

ENVIRONMENTAL NOISE ASSESSMENT

CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION
CLOVIS, CALIFORNIA

PREPARED FOR

CITY OF CLOVIS
1033 FIFTH STREET
CLOVIS, CALIFORNIA 93612

PREPARED BY

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OCTOBER 31, 2008

SETTING

The proposed project is the amendment of the City of Clovis General Plan and the Herndon/Shepherd Specific Plan to permit expansion of the Clovis Research and Technology Business Park (R&T Park). The expansion area is comprised of approximately 160 acres, which is bounded by State Route 168 (SR 168) to the south, Nees Avenue to the north and the Harlan Ranch Master Planned Community to the east. Figure 1 shows the proposed RT Park expansion area.

The expansion area would be developed into research and technology uses, commercial/retail uses and live/work units. The site currently contains mostly semi-rural land uses. Some existing residential uses would remain in the expansion area as the project develops over time.

Appendix A provides definitions of the acoustical terminology used in this report. Unless otherwise stated, all sound levels reported in this analysis are A-weighted sound pressure levels in decibels (dB). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards utilize A-weighted sound levels, as they correlate well with public reaction to noise.

Existing Ambient Noise Levels:

Existing sources of noise in the project area include traffic on SR168 and existing local roadways. There are existing residences scattered throughout the expansion area, and many of those residences occupy relatively large parcels. Ambient noise level measurements were conducted on August 21, 2008 at the two locations noted on Figure 1. The noise monitoring locations are representative of the existing noise environment within the project area

Noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL-820 sound level analyzers equipped with B&K Type 4176 1/2" microphones. The equipment complies with the specifications of the American National Standards Institute (ANSI) for Type I (Precision) sound level meters. The meters were calibrated in the field prior to use with a B&K Type 4230 acoustic calibrator to ensure the accuracy of the measurements. The microphones were located on tripods or poles at approximately 5 feet above the ground. Table I summarizes the ambient noise measurement results.

TABLE I				
SUMMARY OF AMBIENT NOISE LEVEL MEASUREMENTS				
AUGUST 21, 2008				
Site	A-weighted Decibels, dBA			
	Hourly L_{eq}	Hourly L_{max}	Hourly L₉₀	CNEL
3062 Nees	35-53	52-70	26-48	52.6
980 N. Locan	37-56	52-75	29-50	54.6
Source: Brown-Buntin Associates, Inc.				

Figure 1: Project Area and Noise Monitoring Sites

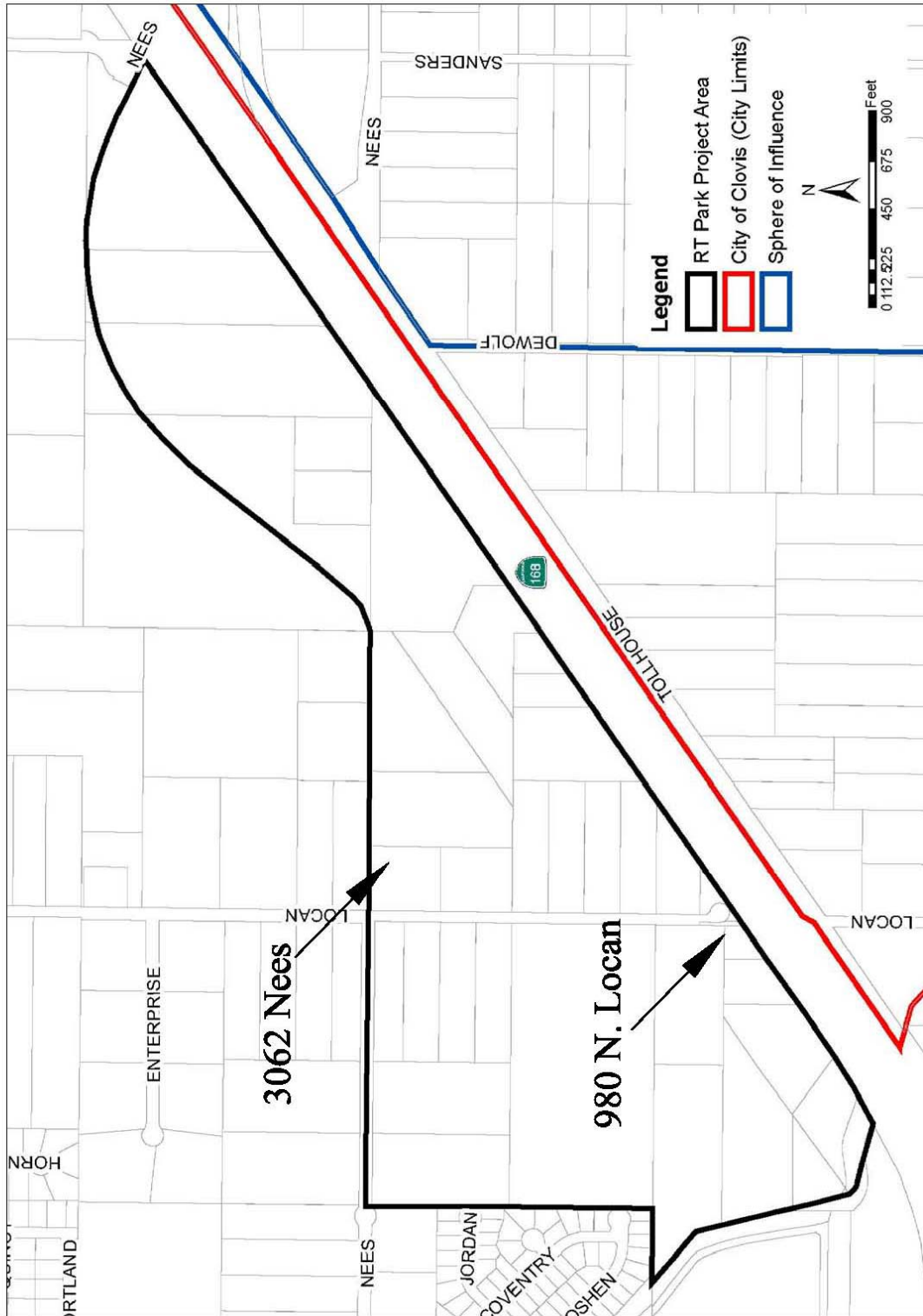


Table I indicates that hourly energy average noise levels (L_{eq}) were in the range of 35-56 dBA at the two monitoring sites during the noise measurement period. Hourly maximum noise levels (L_{max}) were in the range of 52-75 dBA, and hourly L_{90} values were in the range of 26-50 dBA. The L_{90} is a statistical noise descriptor that represents the noise level exceeded 90 % of the time during the one-hour sample periods. The L_{90} describes the residual (or background) noise level in the absence of identifiable noise events.

Figure 2 graphically shows the hourly variations in measured noise levels. As expected, the lowest noise levels occurred during the late night and early morning hours and the highest noise levels occurred during the morning rush hours. Measured CNEL values for the period of midnight to midnight on August 21, 2008 were 52.6 dB at 3062 Nees Avenue and 54.6 dB at 980 N. Locan Avenue. Measured CNEL values were well below the City's 65 dB CNEL noise compatibility criterion level for residential land uses.

Existing Traffic Noise Levels:

Existing noise levels from traffic on roadways within the project area were calculated based upon the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108)¹, and traffic data obtained from the Draft Traffic Impact Study² prepared for the project by Peters Engineering Group (Draft dated July 30, 2008) and Caltrans.

The FHWA Model is a standard analytical method used for roadway traffic noise calculations. The model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within ± 1.5 dB. To predict CNEL values, it is necessary to determine the hourly distribution of traffic for a typical day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Appendix B summarizes traffic noise modeling assumptions used to calculate existing traffic noise exposure within the project area. Peak hourly traffic volumes were derived from the above-referenced traffic study. The Annual Average Daily Traffic (AADT) was estimated by Brown-Buntin Associates, Inc. (BBA) by multiplying the worst-case peak hourly traffic volume by a factor of 10. This is an accepted method for estimating the daily traffic volume on most roadways. The day/evening/night distribution of traffic was estimated by BBA based upon studies of similar roadways since site-specific data were not available. The percentage of trucks on project area roadways was estimated by the City of Clovis with the exception of SR 168. Truck volumes for SR 168 were obtained from the Caltrans web-site.

Table II summarizes predicted traffic noise exposure for existing traffic conditions on roadways within the project area. Shown are predicted CNEL values for an assumed setback of 75 feet from the center of local roadways and 150 feet from the center of SR 168. Also shown in Table II are the distances to the CNEL 65 and 70 dB contours. Table II indicates that existing traffic noise exposures in the vicinity of the project area are in the range of 42-63 dB CNEL at typical residential and commercial building setbacks along major roadways.

Figure 2: Hourly Noise Levels

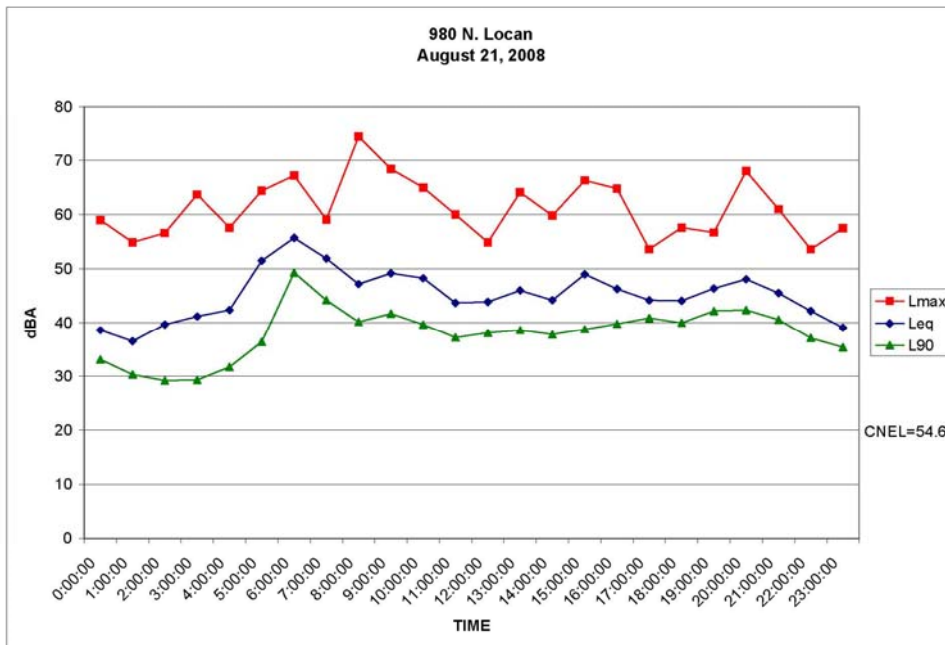
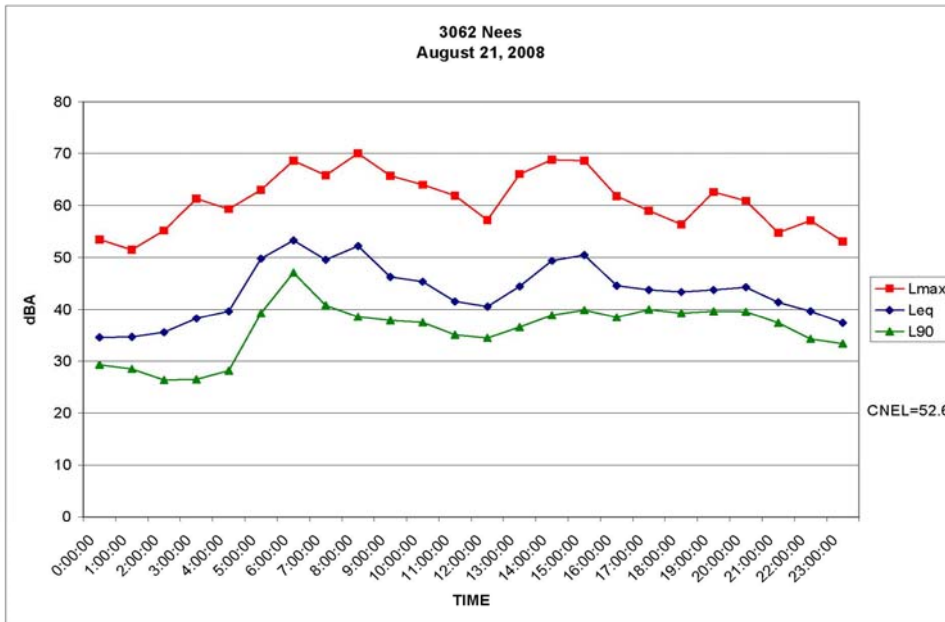


TABLE II
EXISTING TRAFFIC NOISE EXPOSURE
CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION

Roadway	CNEL,dB ¹	Distance (Ft.) to CNEL Contour ²	
		65 dB	70 dB
Temperance Avenue			
South of Shepherd	58.9	29	14
North of Nees	62.4	50	23
South of Nees	64.0	65	30
North of Alluvial	64.2	66	31
South of Alluvial	64.9	73	34
North of Westbound SR 168	64.7	72	33
South of Eastbound SR 168	66.4	93	43
North of Herndon	66.4	92	43
Locan Avenue			
South of Shepherd	52.5	11	5
North of Nees	56.1	19	9
South of Nees	45.9	4	2
North of Alluvial	---	---	---
South of Alluvial	---	---	---
DeWolf Avenue			
South of Shepherd	54.4	15	7
North of Alluvial	---	---	---
South of Alluvial	---	---	---
Shepherd Avenue			
West of Temperance	59.8	34	16
East of Temperance	59.1	30	14
West of Locan	58.9	29	14
East of Locan	58.3	27	12
West of DeWolf	58.3	27	12
East of DeWolf	57.0	22	10
North of SR 168	62.3	50	23
South of SR 168	62.8	54	25
Nees Avenue			
West of Temperance	56.1	19	9
East of Temperance	55.4	17	8
West of Locan	55.3	17	8
East of Locan	43.1	3	1
West of Alluvial	---	---	---
East of Alluvial	---	---	---
West of SR 168	41.7	2	1
East of SR 168	54.3	15	7
Alluvial Avenue			
West of Temperance	55.3	17	8
East of Temperance	53.5	13	6
West of Locan	---	---	---
East of Locan	---	---	---
North of Nees	---	---	---
South of Nees	---	---	---
West of DeWolf	--	--	---

TABLE II (Concluded)
EXISTING TRAFFIC NOISE EXPOSURE
CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION

Roadway	CNEL,dB ¹	Distance, (Ft.) to CNEL Contour ²	
		65 dB	70 dB
Alluvial Avenue (Continue)			
East of DeWolf	--	--	---
SR 168			
East of Shepherd	54.1	28	13
West of Shepherd	58.2	53	25
North of Nees	62.5	102	47
South of Nees	63.2	114	53
¹ At a reference distance of 75 feet from center of all roadways except SR 168 where a setback of 150 feet was assumed. ² From the center of the roadway. Source: Brown-Buntin Associates, Inc.			

THRESHOLDS OF SIGNIFICANCE

Appendix G (Environmental Checklist Form) of the CEQA Guidelines indicates that significant noise impacts occur when a project will expose people to noise levels in excess of standards established in local noise ordinances or general plan noise elements, or causes a substantial permanent or temporary increase in noise levels above levels existing without the project.

Noise Level Standards:

The City of Clovis Noise Element of General Plan³ establishes noise level criteria in terms of the Community Noise Equivalent Level (CNEL) metric. The CNEL is the time-weighted energy average noise level for a 24-hour day, with a penalty of approximately 5 dB added to noise levels occurring during the evening hours (7:00 p.m.-10:00 p.m.) and a 10 dB penalty added to noise levels occurring during the nighttime hours (10:00 p.m.-7:00 a.m.). The CNEL represents cumulative exposure to noise over an extended period of time and is usually calculated based upon annual average conditions.

The Noise Element establishes land use compatibility criteria for exterior noise exposure of 65 dB CNEL within residential developments and 70 dB CNEL within commercial developments. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation.

The Noise Element also requires that interior noise levels attributable to exterior noise sources not exceed 45 dB CNEL in residential developments. The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep.

Substantial Noise Increases:

CEQA does not define what constitutes a “substantial” increase in noise levels. Some guidance is provided by the 1992 findings of the “Federal Interagency Committee on Noise (FICON),” which assessed changes in ambient noise levels resulting from aircraft operations. The FICON recommendations⁴ are based upon studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of the DNL (or CNEL). Annoyance is a summary measure of the general adverse reaction of people to noise that results in speech interference, sleep disturbance, or interference with other daily activities.

Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis for transportation noise sources that are described in terms of cumulative noise exposure metrics such as the CNEL. Table III summarizes the FICON recommendations.

TABLE III MEASURES OF SUBSTANTIAL NOISE INCREASE FOR TRANSPORTATION SOURCES	
Ambient Noise Level Without Project (DNL/CNEL)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels By:
<60 dB	+ 5 dB or more
60-65 dB	+3 dB or more
>65 dB	+1.5 dB or more

Source: FICON, 1992, as applied by Brown-Buntin Associates, Inc.

For noise sources that are not transportation related, which usually includes commercial or industrial activities and other stationary noise sources, it is common to assume that a 3-5 dB increase in noise levels represents a substantial increase in ambient noise levels. This is based on laboratory tests that indicate that a 3 dB increase is the minimum change perceptible to most people, and a 5 dB increase is perceived as a “definitely noticeable change.”

Construction Noise and Vibration:

Noise due to construction activities is generally considered to be less than significant if the construction activity is temporary, use of heavy equipment and noisy activities is limited to daytime hours, pile driving or surface blasting is not proposed and all industry-standard noise abatement measures are implemented for noise-producing equipment. These general parameters acknowledge that people are not as likely to be annoyed by activities that are perceived as being necessary for normal commerce, so long as the inconveniences due to noise are of relatively short duration and all practical measures are being implemented to reduce the impacts of noise-producing activities.

Policy 1.2 of the City of Clovis Noise Element states that hours of construction activity should be limited in residential areas to reduce the intrusion of noise in the early morning and late evening hours, and on weekends and holidays. Although not specifically stated in the Noise Element, it is a standard requirement for many jurisdictions that all construction equipment be properly maintained and muffled to minimize noise generation at the source.

The City of Clovis does not have regulations that define acceptable levels of vibration. One of the most recent references suggesting vibration standards is the Federal Transit Administration's (FTA) publication concerning noise and vibration impact assessment from transit activities⁵. Although the FTA guidelines are to be applied to transit activities, they may be reasonably applied to the assessment of the potential for annoyance or structural damage resulting from other activities. To prevent vibration annoyance in residences, a vibration velocity level of 80 VdB or less is suggested when there are fewer than 70 vibration events per day. A level of 100 VdB or less is suggested by the FTA guidelines to prevent damage to fragile buildings.

PROJECT IMPACTS AND MITIGATION

Roadway Traffic Noise Impacts (Less Than Significant with Mitigation):

Potential project-related traffic noise impacts were analyzed by calculating traffic noise levels at a reference setback of 75 feet from the center of all roadways except SR 168 where a setback of 150 feet was assumed. Traffic noise levels were calculated with and without project-related traffic for near-term (existing) and future (2030) conditions. As described above for existing traffic conditions, the FHWA Model and traffic data summarized in Appendix B were employed. Calculated traffic noise levels were compared to applicable thresholds of significance to determine if project-related increases in traffic noise should be considered a significant impact and therefore require noise mitigation. Table IV summarizes the findings of the traffic noise impact analysis.

Exterior Traffic Noise Exposure-Residential Uses

Table IV shows that, at typical residential setbacks, traffic noise exposure would be expected to exceed the City's 65 dB CNEL exterior noise compatibility criterion in the future *without* construction of the project along many of the roadways in the project area. Table IV also shows that traffic noise levels would be expected to exceed the City's 65 dB CNEL standard for residential uses *as a result of the project* along sections Temperance Avenue and SR 168 in the near term and along sections of realigned Alluvial Avenue in the future (2030).

Table IV shows that project-related changes in traffic noise exposure would be in the range of -0.3 to 19.3 dB for short-term conditions and -0.4 to 3.5 dB for future conditions. Project-related changes are due to proposed changes in the roadway system in the R&T Park expansion area and project-related increases in traffic. It was assumed for the analysis that traffic noise exposure without the project would be 60 dB CNEL or less at typical building setbacks along new or realigned roadways. Significant *changes* in traffic noise exposure, as defined by the significance criteria summarized in Table III, would occur on sections of Temperance, Locan, Nees and Alluvial Avenues and SR 168 for short-term conditions, and along sections of Alluvial Avenue in the future.

TABLE IV
SUMMARY OF TRAFFIC NOISE IMPACT ANALYSIS
CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION

	Short-Term ¹				Cumulative 2030			
	CNEL, dB ²			Significant Impact?	CNEL, dB ²			Significant Impact?
	No Project	Plus Project	Change		No Project	Plus Project	Change	
Temperance Avenue								
South of Shepherd	58.9	61.4	2.5	No	63.1	64.0	0.9	No
North of Nees	62.4	64.0	1.6	No	65.8	65.8	0.0	No
South of Nees	64.0	64.9	0.9	No	67.4	67.5	0.1	No
North of Alluvial	64.2	65.1	0.9	Yes	67.5	67.6	0.1	No
South of Alluvial	64.9	67.5	2.6	Yes	68.6	69.7	1.1	No
North of Westbound SR 168	64.7	67.2	2.5	Yes	68.7	69.6	0.9	No
South of Eastbound SR 168	66.4	67.5	1.1	No	70.0	70.2	0.2	No
North of Herndon	66.4	67.2	0.8	No	70.0	70.2	0.2	No
Locan Avenue								
South of Shepherd	52.5	56.5	4.0	No	56.0	58.2	2.2	No
North of Nees	56.1	58.3	2.2	No	60.4	60.0	-0.4	No
South of Nees	45.9	59.2	13.3	Yes	59.4	60.5	1.1	No
North of Alluvial	---	63.6	---	No	---	64.4	---	No
South of Alluvial	---	---	---	---	---	---	---	---
DeWolf Avenue								
South of Shepherd	54.4	56.7	2.3	No	60.7	61.1	0.4	No
North of Alluvial	---	56.6	---	No	65.1	65.1	0.0	No
South of Alluvial	---	---	---	---	---	---	---	No
Shepherd Avenue								
West of Temperance	59.8	62.5	2.7	No	67.2	67.7	0.5	No
East of Temperance	59.1	60.1	1.0	No	66.6	66.9	0.3	No
West of Locan	58.9	60.0	1.1	No	66.2	66.5	0.3	No
East of Locan	58.3	58.4	0.1	No	66.1	66.2	0.1	No
West of DeWolf	58.3	58.4	0.1	No	66.1	66.2	0.1	No
East of DeWolf	57.0	58.7	1.7	No	65.6	65.6	0.0	No
North of SR 168	62.3	62.8	0.5	No	67.7	67.8	0.1	No
South of SR 168	62.8	63.8	1.0	No	67.1	67.3	0.2	No

TABLE IV (Concluded)
SUMMARY OF TRAFFIC NOISE IMPACT ANALYSIS
CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION

	Short-Term ¹				Cumulative 2030			
	CNEL, dB ²			Significant Impact?	CNEL, dB ²			Significant Impact?
	No Project	Plus Project	Change		No Project	Plus Project	Change	
Nees Avenue								
West of Temperance	56.1	58.1	2.0	No	63.1	62.8	-0.3	No
East of Temperance	55.4	58.2	2.8	No	61.7	60.6	-1.1	No
West of Locan	55.3	58.2	2.9	No	61.8	60.7	-1.1	No
East of Locan	43.1	53.3	10.2	Yes	60.6	59.2	-1.4	No
West of Alluvial	---	60.5	---	No	---	63.0	---	No
East of Alluvial	---	60.6	---	No	---	64.0	---	No
West of SR 168	41.7	61.0	19.3	Yes	65.1	65.8	0.7	No
East of SR 168	54.3	55.8	1.5	No	62.6	62.7	0.1	No
Alluvial Avenue								
West of Temperance	55.3	59.5	4.2	No	61.0	62.3	1.3	No
East of Temperance	53.5	64.2	10.7	Yes	62.0	65.5	3.5	Yes
West of Locan	---	62.5	---	No	--	64.6	---	No
East of Locan	---	61.1	---	No	---	61.4	---	No
North of Nees	---	51.2	---	No	---	58.8	---	No
South of Nees	---	---	---	---	---	---	---	---
West of DeWolf	--	60.2	---	No	62.4	63.9	1.5	No
East of DeWolf	--	60.7	---	No	64.8	65.7	0.9	No
SR 168								
East of Shepherd	54.1	56.1	2	No	63.7	63.8	0.1	No
West of Shepherd	58.2	57.9	-0.3	No	66.4	66.3	-0.1	No
North of Nees	62.5	63.5	1.0	No	66.4	66.7	0.3	No
South of Nees	63.2	65.0	1.8	Yes	68.3	68.5	0.2	No

¹Immediately after project completion.

²At reference distance of 75' from the center of all roadways except SR 168 where a setback of 150 feet was assumed. These are assumed to represent typical residential or commercial building setbacks.

Source: Brown-Buntin Associates, Inc.

Exterior Traffic Noise Exposure-Commercial Uses

Traffic noise exposure would not exceed the City's 70 dB CNEL standard for commercial buildings along any roadways in the R&T Park expansion area for short-term conditions. Traffic noise exposure would be expected to exceed the 70 dB CNEL standard at typical commercial building setbacks along Temperance Avenue between SR 168 and Herndon Avenue in the future without the project. Since the project would not result in the City's noise standard for commercial uses being exceeded, and the project-related increase would be less than 1.5 dB, this is not considered a significant project-related noise impact.

Interior Traffic Noise Exposure

The City of Clovis interior noise level standard is 45 dB CNEL for residential uses. Compliance with the standard is usually determined assuming that windows and doors are in the closed position. Typical residential construction complying with current building and energy conservation codes may be expected to provide at least 20-25 dB of Noise Level Reduction (NLR) performance with the windows and doors closed. This is sufficient to ensure compliance with the City's standard provided projected future traffic noise exposure does not exceed 70 dB CNEL.

Traffic Noise Mitigation

Traffic noise mitigation will be required for the above-described roadways with significant noise impacts as defined by the thresholds of significance of this analysis. Mitigation would be applicable only to areas where existing or proposed residential land uses are located. Based upon the above-described analysis, project-related changes in traffic noise exposure would not require mitigation at typical commercial building setbacks.

Noise mitigation measures should be focused on reducing noise at the source. The most effective mitigation measures would be to locate residential uses at sufficient setbacks from roadways to avoid noise exposure exceeding 65 dB CNEL exterior to buildings. Table V shows the distances from the center of roadways to the 65 and 70 dB CNEL contours for projected future conditions with the project. If this is not practical, sound walls could be constructed to shield residential buildings and outdoor activity areas. Typically, a 6 foot-high sound wall will reduce traffic noise exposure by approximately 5 dB and an 8 foot-high sound wall will reduce traffic noise exposure by approximately 7 dB. Sound walls should be designed on a case by case basis, taking into account site-specific conditions and projected future traffic noise exposure at the locations of interest.

Commercial/Industrial Noise Impacts (Less than Significant With Mitigation):

Uses to be permitted in the R&T Park expansion area include certain manufacturing, assembly and research uses, ancillary retail uses intended to serve primarily R&T Park employees and businesses, and business service uses primarily serving R&T Park occupants or providing complimentary types of services. Also permitted are certain types of transportation and communication facilities. Specific examples of the above-described general descriptions of permitted uses are listed in the Clovis Municipal Code, Section 9.3.288.

TABLE V
CUMULATIVE 2030 WITH PROJECT TRAFFIC NOISE EXPOSURE
CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION

Roadway	CNEL,dB ¹	Distance (Ft.) to CNEL Contour ²	
		65 dB	70 dB
Temperance Avenue			
South of Shepherd	64.0	64	30
North of Nees	65.8	85	40
South of Nees	67.5	110	51
North of Alluvial	67.6	112	52
South of Alluvial	69.7	154	72
North of Westbound SR 168	69.6	151	70
South of Eastbound SR 168	70.2	166	77
North of Herndon	70.2	167	78
Locan Avenue			
South of Shepherd	58.2	26	12
North of Nees	60.0	35	16
South of Nees	60.5	38	18
North of Alluvial	64.4	68	32
South of Alluvial	---	---	---
DeWolf Avenue			
South of Shepherd	61.1	41	16
North of Alluvial	65.1	76	35
South of Alluvial	---	---	---
Shepherd Avenue			
West of Temperance	67.7	113	53
East of Temperance	66.9	101	47
West of Locan	66.5	95	44
East of Locan	66.2	90	42
West of DeWolf	66.2	90	42
East of DeWolf	65.6	82	38
North of SR 168	67.8	116	54
South of SR 168	67.3	107	50
Nees Avenue			
West of Temperance	62.8	53	25
East of Temperance	60.6	38	18
West of Locan	60.7	39	18
East of Locan	59.2	31	14
West of Alluvial	63.0	56	26
East of Alluvial	64.0	65	30
West of SR 168	65.8	85	39
East of SR 168	62.7	52	24
Alluvial Avenue			
West of Temperance	62.3	50	23
East of Temperance	65.5	81	38
West of Locan	64.6	71	33
East of Locan	61.4	43	20
North of Nees	58.8	29	13

TABLE V (Concluded)			
CUMULATIVE 2030 WITH PROJECT TRAFFIC NOISE EXPOSURE CLOVIS RESEARCH AND TECHNOLOGY PARK EXPANSION			
Roadway	CNEL,dB¹	Distance, (Ft.) to CNEL Contour²	
		65 dB	70 dB
Alluvial Avenue (Continue)			
South of Nees	---	---	---
West of DeWolf	63.9	63	29
East of DeWolf	65.7	83	39
SR 168			
East of Shepherd	63.8	125	58
West of Shepherd	66.3	183	85
North of Nees	66.7	195	91
South of Nees	68.5	258	120
¹ At a reference distance of 75 feet from center of all roadways except SR 168 where a setback of 150 feet was assumed. ² From the center of the roadway.			
Source: Brown-Buntin Associates, Inc.			

Specific development plans for the expansion area were not known to BBA at the time this analysis was prepared. However, the types of noise sources generally associated with uses permitted within the R&T Park expansion area include truck movements on private property, loading dock activities, the operation of HVAC and other mechanical equipment, and parking lot activities. Potential noise impacts could result from the development of new noise sources near existing or proposed noise-sensitive land uses within the R&T Park expansion area. As previously noted, some existing homes will remain during and potentially after the expansion area is developed, and live/work residential units are proposed as part of the project.

The City’s Development Standards for the R&T Park expansion area provide specific guidelines concerning the minimum setbacks required between commercial/industrial buildings and adjacent residential properties. Generally, a minimum setback of 60 feet is required, and a 6-8 foot-high masonry wall is required at the property line.

Slowly Moving Trucks

Large and/or medium delivery trucks could be expected to serve many of the permitted uses within the expansion area. The types of trucks and frequency of operation would be determined based upon the needs of individual businesses. Although commercial/industrial buildings would have to be located at least 60 feet from a residential property line, trucks could be expected to use driveways that are closer to the property line. For this analysis, it is assumed that trucks could pass within approximately 40 feet of an adjacent home.

BBA has conducted measurements of the noise levels produced by slowly moving trucks for a number of studies. Such truck movements typically produce noise levels in the range of 72-77 dBA at a distance of 40 feet. The sound exposure level (SEL) for an individual truck pass-by at that distance is in the range of 82-90 dBA. The range in measured truck noise levels is due to differences in the size of trucks, their speed of movement and whether they have refrigeration units in operation during the pass-by.

Assuming that approximately 12 truck deliveries per day could occur between the hours of 6:00 a.m. and 6:00 p.m., the estimated CNEL at a distance of 40 feet from the driveway would be in the range of 44-55 dB. A 6-8 foot-high masonry wall at the property line would provide approximately 5 dB of noise reduction during individual truck pass-bys, so the resulting maximum noise levels at a distance of 40 feet would be in the range of 67-72 dBA and the CNEL would be less than 50 dB. This complies with the 60 dB CNEL standard of the City's noise element.

Loading Docks

Loading docks could be located at some of the commercial/industrial uses constructed within the R&T Park expansion area. Noise sources typically associated with loading dock activities include truck engines, the operation of truck-mounted refrigeration units, fork lifts, the banging of hand carts and roll-up doors, noise from P.A. systems, and the voices of truck drivers and store employees. Truck engines and/or refrigeration units are typically turned off while trucks are in loading dock areas to reduce noise and save energy. It is assumed for this analysis that loading docks could be located as close as 50 feet from an adjacent home.

Based upon noise level measurements conducted by BBA for other studies, loading dock noise levels would be expected to be in the range of 61-79 dBA at a distance of 50 feet. Assuming the number of truck deliveries described above, the calculated CNEL for loading dock activities would be in the range of 43-53 dB at a distance of 50 feet. After consideration of a property line masonry wall of 6-8 feet in height, maximum loading dock noise levels would be in the range of 56-74 dBA and the CNEL would be less than 50 dB. This complies with the 65 dB CNEL standard of the City's noise element.

Mechanical Equipment

It is possible that commercial/industrial uses within the R&T Park expansion area could have trash compactors, cardboard balers or similar equipment on the outside of buildings. Based upon noise studies conducted by BBA for other projects, noise levels produced by a trash compactor would be in the range of 72-77 dBA at a distance of 50 feet. Since trash compactors or similar equipment typically operate on an intermittent basis, such equipment would not be expected to produce noise levels in excess of the 65 dB CNEL standard of the City's noise element on adjacent properties.

Commercial/industrial uses within the R&T Park expansion area would include roof-mounted air conditioning units that could be audible at nearby residential uses. Details on the number, size and placement of HVAC units would depend on the specific facility being proposed. However, based upon data obtained by BBA for typical large commercial buildings, it is estimated that noise levels from the continuous operation of roof-mounted air conditioners could be in the range of 45-55 dBA at a distance of 60 feet. This includes consideration of acoustic shielding provided by a typical commercial building with solid roof parapets on the side of the building facing the residence of concern. The estimated CNEL from roof-mounted mechanical equipment at that distance is 50-60 dB, assuming the continuous operation of the equipment, day and night. This complies with the 65 dB CNEL standard of the City's noise element.

Parking Lot Activities

Noise due to traffic in parking lots is typically limited by low speeds and is not usually considered to be significant. Human activity in parking lots that can produce noise includes voices, stereo systems and the opening and closing of car doors and trunk lids. Such activities can occur at anytime. The noise levels associated with these activities cannot be precisely defined due to variables such as the number of parking movements, time of day and other factors. It is typical for a passing car in a parking lot to produce a maximum noise level of 60 to 65 dBA at a distance of 50 feet, which is comparable to the level of a raised voice. Noise from parking lot activities could be audible at times at nearby homes but would not exceed the City's noise standards.

Commercial/Industrial Noise Mitigation

Detailed plans for commercial/industrial development within the R&T Park expansion area are not known at this time. Based upon the generalized assessment of potential noise impacts above, noise from typical commercial/industrial uses permitted for development within the expansion area would not be expected to exceed the City of Clovis 65 dB CNEL standard at existing residential uses. However, proposed uses to be located either adjacent to an existing residential use or that will include residential uses should be evaluated on a case by case basis to ensure compliance with the City's Development Standards for the R&T Park expansion and the City's noise standards.

Noise from Construction (Less Than Significant With Mitigation):

Construction noise could occur at various locations within the project through the build-out period. During the construction of the project, noise from construction activities would potentially impact noise-sensitive land uses in the immediate area. Activities involved in construction would generate noise levels at 50 feet as indicated by Table VI. Construction activities would be temporary in nature and would most likely occur only during the daytime hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residents if nighttime operations were to occur or if equipment is not properly muffled or maintained. Construction noise is not considered a significant noise impact provided equipment is properly maintained and muffled, and noise-producing construction activities do not occur near existing residential uses during the nighttime hours.

TABLE VI	
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS	
Type of Equipment	Maximum Level, dB (50 Ft.)
Scrapers	88
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85
Source: Reference 6	

Vibration Impacts (Less Than Significant):

The important sources of man-made vibration are sonic booms, blasting, pile driving, pavement breaking, demolition, diesel locomotives, and rail-car coupling. None of these sources are anticipated from the project site. The primary vibratory source during the construction of the project will be large bulldozers and loaded trucks. Typical bulldozers and loaded trucks generate an approximate vibration of level of 86-87 VdB at a distance of 25 feet and approximately 75 VdB at a distance of 100 feet⁷. Typically, vibration levels must exceed 80 VdB before annoyance occurs. Unless the nearest residences are located closer than approximately 50 feet from a construction site, the vibration level would not exceed 80 VdB and would consequently not result in a significant vibration impact.

SOURCES CONSULTED

1. Federal Highway Administration, *Traffic Noise Model, Version 2.5*, April 14, 2004.
2. *Draft Traffic Impact Study, Proposed Research & Technology Park Expansion, Clovis, California*, Peters Engineering Group, July 30, 2008.
3. City of Clovis, *Noise Element of the General Plan*, adopted April 26, 1993.
4. *Federal Agency Review of Selected Airport Noise Analysis Issues*, Federal Interagency Committee on Noise, August, 1992
5. U.S. Department of Transportation, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, April 1995.
6. Cunniff, Patrick, *Environmental Noise Pollution*, 1977.
7. Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, January 2006.

APPENDIX A

ACOUSTICAL TERMINOLOGY

AMBIENT NOISE LEVEL: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

CNEL: Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

DECIBEL, dB: A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

DNL/L_{dn}: Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

L_{eq}: Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.

NOTE: The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.

L_{max}: The maximum noise level recorded during a noise event.

L_n: The sound level exceeded "n" percent of the time during a sample interval (L₉₀, L₅₀, L₁₀, etc.). For example, L₁₀ equals the level exceeded 10 percent of the time.

ACOUSTICAL TERMINOLOGY

NOISE EXPOSURE CONTOURS:

Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.

NOISE LEVEL REDUCTION (NLR):

The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of “noise level reduction” combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.

SEL or SENEL:

Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.

SOUND LEVEL:

The sound pressure level in decibels as measured on a sound level meter using the A-weighting 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 response of the human ear and gives good correlation with subjective reactions to noise.

SOUND TRANSMISSION CLASS (STC):

The single-number rating of sound transmission loss for a construction element (window, door, etc.) over a frequency range where speech intelligibility largely occurs.

APPENDIX B
TRAFFIC NOISE MODELING ASSUMPTIONS

Brown Buntin Associates, Inc

FHWA-RD-77-108

Appendix B-1

Calculation Sheets

September 24, 2008

Project #:	07-052
Description:	Existing Traffic
Ldn/Cnel:	CNEL
Site Type:	Soft

Contour Levels (dB)	55	60	65	70	
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Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
1	Temperance	n/o Shepherd	210	85	5	10	2	1	50	75	
2	Shepherd	e/o Temperance	3320	85	5	10	2	1	45	75	
3	Temperance	s/o Shepherd	2430	85	5	10	2	1	50	75	
4	Shepherd	w/o Temperance	3880	85	5	10	2	1	45	75	
5	Locan	n/o Shepherd		85	5	10	2	1	45	75	
6	Shepherd	e/o Locan	2740	85	5	10	2	1	45	75	
7	Locan	s/o Shepherd	720	85	5	10	2	1	45	75	
8	Shepherd	w/o Locan	3140	85	5	10	2	1	45	75	
9	De Wolf	n/o Shepherd		85	5	10	2	1	45	75	
10	Shepherd	e/o De Wolf	2050	85	5	10	2	1	45	75	
11	De Wolf	s/o Shepherd	1130	85	5	10	2	1	45	75	
12	Shepherd	w/o De Wolf	2760	85	5	10	2	1	45	75	
13	Shepherd	n/o SR 168	6930	85	5	10	2	1	45	75	
14	SR 168	e/o Shepherd	1110	85	5	10	2.7	1.3	65	150	
15	Shepherd	s/o SR 168	7790	85	5	10	2	1	45	75	
16	SR 168	w/o Shepherd	2890	85	5	10	2.7	1.3	65	150	
17	Temperance	n/o Nees	5440	85	5	10	2	1	50	75	
18	Nees	e/o Temperance	1880	85	5	10	2	1	40	75	
19	Temperance	s/o Nees	7930	85	5	10	2	1	50	75	
20	Nees	w/o Temperance	2190	85	5	10	2	1	40	75	
21	Locan	n/o Nees	1670	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-1

Calculation Sheets

September 24, 2008

Project #:	07-052
Description:	Existing Traffic
Ldn/Cnel:	CNEL
Site Type:	Soft

Contour Levels (dB)	55	60	65	70	
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Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
22	Nees	e/o Locan	110	85	5	10	2	1	40	75	
23	Locan	s/o Nees	160	85	5	10	2	1	45	75	
24	Nees	w/o Locan	1840	85	5	10	2	1	40	75	
25	Temperance	n/o Alluvial	8260	85	5	10	2	1	50	75	
26	Alluvial	e/o Temperance	1210	85	5	10	2	1	40	75	
27	Temperance	s/o Alluvial	9620	85	5	10	2	1	50	75	
28	Alluvial	w/o Temperance	1850	85	5	10	2	1	40	75	
29	Locan	n/o Alluvial		85	5	10	2	1	45	75	
30	Alluvial	e/o Locan		85	5	10	2	1	40	75	
31	Locan	s/o Alluvial		85	5	10	2	1	45	75	
32	Alluvial	w/o Locan		85	5	10	2	1	40	75	
33	Alluvial	n/o Nees		85	5	10	2	1	40	75	
34	Nees	e/o Alluvial		85	5	10	2	1	40	75	
35	Alluvial	s/o Nees		85	5	10	2	1	40	75	
36	Nees	w/o Alluvial		85	5	10	2	1	40	75	
37	De Wolf	n/o Alluvial		85	5	10	2	1	45	75	
38	Alluvial	e/o De Wolf		85	5	10	2	1	40	75	
39	De Wolf	s/o Alluvial		85	5	10	2	1	45	75	
40	Alluvial	w/o De Wolf		85	5	10	2	1	40	75	
41	SR 168	n/o Nees	7700	85	5	10	2.7	1.3	65	150	
42	Nees	e/o SR 168	1460	85	5	10	2	1	40	75	

Brown Buntin Associates, Inc

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Appendix B-1

Calculation Sheets

September 24, 2008

Project #:	07-052
Description:	Existing Traffic
Ldn/Cnel:	CNEL
Site Type:	Soft

Contour Levels (dB)	55	60	65	70	
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Segment	Roadway Name	Segment Description	ADT	Day Eve Night			Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
43	SR 168	s/o Nees	9060	85	5	10	2.7	1.3	65	150	
44	Nees	w/o SR 168	80	85	5	10	2	1	40	75	
45	Temperance	n/o WB 168	9250	85	5	10	2	1	50	75	
46	WB 168	e/o Temperance	3060	85	5	10	2.7	1.3	65	150	
47	Temperance	s/o WB 168	10590	85	5	10	2	1	50	75	
48	WB 168	w/o Temperance	1480	85	5	10	2.7	1.3	65	150	
49	Temperance	n/o EB 168	10430	85	5	10	2	1	50	75	
50	EB 168	e/o Temperance	580	85	5	10	2.7	1.3	65	150	
51	Temperance	s/o EB 168	13660	85	5	10	2	1	50	75	
52	EB 168	w/o Temperance	8250	85	5	10	2.7	1.3	65	150	
53	Temperance	n/o Herndon	13540	85	5	10	2	1	50	75	
54	Herndon	e/o Temperance	11340	85	5	10	2	1	45	75	
55	Temperance	s/o Herndon	9540	85	5	10	2	1	50	75	
56	Herndon	w/o Temperance	10000	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-2

Calculation Sheets

September 24, 2008

Project #:	07-052	Contour Levels (dB)	55	60	65	70	
Description:	Existing Plus Project Traffic						
Ldn/Cnel:	CNEL						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
1	Temperance	n/o Shepherd	210	85	5	10	2	1	50	75	
2	Shepherd	e/o Temperance	4200	85	5	10	2	1	45	75	
3	Temperance	s/o Shepherd	4370	85	5	10	2	1	50	75	
4	Shepherd	w/o Temperance	7300	85	5	10	2	1	45	75	
5	Locan	n/o Shepherd		85	5	10	2	1	45	75	
6	Shepherd	e/o Locan	2820	85	5	10	2	1	45	75	
7	Locan	s/o Shepherd	1800	85	5	10	2	1	45	75	
8	Shepherd	w/o Locan	4040	85	5	10	2	1	45	75	
9	De Wolf	n/o Shepherd		85	5	10	2	1	45	75	
10	Shepherd	e/o De Wolf	3000	85	5	10	2	1	45	75	
11	De Wolf	s/o Shepherd	1900	85	5	10	2	1	45	75	
12	Shepherd	w/o De Wolf	2840	85	5	10	2	1	45	75	
13	Shepherd	n/o SR 168	7790	85	5	10	2	1	45	75	
14	SR 168	e/o Shepherd	1750	85	5	10	2.7	1.3	65	150	
15	Shepherd	s/o SR 168	9820	85	5	10	2	1	45	75	
16	SR 168	w/o Shepherd	2700	85	5	10	2.7	1.3	65	150	
17	Temperance	n/o Nees	7790	85	5	10	2	1	50	75	
18	Nees	e/o Temperance	3580	85	5	10	2	1	40	75	
19	Temperance	s/o Nees	9800	85	5	10	2	1	50	75	
20	Nees	w/o Temperance	3510	85	5	10	2	1	40	75	
21	Locan	n/o Nees	2750	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-2

Calculation Sheets

September 24, 2008

Project #:	07-052	Contour Levels (dB)	55	60	65	70	
Description:	Existing Plus Project Traffic						
Ldn/Cnel:	CNEL						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
22	Nees	e/o Locan	1160	85	5	10	2	1	40	75	
23	Locan	s/o Nees	3360	85	5	10	2	1	45	75	
24	Nees	w/o Locan	3550	85	5	10	2	1	40	75	
25	Temperance	n/o Alluvial	10110	85	5	10	2	1	50	75	
26	Alluvial	e/o Temperance	14390	85	5	10	2	1	40	75	
27	Temperance	s/o Alluvial	17440	85	5	10	2	1	50	75	
28	Alluvial	w/o Temperance	4780	85	5	10	2	1	40	75	
29	Locan	n/o Alluvial	9440	85	5	10	2	1	45	75	
30	Alluvial	e/o Locan	7030	85	5	10	2	1	40	75	
31	Locan	s/o Alluvial		85	5	10	2	1	45	75	
32	Alluvial	w/o Locan	9570	85	5	10	2	1	40	75	
33	Alluvial	n/o Nees	720	85	5	10	2	1	40	75	
34	Nees	e/o Alluvial	6260	85	5	10	2	1	40	75	
35	Alluvial	s/o Nees		85	5	10	2	1	40	75	
36	Nees	w/o Alluvial	6140	85	5	10	2	1	40	75	
37	De Wolf	n/o Alluvial	1850	85	5	10	2	1	45	75	
38	Alluvial	e/o De Wolf	6350	85	5	10	2	1	40	75	
39	De Wolf	s/o Alluvial		85	5	10	2	1	45	75	
40	Alluvial	w/o De Wolf	5680	85	5	10	2	1	40	75	
41	SR 168	n/o Nees	9650	85	5	10	2.7	1.3	65	150	
42	Nees	e/o SR 168	2080	85	5	10	2	1	40	75	

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Appendix B-2

Calculation Sheets

September 24, 2008

Project #: 07-052
 Description: Existing Plus Project Traffic
 Ldn/Cnel: CNEL
 Site Type: Soft

Contour Levels (dB)

55	60	65	70	
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Segment	Roadway Name	Segment Description	ADT	Day Eve Night			Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
43	SR 168	s/o Nees	13670	85	5	10	2.7	1.3	65	150	
44	Nees	w/o SR 168	6860	85	5	10	2	1	40	75	
45	Temperance	n/o WB 168	16520	85	5	10	2	1	50	75	
46	WB 168	e/o Temperance	3090	85	5	10	2.7	1.3	65	150	
47	Temperance	s/o WB 168	14110	85	5	10	2	1	50	75	
48	WB 168	w/o Temperance	5200	85	5	10	2.7	1.3	65	150	
49	Temperance	n/o EB 168	15050	85	5	10	2	1	50	75	
50	EB 168	e/o Temperance	760	85	5	10	2.7	1.3	65	150	
51	Temperance	s/o EB 168	17660	85	5	10	2	1	50	75	
52	EB 168	w/o Temperance	8690	85	5	10	2.7	1.3	65	150	
53	Temperance	n/o Herndon	16560	85	5	10	2	1	50	75	
54	Herndon	e/o Temperance	11780	85	5	10	2	1	45	75	
55	Temperance	s/o Herndon	11040	85	5	10	2	1	50	75	
56	Herndon	w/o Temperance	11080	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-3

Calculation Sheets

September 24, 2008

Project #:	07-052	Contour Levels (dB)	55	60	65	70	
Description:	Cumulative 2030-No Project						
Ldn/Cnel:	CNEL						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
1	Temperance	n/o Shepherd	270	85	5	10	2	1	50	75	
2	Shepherd	e/o Temperance	18790	85	5	10	2	1	45	75	
3	Temperance	s/o Shepherd	6330	85	5	10	2	1	50	75	
4	Shepherd	w/o Temperance	21410	85	5	10	2	1	45	75	
5	Locan	n/o Shepherd		85	5	10	2	1	45	75	
6	Shepherd	e/o Locan	16510	85	5	10	2	1	45	75	
7	Locan	s/o Shepherd	1620	85	5	10	2	1	45	75	
8	Shepherd	w/o Locan	17070	85	5	10	2	1	45	75	
9	De Wolf	n/o Shepherd		85	5	10	2	1	45	75	
10	Shepherd	e/o De Wolf	14650	85	5	10	2	1	45	75	
11	De Wolf	s/o Shepherd	4760	85	5	10	2	1	45	75	
12	Shepherd	w/o De Wolf	16500	85	5	10	2	1	45	75	
13	Shepherd	n/o SR 168	23900	85	5	10	2	1	45	75	
14	SR 168	e/o Shepherd	9890	85	5	10	2.3	1.7	65	150	
15	Shepherd	s/o SR 168	20690	85	5	10	2	1	45	75	
16	SR 168	w/o Shepherd	18560	85	5	10	2.3	1.7	65	150	
17	Temperance	n/o Nees	11790	85	5	10	2	1	50	75	
18	Nees	e/o Temperance	8000	85	5	10	2	1	40	75	
19	Temperance	s/o Nees	17380	85	5	10	2	1	50	75	
20	Nees	w/o Temperance	11110	85	5	10	2	1	40	75	
21	Locan	n/o Nees	4420	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-3

Calculation Sheets

September 24, 2008

Project #: 07-052
 Description: Cumulative 2030-No Project
 Ldn/Cnel: CNEL
 Site Type: Soft

Contour Levels (dB)	55	60	65	70	
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Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
22	Nees	e/o Locan	6270	85	5	10	2	1	40	75	
23	Locan	s/o Nees	3550	85	5	10	2	1	45	75	
24	Nees	w/o Locan	8260	85	5	10	2	1	40	75	
25	Temperance	n/o Alluvial	17740	85	5	10	2	1	50	75	
26	Alluvial	e/o Temperance	8590	85	5	10	2	1	40	75	
27	Temperance	s/o Alluvial	22980	85	5	10	2	1	50	75	
28	Alluvial	w/o Temperance	6750	85	5	10	2	1	40	75	
29	Locan	n/o Alluvial		85	5	10	2	1	45	75	
30	Alluvial	e/o Locan		85	5	10	2	1	40	75	
31	Locan	s/o Alluvial		85	5	10	2	1	45	75	
32	Alluvial	w/o Locan		85	5	10	2	1	40	75	
33	Alluvial	n/o Nees		85	5	10	2	1	40	75	
34	Nees	e/o Alluvial		85	5	10	2	1	40	75	
35	Alluvial	s/o Nees		85	5	10	2	1	40	75	
36	Nees	w/o Alluvial		85	5	10	2	1	40	75	
37	De Wolf	n/o Alluvial	13120	85	5	10	2	1	45	75	
38	Alluvial	e/o De Wolf	16260	85	5	10	2	1	40	75	
39	De Wolf	s/o Alluvial		85	5	10	2	1	45	75	
40	Alluvial	w/o De Wolf	9320	85	5	10	2	1	40	75	
41	SR 168	n/o Nees	18810	85	5	10	2.7	1.3	65	150	
42	Nees	e/o SR 168	9790	85	5	10	2	1	40	75	

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Appendix B-3

Calculation Sheets

September 24, 2008

Project #: 07-052
 Description: Cumulative 2030-No Project
 Ldn/Cnel: CNEL
 Site Type: Soft

Contour Levels (dB)				
55	60	65	70	

Segment	Roadway Name	Segment Description	ADT	Day Eve Night			Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
43	SR 168	s/o Nees	29170	85	5	10	2.7	1.3	65	150	
44	Nees	w/o SR 168	17350	85	5	10	2	1	40	75	
45	Temperance	n/o WB 168	23450	85	5	10	2	1	50	75	
46	WB 168	e/o Temperance	6620	85	5	10	2.7	1.3	65	150	
47	Temperance	s/o WB 168	25580	85	5	10	2	1	50	75	
48	WB 168	w/o Temperance	3290	85	5	10	2.7	1.3	65	150	
49	Temperance	n/o EB 168	25910	85	5	10	2	1	50	75	
50	EB 168	e/o Temperance	1600	85	5	10	2.7	1.3	65	150	
51	Temperance	s/o EB 168	31210	85	5	10	2	1	50	75	
52	EB 168	w/o Temperance	12860	85	5	10	2.7	1.3	65	150	
53	Temperance	n/o Herndon	31330	85	5	10	2	1	50	75	
54	Herndon	e/o Temperance	24300	85	5	10	2	1	45	75	
55	Temperance	s/o Herndon	24230	85	5	10	2	1	50	75	
56	Herndon	w/o Temperance	22080	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-4

Calculation Sheets

September 24, 2008

Project #:	07-052	Contour Levels (dB)	55	60	65	70	
Description:	Cumulative 2030-Plus Project Traffic						
Ldn/Cnel:	CNEL						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day	Eve	Night	Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
1	Temperance	n/o Shepherd	270	85	5	10	2	1	50	75	
2	Shepherd	e/o Temperance	20100	85	5	10	2	1	45	75	
3	Temperance	s/o Shepherd	7860	85	5	10	2	1	50	75	
4	Shepherd	w/o Temperance	23990	85	5	10	2	1	45	75	
5	Locan	n/o Shepherd		85	5	10	2	1	45	75	
6	Shepherd	e/o Locan	17020	85	5	10	2	1	45	75	
7	Locan	s/o Shepherd	2700	85	5	10	2	1	45	75	
8	Shepherd	w/o Locan	18400	85	5	10	2	1	45	75	
9	De Wolf	n/o Shepherd		85	5	10	2	1	45	75	
10	Shepherd	e/o De Wolf	14830	85	5	10	2	1	45	75	
11	De Wolf	s/o Shepherd	5190	85	5	10	2	1	45	75	
12	Shepherd	w/o De Wolf	17000	85	5	10	2	1	45	75	
13	Shepherd	n/o SR 168	24660	85	5	10	2	1	45	75	
14	SR 168	e/o Shepherd	10420	85	5	10	2.7	1.3	65	150	
15	Shepherd	s/o SR 168	21930	85	5	10	2	1	45	75	
16	SR 168	w/o Shepherd	18510	85	5	10	2.7	1.3	65	150	
17	Temperance	n/o Nees	11990	85	5	10	2	1	50	75	
18	Nees	e/o Temperance	6190	85	5	10	2	1	40	75	
19	Temperance	s/o Nees	17500	85	5	10	2	1	50	75	
20	Nees	w/o Temperance	10260	85	5	10	2	1	40	75	
21	Locan	n/o Nees	4040	85	5	10	2	1	45	75	

Brown Buntin Associates, Inc

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Appendix B-4

Calculation Sheets

September 24, 2008

Project #:	07-052	Contour Levels (dB)	55	60	65	70	
Description:	Cumulative 2030-Plus Project Traffic						
Ldn/Cnel:	CNEL						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day Eve Night			Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
22	Nees	e/o Locan	4540	85	5	10	2	1	40	75	
23	Locan	s/o Nees	4600	85	5	10	2	1	45	75	
24	Nees	w/o Locan	6340	85	5	10	2	1	40	75	
25	Temperance	n/o Alluvial	18090	85	5	10	2	1	50	75	
26	Alluvial	e/o Temperance	19400	85	5	10	2	1	40	75	
27	Temperance	s/o Alluvial	29290	85	5	10	2	1	50	75	
28	Alluvial	w/o Temperance	9220	85	5	10	2	1	40	75	
29	Locan	n/o Alluvial	11170	85	5	10	2	1	45	75	
30	Alluvial	e/o Locan	7410	85	5	10	2	1	40	75	
31	Locan	s/o Alluvial		85	5	10	2	1	45	75	
32	Alluvial	w/o Locan	15810	85	5	10	2	1	40	75	
33	Alluvial	n/o Nees	4140	85	5	10	2	1	40	75	
34	Nees	e/o Alluvial	13720	85	5	10	2	1	40	75	
35	Alluvial	s/o Nees		85	5	10	2	1	40	75	
36	Nees	w/o Alluvial	10920	85	5	10	2	1	40	75	
37	De Wolf	n/o Alluvial	13240	85	5	10	2	1	45	75	
38	Alluvial	e/o De Wolf	20110	85	5	10	2	1	40	75	
39	De Wolf	s/o Alluvial		85	5	10	2	1	45	75	
40	Alluvial	w/o De Wolf	13190	85	5	10	2	1	40	75	
41	SR 168	n/o Nees	20400	85	5	10	2.7	1.3	65	150	
42	Nees	e/o SR 168	10030	85	5	10	2	1	40	75	

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Appendix B-4

Calculation Sheets

September 24, 2008

Project #:	07-052	Contour Levels (dB)	55	60	65	70	
Description:	Cumulative 2030-Plus Project Traffic						
Ldn/Cnel:	CNEL						
Site Type:	Soft						

Segment	Roadway Name	Segment Description	ADT	Day Eve Night			Truck %		Speed	Dist	Offset
				%	%	%	Med	Hvy	mph	ft	dB
43	SR 168	s/o Nees	31010	85	5	10	2.7	1.3	65	150	
44	Nees	w/o SR 168	20620	85	5	10	2	1	40	75	
45	Temperance	n/o WB 168	28290	85	5	10	2	1	50	75	
46	WB 168	e/o Temperance	6130	85	5	10	2.7	1.3	65	150	
47	Temperance	s/o WB 168	27030	85	5	10	2	1	50	75	
48	WB 168	w/o Temperance	6730	85	5	10	2.7	1.3	65	150	
49	Temperance	n/o EB 168	27760	85	5	10	2	1	50	75	
50	EB 168	e/o Temperance	5870	85	5	10	2.7	1.3	65	150	
51	Temperance	s/o EB 168	32620	85	5	10	2	1	50	75	
52	EB 168	w/o Temperance	12910	85	5	10	2.7	1.3	65	150	
53	Temperance	n/o Herndon	33070	85	5	10	2	1	50	75	
54	Herndon	e/o Temperance	24540	85	5	10	2	1	45	75	
55	Temperance	s/o Herndon	25530	85	5	10	2	1	50	75	
56	Herndon	w/o Temperance	22280	85	5	10	2	1	45	75	