TPM 21079
ER 07-02-012

ACOUSTICAL SITE ASSESSMENT
TPM 21079 – SAN DIEGO, CA

Submitted to:

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The County of San Diego

ISE Project #07-053

February 6, 2008

ACOUSTICS – VIBRATION – AIR QUALITY – TRAFFIC IMPACT ASSESSMENTS – FORENSIC ENGINEERING
EXPERT WITNESS – ENVIRONMENTAL ASSESSMENTS AND COMPLIANCE

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EXECUTIVE SUMMARY

This acoustical site assessment analyzes the approximately 3.57 gross acre project site located in the County of San Diego, California. The proposed development plan calls for the construction of three residential dwelling units. Our findings indicate that exterior mitigation would be necessary due to surface traffic noise around the project site. Additionally, ISE determined that the unmitigated 60 dBA CNEL noise contour would be roughly 195-feet from the Mission Road centerline and 125-feet from the Hamilton Lane centerline.

INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The project site consists of approximately 3.57 gross acres located in the County of San Diego, California. The project site is bordered by Hamilton Lane to the east and Mission Road north. Mission Road provides regional access to the project site via Interstate 15 (I-15) to the west as is shown in Figure 1 below.

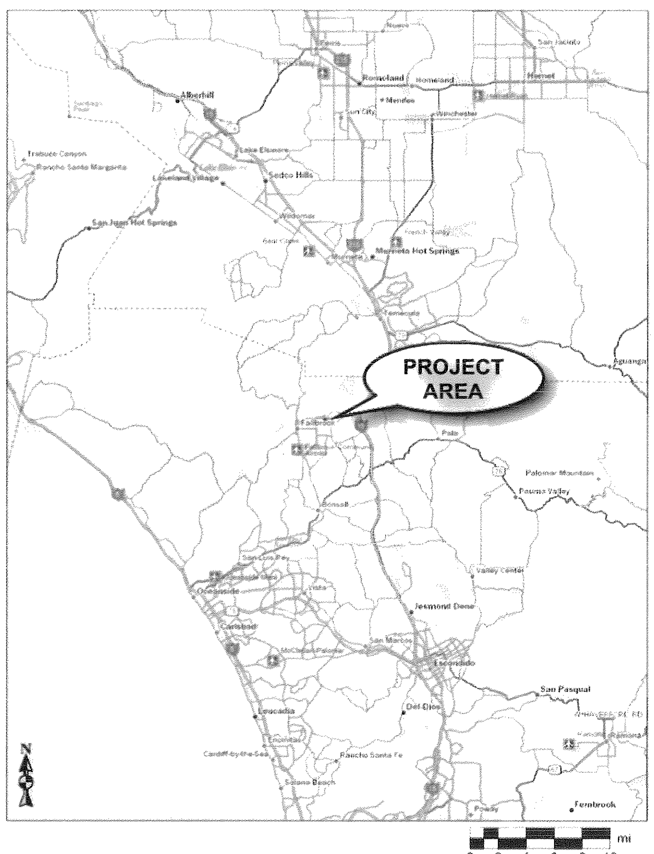

FIGURE 1: Project Vicinity Map (ISE 12/07)

The project site currently resides as an agricultural area. Elevations across the entire property range from approximately 940 to 970 feet above mean sea level (MSL). A project site map with topography is shown below in Figure 2.

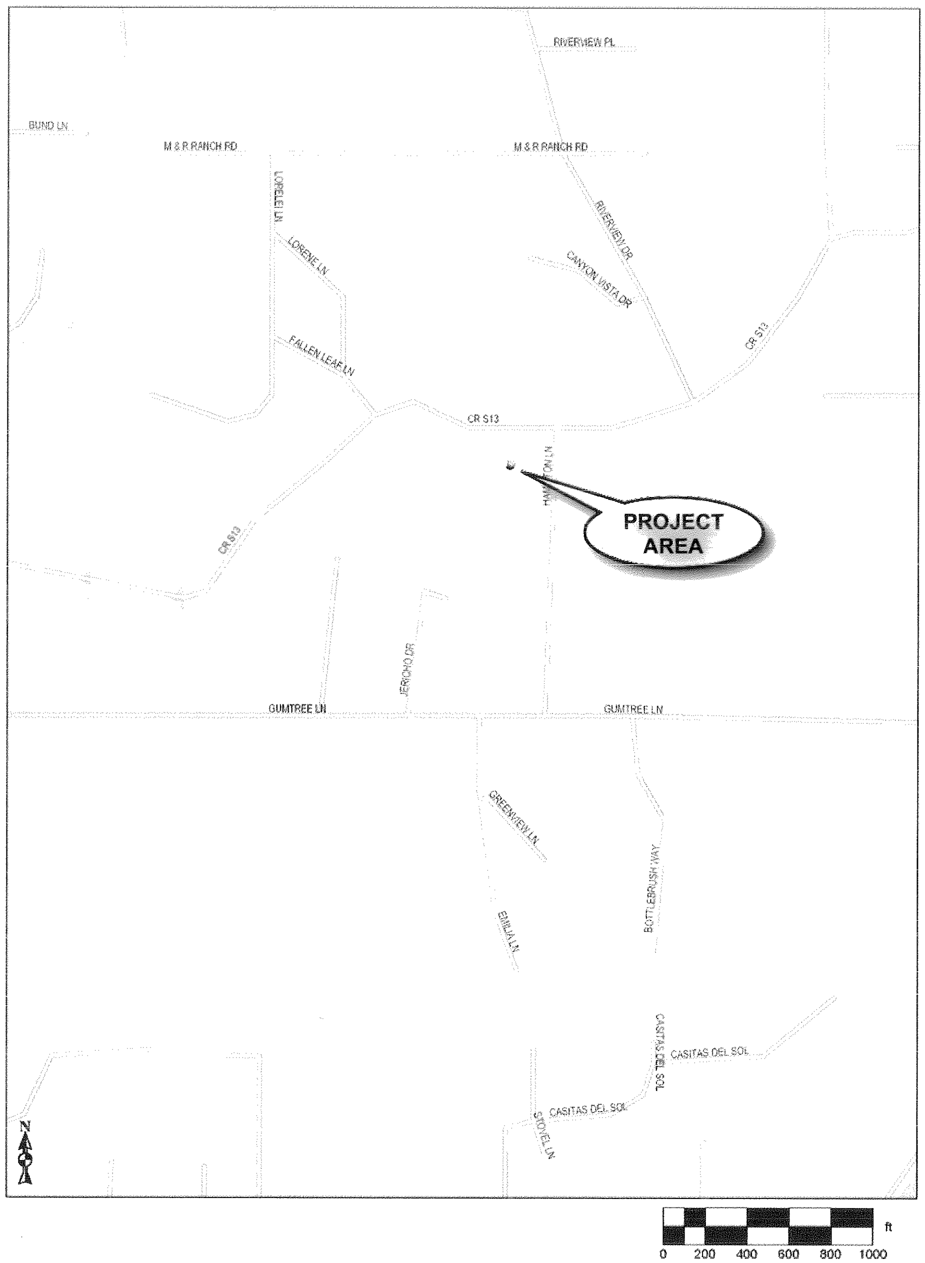

FIGURE 2: Project Site Location Map w/ Topography (ISE 12/07)

Project Description

The proposed development plan calls for the construction of three single family residential dwelling units each within the County of San Diego. The proposed site development plan can be seen in Figure 3 below.

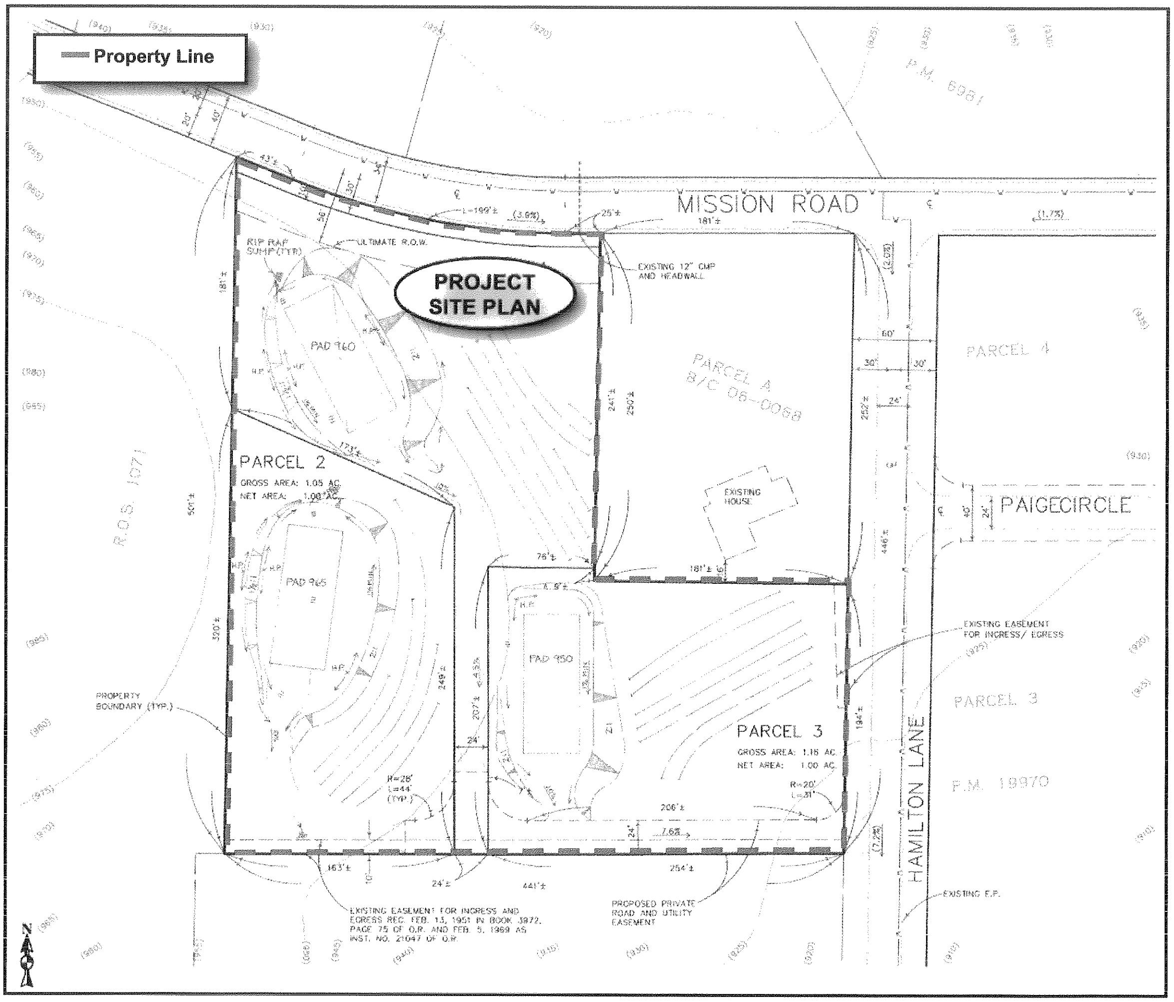

FIGURE 3: Proposed Site Plan – TPM 21079 (Crew Engineering & Surveying, Inc. 3/07)

Acoustical Definitions

Sound waves are linear mechanical waves. They can be propagated in solids, liquids, and gases. The material transmitting such a wave oscillates in the direction of propagation of the wave itself. Sound waves originate from some sort of vibrating surface. Whether this surface is the vibrating string of a violin or a person's vocal cords, a vibrating column of air from an organ or clarinet, or a vibrating panel from a loudspeaker, drum, or aircraft, the sound waves generated are all similar. All of these vibrating elements alternatively compress the surrounding air on a forward movement and expand it on a backward movement.

There is a large range of frequencies within which linear waves can be generated, sound waves being confined to the frequency range that can stimulate the auditory organs to the sensation of hearing. For humans this range is from about 20 Hertz (Hz or cycles per second) to about 20,000 Hz. The air transmits these frequency disturbances outward from the source of the wave. Sound waves, if unimpeded, will spread out in all directions from a source. Upon entering the auditory organs, these waves produce the sensation of sound. Waveforms that are approximately periodic or consist of a small number of periodic components can give rise to a pleasant sensation (assuming the intensity is not too high), for example, as in a musical composition.

Noise, on the other hand, can be represented as a superposition of periodic waves with a large number of components and 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 sensitivity of the individual hearing the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric levels. The loudest sounds that the human ear can hear comfortably are approximately one trillion (or 1×10^{12}) times the acoustic energy that the ear can barely detect. Because of this vast range, any attempt to represent the acoustic intensity of a particular sound on a linear scale becomes unwieldy. As a result, a logarithmic ratio originally conceived for radio work known as the decibel (dB) is commonly employed[1].

A sound level of zero "0" dB is scaled such that it is defined as the threshold of human hearing and would be barely audible to a human of normal hearing under extremely quiet listening conditions. Such conditions can only be generated in anechoic or "dead rooms". Typically, the quietest environmental conditions (extreme rural areas with extensive shielding) yield sound levels of approximately 20 decibels. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB roughly correspond to the threshold of pain.

The minimum change in sound level that the human ear can detect is approximately 3.0 dBA[2]. A change in sound level of 10 dB is usually perceived by the average person as a doubling (or halving) of the sounds loudness[3]. A change in sound

[1] A unit used to express the intensity of a sound wave. This level is defined as being equal to 20 times the common logarithm of the ratio of the pressure produced by a sound wave of interest to a 'reference' pressure wave (which is defined as 1 micro Pascal measured at a distance of 1 meter).

[2] Every 3 dB equates to a 50% of drop (or increase) in wave strength, therefore a 6 dB drop/increase = a loss/increase of 75% of total signal strength and so on.

[3] This is a subjective reference based upon the nonlinear nature of the human ear.

level of 10 dB actually represents an approximate 90 percent change in the sound intensity, but only about a 50 percent change in the perceived loudness. This is due to the nonlinear response of the human ear to sound.

As mentioned above, most of the sounds we hear in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The intensities of each frequency add to generate the sound we hear. The method commonly used to quantify environmental sounds consists of determining all of the frequencies of a sound according to a weighting system that reflects the nonlinear response characteristics of the human ear. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (or 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 sounds from distant sources that create a relatively steady background noise in which no particular source is identifiable. For this type of noise, 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 average of the fluctuating level measured. For most acoustical studies, the monitoring interval is generally taken as one-hour and is abbreviated *Leq-h*.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10 percent, 50 percent, and 90 percent of a stated time. Sound levels associated with the L10 typically describe transient or short-term events, while levels associated with the L90 describe the steady state (or most prevalent) noise conditions. In addition, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum and minimum measured sound level (Lmax and Lmin) indicators. The Lmin value obtained for a particular monitoring location is often called the *acoustic floor* for that location.

Finally, another sound measure employed by the State of California and the County of San Diego is known as the Community Noise Equivalence Level (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.

APPLICABLE SIGNIFICANCE CRITERIA

Vehicular/Transportation Noise Impact Thresholds

Transportation noise levels, such as those produced by vehicles traveling to and from the project site, are governed under Policy 4b of the *County of San Diego's Noise Element of the County's General Plan (as revised 7/06)*. The relevant sections of the Noise Element are cited below:

> Because exterior community noise equivalent levels (CNEL) above 60 decibels and/or interior CNEL above 45 decibels may have an adverse effect on public health and welfare, it is the policy of the County of San Diego that:
>
> 1. Whenever it appears that new *development* may result in any (existing or future) *noise sensitive land use* being subject to noise levels of CNEL equal to 60 *decibels (A)* or greater, an acoustical analysis shall be required.
> 2. If the acoustical analysis shows that noise levels at any *noise sensitive land use* will exceed CNEL equal to 60 decibels, modifications shall be made to the *development* which reduce the *exterior noise* level to less than CNEL of 60 *decibels (A)* and the *interior noise* level to less than CNEL of 45 *decibels (A)*[4].
> 3. If modifications are not made to the *development* in accordance with paragraph 2 above, the *development* shall not be approved unless a finding is made that there are specifically identified overriding social or economic considerations which warrant approval of the development without such modification; provided, however, if the acoustical study shows that sound levels for any noise sensitive land use will exceed a CNEL equal to 75 *decibels (A) even* with such modifications, the *development* shall not be approved irrespective of such social or economic considerations.
>
> Definitions, Notes and Exceptions
>
> *"Decibels (A)"* refers to A-weighted sound levels as noted on page VIII-2 within the Element.
>
> *"Development"* means any physical development including but not limited to residences, commercial, or industrial facilities, roads, civic buildings, hospitals, schools, airports, or similar facilities.
> "*Exterior noise*":

---

[4] **Action Program 4b1:** Recommend programs to soundproof buildings or redevelop areas where it is impossible to reduce existing source noise to acceptable levels.

Action Program 4b2: Study the feasibility of extending the application of Section 1092, California Administrative Code dealing with noise insulation standards to single-family dwellings, and incorporating higher standards for reduction of exterior noise intrusion into structures.

Action Program 4b3: Require present and projected noise level data to be included in Environmental Impact Reports. Designs to mitigate adverse noise impacts shall also be used.

(a) For single family detached dwelling projects, "exterior noise" means noise measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum area:

(i) Net lot area up to 4,000 sq. ft.:	400 square feet.
(ii) Net lot area 4,000 sq. ft. to 10 ac.:	10% of net lot area.
(iii) Net lot area over 10 ac.:	1 ac.

(b) For all other projects, "exterior noise" means noise measured at all exterior areas, which are provided for group or private usable, *open space* purposes.

(c) For County road construction projects, the exterior noise level due to vehicular traffic impacting a noise sensitive area should not exceed the following values:

(i) Federally funded projects: The Noise standard contained in applicable Federal Highway Administration Standards.

(ii) Other projects: 60 *decibels (A),* except if the existing or projected noise level without the project is 58 decibels (*A*) or greater, a 3 *decibel* (*A*) increase is allowed, up to the maximum permitted by Federal Highway Administration Standards.

"Group or Private Usable Open Space" shall mean: Usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways (Group Usable Open Space); and usable open space intended for use of occupants of one dwelling unit, normally including yards, decks and balconies (Private Usable Open Space).

“Interior noise": The following exception shall apply: For rooms which are usually occupied only a part of the day (schools, libraries, or similar), the interior one-hour average sound level, due to noise outside, should not exceed 50 *decibels (A)*.

"Noise sensitive land use" means any residence, hospital, school, hotel, resort, library or any other facility where quiet is an important attribute of the environment.

State of California CCR Title 24 Noise Insulation Standards

The California Code of Regulations (CCR), Title 24, Noise Insulation Standards, states that multi-family dwellings, hotels, and motels located where the CNEL exceeds 60 dBA, must obtain an acoustical analysis showing that the proposed design will limit interior noise to less than 45 dBA CNEL. Interior noise standards are typically applied to sensitive areas within the structure where low noise levels are desirable (such as living rooms, dining rooms, bedrooms, and dens or studies).

Worst-case noise levels, either existing or future, must be used for this determination. Future noise levels must be predicted at least ten years from the time of building permit application. The County of San Diego has adopted the CCR Title 24 standards as part of their Policy 4b implementation.

ANALYSIS METHODOLOGY

Existing Conditions Field Survey

A Quest Model 2900 ANSI Type 2 integrating sound level meter was used as the data collection device. The meter was mounted to a tripod five feet above ground level in order to simulate the noise exposure of an average-height human being. Two short-term sound level measurements were taken on the proposed site as described below.

The first meter location (ML 1) was located in the southeast portion of the site roughly 25 ft to the west of Hamilton Lane. The second meter location (ML 2) was in the northern portion of the site roughly 50 feet south of Mission Road. The monitoring was done in this manner in order to obtain an estimate of the worst-case existing onsite noise during typical peak hour traffic conditions.

The measurements were performed on August 22, 2007. All monitoring sites were spatially logged using a geographic positioning system (GPS) in order to maintain horizontal and vertical control. All equipment was calibrated before testing at ISE's acoustics and vibration laboratory to verify conformance with ANSI S1-4 1983 Type 2 and IEC 651 Type 2 standards.

Traffic Noise Impact Assessment Approach

The *Traffic Noise Model version 2.5* (TNM 2.5) based on FHWA-PD-96-010 and FHWA/CA/TL-87/03 standards was used to calculate future onsite vehicular traffic noise levels. These components are supported by a scientifically founded and experimentally calibrated acoustic computation methodology. The database is made up of over 6,000 individual pass-by events measured at forty sites across the country. Currently TNM 2.5 is the only noise-modeling program accepted by Caltrans for use within the State of California.

The County's Noise Element specifies that 10% of the net lot area per parcel must comply with the County's exterior useable area criterion of 60 dBA CNEL for parcels larger than 4,000 sq. ft. but smaller than 10 acres; the proposed project would fall under these standards having a minimum designated area of 15,500 square feet.

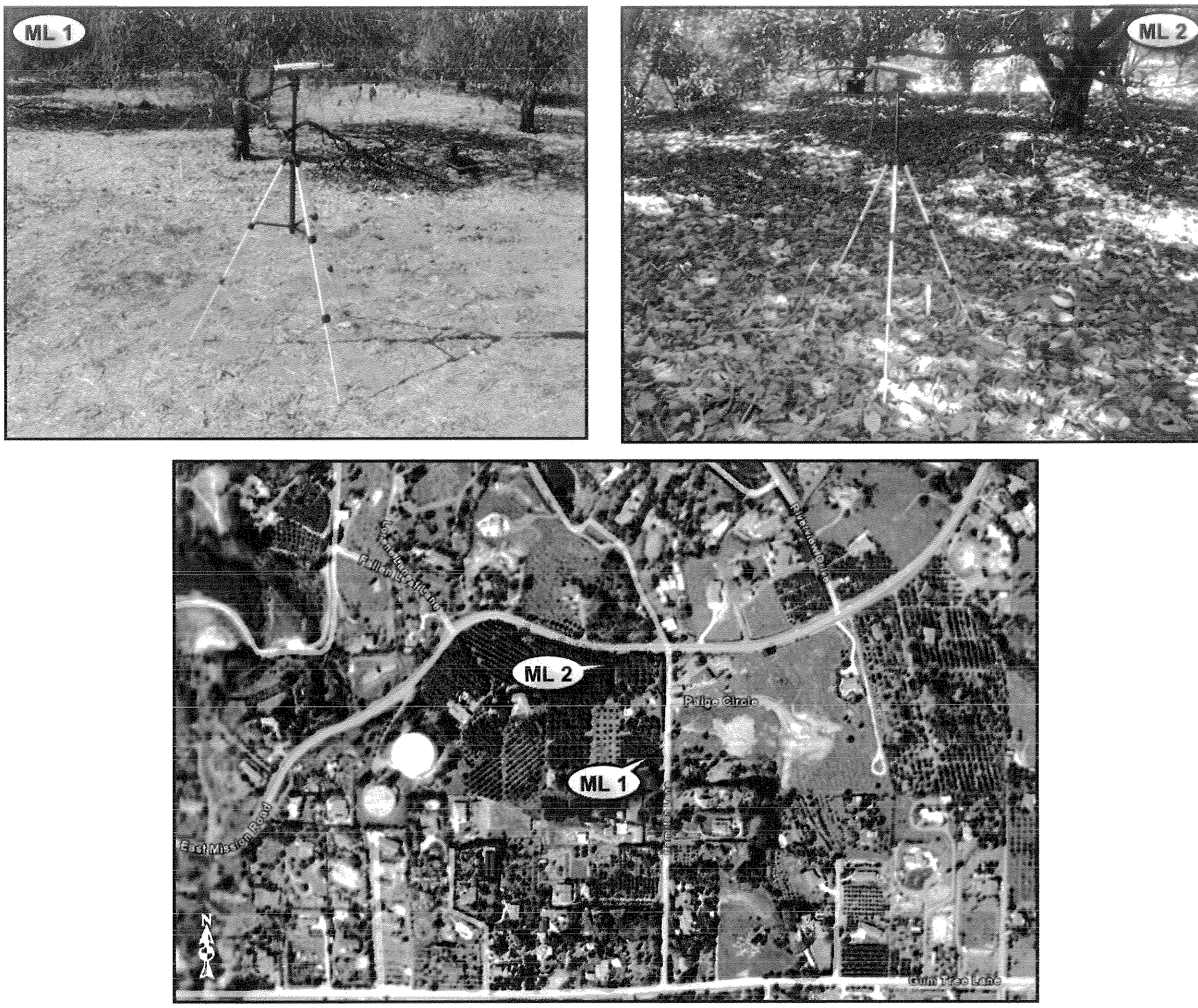

FIGURE 4: Ambient Onsite Monitoring Locations – TPM 21079 (ISE 12/07)

Receptor elevations were considered five feet above the appropriate floor (pad) elevation and were taken near the edge and center of the proposed lot (i.e., within all Noise Sensitive Areas, NSA's) and building facades closest to Hamilton Lane and Mission Road. Second floor receptor areas were modeled at 15 feet above the respective pad elevation. The receptor locations can be seen in Figure 5 on the following page. The TNM model input and output files required for the analysis is provided at the end of this technical report.

Input to the acoustical model includes the following:

- A digitized representation of all affected roadways (i.e., *Future* Mission Road and Hamilton Lane).
- Future Average Daily Trips (ADTs) for nearby major roadways.[5]
- A 96/2/2 (automobiles/medium/heavy) traffic mix in accordance with CALTRANS.
- A peak hour traffic percentage of 10% of the ADT.[6]
- Receptor and topographic elevations as identified in the project site plans.[7]

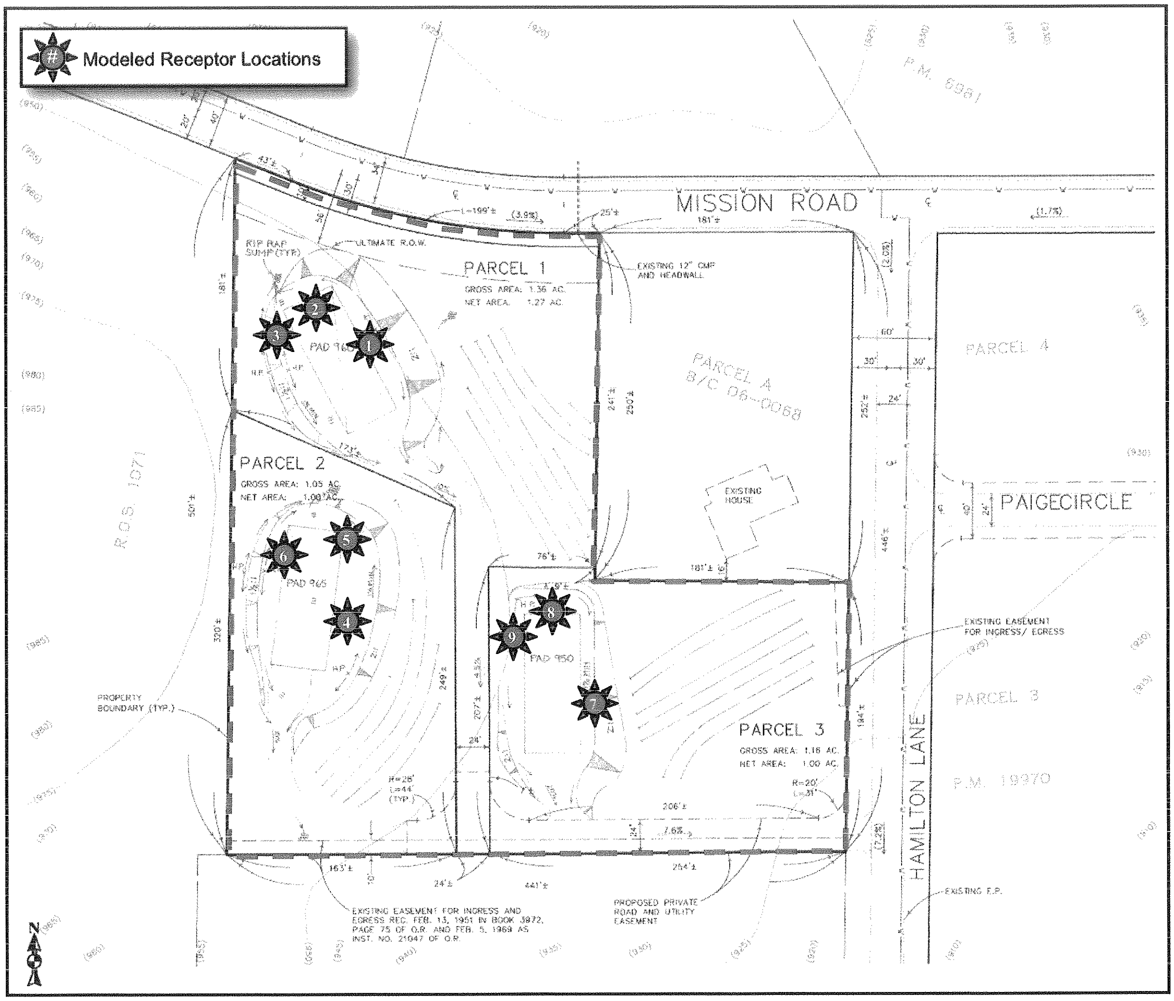

FIGURE 5: Modeled Receptor Locations for TPM 21079 (ISE 10/07)

[5] Source: *SANDAG Series 10 – 2030 Basic Traffic Prediction Model.*

[6] For values between approximately 8 and 12 percent, the energy-mean A-weighted sound level is equivalent to the CNEL. Outside this range, a maximum variance of up to two dBA occurs between Leq-h and CNEL.

[7] Source: Crew Engineering & Surveying, Inc. 3/07.

FINDINGS / RECOMMENDATIONS

Ambient Sound Measurement Results

Testing conditions during the monitoring period were sunny with an average barometric pressure reading of 29.76 in-Hg, an average westerly wind speed of 2 miles per hour (MPH) and an approximate mean temperature of 88 degrees Fahrenheit. The results of one-hour sound level monitoring are shown in Table 1 below. The values for the energy equivalent sound level (Leq), the maximum and minimum measured sound levels (Lmax and Lmin), and the statistical indicators L10, L50, and L90, are given for each monitoring location.

TABLE 1: Measured Ambient Sound Levels – TPM 21079

		1-Hour Noise Level Descriptors in dBA					
Site	**Start Time**	**Leq**	**Lmax**	**Lmin**	**L10**	**L50**	**L90**
ML 1	3:30 p.m.	55.9	72.0	37.8	58.7	46.7	40.6
ML 2	4:30 p.m.	65.5	74.7	51.4	68.6	65.3	60.0

Monitoring Location:

- ML 1: Eastern portion of project site facing Hamilton Lane.
  GPS: 33°23.401'N x 117°12.881'W, EPE 13 ft.
- ML 2: Northern portion of project site facing Mission Road.
  GPS: 33°23.466'N x 117°12.911'W, EPE 13 ft.

Measurements performed by ISE on August 22, 2007. EPE = Estimated Position Error.

Measurements collected at the monitoring locations ML 1 and ML 2 reflect the typical sound levels associated with the community setting with existing adjacent roadway activities. The hourly average sound levels (or Leq-h) recorded over the monitoring period ranged between 55.9 dBA at ML 1 and 65.5 dBA at ML 2. The dominant noise source was peak hour traffic along Mission Road.

As indicated by the monitoring equipment, at least 90 percent of the time (L90) the onsite sound levels at ML 1 and ML 2 were 40.6 dBA and 60.0 dBA, respectively. The acoustic floor for the site, as seen by the Lmin indicator was found to be 37.8 dBA at ML 1 and 51.4 dBA at ML 2. This would be considered the lowest attainable sound levels for the project area near Hamilton Lane and Mission Road during peak hour traffic times.

Future Traffic Noise Impacts

The primary sources of future traffic noise near the project site would be from combined surface traffic on Hamilton Lane and Mission Road. Future traffic estimates for Hamilton Lane and Mission Road predict volumes of 1,000 ADT at 30 MPH and 21,000 ADT at 40 MPH, respectively (*Source: SANDAG Series 10 - 2030 Traffic Volume Forecast*). However, for the purposes of modeling, ISE modeled Mission at 50 MPH.

The results of the acoustical modeling for the selected lots are shown below in Table 2. The table output shows the unmitigated and mitigated 1st floor building façade and noise sensitive area sound, as well as the resultant unmitigated second floor sound levels. All noise sensitive areas which exceed the County's 60 dBA CNEL noise threshold would require noise mitigation.

TABLE 2: Predicted Transportation Noise Levels – TPM 21079

Modeled Receptor No.	Corresponding Lot #	Unmitigated Sound Levels	1st Floor Mitigated Sound Levels	2nd Floor Mitigated Sound Levels
1	Parcel 1 -East	63.3	56.3	67.6
2	Parcel 1 - North	66.6	59.2	69.2
3	Parcel 1 - West	59.6	56.2	65.0
4	Parcel 2 - East	52.4	52.2	55.6
5	Parcel 2 - North	53.9	53.4	57.7
6	Parcel 2 - West	52.8	52.6	54.3
7	Parcel 3 - East	53.2	53.2	56.7
8	Parcel 3 - North	55.4	55.4	59.0
9	Parcel 3 - West	55.0	55.0	58.8

All levels given in dBA CNEL

A proposed mitigation plan consisting of a five-foot-high wall was examined and found to be adequate to mitigate noise levels under the County's noise thresholds. The recommended placement of the wall segment is shown in Figure 6 on the following page. Additionally, unobstructed (i.e. without structural barriers) noise contours for both 1st and 2nd floor areas are shown in shown in Figure 7 on Page 14 of this report.

The five-foot-high wall should run along the proposed top-of-slope of the graded pad on Parcel 1 facing Mission Road. The wall should be of solid construction (i.e., such as an earthen berm, block or glass or a combination of any of these materials).

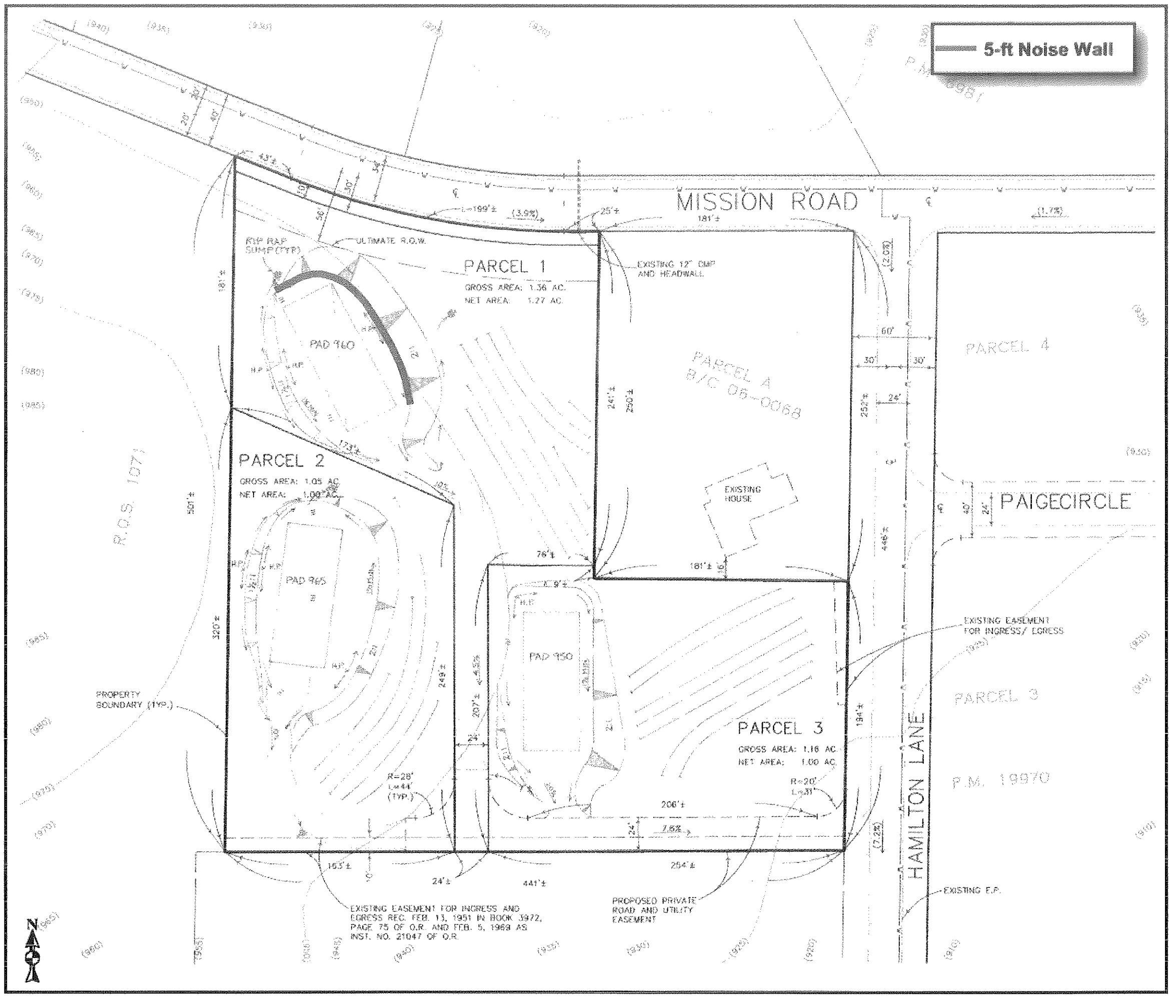

FIGURE 6: Proposed Mitigation Plan – TPM 21079 (ISE 12/07)

Further, it should be noted that second story structural façades for any building proposed on Parcel 1 would be exposed to sound levels in excess of 60 dBA Leq (as shown in Table 2 above) would exceed the CCR Title 24 Noise Insulation Standards and would need to be further analyzed in order to demonstrate that the 45-dBA Leq interior noise threshold can be attained. This analysis would be completed at the time of submittal for building permits and would only be applicable to two-story structures.

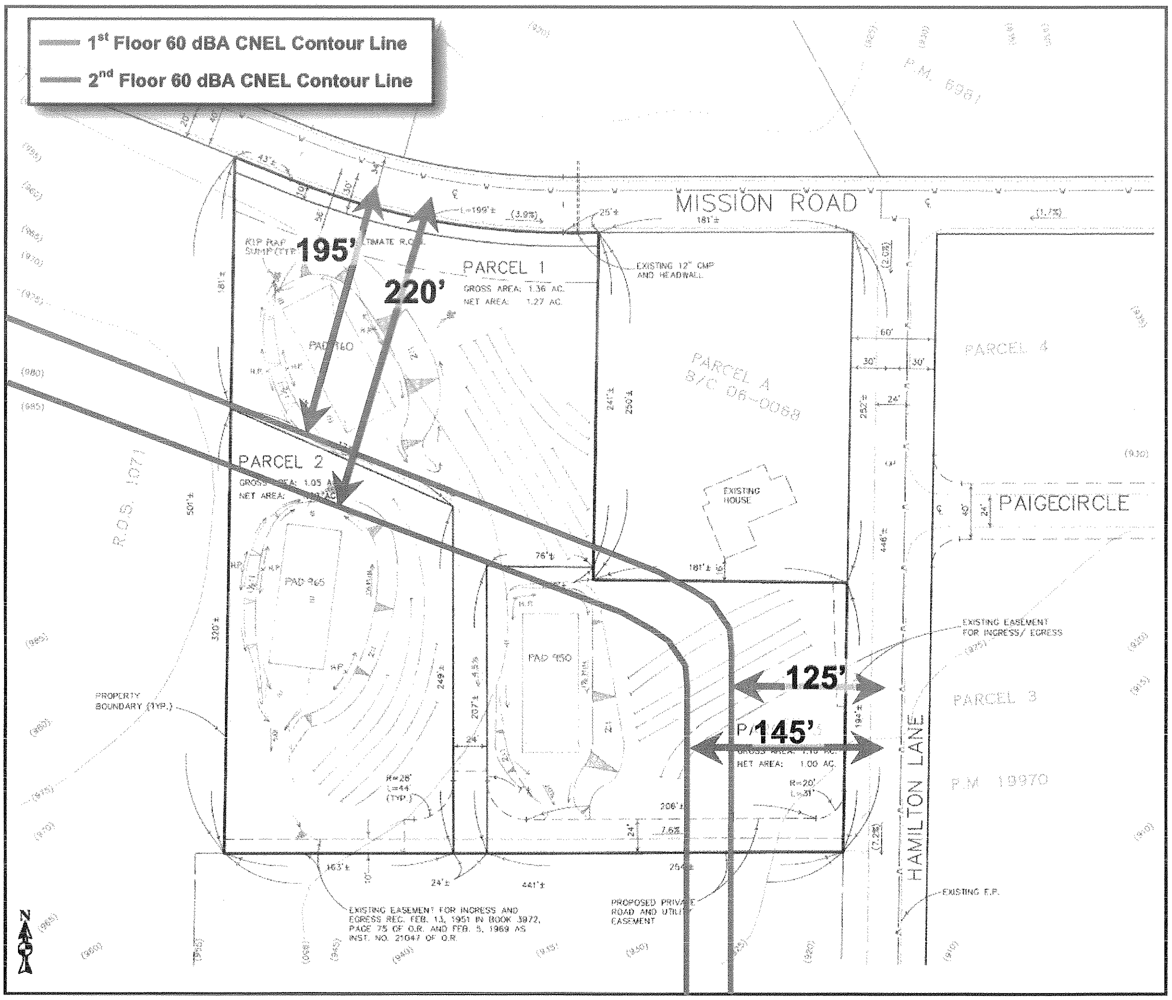

FIGURE 7: Unobstructed 60 Contours from Mission Road & Hamilton Lane Centerline (ISE 12/07)

CERTIFICATION OF ACCURACY AND QUALIFICATIONS

This report was prepared by Investigative Science and Engineering, Inc. (ISE) located at 16486 Bernardo Center Drive, Suite 278, San Diego, CA 92128. The members of its professional staff contributing to the report are listed below:

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ISE affirms to the best of its knowledge and belief that the statements and information contained herein are in all respects true and correct as of the date of this report. Should the reader have any questions regarding the findings and conclusions presented in this report, please do not hesitate to contact ISE at (858) 451-3505.

Content and information contained within this report is intended only for the subject project and is protected under 17 U.S.C. §§ 101 through 810. Original reports contain non-photo blue ISE watermark at the bottom of each page.

Approved as to Form and Content:

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

Attachments to this report: *TNM 2.5 Model Input/Output Decks*

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor Unmitigated

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
mission road	12.0	point1	1	144.1	887.0	947.00				Average	
		point2	2	213.5	859.0	947.00				Average	
		point3	3	282.9	830.9	946.00				Average	
		point4	4	302.2	822.7	945.00				Average	
		point5	5	319.8	816.2	943.00				Average	
		point6	6	356.7	801.5	943.00				Average	
		point7	7	387.5	792.6	941.00				Average	
		point8	8	418.4	783.8	938.00				Average	
		point9	9	450.1	779.0	938.00				Average	
		point10	10	481.9	774.3	937.00				Average	
		point11	11	530.2	772.9	936.00				Average	
		point12	12	687.6	772.9	933.00				Average	
		point13	13	844.3	772.9	935.00				Average	
		point14	14	885.0	772.9	933.00				Average	
		point15	16	932.6	772.9	931.00					
Hamilton Lane	24.0	point17	17	746.0	262.7	917.00				Average	
		point18	18	749.7	531.2	933.00				Average	
		point19	19	753.4	758.7	933.00					

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor Unmitigated
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
Receiver2	2	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
Receiver3	3	1	0.0	59.6	66	59.6	10	----	59.6	0.0	8	-8.0
Receiver4	4	1	0.0	52.4	66	52.4	10	----	52.4	0.0	8	-8.0
Receiver5	5	1	0.0	53.9	66	53.9	10	----	53.9	0.0	8	-8.0
Receiver6	6	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
Receiver7	7	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
Receiver8	8	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0
Receiver9	9	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	9	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: TERRAIN LINES

PROJECT/CONTRACT:	07-053 TPM21079
RUN:	1st Floor Unmitigated

Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Pad2	15	350.8	414.7	965.00
	16	385.2	470.1	965.00
	17	385.2	540.3	965.00
	18	346.8	561.5	965.00
	38	321.8	552.6	965.00
	19	308.0	516.1	965.00
	20	309.0	432.5	965.00
Pad3	21	532.4	369.5	950.00
	22	541.5	424.1	950.00
	23	535.4	495.9	950.00
	24	484.9	499.6	950.00
	25	474.5	429.2	950.00
	26	492.8	360.5	950.00
terrain2	34	317.1	708.3	960.00
	35	295.3	700.7	965.00
	36	261.8	678.4	970.00
	37	243.3	664.2	975.00

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6 February 2008
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor Unmitigated

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Increment	Perturbs #Up	Perturbs #Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
wall	W	0.00	99.99	0.00				0.00	point1	1	317.1	708.3	960.00	0.00	0.00	0	0		
									point2	2	338.3	720.9	960.00	0.00	0.00	0	0		
									point3	3	354.7	722.0	960.00	0.00	0.00	0	0		
									point4	4	381.4	699.6	960.00	0.00	0.00	0	0		
									point5	5	401.9	663.7	960.00	0.00	0.00	0	0		
									point6	6	412.0	625.1	960.00	0.00					
House 1	W	0.00	99.99	0.00				0.00	point23	23	368.6	610.6	960.00	0.00	0.00	0	0		
									point24	24	323.4	698.3	960.00	0.00	0.00	0	0		
									point25	25	357.6	715.4	960.00	0.00	0.00	0	0		
									point26	26	403.0	629.0	960.00	0.00	0.00	0	0		
									point27	27	372.3	612.3	960.00	0.00					
House 2	W	0.00	99.99	0.00				0.00	point28	28	314.3	447.2	965.00	0.00	0.00	0	0		
									point29	29	327.3	545.3	965.00	0.00	0.00	0	0		
									point30	30	365.3	540.4	965.00	0.00	0.00	0	0		
									point31	31	352.6	442.0	965.00	0.00	0.00	0	0		
									point32	32	319.4	446.1	965.00	0.00					
House 3	W	0.00	99.99	0.00				0.00	point33	33	492.1	383.5	950.00	0.00	0.00	0	0		
									point34	34	491.8	482.1	950.00	0.00	0.00	0	0		
									point35	35	531.2	481.7	950.00	0.00	0.00	0	0		
									point36	36	531.4	383.3	950.00	0.00	0.00	0	0		
									point37	37	497.8	383.5	950.00	0.00					

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor Unmitigated

Receiver												
Name	No.	#DUs	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y	Z		Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Receiver1	1	1	384.5	677.4	960.00	5.00	0.00	66	10.0	8.0	
Receiver2	2	1	344.2	716.8	960.00	5.00	0.00	66	10.0	8.0	
Receiver3	3	1	328.5	678.4	960.00	5.00	0.00	66	10.0	8.0	
Receiver4	4	1	371.9	477.4	965.00	5.00	0.00	66	10.0	8.0	
Receiver5	5	1	372.7	533.5	965.00	5.00	0.00	66	10.0	8.0	
Receiver6	6	1	316.9	508.5	965.00	5.00	0.00	66	10.0	8.0	
Receiver7	7	1	536.6	423.5	950.00	5.00	0.00	66	10.0	8.0	
Receiver8	8	1	519.8	492.3	950.00	5.00	0.00	66	10.0	8.0	
Receiver9	9	1	489.3	493.6	950.00	5.00	0.00	66	10.0	8.0	

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor Unmitigated

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
mission road	point1	1	2016	50	42	50	42	50	0	0	0	0
	point2	2	2016	50	42	50	42	50	0	0	0	0
	point3	3	2016	50	42	50	42	50	0	0	0	0
	point4	4	2016	50	42	50	42	50	0	0	0	0
	point5	5	2016	50	42	50	42	50	0	0	0	0
	point6	6	2016	50	42	50	42	50	0	0	0	0
	point7	7	2016	50	42	50	42	50	0	0	0	0
	point8	8	2016	50	42	50	42	50	0	0	0	0
	point9	9	2016	50	42	50	42	50	0	0	0	0
	point10	10	2016	50	42	50	42	50	0	0	0	0
	point11	11	2016	50	42	50	42	50	0	0	0	0
	point12	12	2016	50	42	50	42	50	0	0	0	0
	point13	13	2016	50	42	50	42	50	0	0	0	0
	point14	14	2016	50	42	50	42	50	0	0	0	0
	point15	16										
Hamilton Lane	point17	17	96	30	2	30	2	30	0	0	0	0
	point18	18	96	30	2	30	2	30	0	0	0	0
	point19	19										

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor mitigated
BARRIER DESIGN: INPUT HEIGHTS

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: 68 deg F, 50% RH

Receiver													
Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc	Impact	LAeq1h	Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	56.3	66	56.3	10	----	56.3	0.0	8	-8.0
Receiver2	2	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
Receiver3	3	1	0.0	56.2	66	56.2	10	----	56.2	0.0	8	-8.0
Receiver4	4	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
Receiver5	5	1	0.0	53.4	66	53.4	10	----	53.4	0.0	8	-8.0
Receiver6	6	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
Receiver7	7	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
Receiver8	8	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0
Receiver9	9	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	9	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: TERRAIN LINES
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor mitigated

Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Pad2	15	350.8	414.7	965.00
	16	385.2	470.1	965.00
	17	385.2	540.3	965.00
	18	346.8	561.5	965.00
	38	321.8	552.6	965.00
	19	308.0	516.1	965.00
	20	309.0	432.5	965.00
Pad3	21	532.4	369.5	950.00
	22	541.5	424.1	950.00
	23	535.4	495.9	950.00
	24	484.9	499.6	950.00
	25	474.5	429.2	950.00
	26	492.8	360.5	950.00
terrain2	34	317.1	708.3	960.00
	35	295.3	700.7	965.00
	36	261.8	678.4	970.00
	37	243.3	664.2	975.00

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Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor mitigated

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	If Berm Top Width	If Berm Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Coordinates (bottom) Y	Coordinates (bottom) Z	Height at Point	Segment Seg Ht Increment	Segment Perturbs #Up	Segment Perturbs #Dn	Segment On Struct?	Segment Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
wall	W	0.00	99.99	0.00				0.00	point1	1	317.1	708.3	960.00	5.00	0.00	0	0		
									point2	2	338.3	720.9	960.00	5.00	0.00	0	0		
									point3	3	354.7	722.0	960.00	5.00	0.00	0	0		
									point4	4	381.4	699.6	960.00	5.00	0.00	0	0		
									point5	5	401.9	663.7	960.00	5.00	0.00	0	0		
									point6	6	412.0	625.1	960.00	5.00					
House 1	W	0.00	99.99	0.00				0.00	point23	23	368.6	610.6	960.00	0.00	0.00	0	0		
									point24	24	323.4	698.3	960.00	0.00	0.00	0	0		
									point25	25	357.6	715.4	960.00	0.00	0.00	0	0		
									point26	26	403.0	629.0	960.00	0.00	0.00	0	0		
									point27	27	372.3	612.3	960.00	0.00					
House 2	W	0.00	99.99	0.00				0.00	point28	28	314.3	447.2	965.00	0.00	0.00	0	0		
									point29	29	327.3	545.3	965.00	0.00	0.00	0	0		
									point30	30	365.3	540.4	965.00	0.00	0.00	0	0		
									point31	31	352.6	442.0	965.00	0.00	0.00	0	0		
									point32	32	319.4	446.1	965.00	0.00					
House 3	W	0.00	99.99	0.00				0.00	point33	33	492.1	383.5	950.00	0.00	0.00	0	0		
									point34	34	491.8	482.1	950.00	0.00	0.00	0	0		
									point35	35	531.2	481.7	950.00	0.00	0.00	0	0		
									point36	36	531.4	383.3	950.00	0.00	0.00	0	0		
									point37	37	497.8	383.5	950.00	0.00					

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor mitigated

Receiver												
Name	No.	#DUs	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y	Z		Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Receiver1	1	1	384.5	677.4	960.00	5.00	0.00	66	10.0	8.0	
Receiver2	2	1	344.2	716.8	960.00	5.00	0.00	66	10.0	8.0	
Receiver3	3	1	328.5	678.4	960.00	5.00	0.00	66	10.0	8.0	
Receiver4	4	1	371.9	477.4	965.00	5.00	0.00	66	10.0	8.0	
Receiver5	5	1	372.7	533.5	965.00	5.00	0.00	66	10.0	8.0	
Receiver6	6	1	316.9	508.5	965.00	5.00	0.00	66	10.0	8.0	
Receiver7	7	1	536.6	423.5	950.00	5.00	0.00	66	10.0	8.0	
Receiver8	8	1	519.8	492.3	950.00	5.00	0.00	66	10.0	8.0	
Receiver9	9	1	489.3	493.6	950.00	5.00	0.00	66	10.0	8.0	

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor mitigated

Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
mission road	point1	1	2016	50	42	50	42	50	0	0	0	0
	point2	2	2016	50	42	50	42	50	0	0	0	0
	point3	3	2016	50	42	50	42	50	0	0	0	0
	point4	4	2016	50	42	50	42	50	0	0	0	0
	point5	5	2016	50	42	50	42	50	0	0	0	0
	point6	6	2016	50	42	50	42	50	0	0	0	0
	point7	7	2016	50	42	50	42	50	0	0	0	0
	point8	8	2016	50	42	50	42	50	0	0	0	0
	point9	9	2016	50	42	50	42	50	0	0	0	0
	point10	10	2016	50	42	50	42	50	0	0	0	0
	point11	11	2016	50	42	50	42	50	0	0	0	0
	point12	12	2016	50	42	50	42	50	0	0	0	0
	point13	13	2016	50	42	50	42	50	0	0	0	0
	point14	14	2016	50	42	50	42	50	0	0	0	0
	point15	16										
Hamilton Lane	point17	17	96	30	2	30	2	30	0	0	0	0
	point18	18	96	30	2	30	2	30	0	0	0	0
	point19	19										

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 1st Floor mitigated

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
mission road	12.0	point1	1	144.1	887.0	947.00				Average	
		point2	2	213.5	859.0	947.00				Average	
		point3	3	282.9	830.9	946.00				Average	
		point4	4	302.2	822.7	945.00				Average	
		point5	5	319.8	816.2	943.00				Average	
		point6	6	356.7	801.5	943.00				Average	
		point7	7	387.5	792.6	941.00				Average	
		point8	8	418.4	783.8	938.00				Average	
		point9	9	450.1	779.0	938.00				Average	
		point10	10	481.9	774.3	937.00				Average	
		point11	11	530.2	772.9	936.00				Average	
		point12	12	687.6	772.9	933.00				Average	
		point13	13	844.3	772.9	935.00				Average	
		point14	14	885.0	772.9	933.00				Average	
		point15	16	932.6	772.9	931.00					
Hamilton Lane	24.0	point17	17	746.0	262.7	917.00				Average	
		point18	18	749.7	531.2	933.00				Average	
		point19	19	753.4	758.7	933.00					

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Kyle Shimabuku

6 February 2008
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 2nd Floor mitigated
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver													
Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	67.6	66	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
Receiver2	2	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0
Receiver3	3	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
Receiver4	4	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
Receiver5	5	1	0.0	57.7	66	57.7	10	----	57.7	0.0	8	-8.0
Receiver6	6	1	0.0	54.3	66	54.3	10	----	54.3	0.0	8	-8.0
Receiver7	7	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
Receiver8	8	1	0.0	59.0	66	59.0	10	----	59.0	0.0	8	-8.0
Receiver9	9	1	0.0	58.8	66	58.8	10	----	58.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	9	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: TERRAIN LINES
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 2nd Floor mitigated

Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Pad2	15	350.8	414.7	965.00
	16	385.2	470.1	965.00
	17	385.2	540.3	965.00
	18	346.8	561.5	965.00
	38	321.8	552.6	965.00
	19	308.0	516.1	965.00
	20	309.0	432.5	965.00
Pad3	21	532.4	369.5	950.00
	22	541.5	424.1	950.00
	23	535.4	495.9	950.00
	24	484.9	499.6	950.00
	25	474.5	429.2	950.00
	26	492.8	360.5	950.00
terrain2	34	317.1	708.3	960.00
	35	295.3	700.7	965.00
	36	261.8	678.4	970.00
	37	243.3	664.2	975.00

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 2nd Floor mitigated

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
wall	W	0.00	99.99	0.00				0.00	point1	1	317.1	708.3	960.00	5.00	0.00	0	0		
									point2	2	338.3	720.9	960.00	5.00	0.00	0	0		
									point3	3	354.7	722.0	960.00	5.00	0.00	0	0		
									point4	4	381.4	699.6	960.00	5.00	0.00	0	0		
									point5	5	401.9	663.7	960.00	5.00	0.00	0	0		
									point6	6	412.0	625.1	960.00	5.00					
House 1	W	0.00	99.99	0.00				0.00	point23	23	368.6	610.6	960.00	0.00	0.00	0	0		
									point24	24	323.4	698.3	960.00	0.00	0.00	0	0		
									point25	25	357.6	715.4	960.00	0.00	0.00	0	0		
									point26	26	403.0	629.0	960.00	0.00	0.00	0	0		
									point27	27	372.3	612.3	960.00	0.00					
House 2	W	0.00	99.99	0.00				0.00	point28	28	314.3	447.2	965.00	0.00	0.00	0	0		
									point29	29	327.3	545.3	965.00	0.00	0.00	0	0		
									point30	30	365.3	540.4	965.00	0.00	0.00	0	0		
									point31	31	352.6	442.0	965.00	0.00	0.00	0	0		
									point32	32	319.4	446.1	965.00	0.00					
House 3	W	0.00	99.99	0.00				0.00	point33	33	492.1	383.5	950.00	0.00	0.00	0	0		
									point34	34	491.8	482.1	950.00	0.00	0.00	0	0		
									point35	35	531.2	481.7	950.00	0.00	0.00	0	0		
									point36	36	531.4	383.3	950.00	0.00	0.00	0	0		
									point37	37	497.8	383.5	950.00	0.00					

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 2nd Floor mitigated

Receiver

Name	No.	#DUs	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y	Z		Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Receiver1	1	1	384.5	677.4	960.00	15.00	0.00	66	10.0	8.0	
Receiver2	2	1	344.2	716.8	960.00	15.00	0.00	66	10.0	8.0	
Receiver3	3	1	328.5	678.4	960.00	15.00	0.00	66	10.0	8.0	
Receiver4	4	1	371.9	477.4	965.00	15.00	0.00	66	10.0	8.0	
Receiver5	5	1	372.7	533.5	965.00	15.00	0.00	66	10.0	8.0	
Receiver6	6	1	316.9	508.5	965.00	15.00	0.00	66	10.0	8.0	
Receiver7	7	1	536.6	423.5	950.00	15.00	0.00	66	10.0	8.0	
Receiver8	8	1	519.8	492.3	950.00	15.00	0.00	66	10.0	8.0	
Receiver9	9	1	489.3	493.6	950.00	15.00	0.00	66	10.0	8.0	

ISE **6 February 2008**
Kyle Shimabuku **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **07-053 TPM21079**
RUN: **2nd Floor mitigated**

Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
mission road	point1	1	2016	50	42	50	42	50	0	0	0	0	
	point2	2	2016	50	42	50	42	50	0	0	0	0	
	point3	3	2016	50	42	50	42	50	0	0	0	0	
	point4	4	2016	50	42	50	42	50	0	0	0	0	
	point5	5	2016	50	42	50	42	50	0	0	0	0	
	point6	6	2016	50	42	50	42	50	0	0	0	0	
	point7	7	2016	50	42	50	42	50	0	0	0	0	
	point8	8	2016	50	42	50	42	50	0	0	0	0	
	point9	9	2016	50	42	50	42	50	0	0	0	0	
	point10	10	2016	50	42	50	42	50	0	0	0	0	
	point11	11	2016	50	42	50	42	50	0	0	0	0	
	point12	12	2016	50	42	50	42	50	0	0	0	0	
	point13	13	2016	50	42	50	42	50	0	0	0	0	
	point14	14	2016	50	42	50	42	50	0	0	0	0	
	point15	16											
Hamilton Lane	point17	17	96	30	2	30	2	30	0	0	0	0	
	point18	18	96	30	2	30	2	30	0	0	0	0	
	point19	19											

ISE
Kyle Shimabuku

6 February 2008
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 07-053 TPM21079
RUN: 2nd Floor mitigated

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
mission road	12.0	point1	1	144.1	887.0	947.00				Average	
		point2	2	213.5	859.0	947.00				Average	
		point3	3	282.9	830.9	946.00				Average	
		point4	4	302.2	822.7	945.00				Average	
		point5	5	319.8	816.2	943.00				Average	
		point6	6	356.7	801.5	943.00				Average	
		point7	7	387.5	792.6	941.00				Average	
		point8	8	418.4	783.8	938.00				Average	
		point9	9	450.1	779.0	938.00				Average	
		point10	10	481.9	774.3	937.00				Average	
		point11	11	530.2	772.9	936.00				Average	
		point12	12	687.6	772.9	933.00				Average	
		point13	13	844.3	772.9	935.00				Average	
		point14	14	885.0	772.9	933.00				Average	
		point15	16	932.6	772.9	931.00					
Hamilton Lane	24.0	point17	17	746.0	262.7	917.00				Average	
		point18	18	749.7	531.2	933.00				Average	
		point19	19	753.4	758.7	933.00					