DUDEK

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January 11, 2016 P.N. 9404

Peter Krahenbuhl
Project Manager
SimonCRE
5111 N Scottsdale Rd. | Suite 200
Scottsdale, AZ 85250

SUBJECT: Proposed Dollar General Store
4382 Phelan Road, Phelan California
Acoustical Study Results

Dear Mr. Krahenbuhl:

This report contains the results of our acoustical analysis for the proposed Dollar General Store to be located in the Phelan community of San Bernardino County (County), California. The assessment has been conducted in conformance with the County requirement that the interior Community Noise Equivalent Level (CNEL) not exceed 50 dB within the proposed retail space. Additionally, the County's exterior noise generation limit of 60 dBA CNEL for commercial uses (measured at the closest residential parcel boundary) has been included in the evaluation.

The noise study included an exterior noise evaluation and rudimentary exterior to interior noise assessment of future noise levels calculated to occur at the southern building façade of the Dollar General Store. Future traffic noise from Phelan Street was modeled in order to determine exterior noise exposure levels for the property.

Operational noise including truck deliveries and exterior mechanical equipment (i.e, roof-mounted HVAC packages), was evaluated at the closest residential property boundary (north side of Lindero Street) to determine compliance with Santa Bernardino County Code.

1.0 BACKGROUND

The project site is located at the northwest corner of the intersection of Phelan Road and Sierra Vista Road in the unincorporated community of Phelan, San Bernardino County California (Refer to Site Plan). The project consists of a single story retail structure of approximately 9,100 square feet, 36 vehicle parking spaces, and landscape areas (Refer to Site Plan). An exterior

trash enclosure and delivery pad would be located at the northwest corner of the structure, and four package unit Heating-Ventilation-Air-Conditioning (HVAC) systems would be located on the roof of the structure.

The site and immediately adjacent parcels to the east, north, west, and south are zoned General Commercial (Refer to zoning map). Land uses in the project area consist of vacant land to the west and north, a retail store to the east (across Sierra Vista Road), and a medical clinic to the south (across Phelan Road). The closest residentially zoned parcels in the vicinity of the subject property are located approximately 315 feet to the north, on the opposite side of Lindero Street). This environmental noise analysis is based on the Preliminary Site Plan (MPA Architecture Inc., 12/14/15).

2.0 COUNTY NOISE CRITERIA

With respect to noise performance standards for commercial properties, the pertinent regulation is San Bernardino County Code (SBCC) Chapter 83.01.080. For commercial uses proposed adjacent to residential property, noise produced from the commercial operation is limited to a maximum of 60 dBA CNEL at the boundary of any existing or potential outdoor use area associated with the residential property; as a practical matter, the property boundary of the closest residential parcel is normally used for this determination.

The General Plan, Noise Element dictates that interior noise levels for a use such as the proposed Dollar General not exceed 50 dBA CNEL.

CNEL is a 24-hour average equivalent A-weighted sound level with a ten decibel (dB) "penalty" added to noise during the hours of 10:00 p.m. to 7:00 a.m., and a five dB penalty added to the evening hours of 7:00 p.m. to 10:00 p.m. The five and ten dB penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. The A-weighted scale measures noise levels corresponding to the human hearing frequency response. All sound levels in this report are A-weighted. Definitions of acoustical terms used in this report are provided in Attachment 1.

3.0 NOISE ANALYSIS

3.1 Exterior Traffic Noise Impact

Currently and in the future, it is anticipated that the vicinity of the site would primarily be affected by traffic noise along Phelan Road. Based upon the Phelan / Pinon Hills Community Plan (County, 2007), the Year 2030 traffic volume along Phelan Road adjacent to the project site is projected to be 17,120 average vehicles per day (ADT).

The future CNEL was calculated using FHWA Transportation Noise Model (TNM) Version 2.5 and the projected future traffic volumes along Phelan Road. To determine the CNEL from the daily traffic volume, it was assumed that the average hourly noise level generated by a representative hourly traffic volume equal to 10 percent of the ADT is numerically equivalent to the CNEL value expected to be generated by the daily (24-hour) traffic.

A receptor location at the middle of the south building façade was created in the model to allow determination of the sound level from traffic noise at the exterior building façade. The future modeled traffic noise level at the south building façade is 61.5 dBA CNEL. See *Attachment 3* for full model inputs and outputs.

3.2 Interior Noise Impact

Structures provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 to 20 dBA with open windows, and between 25 and 30 dBA with closed windows, as shown in *Table 1.*

Table 1
Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows[a]
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Offices/Hotels	17	25
Theaters	17	25

Source: Transportation Research Board, National Research Council, 2000.

Based upon a calculated future exterior noise level of 61.5 dBA CNEL, even with windows open, the proposed retail structure would have interior noise levels not exceeding 44.5 dBA CNEL (the minimum anticipated exterior to interior attenuation being 17 dBA). Thus, the proposed Dollar General Store building would comply with the County's 50 dBA CNEL interior.

3.3 Delivery Truck Noise

Noise impacts due to retail store delivery area activities include truck traffic arrivals and departures, and truck off-loading noise levels at the delivery area. The proposed project designates a concrete delivery pad at the northeast corner of the building, adjacent to the trash dumpster enclosure (Refer to Site Plan).

To determine typical delivery area and truck circulation noise levels associated with the proposed project, Dudek used reported noise level measurement data collected at a Safeway Store loading dock during a peak morning hour. Noise level measurements were conducted at a distance of 50 feet from the loading area. During the one hour sample of loading dock noise levels, there were 3 semi-truck arrivals and 4 semi-truck departures, unloading activities, and 4 step side delivery trucks.

The noise level measurements were conducted for a one hour period, and the noise measurements of the loading dock activities were confirmed to represent a typical busy hour of loading dock operations. The analysis indicated that during a busy hour of loading dock operations, the measured hourly Leq noise level was 60 dBA at a distance of 50 feet from the loading dock.

The location of the delivery area at the northeast corner of the building is approximately 355 feet from the closest property line of a parcel with residential zoning (north side of Lindero Street). To determine loading activity noise at this property line, a calculation is performed using the reported noise level and new distance of interest.

Sound attenuation due to distance, for a point source (which is applicable to the delivery area) is calculated with the equation:

$$SPL_1 = SPL_2 - 20\log(D_2/D_1)$$

Where:

SPL_1 is the calculated sound pressure level (in dB) at specified distance [D_2]

SPL_2 is a known (measured) sound pressure level at a known distance [D_1]

D_1 is distance from source to measured sound pressure level

D_2 is distance from source to location of calculated sound pressure level

Using the above calculation, the predicted delivery area noise level at the closest residential property line is 43 dBA Leq.

3.4 Outdoor Mechanical Equipment Noise Level

The outdoor mechanical equipment for the project will consist of four package HVAC units located on the rooftop of the building. Three of the HVAC units will be York 7.5 ton units, Model XP090. One unit will be a York 5 ton unit, Model XP060.

Noise level data provided by the manufacturer was used to determine the noise levels which would be generated by the HVAC package units. Each of the York package units proposed for the project has a sound power rating of 78 dBA.

Assuming all the equipment is operating simultaneously for a minimum period of one hour, the worst-case calculated noise level at the property line of the closest residential parcel (to the north) is 36 dBA Leq. The noise level calculations are included in Attachment 4.

3.5 Combined Commercial Operations Noise Level

As described above in Section 3.3, delivery activities would result in an hourly average noise level of 43 dBA Leq at the closest residential property boundary, during the busiest delivery periods at the store. As described in Section 3.4, the roof-top HVAC equipment, if all operating simultaneously, would result in an hourly average noise level of 36 dBA Leq at the closest residential property boundary.

Sound levels are expressed in decibels, which are a logarithmic function. The formula to add one dB level to another is:

$$L_A + L_B = 10\log_{10}(10^{LA/10} + 10^{LB/10})\ dB$$

Using the above formula, the calculated noise level at the closest residential property boundary during a worst-case hour with busy store deliveries and full operation of all of the HVAC units is **44 dBA Leq**.

Deliveries would not occur at the same intensity throughout the day as during the busiest hour, and the HVAC units would also not be anticipated to run continuously throughout the day and night. However, in order to compare the greatest potential noise level from the combined commercial noise sources against the County Code, it was assumed the peak delivery noise and peak HVAC noise would occur constantly over an entire 24-hour period.

This assumption equates to operational noise with an hourly Leq of 44 dB(A) during each of the 24 one-hour periods of the day. Based upon an hourly average sound level of 44 dB(A) for each hour throughout the day, the calculated noise level at the closest residential property line, on a worst-case basis, is **51 dB(A) CNEL**. This is well below the 60 dBA CNEL restriction.

4.0 MITIGATION

4.1 Interior Noise

The project would comply with the County interior noise criterion of 50 dBA CNEL maximum, as proposed. Therefore, no mitigation measures are required.

4.2 Outdoor Commercial Activity Noise Level

The combined noise from truck delivery activity and mechanical equipment operation will comply with the County's Noise Element Policy sound level limits at the closest residential property boundary; therefore, no mitigation is required.

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This concludes our noise assessment. Should you have any questions regarding this assessment, you can contact me at (805) 308-8527, or at jleech@dudek.com.

Sincerely,

DUDEK

Jonathan V. Leech, INCE
Senior Environmental Planner, Acoustician

Att: Attachments 1 through 4

References

County of San Bernardino. 2007. General Plan, Noise Element.

County of San Bernardino. 2007. Phelan/Pinon Hills Community Plan.

County of San Bernardino. Municipal Code. 2016

Diehl, George M., ed. 1973. Machinery Acoustics. John Wiley & Sons, Inc. New York, NY

Federal Highway Administration (FHWA). 2004. FHWA Traffic Noise Model, Version 2.5. Office of Environment and Planning. Washington, DC. February.

Transportation Research Board, National Research Council, 2000.

ATTACHMENT 1
Noise Terminology

ATTACHMENT 1

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, dB	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 Equivalent) Sound Level (CNEL)	CNEL is the A-weighted equivalent continuous sound exposure (CNEL) level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during the nighttime hours (10 p.m. to 7 a.m.) and 5 dB added to the sound during the evening hours (7 p.m. to 10 p.m.).
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 level containing the same total energy as a time varying signal over a given sample period. Stated another way, the L_{eq} is the energy-averaged sound level.
Sound Transmission Class, STC	A single number rating of the noise reduction of a building element.

ATTACHMENT 2
Site Plan
&
Zoning Map

PRELIMINARY SITE PLAN

PHELAN, CA
4382 PHELAN ROAD @ SIERRA VISTA ROAD

PROTOTYPE:	F	DEVELOPER		DESIGNER		DATE:
BLDG/SALES SF:	9,002/7,385	COMPANY:	SIMON CRE	COMPANY:	MPA ARCHITECTS, INC.	12-14-15
ACREAGE:	1.87	NAME:	JOSHUA SIMON	NAME:	LEONARDO DALE	
REQ'D PARKING SPACES:	36	PHONE #:	480-745-1956	PHONE #:	619-236-0585	

REVIEWED
By kriddick at 2:42 pm, Dec 14, 2015

LEGEND:
- HEAVY DUTY CONCRETE
- HEAVY DUTY ASPHALT
- STAND. DUTY ASPHALT
- LANDSCAPE

PARKING REQUIREMENTS:
1 SPACE PER 250 SQ.FT.
9,100/300 = 36 SPACES
STAND. PARKING: 36 SPACES
COMPACT PARKING: N/A

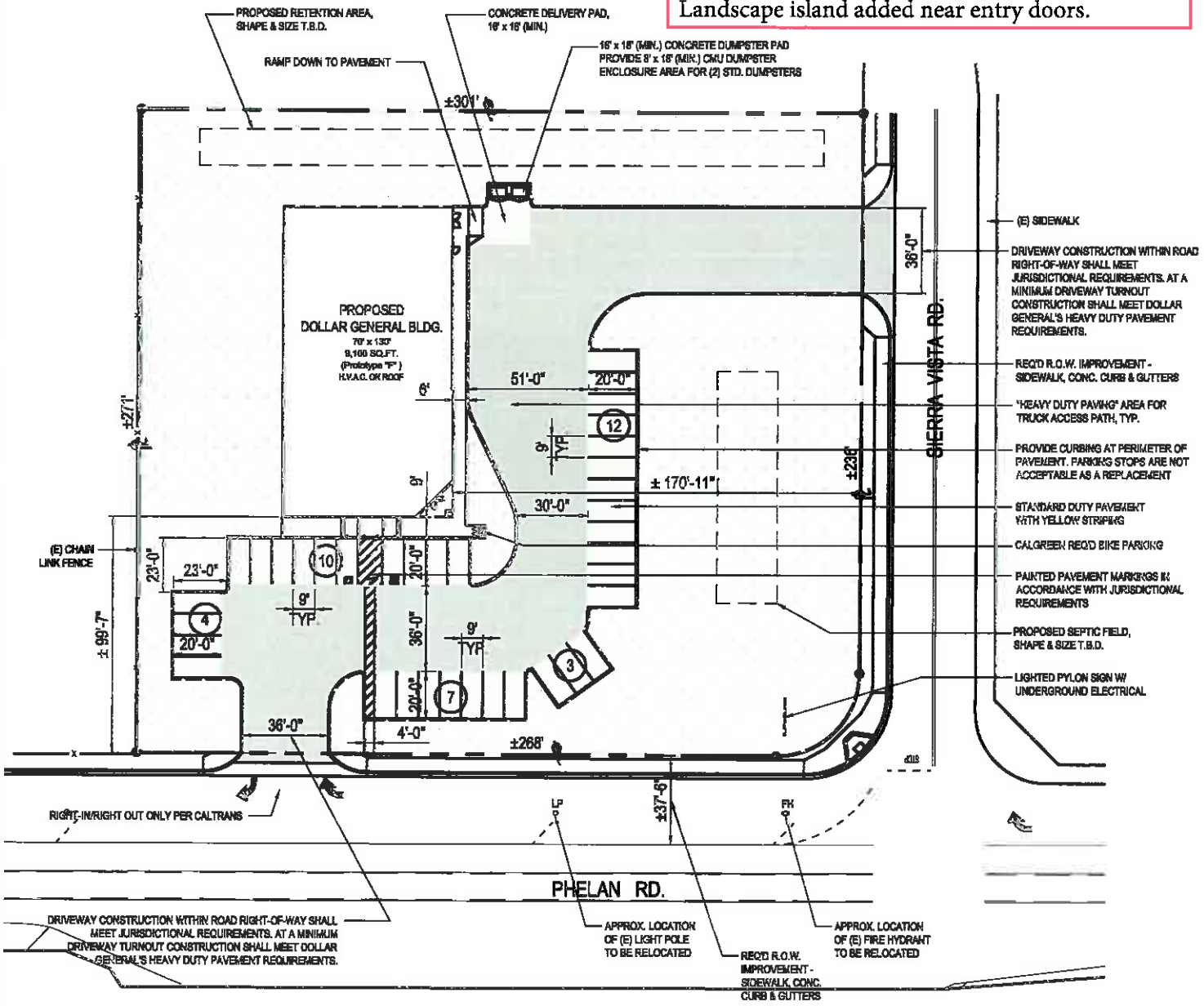
PARKING SPACE DIMENSIONS:
STAND. PARKING: 9'x20'
COMPACT PARKING: N/A

JURISDICTION:
SAN BERNARDINO COUNTY

BUILDING SETBACKS:
FRONT: 25'
STREET SIDE: 25'
INTERIOR SIDE: 0'
REAR: 0' (10' IF ABUTS RES.)

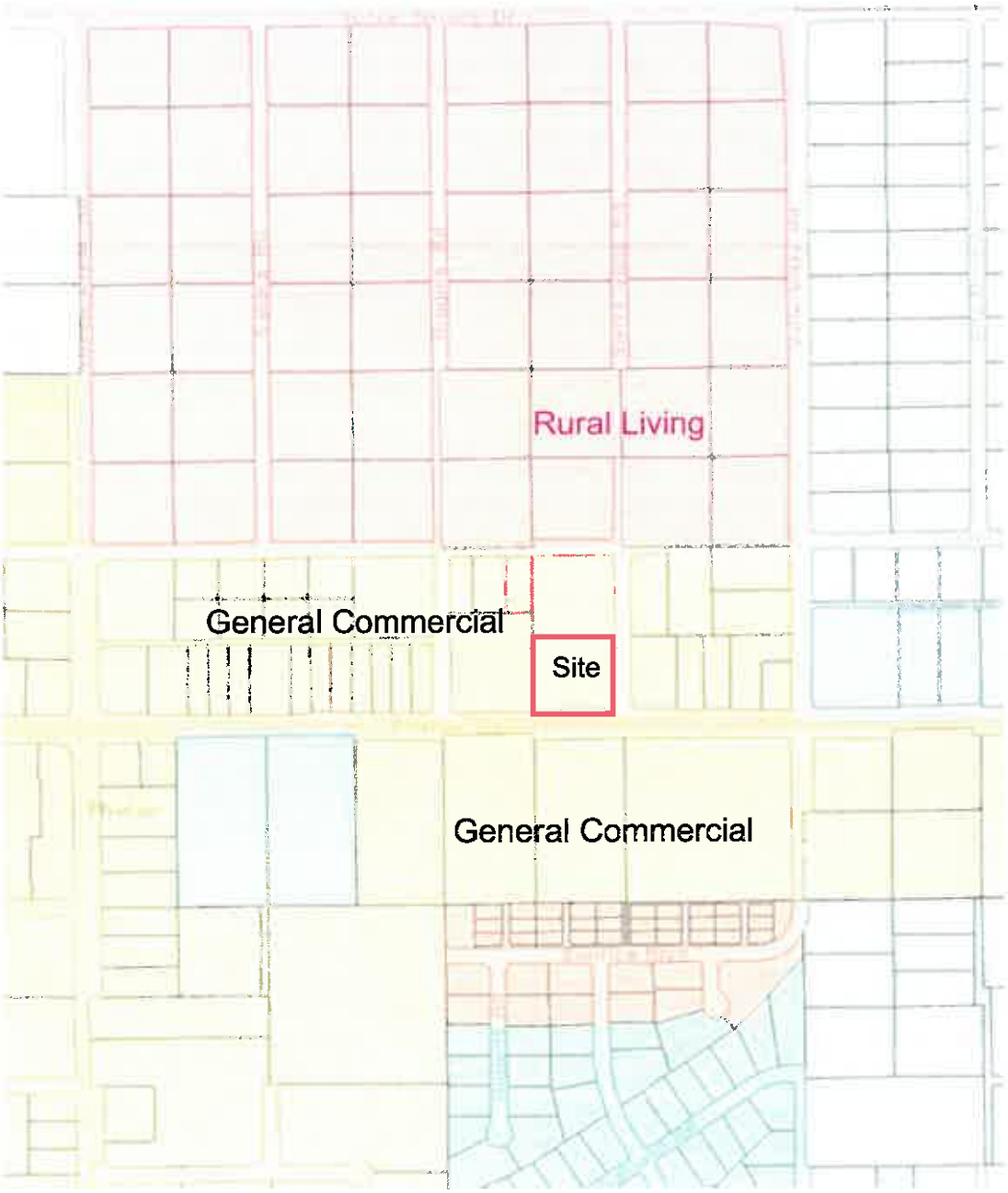
NOTES:
1. SITE LAYOUT BASED ON AERIAL DATA ONLY. LOT LINES AND PROPERTY DIMENSIONS MUST BE VERIFIED BY ALTA SURVEY.
2. LANDSCAPE, UTILITY, SIGNAGE, DRAINAGE ARE PRELIMINARY AND SHOWN FOR REFERENCE ONLY.
3. SITE LAYOUT SUBJECT TO CHANGE PENDING LOCAL JURISDICTION RESTRICTIONS AND APPROVALS.

Post REC Review - Extended the driveway from Sierra Vista Dr. due to existing grade differential & to ensure the site meet DG required slope levels. Landscape island added near entry doors.



NORTH

SCALE = 1"=80'-0"



Zoning Map

Dollar General Store

Phelan CA

ATTACHMENT 3
Traffic Noise Model (TNM)
Input / Output

Simon CRE
JVL

6 January 2016
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT:	Dollar Store Phelan
RUN:	Phelan Road Year 2030
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	With Barrier Noise Reduction Calculated	With Barrier Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Store South Facade	1	1	0.0	61.5	66	61.5	10	---	61.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	1	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

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TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: Dollar Store Phelan
RUN: Phelan Road Year 2030

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

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Phelan Eastbound	12.0	West End	1	0.0	6.0	0.00				Average	
		point2	2	200.0	6.0	0.00				Average	
		point3	3	350.0	6.0	0.00				Average	
		point4	4	500.0	6.0	0.00				Average	
		point5	5	700.0	6.0	0.00					
Phelan Road Westbound	12.0	East End	6	700.0	30.0	0.00				Average	
		point7	7	500.0	30.0	0.00				Average	
		point8	8	350.0	30.0	0.00				Average	
		point9	9	200.0	30.0	0.00				Average	
		point10	10	0.0	30.0	0.00					

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TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Dollar Store Phelan
RUN: Phelan Road Year 2030

Roadway Name	Points 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
Phelan Eastbound	West End	1	829	35	18	35	9	35	2	35	0	0	
	point2	2	829	35	18	35	9	35	2	35	0	0	
	point3	3	829	35	18	35	9	35	2	35	0	0	
	point4	4	829	35	18	35	9	35	2	35	0	0	
	point5	5											
Phelan Road Westbound	East End	6	829	35	18	35	9	35	2	35	0	0	
	point7	7	829	35	18	35	9	35	2	35	0	0	
	point8	8	829	35	18	35	9	35	2	35	0	0	
	point9	9	829	35	18	35	9	35	2	35	0	0	
	point10	10											

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6 January 2016
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: Dollar Store Phelan
RUN: Phelan Road Year 2030

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Store South Facade	1	1	350.0	176.0	0.00	4.92	0.00	66	10.0	8.0	Y

ATTACHMENT 4
Outdoor Mechanical Equipment Analysis

MECHANICAL EQUIPMENT NOISE LEVEL

Location:
North P.L 35 485 0

Source Coordinates X	Y	Z	Receiver Coordinates X	Y	Location-Equipment	Leq (h) at 50' (dBA)	Receiver Elevation (feet)	Source Elevation (feet)	Source to Receiver (feet)	Source to Barrier (feet)	Receiver to Barrier (feet)	Barrier (base) (feet)	Barrier Height (feet)	Fresnel No. at 500 Hz	Barrier Attenuation (dBA)	Leq w/o Barrier (dBA)	Leq w/Barrier (dBA)
15	30	15	35	485	1 - YORK XP090	48	5	18.0	455	12	443	15	3.5	0.03	5	29	24
15	75	15	35	485	2 - YORK XP090	48	5	18.0	410	12	398	15	3.5	0.03	6	30	24
45	30	15	35	485	3 - YORK XP090	48	5	18.0	455	12	443	15	3.5	0.03	5	29	24
45	75	15	35	485	4 - YORK XP060	48	5	18.0	410	12	398	15	3.5	0.03	6	30	24
																36	30

Barrier Attenuation limited to 20 dB maximum

X	Y	Elev. At Roof or Ground	Source Height	LwA Single Source	Number of Units	Sound Level at 50 feet Total	Equip. Location Site / Number
15	30	0	3	80	1	48	1
15	75	0	3	80	1	48	2
45	30	0	3	80	1	48	3
45	75	0	3	80	1	48	4

Frequency (in Hz) 500