2 3 4 5 6 7

1

REC	REC ID	DNL	PEOPLE	LEQ(CAL)	
1	M1/A	67.	500.	78.5	
2	M3/58	67.	500.	71.1	
3	M4/43	67.	500.	70.3	
4	M4B/	67.	500.	70.9	
5	M7/54	67.	500.	62.9	
6	M10/46	67.	500.	76.7	
7	M11/62	67.	500.	76.0	
8	M12/61	67.	500.	67.6	– 4 = 63.6
9	R60/42	67.	500.	70.3	
10	R61/44	67.	500.	63.3	
11	R62/45	67.	500.	63.5	
12	R63/47	67.	500.	72.4	
13	R64/48	67.	500.	76.7	
14	R65/49	67.	500.	71.0	
15	R66/50	67.	500.	74.3	
16	R67/51	67.	500.	75.1	
17	R68/52	67.	500.	75.5	
18	R69/53	67.	500.	62.4	
19	R70/55	67.	500.	74.0	
20	R71/56	67.	500.	70.3	
21	R72/57	67.	500.	73.0	
22	R73/59	67.	500.	74.3	
23	R74/63	67.	500.	77.2	
24	R80/60	67.	500.	69.7	

BARRIER TYPE	COST
BERM	0.
MASONRY	43119.
MASONRY/JERSEY	0.

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SR 163/Friars Road West Side, South End Alt 6 SB6/NB4 future  (S163WS6.FUT
T-SR 163, 1
 8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 2
 8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 3
 8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 4
 3852 , 65 , 96 , 65 , 52 , 65
T-SR 163, 5
 3852 , 65 , 96 , 65 , 52 , 65
T-SR 163, 6
 10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 7
 10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 8
 10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 9
 9052 , 65 , 226 , 65 , 122 , 65
T-SR 163, 10
 9052 , 65 , 226 , 65 , 122 , 65
T-FRIARS ROAD, 11
 2870 , 50 , 60 , 50 , 60 , 50
T-Friars Road, 12
 2592 , 50 , 54 , 50 , 54 , 50
T-FRIARS ROAD, 13
 3562 , 50 , 74 , 50 , 74 , 50
T-Friars Road, 14
 3725 , 50 , 78 , 50 , 78 , 50
T-SR 163, 15
 1088 , 35 , 27 , 35 , 15 , 35
T-SR 163, 16
 1839 , 35 , 46 , 35 , 25 , 35
T-SR 163, 17
 1733 , 55 , 43 , 55 , 23 , 55
T-SR 163, 18
 4430 , 65 , 110 , 65 , 60 , 65
T-SR 163, 19
 2494 , 55 , 62 , 55 , 34 , 55
T-SR 163, 20
 1936 , 65 , 48 , 65 , 26 , 65
T-SR 163, 21
 1864 , 55 , 46 , 55 , 25 , 55
T-WB I-8, 22
 1 , 65 , 1 , 65 , 1 , 65
T-SR 163, 23
 3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 24
 3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 25
 3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 26
 3274 , 65 , 82 , 65 , 44 , 65
L-SOUTHBOUND A, 1
N,16153,32682,370,S1
N,16090,32484,366,S2
N,16026,32284,365,S3
N,15964,32084,363,S4
N,15901,31884,360,S5
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N,15837,31684,359,S6
N,15775,31483,357,S7
N,15711,31284,354,S8
N,15647,31083,353,S9
N,15583,30883,350,S10
N,15520,30683,347,S11
N,15457,30483,342,S12
N,15394,30283,337,S13
N,15329,30083,330,S14
N,15265,29882,321,S15
15202,29682,312,S16
L-SOUTHBOUND B, 2
N,15202,29682,312,S16
N,15139,29482,302,S17
N,15075,29282,291,S18
N,15013,29082,280,S19
N,14949,28882,269,S20
N,14885,28681,258,S21
N,14823,28481,248,S22
N,14760,28280,239,S23
N,14706,28078,229,S24
N,14668,27876,218,S25
N,14644,27673,207,S26
N,14632,27471,198,S27
N,14636,27268,187,S28
N,14652,27066,177,S29
N,14682,26864,167,S30
14726,26662,157,S31
L-SOUTHBOUND C, 3
N,14726,26662,157,S31
N,14785,26460,146,S32
N,14859,26258,135,S33
N,14941,26058,123,S34
N,15023,25859,112,S35
N,15098,25661,100,S36
N,15151,25465,89,S37
N,15182,25268,79,S38
N,15195,25072,69,S39
N,15187,24876,59,S40
N,15161,24679,51,S41
L-SB N/O FRIARS ROAD, 4
N,15161.,24679,51,S41
N,15117.,24480,47,S42
N,15072.,24280,42,S43
N,15025.,24080,39,S44
N,14980.,23880,39,S45
N,14934.,23680,39,S46
N,14888.,23480,39,S47
N,14842.,23280,40,S48
N,14798.,23080,41,S49
N,14751.,22880,42,S50
N,14705.,22680,42,S51
N,14659.,22479,41,S52
N,14613.,22280,40,S53
N,14569.,22080,38,S54
L-SOUTHBOUND D, 5
N,14569.,22080,38,S54
N,14517.,21880,38,S55
N,14469.,21677,38,S56
N,14446.,21474,38,S57

14436.,21273,38,S58
L-NORTHBOUND A, 6
N,16222,32661,370,N1
N,16159,32462,366,N2
N,16095,32262,365,N3
N,16032,32062,363,N4
N,15969,31862,360,N5
N,15906,31662,359,N6
N,15843,31462,357,N7
N,15780,31262,354,N8
N,15716,31062,353,N9
N,15652,30861,350,N10
N,15589,30661,347,N11
N,15526,30461,342,N12
N,15463,30261,337,N13
N,15398,30061,330,N14
N,15334,29861,321,N15
15271,29660,312,N16
L-NORTHBOUND B, 7
N,15271,29660,312,N16
N,15208,29460,302,N17
N,15144,29260,291,N18
N,15081,29060,280,N19
N,15017,28860,269,N20
N,14954,28660,258,N21
N,14892,28460,248,N22
N,14829,28260,236,N23
N,14777,28062,226,N24
N,14739,27865,215,N25
N,14715,27667,205,N26
N,14705,27469,195,N27
N,14708,27272,185,N28
N,14724,27074,175,N29
N,14753,26877,165,N30
14796,26680,154,N31
L-NORTHBOUND C, 8
N,14796,26680,154,N31
N,14853,26482,144,N32
N,14926,26284,133,N33
N,15008,26085,123,N34
N,15090,25885,113,N35
N,15166,25683,103,N36
N,15221,25480,93,N37
N,15254,25277,82,N38
N,15267,25073,72,N39
N,15259,24869,62,N40
N,15232,24666,54,N41
L-NB (N/O FRIARS), 9
N,15232.,24666,54,N41
N,15188.,24465,49,N42
N,15142.,24264,42,N43
N,15096.,24064,39,N44
N,15050.,23864,39,N45
N,15004.,23664,39,N46
N,14958.,23464,39,N47
N,14913.,23264,40,N48
N,14868.,23064,41,N49
N,14821.,22864,42,N50
N,14775.,22664,42,N51
N,14729.,22463,41,N52

N,14684.,22264,39,N53
N,14639.,22063,38,N54
L-NORTHBOUND D, 10
N,14639.,22063,38,N54
N,14587.,21863,37,N55
N,14540.,21665,37,N56
N,14518.,21468,38,N57
14508.,21269,38,N58
L-WESTBOUND (West Segment) NEW, 11
N,13435.,23865,39,B25
N,13701.,23895,37,B24
N,13950.,23928,35,B23
N,14075.,23951,34,B22
N,14196.,23987,34,B21
N,14321.,24036,34,B20
N,14435.,24095,39,B19
N,14547.,24161,46,B18
L-Westbound (Middle Segment)NEW, 12
N,14547.,24161,46,B18
N,14658.,24229,54,B17
N,14767.,24302,61,B16
N,14878.,24370,68,B15
N,14993.,24439,74,B14
N,15114.,24495,77,B13
N,15239.,24557,79,B12
N,15364.,24593,79,B11
N,15495.,24623,75,B10
N,15623.,24643,68,B9
N,15754.,24643,59,B8
N,15882.,24666,52,B7
N,16013.,24685,49,B6
N,16131.,24725,48,B5
16239.,24790,49,B4
L-EASTBOUND (West Segment) NEW, 13
N,13441.,23800,40,A1
N,13701.,23829,38,A2
N,13960.,23862,37,A3
N,14091.,23885,36,A4
N,14219.,23924,35,A5
N,14350.,23974,36,A6
N,14475.,24023,38,A7
N,14589.,24095,46,A8
L-Eastbound (Middle Segment)NEW, 14
N,14589.,24095,46,A8
N,14698.,24164,52,A9
N,14809.,24236,57,A10
N,14921.,24305,59,A11
N,15029.,24370,69,A12
N,15144.,24423,72,A13
N,15262.,24469,74,A14
N,15383.,24505,72,A15
N,15508.,24531,69,A16
N,15636.,24551,64,A17
N,15764.,24567,60,A18
N,15895.,24580,54,A19
N,16033.,24600,52,A20
N,16167.,24646,51,A21
N,16289.,24721,53,A22
L-SB ON-RAMP (N/O Friars) NEW, 15
N,14614.,24335,57,C1

N,14556.,24471,69,C2
N,14772.,24601,75,C3
N,14928.,24676,86,C4
N,14989.,24661,96,C5
N,15051.,24575,100,C5A
N,15041.,24472,105,C6
N,15013.,24272,105,C7
L-SB OFF-RAMP (S/O Friars), 16
N,14986,24227,39,X9
N,14941,24067,39,X10
N,14848,24019,37,X11
N,14774,24055,43,X12
14735,24111,49,X13
L-NB ON-RAMP (N/O Friars), 17
N,15823,24657,54,X20
N,15725,24709,61,X22
N,15672,24845,67,X23
N,15486,25003,77,X24
N,15357,25221,84,X25
L-COLLECTOR (N/O FRIARS), 18
N,15310.,25369,90,X47
N,15295.,25497,97,X26
N,15232.,25725,109,X27
N,15037.,26143,125,X28
N,14867.,26559,144,X29
L-NB OFF-RAMP (@ FRIARS) NEW, 19
N,15015.,23363,39,C20
N,15040.,23473,38,C22
N,15086.,23672,37,C23
N,15132.,23872,38,C24
N,15177.,24073,38,C25
N,15223.,24273,41,C26
N,15275.,24473,45,C27
N,15346.,24673,56,C28
N,15421.,24845,64,C29
N,15525.,24881,66,C30
N,15620.,24825,65,C31
N,15676.,24692,62,C32
L-Collector Lane (N/O I-8), 20
N,14812,22297,39,X40
N,14808,22447,39,X41
N,14941,23057,41,X42
N,15064,23547,38,X43
N,15244,24414,44,X44
N,15314,24829,66,X45
N,15329,25136,79,X46
15310,25369,90,X47
L-WESTBOUND I-8 ON-RAMP (FROM S, 21
N,13637,20906,47,X50
N,13921,21106,50,X51
N,14249,21491,46,X52
14438,21800,37,X53
L-WESTBOUND I-8, 22
N,13665,20820,51,X60
N,14045,20994,56,X61
N,14444,21222,61,X62
N,14836,21443,61,X63
N,15210,21597,52,X64
15718,21744,41,X65
L-SB COLL. LN N/O FRIARS NEW, 23

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N,15415.,30472,341,Y10
N,15353.,30272,336,Y11
N,15290.,30072,328,Y12
N,15226.,29872,320,Y13
N,15163.,29671,312,Y14
N,15100.,29472,300,Y15
N,15036.,29271,290,Y16
N,14973.,29071,279,Y17
L-SB COLLCTR LN N/O FRIARS NEW, 24
N,14973.,29071,279,Y17
N,14910.,28871,268,Y18
N,14846.,28670,258,Y19
N,14783.,28470,247,Y20
N,14722.,28270,239,Y21
N,14671.,28070,232,Y22
N,14633.,27870,218,Y23
N,14610.,27669,208,Y24
N,14599.,27470,198,Y25
N,14601.,27270,189,Y26
N,14608.,27070,179,Y27
N,14626.,26870,169,Y28
N,14661.,26670,162,Y29
L-SB COLL. LN. N/O FRIAR'S NEW, 25
N,14661.,26670,162,Y29
N,14712.,26470,157,Y30
N,14783.,26271,152,Y31
N,14863.,26070,149,Y32
N,14945.,25872,147,Y33
N,15025.,25672,141,Y34
N,15089.,25472,138,Y35
N,15131.,25272,133,Y36
N,15151.,25074,128,Y37
N,15147.,24872,121,Y38
N,15122.,24673,116,Y39
N,15080.,24472,111,Y40
N,15034.,24271,105,Y41
L-SB CLLCTR LN. N/O FRIARS NEW, 26
N,15034.,24271,105,Y41
N,14981.,24072,95,Y42
N,14935.,23872,85,Y43
N,14880.,23672,73,Y44
N,14815.,23472,62,Y45
N,14750.,23271,49,Y46
N,14698.,23072,42,Y47
N,14668.,22871,39,Y48
N,14637.,22671,39,Y49
N,14599.,22471,41,Y50
N,14556.,22272,39,Y51
N,14510.,22071,38,Y52
N,14462.,21871,38,Y53
N,14407.,21687,39,Y54
B-Existing Wall 4, 1 , 2 , 0 ,0
14611,28074,228,232,W60
14599,28031,228,232,W61
14577,27965,225,229,W62
14569,27941,225,229,W63
14564,27922,221,225,W64
14560,27891,220,224,W65
14553,27844,218,222,W66
14545,27788,215,220,W67
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14534,27672,210,215,W68
14525,27498,203,208,W69
14523,27406,200,205,W70
B-Existing Wall 4, 2 , 2 , 0 ,0
14523,27406,200,205,W70
14527,27257,190,195,W71
14533,27158,184,189,W72
14548,27012,177,183,W73
14573,26853,171,176,W74
14598,26724,164,169,W75
14596,26613,164,169,W76
14594,26530,166,171,W77
14593,26449,167,172,W78
14575,26427,169,169,W79
14575,26423,170,170,W80
B-Existing Wall 4, 3 , 2 , 0 ,0
14575,26423,170,170,W80
14519,26425,170,170,W81
B-Topography, 4 , 1 , 0 ,0
13501,24315,216,216,F1
13716,24378,216,216,F2
13791,24399,213,213,F3
13801,24406,215,215,F4
13978,24449,215,215,F5
14112,24582,215,215,F6
14123,24605,216,216,F7
14132,24627,216,216,F8
14139,24647,216,216,F9
14109,24721,216,216,F10
14062,24798,216,216,F11
B-Topography, 5 , 1 , 0 ,0
14062,24798,216,216,F11
14011,24861,216,216,F12
13920,24938,215,215,F13
13820,24989,215,215,F14
B-Topography, 6 , 1 , 0 ,0
14484,24937,192,192,F20
14496,24918,192,192,F21
14498,24912,189,189,F22
14529,24878,185,185,F23
14550,24844,175,175,F24
14603,24788,175,175,F25
14622,24774,175,175,F26
14660,24763,175,175,F27
14706,24757,171,171,F28
14755,24771,167,167,F29
14779,24777,166,166,F30
B-Topography, 7 , 1 , 0 ,0
14779,24777,166,166,F30
14820,24799,162,162,F31
14878,24850,153,153,F32
14910,24880,149,149,F33
14942,24911,144,144,F34
14983,24951,138,138,F35
15023,24993,131,131,F36
15053,25035,130,130,F37
15075,25075,126,126,F38
15072,25120,128,128,F39
15077,25238,130,130,F40
B-Topography, 8 , 1 , 0 ,0
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15077,25238,130,130,F40
15044,25243,131,131,F41
15040,25246,133,133,F42
14949,25251,133,133,F43
14920,25222,133,133,F44
14844.,25109,139,139,F44b
14675.,24969,185,185,F44c
B-Topography, 9 , 1 , 0 ,0
14784,25286,238,238,F50
14802,25363,239,239,F51
14805,25429,243,243,F52
14813,25501,246,246,F53
14824,25561,248,248,F54
14824,25575,248,248,F55
14838,25636,253,253,F56
14847,25676,254,254,F57
14850,25730,256,256,F58
14822,25782,256,256,F59
14784,25793,256,256,F60
B-Topography, 10 , 1 , 0 ,0
14784,25793,256,256,F60
14760,25839,259,259,F61
14720,25905,259,259,F62
14666,25963,259,259,F63
14576,25989,261,261,F64
14512,26017,261,261,F65
14441,26086,262,262,F66
14431,26096,264,264,F67
14430,26156,264,264,F68
14432,26245,264,264,F69
14395,26275,266,266,F70
B-Topography, 11 , 1 , 0 ,0
14395,26275,266,266,F70
14373,26319,266,266,F71
14333,26365,267,267,F72
14282,26443,274,274,F73
14289,26512,274,274,F74
14280,26551,276,276,F75
14256,26588,276,276,F76
B-Topography, 12 , 1 , 0 ,0
14790,28673,279,279,T40
14765,28598,274,274,T41
14743,28524,271,271,T42
14719,28449,267,267,T43
14697,28379,262,262,T44
14680,28326,259,259,T45
14667,28282,256,256,T46
14651,28226,254,254,T47
14645,28199,253,253,T48
14637,28171,246,246,T49
14629,28143,238,238,T50
B-Topography, 13 , 1 , 0 ,0
14629,28143,238,238,T50
14623,28121,231,231,T51
14621,28115,230,230,T52
14611.,28074,228,228,T52b/W60
R, 1 , 67 ,500
14610,26503,164.,M2/B
R, 2 , 67 ,500
13773,24373,212.,M6/39

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R, 3 , 67 ,500
14129,24638,222.,M6B/38
R, 4 , 67 ,500
14504,27807,221.,M9/18
R, 5 , 67 ,500
14493,22158,46.,M13/41
R, 6 , 67 ,500
14471,22752,35.,M14/40
R, 7 , 67 ,500
14562,28076,236.,R35/16
R, 8 , 67 ,500
14583,28026,233.,R36/17
R, 9 , 67 ,500
14475,27524,212.,R37/19
R, 10 , 67 ,500
14475,27311,202.,R38/20
R, 11 , 67 ,500
14509,26913,179.,R39/21
R, 12 , 67 ,500
14548,26435,174.,R40/22
R, 13 , 67 ,500
14423,26241,271.,R41/30
R, 14 , 67 ,500
14681,25930,264.,R42/31
R, 15 , 67 ,500
14827,25732,262.,R43/32
R, 16 , 67 ,500
14796,25433,248.,R44/33
R, 17 , 67 ,500
15040,25227,135.,R45/34
R, 18 , 67 ,500
15063,25062,133.,R46/35
R, 19 , 67 ,500
14954,24934,146.,R47/36
R, 20 , 67 ,500
14815,24808,167.,R48/37
R, 21 , 67 ,500
14581,24825,182.,R49/
D, 4.5
ALL,4,5,6
C,C
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97	-	0.*	T50	23.9	BERM
98	-	0.*	T51	6.4	BERM
99	-	0.*	T52	42.2	BERM

0 1 2 3 4 5 6 7

1

REC	REC ID	DNL	PEOPLE	LEQ(CAL)	
1	M2/B	67.	500.	81.2	
2	M6/39	67.	500.	70.5	-7 = 63.5
3	M6B/38	67.	500.	70.8	-7 = 63.8
4	M9/18	67.	500.	75.2	
5	M13/41	67.	500.	81.0	
6	M14/40	67.	500.	73.4	-9 = 64.4
7	R35/16	67.	500.	77.9	
8	R36/17	67.	500.	78.0	
9	R37/19	67.	500.	75.6	
10	R38/20	67.	500.	75.6	
11	R39/21	67.	500.	75.0	
12	R40/22	67.	500.	75.9	
13	R41/30	67.	500.	76.1	
14	R42/31	67.	500.	72.1	
15	R43/32	67.	500.	69.6	
16	R44/33	67.	500.	70.2	
17	R45/34	67.	500.	76.5	
18	R46/35	67.	500.	81.3	
19	R47/36	67.	500.	77.1	
20	R48/37	67.	500.	75.6	
21	R49/	67.	500.	69.6	

BARRIER TYPE	COST
BERM	0.
MASONRY	72443.
MASONRY/JERSEY	0.
CONCRETE	0.

TOTAL COST = $ 72000.

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION

```
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
```

CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION

```
4. 4. 4. 4. 4. 4. 5. 5. 5. 5. 5. 5. 6. 6. 5. 5. 5. 5. 3. 0. 0. 0. 0. 0. 0
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
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SR 163/Friars Road West Side, North End, Alt 6 SB6/NB4 future(S163WN6.FUT
T-SR 163, 1
8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 2
8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 3
10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 4
10208 , 65 , 254 , 65 , 138 , 65
T-GENESEE AVENUE, 5
1718 , 45 , 36 , 45 , 36 , 45
T-GENESEE AVENUE, 6
1267 , 45 , 26 , 45 , 26 , 45
T-SR 163, 7
795 , 55 , 20 , 55 , 11 , 55
T-SR 163, 8
761 , 50 , 19 , 50 , 10 , 50
T-SR 163, 9
847 , 50 , 21 , 50 , 11 , 50
T-SR 163, 10
3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 11
3274 , 65 , 82 , 65 , 44 , 65
L-SOUTHBOUND (N/O FRIARS), 1
N,16153,32682,370,S1
N,16090,32484,366,S2
N,16026,32284,365,S3
N,15964,32084,363,S4
N,15901,31884,360,S5
N,15837,31684,359,S6
N,15775,31483,357,S7
N,15711,31284,354,S8
N,15647,31083,353,S9
N,15583,30883,350,S10
N,15520,30683,347,S11
N,15457,30483,342,S12
N,15394,30283,337,S13
N,15329,30083,330,S14
N,15265,29882,321,S15
15202,29682,312,S16
L-SOUTHBOUND (N/O FRIARS), 2
N,15202,29682,312,S16
N,15139,29482,302,S17
N,15075,29282,291,S18
N,15013,29082,280,S19
N,14949,28882,269,S20
N,14885,28681,258,S21
N,14823,28481,248,S22
N,14760,28280,239,S23
N,14706,28078,229,S24
N,14668,27876,218,S25
N,14644,27673,207,S26
N,14632,27471,198,S27
N,14636,27268,187,S28
N,14652,27066,177,S29
N,14682,26864,167,S30
14726,26662,157,S31
L-NORTHBOUND (N/O FRIARS), 3
N,16222.,32661,370,N1

N,16159,32462,366,N2
N,16095,32262,365,N3
N,16032,32062,363,N4
N,15969,31862,360,N5
N,15906,31662,359,N6
N,15843,31462,357,N7
N,15780,31262,354,N8
N,15716,31062,353,N9
N,15652,30861,350,N10
N,15589,30661,347,N11
N,15526,30461,342,N12
N,15463,30261,337,N13
N,15398,30061,330,N14
N,15334,29861,321,N15
15271,29660,312,N16
L-NORTHBOUND (N/O FRIARS), 4
N,15271,29660,312,N16
N,15208,29460,302,N17
N,15144,29260,291,N18
N,15081,29060,280,N19
N,15017,28860,269,N20
N,14954,28660,258,N21
N,14892,28460,248,N22
N,14829,28260,236,N23
N,14777,28062,226,N24
N,14739,27865,215,N25
N,14715,27667,205,N26
N,14705,27469,195,N27
N,14708,27272,185,N28
N,14724,27074,175,N29
N,14753,26877,165,N30
14796,26680,154,N31
L-EASTBOUND, 5
N,15191,31642,358,E1
N,15345,31639,354,E2
N,15494,31656,347,E3
N,15740,31727,336,E4
16358,31951,348,E5
L-WESTBOUND, 6
N,15192,31614,358,W1
N,15407,31616,354,W2
N,15508,31630,349,W3
N,15771,31713,336,W4
16350,31912,348,W5
L-NB OFF-RAMP (S/O GENESEE), 7
N,15744,30943,350,9
N,15914,31417,351,10
16049,31717,341,11
L-SB On-Ramp (N/O Genesee), 8
N,15627.,32032,362,Y1
N,15745.,32044,361,Y2
N,15833.,31959,359,Y3
N,15849.,31872,360,Y4
N,15797.,31673,336,Y5
N,15738.,31472,356,Y6
N,15677.,31272,354,Y7
N,15613.,31071,352,Y8
L-SB On-Ramp (S/O Genesee), 9
N,15272.,31582,358,1
N,15385.,31570,358,2

N,15479.,31535,357,3
N,15542.,31480,356,4
N,15602.,31380,356,5
N,15609.,31271,354,6a
N,15555.,31024,351,7a
N,15415.,30472,341,Y10
L-SB COLLECTOR LANE, 10
N,15415.,30472,341,Y10
N,15353.,30272,336,Y11
N,15290.,30072,328,Y12
N,15226.,29872,320,Y13
N,15163.,29671,312,Y14
N,15100.,29472,300,Y15
N,15036.,29271,290,Y16
N,14973.,29071,279,Y17
N,14910.,28871,268,Y18
N,14846.,28670,258,Y19
N,14783.,28470,247,Y20
L-SB COLLECTOR LANE, 11
N,14783.,28470,247,Y20
N,14722.,28270,239,Y21
N,14671.,28070,232,Y22
N,14633.,27870,218,Y23
N,14610.,27669,208,Y24
N,14599.,27470,198,Y25
N,14601.,27270,189,Y26
N,14608.,27070,179,Y27
N,14626.,26870,169,Y28
N,14661.,26670,162,Y29
N,14712.,26470,157,Y30
N,14783.,26271,152,Y31
B-Existing Wall 2, 1 , 2 , 0 ,0
16006,32544,376,387,W20
15965,32446,376,387,W21
15940,32386,374,385,W22
15915,32327,371,382,W23
15882,32248,369,380,W24
15872,32221,367,378,W25
15834,32183,367,378,W26
15672,32111,369,380,W27
15627,32092,371,379,W28
15555,32048,372,380,W29
15512,32003,372,380,W30
B-Existing Wall 2, 2 , 2 , 0 ,0
15512,32003,372,380,W30
15476,31933,372,380,W31
15451,31894,369,377,W32
15426,31853,366,374,W33
15406,31821,364,372,W34
15354,31741,361,369,W35
15338,31718,360,368,W36
15278,31676,360,368,W37
15190,31675,359,367,W38
B-Existing Wall 3, 3 , 2 , 0 ,0
15379,31004,349,361,W40
15506,30966,349,361,W41
15482,30870,349,361,W42
15476,30845,349,361,W43
15434,30712,348,359,W44
15412,30641,346,357,W45

15392,30580,345,356,W46
15368,30506,343,356,W47
15358,30471,343,357,W48
15329,30380,338,357,W49
15279,30395,339,357,W50
B-Existing Wall, 4 , 2 , 0 ,0
14611.,28074,228,232,W60
14599.,28031,228,232,W61
14577.,27965,225,229,W62
14569.,27941,225,229,W63
14564.,27922,221,225,W64
14560.,27891,220,224,W65
14553.,27844,218,222,W66
14545.,27788,215,220,W67
14534.,27672,210,215,W68
14525.,27498,203,208,W69
14523.,27406,200,205,W70
B-Topography, 5 , 1 , 0 ,0
14841,29158,344,344,H1
14866,29251,339,339,H2
14872,29299,339,339,H3
14884,29401,348,348,H4
14915,29505,346,346,H5
14926,29596,349,349,H6
14955,29746,351,351,H7
14961,29794,351,351,H8
14971,29843,349,349,H9
14980,29892,348,348,H10
14993,29998,346,346,H11
B-Topography, 6 , 1 , 0 ,0
14993,29998,346,346,H11
14995,30041,349,349,H12
15212.,30006,346,346,T10
B-Topography, 7 , 1 , 0 ,0
15108,30321,349,349,T1
15273,30285,349,349,T2
15289,30282,348,348,T3
15292,30258,348,348,T4
15287,30240,349,349,T5
15282,30226,351,351,T6
15258,30150,351,351,T7
15238,30086,349,349,T8
15225,30044,348,348,T9
15212,30006,346,346,T10
15201,29971,343,343,T11
B-Topography, 8 , 1 , 0 ,0
15201,29971,343,343,T11
15188,29932,339,339,T12
15183,29916,338,338,T13
15174,29886,336,336,T14
B-Topography, 9 , 1 , 0 ,0
14632,29101,346,346,T20
14797,29076,344,344,T21
14832,29096,344,344,T22
14892,29147,335,335,T23
14920,29233,326,326,T24
B-Topography, 10 , 1 , 0 ,0
14832.,29096,344,344,T22
14870.,29069,331,331,T30
14887.,29040,310,310,T31

14887.,29012,302,302,T32
14885.,28984,298,298,T33
14881.,28965,295,295,T34
14879.,28953,292,292,T35
14869.,28919,289,289,T36
14858.,28888,287,287,T37
14838.,28824,285,285,T38
14813.,28745,282,282,T39
B-Topography, 11 , 1 , 0 ,0
14813.,28745,282,282,T39
14790.,28673,279,279,T40
14765.,28598,274,274,T41
14743.,28524,271,271,T42
14719.,28449,267,267,T43
14697.,28379,262,262,T44
14680.,28326,259,259,T45
14667.,28282,256,256,T46
14651.,28226,254,254,T47
14645.,28199,253,253,T48
14637.,28171,246,246,T49
B-Topography, 12 , 1 , 0 ,0
14637.,28171,246,246,T49
14629.,28143,238,238,T50
14623.,28121,231,231,T51
14621.,28115,230,230,T52
14611.,28074,228,232,W60
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15113,29713,320.,M8/8
R, 3 , 67 ,500
15175,29937,343.,M8B/7
R, 4 , 67 ,500
15448,31951,376.,R20/
R, 5 , 67 ,500
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R, 6 , 67 ,500
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R, 7 , 67 ,500
15242,30326,348.,R23/4
R, 8 , 67 ,500
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R, 9 , 67 ,500
15158,30046,353.,R25/6
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14956,29885,357.,R26/9
R, 11 , 67 ,500
14891,29461,353.,R27/10
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14852,29229,346.,R28/11
R, 13 , 67 ,500
14695,29098,351.,R29/
R, 14 , 67 ,500
14754,28713,276.,R30/12
R, 15 , 67 ,500
14709,28551,264.,R31/13
R, 16 , 67 ,500
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R, 17 , 67 ,500
14605,28277,248.,R33/15

R, 18 , 67 ,500
14547,28218,246.,R34/
C,C

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52	-	0.*
53	-	0.*
54	-	0.*
55	-	0.*
56	-	0.*
57	-	0.*
58	-	0.*
59	-	0.*
60	-	0.*
61	-	0.*
62	-	0.*
63	-	0.*
64	-	0.*
65	-	0.*
66	-	0.*
67	-	0.*
68	-	0.*
69	-	0.*
70	-	0.*
71	-	0.*
72	-	0.*
73	-	0.*
74	-	0.*
75	-	0.*
76	-	0.*
77	-	0.*
78	-	0.*
79	-	0.*
80	-	0.*
81	-	0.*
82	-	0.*
83	-	0.*
84	-	0.*
85	-	0.*
86	-	0.*
87	-	0.*
88	-	0.*
89	-	0.*
90	-	0.*
91	-	2.*

T1	168.9	BERM
T2	16.3	BERM
T3	24.2	BERM
T4	18.7	BERM
T5	15.0	BERM
T6	79.7	BERM
T7	67.1	BERM
T8	44.0	BERM
T9	40.2	BERM
T10	36.8	BERM
T11	41.3	BERM
T12	16.8	BERM
T13	31.4	BERM
T20	166.9	BERM
T21	40.3	BERM
T22	79.3	BERM
T23	90.9	BERM
T22	48.4	BERM
T30	39.6	BERM
T31	29.1	BERM
T32	28.4	BERM
T33	19.6	BERM
T34	12.5	BERM
T35	35.6	BERM
T36	33.0	BERM
T37	67.1	BERM
T38	82.9	BERM
T39	75.6	BERM
T40	79.2	BERM
T41	77.3	BERM
T42	78.8	BERM
T43	73.5	BERM
T44	55.7	BERM
T45	46.0	BERM
T46	58.3	BERM
T47	27.7	BERM
T48	29.9	BERM
T49	30.2	BERM
T50	23.9	BERM
T51	6.4	BERM
T52	42.2	BERM

0 1 2 3 4 5 6 7

1

REC	REC ID	DNL	PEOPLE	LEQ(CAL)	
1	M5/2	67.	500.	77.4	-8 = 69.4
2	M8/8	67.	500.	83.0	
3	M8B/7	67.	500.	77.0	
4	R20/	67.	500.	66.7	
5	R21/1	67.	500.	77.9	
6	R22/3	67.	500.	67.7	
7	R23/4	67.	500.	77.5	
8	R24/5	67.	500.	75.5	
9	R25/6	67.	500.	72.8	

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10  R26/9     67.    500.   74.8
11  R27/10    67.    500.   77.9
12  R28/11    67.    500.   76.5
13  R29/      67.    500.   71.3
14  R30/12    67.    500.   67.1
15  R31/13    67.    500.   65.4
16  R32/14    67.    500.   66.1
17  R33/15    67.    500.   68.2
18  R34/      67.    500.   71.4
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BARRIER TYPE              COST
--------------------------------
BERM                      370.
MASONRY                227045.
MASONRY/JERSEY              0.
CONCRETE                    0.
--------------------------------
       TOTAL COST = $   227000.

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
11.11.11.11.11.11.11.10. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.12.12.12.12.11.11.12.
14.17.19. 4. 4. 4. 4. 4. 4. 5. 5. 5. 5. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 2.
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SR 163/FRIARS ROAD--east side, Alternative 6 SB6/NB4 future (S163E6.fut)
T-SR 163, 1
8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 2
8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 3
8667 , 65 , 216 , 65 , 117 , 65
T-SR 163, 4
3852 , 65 , 96 , 65 , 52 , 65
T-SR 163, 5
3852 , 65 , 96 , 65 , 52 , 65
T-SR 163, 6
10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 7
10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 8
10208 , 65 , 254 , 65 , 138 , 65
T-SR 163, 9
9052 , 65 , 226 , 65 , 122 , 65
T-SR 163, 10
9052 , 65 , 226 , 65 , 122 , 65
T-GENESEE, 11
1718 , 45 , 36 , 45 , 36 , 45
T-GENESEE AVE., 12
1267 , 45 , 26 , 45 , 26 , 45
T-SR 163 Off Ramp, 13
795 , 55 , 20 , 55 , 11 , 55
T-Friars Road, 14
2592 , 50 , 54 , 50 , 54 , 50
T-FRIARS ROAD, 15
1440 , 50 , 30 , 50 , 30 , 50
T-Friars Road, 16
3725 , 50 , 78 , 50 , 78 , 50
T-FRIARS ROAD, 17
2342 , 50 , 49 , 50 , 49 , 50
T-SR 163 ON-RAMP, 18
1733 , 55 , 43 , 55 , 23 , 55
T-SR 163, 19
4430 , 65 , 110 , 65 , 60 , 65
T-SR 163 OFF RAMP, 20
2494 , 55 , 62 , 55 , 34 , 55
T-SR 163, 21
1936 , 65 , 48 , 65 , 26 , 65
T-I-8, 22
1 , 65 , 1 , 65 , 1 , 65
T-SR 163, 23
761 , 50 , 19 , 50 , 10 , 50
T-SR 163, 24
847 , 50 , 21 , 50 , 11 , 50
T-SR 163, 25
3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 26
3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 27
3274 , 65 , 82 , 65 , 44 , 65
T-SR 163, 28
3274 , 65 , 82 , 65 , 44 , 65
L-SOUTHBOUND (N/O FRIARS), 1
N,16153.,32682,370,S1

N,16090,32484,366,S2
N,16026,32284,365,S3
N,15964,32084,363,S4
N,15901,31884,360,S5
N,15837,31684,359,S6
N,15775,31483,357,S7
N,15711,31284,354,S8
N,15647,31083,353,S9
N,15583,30883,350,S10
N,15520,30683,347,S11
N,15457,30483,342,S12
N,15394,30283,337,S13
N,15329,30083,330,S14
N,15265,29882,321,S15
15202,29682,312,S16
L-SOUTHBOUND (N/O FRIARS), 2
N,15202,29682,312,S16
N,15139,29482,302,S17
N,15075,29282,291,S18
N,15013,29082,280,S19
N,14949,28882,269,S20
N,14885,28681,258,S21
N,14823,28481,248,S22
N,14760,28280,239,S23
N,14706,28078,229,S24
N,14668,27876,218,S25
N,14644,27673,207,S26
N,14632,27471,198,S27
N,14636,27268,187,S28
N,14652,27066,177,S29
N,14682,26864,167,S30
14726,26662,157,S31
L-SOUTHBOUND (N/O FRIARS), 3
N,14726,26662,157,S31
N,14785,26460,146,S32
N,14859,26258,135,S33
N,14941,26058,123,S34
N,15023,25859,112,S35
N,15098,25661,100,S36
N,15151,25465,89,S37
N,15182,25268,79,S38
N,15195,25072,69,S39
N,15187,24876,59,S40
N,15161,24679,51,S41
L-SOUTHBOUND (S/O FRIARS), 4
N,15161.,24679,51,S41
N,15117.,24480,47,S42
N,15072.,24280,42,S43
N,15025.,24080,39,S44
N,14980.,23880,39,S45
N,14934.,23680,39,S46
N,14888.,23480,39,S47
N,14842.,23280,40,S48
N,14798.,23080,41,S49
N,14751.,22880,42,S50
N,14705.,22680,42,S51
N,14659.,22479,41,S52
N,14613.,22280,40,S53
N,14569.,22080,38,S54
L-Southbound (S/O FRIARS), 5

N,14569.,22080,38,S54
N,14517.,21880,38,S55
N,14469.,21677,38,S56
N,14446.,21474,38,S57
N,14436.,21273,38,S58
L-NORTHBOUND (N/O FRIARS), 6
N,16222,32661,370,N1
N,16159,32462,366,N2
N,16095,32262,365,N3
N,16032,32062,363,N4
N,15969,31862,360,N5
N,15906,31662,359,N6
N,15843,31462,357,N7
N,15780,31262,354,N8
N,15716,31062,353,N9
N,15652,30861,350,N10
N,15589,30661,347,N11
N,15526,30461,342,N12
N,15463,30261,337,N13
N,15398,30061,330,N14
N,15334,29861,321,N15
15271,29660,312,N16
L-NORTHBOUND (N/O FRIARS), 7
N,15271,29660,312,N16
N,15208,29460,302,N17
N,15144,29260,291,N18
N,15081,29060,280,N19
N,15017,28860,269,N20
N,14954,28660,258,N21
N,14892,28460,248,N22
N,14829,28260,236,N23
N,14777,28062,226,N24
N,14739,27865,215,N25
N,14715,27667,205,N26
N,14705,27469,195,N27
N,14708,27272,185,N28
N,14724,27074,175,N29
N,14753,26877,165,N30
14796,26680,154,N31
L-NORTHBOUND (N/O FRIARS), 8
N,14796,26680,154,N31
N,14853,26482,144,N32
N,14926,26284,133,N33
N,15008,26085,123,N34
N,15090,25885,113,N35
N,15166,25683,103,N36
N,15221,25480,93,N37
N,15254,25277,82,N38
N,15267,25073,72,N39
N,15259,24869,62,N40
N,15232,24666,54,N41
L-NORTHBOUND (S/O FRIARS), 9
N,15232.,24666,54,N41
N,15188.,24465,49,N42
N,15142.,24264,42,N43
N,15096.,24064,39,N44
N,15050.,23864,39,N45
N,15004.,23664,39,N46
N,14958.,23464,39,N47
N,14913.,23264,40,N48

N,14868.,23064,41,N49
N,14821.,22864,42,N50
N,14775.,22664,42,N51
N,14729.,22463,41,N52
N,14684.,22264,39,N53
N,14639.,22063,38,N54
L-NORTHBOUND (S/O FRIARS), 10
N,14639.,22063,38,N54
N,14587.,21863,37,N55
N,14540.,21665,37,N56
N,14518.,21468,38,N57
N,14508.,21269,38,N58
L-EASTBOUND, 11
N,15345.,31639,354,E2
N,15494.,31656,347,E3
N,15740.,31727,336,E4
16358.,31951,348,E5
L-WESTBOUND, 12
N,15407.,31616,354,W2
N,15508.,31630,349,W3
N,15771.,31713,336,W4
16350.,31912,348,W5
L-NB OFF-RAMP (S/O Genesee), 13
N,15744,30943,350,9
N,15914,31417,351,10
16049,31717,341,11
L-Westbound (Middle Segment)NEW, 14
N,14878.,24370,68,B15
N,14993.,24439,74,B14
N,15114.,24495,77,B13
N,15239.,24557,79,B12
N,15364.,24593,79,B11
N,15495.,24623,75,B10
N,15623.,24643,68,B9
N,15754.,24643,59,B8
N,15882.,24666,52,B7
N,16013.,24685,49,B6
N,16131.,24725,48,B5
N,16239.,24790,49,B4
L-WESTBOUND (East of Frazee)NEW, 15
N,16239.,24790,49,B4
N,16338.,24869,51,B3
N,16423.,24967,53,B2
N,16492.,25059,56,B1
N,16614.,25230,61,26
N,16703.,25331,62,27
16799.,25410,62,28
L-Eastbound (Middle Segment)NEW, 16
N,14921.,24305,59,A11
N,15029.,24370,69,A12
N,15144.,24423,72,A13
N,15262.,24469,74,A14
N,15383.,24505,72,A15
N,15508.,24531,69,A16
N,15636.,24551,64,A17
N,15764.,24567,60,A18
N,15895.,24580,54,A19
N,16033.,24600,52,A20
N,16167.,24646,51,A21
N,16289.,24721,53,A22

L-EASTBOUND FRIAR'S ROAD B NEW, 17
N,16289.,24721,53,A22
N,16393.,24836,54,A23
N,16466.,24931,55,A24
N,16535.,25030,57,A25
N,16671.,25217,57,E26
N,16739.,25298,58,E27
16831.,25369,59,E30
L-NB ON-RAMP N/O Friars, 18
N,15823,24657,54,X20
N,15725,24709,61,X22
N,15672,24845,67,X23
N,15486,25003,77,X24
N,15357,25221,84,X25
L-COLLECTOR (N/O Friars), 19
N,15310.,25369,90,X47
N,15295.,25497,97,X26
N,15232.,25725,109,X27
N,15037.,26143,125,X28
N,14867.,26559,144,X29
L-NB OFF-RAMP (S/O Friars) NEW, 20
N,15015.,23363,39,C20
N,15040.,23473,38,C22
N,15086.,23672,37,C23
N,15132.,23872,38,C24
N,15177.,24073,38,C25
N,15223.,24273,41,C26
N,15275.,24473,45,C27
N,15346.,24673,56,C28
N,15421.,24845,64,C29
N,15525.,24881,66,C30
N,15620.,24825,65,C31
N,15676.,24692,62,C32
L-NB COLLECTOR LANE (N/O I-8), 21
N,14812,22297,39,X40
N,14808,22447,39,X41
N,14941,23057,41,X42
N,15064,23547,38,X43
N,15244,24414,44,X44
N,15314,24829,66,X45
N,15329,25136,79,X46
15310,25369,90,X47
L-WESTBOUND, 22
N,14444.,21222,61,X62
N,14836.,21443,61,X63
N,15210.,21597,52,X64
15718.,21744,41,X65
L-SB On-Ramp N/O Genesee, 23
N,15849.,31872,360,Y4
N,15797.,31673,336,Y5
N,15738.,31472,356,Y6
N,15677.,31272,354,Y7
N,15613.,31071,352,Y8
N,15549.,30871,350,Y8B
L-SB On-Ramp S/O Genesee, 24
N,15272.,31582,358,1
N,15385.,31570,358,2
N,15479.,31535,357,3
N,15542.,31480,356,4
N,15602.,31380,356,5

N,15609.,31271,354,6a
N,15555.,31024,351,7a
N,15415.,30472,341,y10
L-SB New Collector Lane, 25
N,15415.,30472,341,Y10
N,15353.,30272,336,Y11
N,15290.,30072,328,Y12
N,15226.,29872,320,Y13
N,15163.,29671,312,Y14
N,15100.,29472,300,Y15
N,15036.,29271,290,Y16
N,14973.,29071,279,Y17
N,14910.,28871,268,Y18
N,14846.,28670,258,Y19
N,14783.,28470,247,Y20
L-SB New Collector Lane, 26
N,14783.,28470,247,y20
N,14722.,28270,239,y21
N,14671.,28070,232,y22
N,14633.,27870,218,y23
N,14610.,27669,208,y24
N,14599.,27470,198,y25
N,14601.,27270,189,y26
N,14608.,27070,179,y27
N,14626.,26870,169,y28
N,14661.,26670,162,y29
N,14712.,26470,157,y30
N,14783.,26271,152,y31
N,14863.,26070,149,y32
L-SB New Collector Lane, 27
N,14863.,26070,149,y32
N,14945.,25872,147,y33
N,15025.,25672,141,y34
N,15089.,25472,138,y35
N,15131.,25272,133,y36
N,15151.,25074,128,y37
N,15147.,24872,121,y38
N,15122.,24673,116,y39
N,15080.,24472,111,y40
N,15034.,24271,105,y41
N,14981.,24072,95,y42
N,14935.,23872,85,y43
N,14880.,23672,73,y44
L-SB New collector Lane, 28
N,14880.,23672,73,y44
N,14815.,23472,62,y45
N,14750.,23271,49,y46
N,14698.,23072,42,y47
N,14668.,22871,39,y48
N,14637.,22671,39,y49
N,14599.,22471,41,y50
N,14556.,22272,39,y51
N,14510.,22071,38,y52
N,14462.,21871,38,y53
N,14407.,21687,39,y54
B-Existing Wall 1, 1 , 2 , 0 ,0
16020,31560,354,359,W1
16002,31523,353,360,W2
15954,31402,353,360,W3
15939,31363,353,362,W4

15924,31320,354,362,W5
15893,31218,354,362,W6
15884,31187,354,362,W7
15869,31137,353,362,W8
15865,31120,351,360,W9
15861,31107,349,358,W10
15855,31084,344,353,W11
B-Existing Wall 5, 2 , 2 , 0 ,0
15377,28915,330,336,W90
15231,28915,328,334,W91
15217,28882,328,328,T70
B-Topography, 3 , 1 , 0 ,0
15435,28942,336,336,G1
15273,28977,336,336,G2
15314,29119,336,336,G3
15323,29212,336,336,G4
15332,29295,336,336,G5
15332,29311,335,335,G6
15334,29338,338,338,G7
15334,29352,338,338,G8
15343,29395,343,343,G9
15356,29437,353,353,G10
15437,29782,354,354,G11
B-Topography, 4 , 1 , 0 ,0
15437,29782,354,354,G11
15474,29954,354,354,G12
15478,29985,353,353,G13
15478,30021,351,351,G14
15502,30100,351,351,G15
15511,30128,349,349,G16
15533,30191,344,344,G17
15562,30257,338,338,G18
15596,30355,333,333,G19
15666,30577,335,335,G20
15704,30686,336,336,G21
B-Topography, 5 , 1 , 0 ,0
15704,30686,336,336,G21
15802,30919,336,336,G22
15836,31012,338,338,G23
B-Topography, 6 , 1 , 0 ,0
15217,28882,328,328,T70
15171,28741,328,328,T71
15161,28711,326,326,T72
15151,28659,325,325,T73
15132,28600,321,321,T74
15122,28588,316,316,T75
15103,28536,315,315,T76
15093,28529,306,306,T77
15086,28467,305,305,T78
15081,28449,300,300,T79
15066,28405,298,298,T80
B-Topography, 7 , 1 , 0 ,0
15066,28405,298,298,T80
15063,28396,297,297,T81
15035,28301,297,297,T82
15016,28240,297,297,T83
15003,28201,297,297,T84
15001,28179,295,295,T85
14979,28101,295,295,T86
14973,28063,294,294,T87

14975,28050,294,294,T88
15034,28004,294,294,T89
14856,27956,221,221,T90
B-Topography, 8 , 1 , 0 ,0
14856,27956,221,221,T90
14840,27821,213,213,T91
14832,27749,210,210,T92
14822,27646,203,203,T93
14815,27510,197,197,T94
14813,27380,190,190,T95
14821,27257,184,184,T96
14832,27138,177,177,T97
14851,26997,171,171,T98
14894,26778,157,157,T99
14964,26534,144,144,T100
B-Topography, 9 , 1 , 0 ,0
14964,26534,144,144,T100
14990,26442,138,138,T101
15041,26331,133,133,T102
15050,26272,130,130,T103
15060,26195,125,125,T104
15149,26001,118,118,T105
15244,25793,112,112,T106
15296,25651,105,105,T107
15328,25512,98,98,T108
15340,25396,93,93,T109
15396,25274,93,93,T110
B-Topography, 10 , 1 , 0 ,0
15396,25274,93,93,T110
15443,25216,79,79,T111
15436,25173,77,77,T112
15436,25130,76,76,T113
15446,25097,77,77,T114
15527,25019,75,75,T115
15635,24946,72,72,T116
15716,24868,66,66,T117
15718,24800,66,66,T118
R, 1 , 67 ,500
14957,28128,279.,M1/A
R, 2 , 67 ,500
16596,25303,69,M3/58
R, 3 , 67 ,500
15978,31116,355,M4/43
R, 4 , 67 ,500
15991,31442,356,M4B
R, 5 , 67 ,500
14875,27181,159.,M7/54
R, 6 , 67 ,500
15283,28983,342,M10/46
R, 7 , 67 ,500
15190,23251,139.,M11/62
R, 8 , 67 ,500
15448,23395,139.,M12/61
R, 9 , 67 ,500
15994,31338,354.,R60/42
R, 10 , 67 ,500
15432,29330,342.,R61/44
R, 11 , 67 ,500
15400,29071,341.,R62/45
R, 12 , 67 ,500

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15230,28888,333.,R63/47
R, 13 , 67 ,500
15179,28742,333.,R64/48
R, 14 , 67 ,500
15132,28577,321.,R65/49
R, 15 , 67 ,500
15086,28436,304.,R66/50
R, 16 , 67 ,500
15040,28285,302.,R67/51
R, 17 , 67 ,500
14984,28057,300.,R68/52
R, 18 , 67 ,500
14893,27483,169.,R69/53
R, 19 , 67 ,500
15104,26321,136.,R70/55
R, 20 , 67 ,500
15805,24927,57.,R71/56
R, 21 , 67 ,500
16456,25152,64.,R72/57
R, 22 , 67 ,500
16333,24666,61.,R73/59
R, 23 , 67 ,500
14925,22363,40.,R74/63
R, 24 , 67 ,500
15377,23662,143.,R80/60
D, 4.5
ALL,2,3,8,24
C,C
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62	-	0.*
63	-	0.*
64	-	0.*
65	-	0.*
66	-	0.*
67	-	0.*
68	-	0.*
69	-	0.*
70	-	0.*
71	-	0.*
72	-	0.*
73	-	0.*
74	-	0.*
75	-	0.*
76	-	0.*
77	-	0.*
78	-	0.*
79	-	0.*
80	-	0.*
81	-	0.*
82	-	0.*

T97	142.4	BERM
T98	223.6	BERM
T99	254.2	BERM
T100	95.8	BERM
T101	122.3	BERM
T102	59.8	BERM
T103	77.8	BERM
T104	213.6	BERM
T105	228.7	BERM
T106	151.4	BERM
T107	142.8	BERM
T108	116.7	BERM
T109	134.2	BERM
T110	76.0	BERM
T111	43.6	BERM
T112	43.0	BERM
T113	34.5	BERM
T114	112.5	BERM
T115	130.4	BERM
T116	112.6	BERM
T117	68.0	BERM

0 1 2 3 4 5 6 7

1

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	M1/A	67.	500.	80.2
2	M3/58	67.	500.	71.7
3	M4/43	67.	500.	71.7
4	M4B	67.	500.	72.2
5	M7/54	67.	500.	64.6
6	M10/46	67.	500.	78.5
7	M11/62	67.	500.	77.5
8	M12/61	67.	500.	69.1 -4 = 65.1
9	R60/42	67.	500.	71.6
10	R61/44	67.	500.	65.1
11	R62/45	67.	500.	65.4
12	R63/47	67.	500.	74.4
13	R64/48	67.	500.	78.6
14	R65/49	67.	500.	73.1
15	R66/50	67.	500.	76.3
16	R67/51	67.	500.	77.1
17	R68/52	67.	500.	77.5
18	R69/53	67.	500.	64.2
19	R70/55	67.	500.	76.3
20	R71/56	67.	500.	71.8
21	R72/57	67.	500.	73.6
22	R73/59	67.	500.	75.4
23	R74/63	67.	500.	78.5
24	R80/60	67.	500.	71.3

BARRIER TYPE	COST
BERM	0.
MASONRY	43119.
MASONRY/JERSEY	0.
CONCRETE	0.

ATTACHMENT 4

WORKSHEETS FOR CALCULATING REASONABLE ALLOWANCE PER RESIDENCE

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

County:	San Diego	
Route:	163	
Post Mile:	PM 3.8/5.8	
Project Exp Auth:	EA 085780	
Program Code:	HE11	

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	√	$4,000
75-78 dBA:	Add:	$6,000	☐	$0
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	√	$0
6-8 dBA:	Add:	$2,000	☐	$0
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$45,000
Unmodified Barrier Allowance				$315,000
Adjusted reasonable allowance for Benefitted Residence				$2,861,000
Adjusted Unmodified Barrier Allowance				$315,000

Barrier Name or ID	B1
Barrier Height (Feet)	8
Critical Design Receiver	Site 2
Number of benefitted Residences (equivalent)	7
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	69 dBA
Future Noise Levels	70 dBA
Changes in Noise Level	1 dBA increase
Noise Level with Abatement	65 dBA
Barrier Insertion Loss	5 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	☐	$0
75-78 dBA:	Add:	$6,000	√	$6,000
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	√	$0
6-8 dBA:	Add:	$2,000	☐	$0
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$47,000
Unmodified Barrier Allowance				$376,000
Adjusted reasonable allowance for Benefitted Residence				$3,416,000
Adjusted Unmodified Barrier Allowance				$376,000

County: San Diego
Route: 163
Post Mile: PM 3.8/5.8
Project Exp Auth: EA 085780
Program Code: HE11

Barrier Name or ID	B2
Barrier Height (Feet)	12
Critical Design Receiver	Site 7
Number of benefitted Residences (equivalent)	8
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	75 dBA
Future Noise Levels	77 dBA
Changes in Noise Level	2 dBA increase
Noise Level with Abatement	72 dBA
Barrier Insertion Loss	5 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	☐	$0
75-78 dBA:	Add:	$6,000	√	$6,000
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	√	$0
6-8 dBA:	Add:	$2,000	☐	$0
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$47,000
Unmodified Barrier Allowance				$1,034,000
Adjusted reasonable allowance for Benefitted Residence				$9,393,000
Adjusted Unmodified Barrier Allowance				$1,034,000

County: San Diego
Route: 163
Post Mile: PM 3.8/5.8
Project Exp Auth: EA 085780
Program Code: HE11

Barrier Name or ID	B3
Barrier Height (Feet)	8
Critical Design Receiver	Site 9
Number of benefitted Residences (equivalent)	22
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	73 dBA
Future Noise Levels	75 dBA
Changes in Noise Level	2 dBA increase
Noise Level with Abatement	70 dBA
Barrier Insertion Loss	5 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	√	$4,000
75-78 dBA:	Add:	$6,000	☐	$0
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	☐	$0
6-8 dBA:	Add:	$2,000	√	$2,000
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$47,000
Unmodified Barrier Allowance				$658,000
Adjusted reasonable allowance for Benefitted Residence				$5,977,000
Adjusted Unmodified Barrier Allowance				$658,000

County: San Diego
Route: 163
Post Mile: PM 3.8/5.8
Project Exp Auth: EA 085780
Program Code: HE11

Barrier Name or ID	B4
Barrier Height (Feet)	8
Critical Design Receiver	Site 47
Number of benefitted Residences (equivalent)	14
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	72 dBA
Future Noise Levels	74 dBA
Changes in Noise Level	2 dBA increase
Noise Level with Abatement	68 dBA
Barrier Insertion Loss	6 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	√	$2,000
70-74 dBA:	Add:	$4,000	☐	$0
75-78 dBA:	Add:	$6,000	☐	$0
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	√	$0
6-8 dBA:	Add:	$2,000	☐	$0
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	☐	$0
NO on both:	Add:	$0	√	$0
Reasonable Allowance Per Residence				$33,000
Unmodified Barrier Allowance				$1,023,000
Adjusted reasonable allowance for Benefitted Residence				$9,293,000
Adjusted Unmodified Barrier Allowance				$1,023,000

County: San Diego

Route: 163

Post Mile: PM 3.8/5.8

Project Exp Auth: EA 085780

Program Code: HE11

Barrier Name or ID	B5/E3
Barrier Height (Feet)	14
Critical Design Receiver	Site 19
Number of benefitted Residences (equivalent)	31
New Hwy Construction	No
Pre 1978 residences	No
Existing Noise Levels	67 dBA
Future Noise Levels	69 dBA
Changes in Noise Level	2 dBA increase
Noise Level with Abatement	64 dBA
Barrier Insertion Loss	5 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	☐	$0
75-78 dBA:	Add:	$6,000	√	$6,000
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	☐	$0
3-7 dBA:	Add:	$2,000	√	$2,000
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	☐	$0
6-8 dBA:	Add:	$2,000	√	$2,000
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$51,000
Unmodified Barrier Allowance				$1,326,000
Adjusted reasonable allowance for Benefitted Residence				$12,050,000
Adjusted Unmodified Barrier Allowance				$1,326,000

County: San Diego
Route: 163
Post Mile: PM 3.8/5.8
Project Exp Auth: EA 085780
Program Code: HE11

Barrier Name or ID	B6
Barrier Height (Feet)	8
Critical Design Receiver	Site 27
Number of benefitted Residences (equivalent)	26
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	72 dBA
Future Noise Levels	75 dBA
Changes in Noise Level	3 dBA increase
Noise Level with Abatement	69 dBA
Barrier Insertion Loss	6 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	√	$4,000
75-78 dBA:	Add:	$6,000	☐	$0
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	☐	$0
6-8 dBA:	Add:	$2,000	√	$2,000
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$47,000
Unmodified Barrier Allowance				$1,316,000
Adjusted reasonable allowance for Benefitted Residence				$11,950,000
Adjusted Unmodified Barrier Allowance				$1,316,000

County: San Diego
Route: 163
Post Mile: PM 3.8/5.8
Project Exp Auth: EA 085780
Program Code: HE11

Barrier Name or ID	B7
Barrier Height (Feet)	8
Critical Design Receiver	Site 32
Number of benefitted Residences (equivalent)	28
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	68 dBA
Future Noise Levels	70 dBA
Changes in Noise Level	2 dBA increase
Noise Level with Abatement	64 dBA
Barrier Insertion Loss	6 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	☐	$0
75-78 dBA:	Add:	$6,000	☐	$0
More than 78 dBA:	Add:	$8,000	√	$8,000
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	☐	$0
6-8 dBA:	Add:	$2,000	☐	$0
9-11 dBA:	Add:	$4,000	√	$4,000
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	√	$10,000
NO on both:	Add:	$0	☐	$0
Reasonable Allowance Per Residence				$53,000
Unmodified Barrier Allowance				$530,000
Adjusted reasonable allowance for Benefitted Residence				$4,814,000
Adjusted Unmodified Barrier Allowance				$530,000

County: San Diego
Route: 163
Post Mile: PM 3.8/5.8
Project Exp Auth: EA 085780
Program Code: HE11

Barrier Name or ID	B8 (Alternative 13)
Barrier Height (Feet)	8
Critical Design Receiver	Site 34/35[1]
Number of benefitted Residences (equivalent)	10
New Hwy Construction	No
Pre 1978 residences	Yes
Existing Noise Levels	71/79 dBA
Future Noise Levels	73/81 dBA
Changes in Noise Level	2 dBA increase
Noise Level with Abatement	67/70 dBA
Barrier Insertion Loss	6/11 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

[1]Receivers with greatest existing noise level and lowest insertion loss are reported.

Worksheet A

Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000	☐	$0
70-74 dBA:	Add:	$4,000	√	$4,000
75-78 dBA:	Add:	$6,000	☐	$0
More than 78 dBA:	Add:	$8,000	☐	$0
2) Build vs. Existing Noise Levels			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000	☐	$0
8-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	√	$0
6-8 dBA:	Add:	$2,000	☐	$0
9-11 dBA:	Add:	$4,000	☐	$0
12 dBA or more:	Add:	$6,000	☐	$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000	☐	$0
NO on both:	Add:	$0	√	$0
Reasonable Allowance Per Residence				$35,000
Unmodified Barrier Allowance				$35,000
Adjusted reasonable allowance for Benefitted Residence				$317,900
Adjusted Unmodified Barrier Allowance				$35,000

County: San Diego

Route: 163

Post Mile: PM 3.8/5.8

Project Exp Auth: EA 085780

Program Code: HE11

Barrier Name or ID	B9
Barrier Height (Feet)	6
Critical Design Receiver	Site 60
Number of benefitted Residences (equivalent)	1
New Hwy Construction	No
Pre 1978 residences	No
Existing Noise Levels	70 dBA
Future Noise Levels	71 dBA
Changes in Noise Level	1 dBA increase
Noise Level with Abatement	66 dBA
Barrier Insertion Loss	5 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

Worksheet B
Noise Barrier Reasonable Allowance Calculation

County: San Diego Route: 163 Post Mile: 3.8/5.8 Program Code: HE11

From Worksheet A				Adjusted Barrier Allowance vs Construction Cost	Percentage of Total Barrier Allowance	Modified Barrier Allowance	Modified Allowance Benefitted Residence
Barrier ID	Adjusted Allowance for Critical Design Receiver	Number of Benefitted Residences	Adjusted Unmodified Barrier Allowance		(col 4: A/ΣA)	(A/ΣA x .5 x Const Cost)	(col 7/col 3)
B1	$45,000	7	$315,000	The total unmodified barrier allowance (column 4) is less than 50% of the construction cost without abatement, therefore no allowance modification is required.			
B2	$47,000	8	$376,000				
B3/E3	$47,000	22	$1,034,000				
B4	$47,000	14	$658,000				
B5	$33,000	31	$1,023,000				
B6	$51,000	26	$1,326,000				
B7	$47,000	28	$1,316,000				
B8	$53,000	10	$530,000				
B9	$35,000	1	$35,000				
	Totals	147	$6,613,000				
1	2	3	4	5	6	7	8