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TA Truck Center Supplemental Noise Analysis

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June 8, 2011

Mr. Travis Crawford
Quad Knopf, Inc.
5110 West Cypress Avenue
Visalia, CA 93277

Subject: Shasta County TA Truck Center Revised Circulation Noise Analysis

Dear Mr. Crawford:

The acoustical consulting firm of j.c. brennan & associates, Inc. has reviewed the potential changes in overall noise levels at residences adjacent to Pacheco Road and at the Pacheco School, which may be associated with the proposed revised egress driveway. It is our understanding that the revised egress driveway is a condition associated with the Truck Center Conditions of Approval (No. 96-90).

As a means of evaluating the potential noise impacts, data contained in the October 5, 2010 memorandum, prepared by Kittelson & Associates, Inc., which are the traffic engineers for the project was used as direct inputs to the traffic noise impact modeling (*Knighton & Churn Creek Commons Retain Center, Travel Centers of American Vehicle Circulation Analysis, Kittelson & Associates, Inc. Memorandum, October 5, 2010, Project # 8477.0*). In addition, noise measurement data collected by j.c. brennan & associates, Inc. in 2009 for the Knighton & Churn Creek Commons Retail Center EIR noise section was also used to evaluate the existing noise environment.

Based upon the noise measurement data collected for the Knighton & Churn Creek Commons Retail Center EIR noise section in 2009, the existing daytime noise levels in the vicinity of the Pacheco Road residential area range between 63 dBA and 64 dBA Leq. The existing daytime noise levels in the vicinity of the Pacheco School area range between 58 dBA and 59 dBA Leq. The primary noise sources associated with the measured noise levels were I-5 traffic, TA Truck Center activities, and local roadway traffic. Therefore, the cumulative background noise levels are due to traffic on several roadways and TA Center activities.

As a means of determining the traffic noise levels and changes in traffic noise levels due to the revised egress driveway, the peak hour traffic volumes and truck mix percentages contained in the Kittelson Memorandum were used. The memorandum does not have 24-hour volumes to compare to the Shasta County General Plan Noise Element. However, impacts relative to CEQA can be determined based upon the changes in traffic noise levels. j.c. brennan & associates, Inc. utilized the Federal Highway Administration (FHWA RD77-108) Traffic Noise Prediction Model to determine the potential noise

impacts. Previously an increase in noise levels of +4 dB or greater above exiting noise levels, was used in the noise section for the Knighton and Churn Creek Commons EIR as a test of significance. Table 1 shows the predicted changes in modeled traffic noise levels on roadways of concern.

Table 1
Changes in Traffic Noise Levels with Revised TA Truck Center Egress Driveway

Roadway Segment	Traffic Noise Level @ 50 feet from Roadway Centerline	
	Existing No Project	Existing + Project
Pacheco Road, South of Knighton Road	52.5 dB Leq	64.5 dB Leq
Knighton Road, East of Churn Creek-Pacheco	62.5 dB Leq	62.4 dB Leq
Churn Creek Road, North of Knighton Road	60.2 dB Leq	60.9 dB Leq

Based upon Table 1, the segment of Pacheco Road, south of Knighton Road, and extending to the proposed egress driveway will be the only roadway segment which will experience a significant increase in traffic noise levels. This segment of roadway will result in approximately 40 additional heavy trucks exiting onto Pacheco Road, and traveling north to Knighton Road during the peak hour. Based upon the Kittelson Memorandum, all of the 40 trucks are expected to turn to the west on Knighton Road to access I-5.

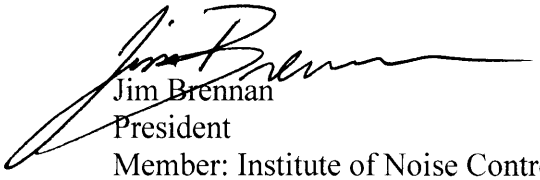
Table 1 also reveals that the predicted traffic noise levels at residences adjacent to Pacheco Road and Pacheco School are less than the overall measured background noise levels. As mentioned previously, the field survey indicated that the measured noise levels were due to a number of noise sources. Measured overall noise levels at the residences adjacent to Pacheco Road are 10 dBA Leq higher than the modeled Pacheco Road noise levels. Measured overall noise levels at the Pacheco School area are 3 dBA to 4 dBA Leq higher than the modeled Knighton Road noise levels.

When adding the modeled Pacheco Road noise level of 64.5 dBA Leq, as shown in Table 1, to the measured background noise level of 64 dBA Leq, the cumulative resulting noise level is 67dBA Leq. Therefore, the addition of the truck traffic on Pacheco Road will not result in a significant increase in background noise levels at the Pacheco Road residences. The revised egress would not have a significant impact on the Pacheco School.

Please call or contact me if you have any questions at (530) 823-0960 – jbrennan@jcbrennanassoc.com.

Respectfully submitted,

j.c. brennan & associates, Inc.



Jim Brennan
President
Member: Institute of Noise Control Engineering

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2011-135
	Project Name:	TA Existing + Project
	Roadway Tested:	Pacheco
	Test Location:	
	Test Date:	
Weather Conditions:	Temperature (Fahrenheit):	
	Relative Humidity:	
	Wind Speed and Direction:	
	Cloud Cover:	
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	50
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	
Roadway Condition:	Pavement Type	
	Pavement Condition:	
	Number of Lanes:	
	Posted Maximum Speed (mph):	
Test Parameters:	Test Time:	
	Test Duration (minutes):	60
	Observed Number Automobiles:	58
	Observed Number Medium Trucks:	1
	Observed Number Heavy Trucks:	43
	Observed Average Speed (mph):	25
Model Calibration:	Measured Average Level (L_{eq}):	
	Level Predicted by FHWA Model:	64.5
	Difference:	***64.5 dB***

Conclusions:

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2011-135
	Project Name:	TA Existing
	Roadway Tested:	Pacheco
	Test Location:	
	Test Date:	
Weather Conditions:	Temperature (Fahrenheit):	
	Relative Humidity:	
	Wind Speed and Direction:	
	Cloud Cover:	
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	50
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	
Roadway Condition:	Pavement Type	
	Pavement Condition:	
	Number of Lanes:	
	Posted Maximum Speed (mph):	
Test Parameters:	Test Time:	
	Test Duration (minutes):	60
	Observed Number Automobiles:	47
	Observed Number Medium Trucks:	1
	Observed Number Heavy Trucks:	2
	Observed Average Speed (mph):	25
Model Calibration:	Measured Average Level (L_{eq}):	
	Level Predicted by FHWA Model:	52.5
	Difference:	***52.5 dB***

Conclusions:

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2011-135
	Project Name:	TA Existing + Project
	Roadway Tested:	Knighton East
	Test Location:	
	Test Date:	
Weather Conditions:	Temperature (Fahrenheit):	
	Relative Humidity:	
	Wind Speed and Direction:	
	Cloud Cover:	
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	50
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	
Roadway Condition:	Pavement Type	
	Pavement Condition:	
	Number of Lanes:	
	Posted Maximum Speed (mph):	
Test Parameters:	Test Time:	
	Test Duration (minutes):	60
	Observed Number Automobiles:	752
	Observed Number Medium Trucks:	1
	Observed Number Heavy Trucks:	18
	Observed Average Speed (mph):	25
Model Calibration:	Measured Average Level (L_{eq}):	
	Level Predicted by FHWA Model:	62.4
	Difference:	***62.4 dB***

Conclusions:

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2011-135
	Project Name:	TA Existing
	Roadway Tested:	Knighton East
	Test Location:	
	Test Date:	
Weather Conditions:	Temperature (Fahrenheit):	
	Relative Humidity:	
	Wind Speed and Direction:	
	Cloud Cover:	
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	50
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	
Roadway Condition:	Pavement Type	
	Pavement Condition:	
	Number of Lanes:	
	Posted Maximum Speed (mph):	
Test Parameters:	Test Time:	
	Test Duration (minutes):	60
	Observed Number Automobiles:	514
	Observed Number Medium Trucks:	1
	Observed Number Heavy Trucks:	21
	Observed Average Speed (mph):	25
Model Calibration:	Measured Average Level (L_{eq}):	
	Level Predicted by FHWA Model:	62.5
	Difference:	***62.5 dB***

Conclusions:

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:	Job Number:	2011-135
	Project Name:	TA Existing + Project
	Roadway Tested:	Churn Creek North
	Test Location:	
	Test Date:	
Weather Conditions:	Temperature (Fahrenheit):	
	Relative Humidity:	
	Wind Speed and Direction:	
	Cloud Cover:	
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CAL200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	50
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	
Roadway Condition:	Pavement Type	
	Pavement Condition:	
	Number of Lanes:	
	Posted Maximum Speed (mph):	
Test Parameters:	Test Time:	
	Test Duration (minutes):	60
	Observed Number Automobiles:	396
	Observed Number Medium Trucks:	1
	Observed Number Heavy Trucks:	14
	Observed Average Speed (mph):	25
Model Calibration:	Measured Average Level (L_{eq}):	
	Level Predicted by FHWA Model:	60.9
	Difference:	***60.9 dB***

Conclusions:

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Calibration Worksheet

Project Information:

Job Number: 2011-135
Project Name: TA Existing
Roadway Tested: Churn Cr North
Test Location:
Test Date:

Weather Conditions:

Temperature (Fahrenheit):
Relative Humidity:
Wind Speed and Direction:
Cloud Cover:

Sound Level Meter:

Sound Level Meter: LDL Model 820
Calibrator: LDL Model CAL200
Meter Calibrated: Immediately before and after test
Meter Settings: A-weighted, slow response

Microphone:

Microphone Location: On Project Site
Distance to Centerline (feet): 50
Microphone Height: 5 feet above ground
Intervening Ground (Hard or Soft): **Soft**
Elevation Relative to Road (feet):

Roadway Condition:

Pavement Type
Pavement Condition:
Number of Lanes:
Posted Maximum Speed (mph):

Test Parameters:

Test Time:
Test Duration (minutes): 60
Observed Number Automobiles: 257
Observed Number Medium Trucks: 1
Observed Number Heavy Trucks: 13
Observed Average Speed (mph): 25

Model Calibration:

Measured Average Level (L_{eq}):
Level Predicted by FHWA Model: 60.2
Difference: ***60.2 dB***

Conclusions:

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