

**CHRISTOPHER JEAN & ASSOCIATES, INC.**  
ACOUSTICAL CONSULTING SERVICES

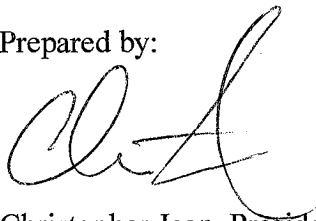
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REVISED ACOUSTICAL ANALYSIS

BUS MANUFACTURING FACILITY

CITY OF LANCASTER

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SUMMARY

This revised analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed Bus Manufacturing Facility located on West Avenue H near 55th Street West in the City of Lancaster. A list of requirements and recommendations is given in the following summary. Details are discussed in the body of the report.

A. EXTERIOR NOISE CONTROL

Neither the City nor the CalGreen standards require exterior noise mitigation for non-residential construction. No exterior noise mitigation is proposed.

B. INTERIOR NOISE CONTROL

The building shall be constructed, as a minimum, in accordance with the outline of Table 6 found in the body of the report. This will provide adequate interior noise reduction.

C. VENTILATION

This analysis assumed that all windows and doors are kept closed. If the allowable interior noise levels are met by requiring that windows and doors be kept closed, then the design of the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the office space noise reduction.

D. PROJECT DISCLOSURE

The acoustical code requirements represent minimal acceptable standards. Compliance with the Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an interior noise limit of 50 dBA Leq(1 hour) means that exterior noise sources will remain audible on the interior of a building.

Do not misrepresent the degree of exterior to interior or unit-to-unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

E. PROJECT NOISE IMPACTS

Project generated noise from the bus manufacturing process is likely to exceed the existing ambient noise levels nor the City's 65 dBA noise limit at any of the nearest residential uses around the project site. Noise from employee vehicles on the project site is likely to exceed the existing ambient noise levels nor the City's 65 dBA noise limit at any of the nearest residential uses around the project site. Truck and bus air brakes could exceed the City's 65 dBA residential noise limit at the nearest residential use so trucks and buses should only enter and exit the project site via the driveway on the west side of the site.

F. CONSTRUCTION NOISE

Construction activities shall not commence prior to seven a.m. nor continue past eight p.m. Monday through Saturday. Construction activities shall not occur on Sunday. Construction activities shall be completed as quickly as possible to minimize the duration of any unavoidable noise impacts.

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## ACOUSTICAL CONSULTING SERVICES

### 1.0 INTRODUCTION

This revised report presents the results of a noise impact and design study of the proposed Bus Manufacturing Facility located on West Avenue H near 55th Street East in the City of Lancaster. This report includes a discussion of both the existing and the expected exterior community noise environments and the recommendations for control of noise on and off the project site.

A vicinity map showing the general location of the project site is presented in Exhibit 1 – Site Location Map. An aerial photograph of the existing project site and its surroundings is shown on Exhibit 2. The project site plan is shown on Exhibit 3. The project consists of a bus manufacturing facility.

### 2.0 APPLICABLE NOISE CRITERIA

The City of Lancaster and the California Green Building Standards (CalGreen) require all non-residential projects to conform to the requirements of Table 1.

TABLE 1

APPLICABLE NOISE CRITERIA (1)

Exterior	None
Interior	50 dBA Leq(1hour)
Unit-to-Unit	STC 40

- (1) Please see Noise Rating Methods (Appendix 1) for an explanation of the commonly applicable acoustical terminology.

In addition to the requirements of Table 1, Section 17.20.160 of the City Performance Standards requires that "...noise levels emitted from the use shall not exceed 65 dBA at any property line which abuts a residential zone or use."

### 3.0 EXISTING NOISE LEVELS

Scattered residential uses exist around the perimeter of the project site. These sensitive noise receptors are currently exposed to a certain amount of environmental noise generated by activities in the project area. Long-term noise exposure can be caused by roadway, railroad and aircraft noise. The section will discuss these potential noise sources as they exist in the project area as well as the noise levels at the existing noise sensitive receptors. The nearest residential receptors are shown on Exhibit 4. The receptors are listed in Table 2.

TABLE 2

#### NEAREST RESIDENTIAL USES

<u>SYMBOL</u>	<u>DISTANCE TO PROJECT</u>	<u>DISTANCE TO NEAREST ROADWAY</u>
R1	1,660'	737'
R2	940'	905'
R3	325'	130'
R4	1,875'	530'
R5	1,840'	450'
R6	1,530'	1,400'
R7	2,070'	2,230'

### 3.1 ROADWAYS

The existing roadway noise impacts were calculated using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. These include the roadway cross-section (e.g. number of lanes), the roadway active width, the average daily traffic (ADT), the vehicle travel speed, the percentage of auto and truck traffic, the roadway grade, the angle of view, the site conditions ("hard" or "soft" site), and the percentage of average daily traffic that flows each hour throughout a 24 hour period.

As both West Avenue H-8 and 55th Street West are not yet paved, it is assumed that these roadways do not create significant noise impacts. The West Avenue H and 50th Street West existing traffic volumes were obtained from the Lancaster General Plan documents. The percentage of truck traffic was taken from a standard arterial mix. The

same source was used to project the distribution by time of day. The input data is listed in Table 3.

TABLE 3

TRAFFIC INPUT DATA

	<u>% DAY</u>	<u>% EVENING</u>	<u>% NIGHT</u>	<u>% VOLUME</u>
Autos	75.51	12.57	9.34	100.0
Medium Trucks	1.56	0.09	0.19	100.0
Heavy Trucks	0.64	0.02	0.08	100.0
Volume/Speed	=	1,400 ADT on West Avenue H at 55 MPH		
	=	1,100 ADT on 50th Street West at 50 MPH		
	=	2,600 ADT on 60th Street West at 55 MPH		

The calculations are contained in Appendix 2. The calculations yield the existing combined daytime roadway average noise levels shown in Table 4.

TABLE 4

EXISTING ROADWAY Leq NOISE LEVELS AT  
THE NEAREST RESIDENTIAL USES

<u>SYMBOL</u>	<u>ROADWAY NOISE LEVEL</u>
R1	45 dBA
R2	43 dBA
R3	56 dBA
R4	46 dBA
R5	46 dBA
R6	45 dBA
R7	44 dBA

Table 4 lists daytime average noise levels. Minimum noise levels could be as much as 10 dBA less than the average while maximum noise levels could be as much as 20 dBA higher. This means that receptor R3 which is closest to the project site is exposed to daytime roadway noise levels ranging from 46 to 76 dBA.

### 3.2 RAILROAD

There are no railroad operations in the vicinity of the project site. Railroad noise does not impact the project area.

### 3.3 AIRCRAFT

The future Fox Field noise contours are shown on Exhibit 5. Exhibit 5 shows that the future 55 dBA CNEL noise contour does not extend south of Avenue G-6. The Air Force Plant 42 noise contours are shown on Exhibit 6. Exhibit 6 shows that the Plant 42 60 dBA CNEL noise contour does not extend west of State Route 14. Aircraft noise, though sometimes audible, does not currently impact the project area.

## 3.0 FUTURE NOISE LEVELS

The project building must comply with City and CalGreen acoustical standards. Demonstrating compliance with these standards requires that the future exterior noise environment be examined to ensure that the building remains in compliance for some time in the future.

### 3.1 ROADWAYS

The expected future roadway noise impact was projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. These include the roadway cross-section (e.g. number of lanes), the roadway active width, the average daily traffic (ADT), the vehicle travel speed, the percentage of auto and truck traffic, the roadway grade, the angle of view, the site conditions ("hard" or "soft" site), and the percentage of average daily traffic that flows each hour throughout a 24 hour period.

As both West Avenue H-8 and 55th Street West are not yet paved, it is assumed that these roadways will never exceed the status of collector roadways and will likely not impact the project site. The West Avenue H and 50th Street West capacity traffic volumes were obtained from the Lancaster General Plan documents. The percentage of truck traffic was taken from a standard arterial mix. The same source was used to project the distribution by time of day. The input data is listed in Table 5 on the following page.

TABLE 5TRAFFIC INPUT DATA

	<u>% DAY</u>	<u>% EVENING</u>	<u>% NIGHT</u>	<u>% VOLUME</u>
Autos	75.51	12.57	9.34	100.0
Medium Trucks	1.56	0.09	0.19	100.0
Heavy Trucks	0.64	0.02	0.08	100.0
Volume	=	16,000 ADT on West Avenue H and 50th Street West		
Speed	=	55 MPH on West Avenue H and 50 MPH on 50th Street West		

The calculations are contained in Appendix 3. The calculations yield 50 foot design noise levels of 73 dBA CNEL and 72 dBA Leq(1 hour) for West Avenue H and 72 dBA CNEL and 71 dBA Leq(1hour) for 50th Street West.

### 3.2 RAILROAD

There are no railroad operations in the vicinity of the project site. Railroad noise will not impact the site.

### 3.3 AIRCRAFT

The future Fox Field noise contours are shown on Exhibit 4. Exhibit 4 shows that the future 55 dBA CNEL noise contour does not extend south of Avenue G-6. The Air Force Plant 42 noise contours are shown on Exhibit 5. Exhibit 5 shows that the Plant 42 60 dBA CNEL noise contour does not extend west of State Route 14. Aircraft noise, though sometimes audible, will not impact the project site.

## 4.0 MITIGATION MEASURES

### 4.1 EXTERIOR

Neither the City of Lancaster nor the CalGreen standards require non-residential projects to provide exterior noise mitigation. No exterior noise mitigation is proposed.



## 4.2 INTERIOR

The City's and CalGreen exposure criteria for non-residential construction require that the interior noise environment, attributable to outside noise sources, be limited to 50 dBA Leq(1 hour). Analysis and recommendations for control of outdoor-to-indoor noise intrusion are presented in this section.

The exterior-to-interior noise reduction expected for the planned construction was based on a detailed analysis of sample rooms and units planned for the development. Calculations of the expected typical noise reduction performance were performed for sample rooms. The analysis was based on the typical spectra expected for the primary sources of community noise impact, the typical octave-band transmission loss for each element in the planned building shell, the relative square footage of each element of the planned building shell, the expected typical interior surface treatment, and the acoustical absorption coefficient for each interior surface treatment. Corrections for the "A" Weighted room absorption factors are also included.

Each component of the building shell (e.g. exterior wall, windows, doors, etc.) provides a different amount of transmission loss for each "A" Weighted octave- band of community noise. With the knowledge of the building shell components and their individual octave band transmission loss values for the noise sources, calculations of the composite building shell transmission loss can be made for each room.

The characteristics of the basic building shell are listed in Table 6 for the office areas of the proposed building (storage and manufacturing areas of the building are not subject to the City and CalGreen acoustical standards).

TABLE 6

BASIC BUILDING SHELL CHARACTERISTICS

<u>PANEL</u>	<u>CONSTRUCTION</u>
Exterior Wall	Steel siding over steel framing, R-13 fiberglass insulation, 5/8" drywall
Windows/doors	Fixed pane in storefront frame
Roof	Steel roofing over steel framing, R-19 insulation, 5/8" drywall
Floor	Carpeted

Table 6 construction minimums will provide around 20 dBA of interior noise reduction. This will provide adequate interior noise reduction for exterior noise levels as high as 70 dBA Leq(1 hour). Since exterior noise levels are not expected to exceed 68

dBA Leq(1 hour) along West Avenue H, the standard UBC compliant construction of Table 6 will be more than adequate. No additional interior noise reduction measures are necessary.

#### 4.3 VENTILATION

The analysis assumes that the required noise reduction levels are achieved with windows and doors closed. Thus, the design of the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the dwelling unit or guest room noise reduction.

#### 4.4 PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an interior noise limit of 50 dBA Leq(1 hour) means that exterior noise sources will remain audible on the interior of a structure.

Do not misrepresent the degree of exterior to interior or unit to unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

#### 5.0 PROJECT NOISE LEVELS

The project will be used to manufacture electric powered school buses. The manufacturing process could range from installing pre-made body parts onto a truck chassis manufactured off site, to a complete in-house manufacture of the chassis and drive train, stamping, painting and installing body parts, as well as upholstering the bus interiors. For purposes of analysis, a worst-case scenario is assumed with every aspect of the bus manufacturing process occurring on site.

Various automotive manufacturing noise sources and their typical noise levels at a reference distance of 50 feet are given in Table 7 on the following page.

TABLE 750 FOOT NOISE LEVELS FOR TYPICAL  
MANUFACTURING NOISE SOURCES

<u>EQUIPMENT</u>	<u>DBA @ 50'</u>
Air Compressor	81
Pneumatic Tool	85
Overhead Crane	83
Panel Stamper	96
Grinder	85

Obviously, Table 7 does not include all types of equipment that could be used in the manufacturing process. However, the noise source samples in Table 5 represent examples of loud equipment that will almost certainly be used in the proposed facility. Depending on the number of sources operating at one time, it would not be surprising for combined noise levels as high as 100 dBA to occur inside the project building.

The building structure will provide around 10 dBA of interior to exterior noise reduction with the roll-up doors open. Thus, the project can be expected to produce worst-case noise levels as high as 90 dBA at a distance of 50 feet outside the building. Projecting this level out to the nearest residential uses around the project site would result in the noise level listed in Table 8 on the following page.

TABLE 8  
MANUFACTURING MAXIMUM NOISE LEVELS  
AT THE NEAREST RESIDENTIAL USES

<u>SYMBOL</u>	<u>ROADWAY NOISE LEVEL</u>
R1	58 dBA
R2	60 dBA
R3	61 dBA
R4	58 dBA
R5	58 dBA
R6	59 dBA
R7	57 dBA

The results of Table 8 show that noise from the manufacturing process inside the project building will not exceed the existing maximum ambient noise levels and will not exceed the City's 65 dBA residential noise limit. Keeping the roll-up doors closed when not actually in use would reduce the project noise another 10 dBA. This would reduce the Table 8 maximum noise levels by 10 dBA.

In addition to the manufacturing process noise sources, vehicle movements on site will create noise. Employee vehicles will be driven onto the site, maneuvered into a parking space, shut off, door opened then shut, and maybe the trunk opened and shut. At the end of the day, the employees will return to their cars, maybe open and close the trunk, open and shut the door, start the engine, maneuver out of the parking space, then drive off the site onto West Avenue H. A typical parking cycle has been found to produce a level of 68 dBA Leq at a distance of 10 feet. The nearest 50 parking spaces to receptor R3 would produce a worst-case combined level of 85 dBA Leq. Projecting this level out to receptor R3 results in a level of 52 dBA Leq. This level is below the existing ambient levels and is less than the City's 65 dBA limit.

Truck deliveries to the site will require trucks to drive onto the site, maneuver to a loading door or other loading area, the truck may be left idling or shut down, and forklifts would be used to load/unload the truck. Once loaded or unloaded, the truck would be restarted if shut down, maneuvered away from the loading door or area, then driven off the site. Since truck deliveries tend to be single trucks accessing the site at one time, the most significant potential noise impact will be due to the maximum noise level. The loudest noise source during this process is the air brake at 92 dBA at a distance of 50 feet. Projecting this level from the nearest site entry driveway out to receptor R3 results in a maximum level of 75 dBA. This level does not exceed the existing ambient maximum noise level at R3 but does exceed the City's 65 dBA limit.

Restricting truck entry/exit to the driveway on the west side of the property will significantly reduce the potential for noise impact at any of the nearest residential uses.

Movement of the electric buses around and off the project site should not cause significant noise impacts to any of the nearest residential uses as the electric power trains of these buses will be extremely quiet. As with the delivery trucks, the only significant source will be air brakes, if the buses are so equipped. Thus, buses should be restricted to leaving the project site from the driveway on the west side of the project site.

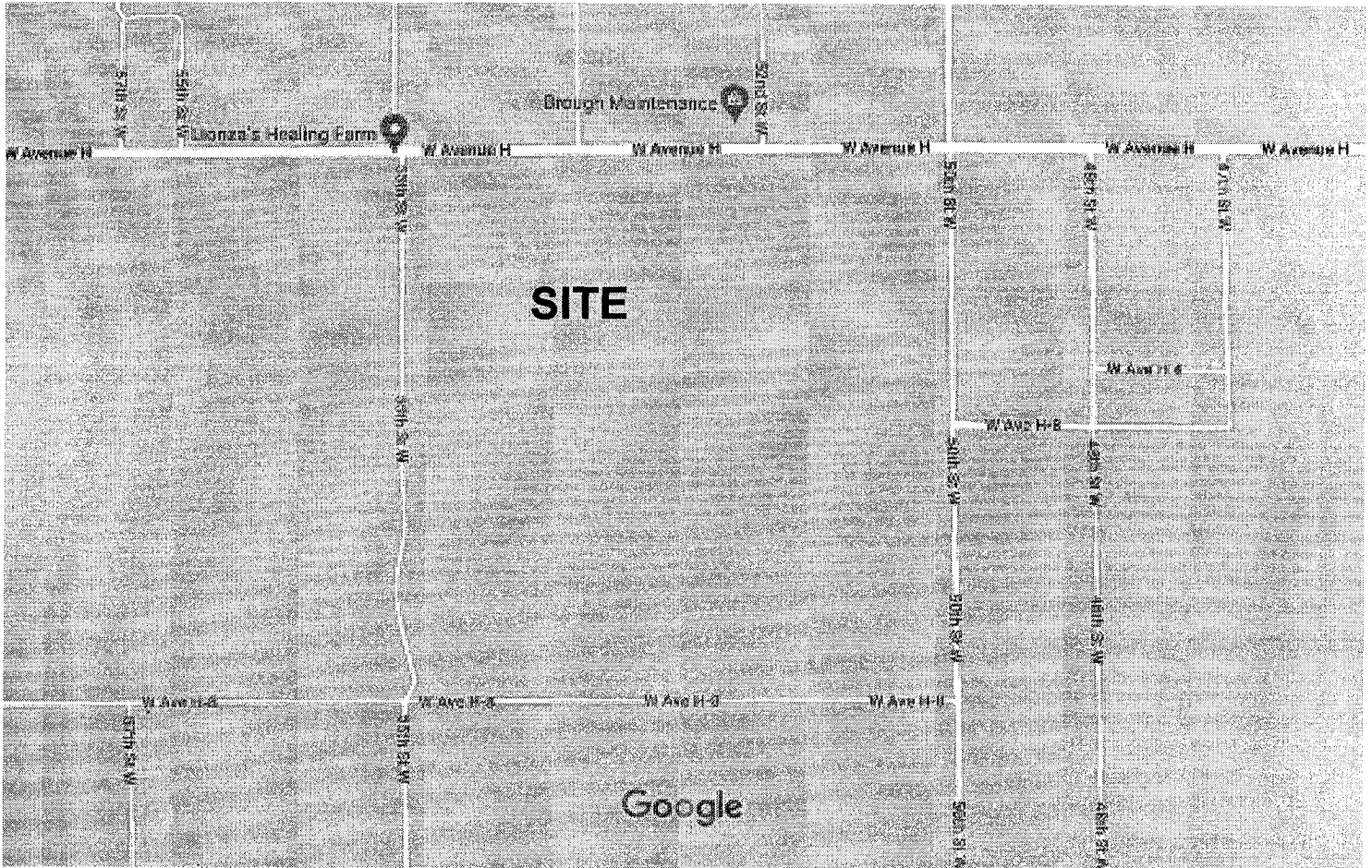
## 6.0 CONSTRUCTION NOISE

The construction phase of the project will create unavoidable but temporary noise impacts at the nearest residential uses. Section 8.24.040 prohibits construction noise on "Sundays or any day between the hours of eight p.m. and seven a.m." At the very least, project construction shall not commence prior to seven a.m. nor continue past eight p.m. Monday through Saturday. Construction shall not occur on Sunday.

Construction noise sources could include pile drivers, bulldozers, graders, backhoes, loaders, dump trucks, water trucks, rollers, compactors, jack hammers, air compressors, pneumatic tools, hammers, saws, etc. Construction noise will also include truck deliveries and worker's vehicles driving on and off the site. Since no structures can exist at the time of the grading process, it is difficult to mitigate the noise associated with grading and excavation. Care should be taken to schedule project grading in the northeast corner of the project site during mid-day hours to avoid disturbing the occupants of residential use R3. If pile driving is to occur, it should be completed as quickly as possible to minimize the duration of the noise impacts. When possible, stationary noise sources should be positioned near the south end of the project site whenever possible. Loud music should not be played on site during the construction phase.

# EXHIBIT 1 SITE LOCATION

Google Maps Lancaster



Map data ©2023 500 ft 