CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

June 20, 2018

ACOUSTICAL ANALYSIS

LA QUINTA INNS & SUITES

NORTH GOLDEN STATE BOULEVARD

CITY OF TURLOCK

Prepared by:

Christopher Jean, INCE

Prepared for: Mr. Raymond Melendez
Ventana Design and Development
313 Main Street, Suite 310
Williston, ND 58801

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

SUMMARY

This analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed La Quinta Inns & Suites project located on North Golden State Boulevard in the City of Turlock. 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

A continuous sound barrier at least eight feet (8') high must be erected around the west, south and east sides of the exterior patio area.

B. NOISE CONTROL BARRIER CONSTRUCTION MATERIALS

The required noise control barriers may be constructed using any of the following materials:

(1) Masonry block

(2) Stucco on wood frame

(3) 3/4" plywood

(4) 1/4" tempered glass or 1/2" Lexan

(5) Earthen berm

(6) Any combination of the above materials or any material with a surface weight of at least 3.5 pounds per square foot.

Each completed noise control barrier must present a solid face from top-to-bottom and end-to-end. Cutouts are not permitted except for drain holes.

C. INTERIOR NOISE CONTROL

The buildings shall be constructed, as a minimum, in accordance with the outline of Table 9 found in the body of the report. This will be adequate for all units with the following exceptions:

(1) Add STC 26 glazing units to all first floor units facing north or south (except west and east end units).

(2) Add STC 30 glazing units to all first and second floor rooms on the east end of the building.

(3) Add STC 32 glazing units to all second floor units facing north or south, and all first and second floor units on the west end of the building.

(4) Add STC 34 glazing units to all third and fourth floor units facing north, south or east (except west end units).

(5) Add STC 38 glazing units to all third and fourth floor units on the west end of the building.

(6) Add RC-1 resilient channels and two layers of interior drywall to all exterior walls and fourth floor ceilings of all third and fourth floor units facing north or south, and all second, third and fourth floor units on the west end of the building.

D. 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 dwelling or guest room noise reduction.

E. UNIT-TO-UNIT NOISE CONTROL

Common floor/ceiling assemblies between units are subject to Title 24 Sound Transmission Class (STC) and Impact Insulation Class (IIC) requirements. The plan set provided for this analysis did not include common floor/ceiling assembly details. It is highly recommended

that one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) 8" concrete slab (Riverbank Acoustical Labs, TL 76-77, 1977, 16f, Pre-stressed Concrete Institute, STC 58 -- IIC 71 with carpet, IIC 34 for bare floor)

(2) 1 1/2" lightweight concrete, sub-floor, R-11 insulation, resilient channel, drywall ceiling (Geiger and Hamme CCA-14MT, CCA-15MT, 1972, 16f, Cellular Concrete Associates, STC 60 --IIC 73 with carpet, IIC 47 with vinyl tile)

(3) 1 3/8" Gyp-Crete, sub-floor, 2" by 10" joists, R-11 insulation, resilient channel, 1/2" drywall ceiling (Riverbank Acoustical Labs TL 81-16, Gyp-Crete Corp., 1981, STC 60 -- Riverbank Acoustical Labs IN 81-14, Gyp-Crete Corp., 1981, IIC 51 with sheet vinyl)

As can be seen by the above list, some of the recommended assemblies cannot meet the IIC 50 minimum requirement without carpet. Uncarpeted areas above other living units will require some form of proprietary isolation product under the floor to achieve the required rating. Such products include Enkasonic, Acousti-Mat, Monsanto SC50, and others. Such products are designed to be installed atop the bare sub-floor and topped with either a LWC/Gyp-Crete pour or additional layers of plywood. Each product has its own specific installation requirements. These products can produce both design and field IIC compliance with sheet vinyl or wood flooring. While various lab tests have shown these same products to produce design IIC compliance when used with ceramic tile, field testing experience has proven that actual ceramic tile installations are marginal. The use of ceramic tile or marble flooring is not recommended, regardless of the installation method.

The plan set provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) Two layers 1/2" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, fiberglass insulation, two layers 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-55-69, 1969, 16f, Owens/Corning Fiberglas, STC 54)

(2) Two layers 5/8" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, R-11 insulation, two layers 5/8" direct nailed drywall (National Gypsum Co. NGC 2376, 1970, 16f, STC 53)

(3) 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, R-11 insulation, 1" airspace at plate, 2" by 4" plate with 2" by 4" studs, 5/8" direct nailed drywall (Owens/Corning Fiberglas OCF 448, 1967, 16f, STC 56)

(4) Same as #3 with two layers of R-11 insulation (Riverbank Acoustical Labs TL75-83, 1975, 16f, U.S. Department of Agriculture, STC 57)

(5) Two layers 5/8" drywall direct nailed, 2" by 4" plate with 2" x 4" studs, 1" air space, 2" by 4" plate with 2" by 4" studs, R-11 insulation, two layers 5/8" drywall (National Gypsum Co. NGC 3056, 1970, 16f, Gypsum Association, STC 58)

(6) Same as #5 with two layers of R-11 insulation (Riverbank Acoustical Labs TL 75-82, 1975, 16f, U.S. Department of Agriculture, STC 63)

All wall assemblies between any common space and a living unit must be an STC 50 minimum rated assembly. All Plumbing and electrical installations shall be installed per the instructions contained in Appendix 10. Put all details onto Plans.

F. PROJECT DISCLOSURE

The acoustical code requirements represent minimal acceptable standards. Compliance with the Building Department acoustical criteria does not guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 60 dBA CNEL means that exterior noise sources will remain clearly audible in the mitigated exterior space. Compliance with an interior noise limit of 45 dBA CNEL means that exterior noise sources will remain audible on the interior of a building.

Due to quality control and other field related problems, the code minimum laboratory ratings of STC/IIC 50 for common assemblies does not guarantee that all common assemblies will pass a field test. In fact, there is a 50 percent chance that half of all common assemblies rated at the STC/IIC 50 minimum could fail field tests. An STC 50 rated assembly will produce around 45 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

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.

G. PROJECT GENERATED NOISE

Even worst-case operations of the completed project are not likely to generate noise exceeding the Table 2 "Other Commercial" nighttime noise limits at the surrounding land uses. Thus, project generated noise will not violate the Turlock Noise Ordinance.

H. CONSTRUCTION NOISE

The easiest way to ensure compliance with the Noise Ordinance limits for construction noise is to prohibit construction operations between 7 pm and 7 am on weekdays and to prohibit all construction operations on weekends and holidays.

1.0 INTRODUCTION

This report presents the results of a noise impact and design study of the proposed La Quinta Inns & Suites project located on North Golden State Boulevard in the City of Turlock. This report includes a discussion of the expected exterior community noise environment and the recommendations for control of noise in the exterior and interior living spaces.

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 multi-story hotel building.

2.0 APPLICABLE NOISE CRITERIA

The City of Turlock requires all hotel projects to conform to the requirements of Table 1.

TABLE 1

APPLICABLE NOISE CRITERIA (1)

Exterior	60 dBA CNEL
Interior	45 dBA CNEL
Unit-to-Unit	STC 50/IIC 50

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

The City of Turlock also has a Noise Ordinance. The Noise Ordinance will require post-construction project noise levels to conform to the limits shown in Table 2 on the following page.

TABLE 2

TURLOCK NOISE ORDINANCE LIMITS(1)

EXTERIOR DBA NOISE LIMITS

PARAMETER	PUBLIC SPACE DAY	PUBLIC SPACE NIGHT	LIMITED COMMERCIAL DAY	LIMITED COMMERCIAL NIGHT	OTHER COMMERCIAL DAY	OTHER COMMERCIAL NIGHT
L50	65	60	60	55	65	60
L25	70	65	65	60	70	65
L8	75	70	70	65	75	70
L2	80	75	75	70	80	75
LMAX	85	80	80	75	85	80

INTERIOR DBA NOISE LIMITS

PARAMETER	PUBLIC SPACE DAY	PUBLIC SPACE NIGHT	LIMITED COMMERCIAL DAY	LIMITED COMMERCIAL NIGHT	OTHER COMMERCIAL DAY	OTHER COMMERCIAL NIGHT
L8	N/A	N/A	45	35	N/A	N/A
L2	N/A	N/A	50	40	N/A	N/A
LMAX	N/A	N/A	55	45	N/A	N/A

(1) There are no public spaces in the vicinity of the project site. There are no Limited Commercial uses in the vicinity of the project site. Other Commercial applies to all remaining uses in the vicinity of the project site.

The Noise Ordinance also restricts construction noise between 7 pm and 7 am on weekdays and between 8 pm and 9 am on weekends and holidays. It also limits noise levels from mobile construction equipment to 75 dBA on weekdays and 70 dBA on weekends and holidays at limited commercial uses (nearby hotels), and 85 dBA any day at other commercial uses (nearby offices and retail uses). The Ordinance further limits noise levels from stationary construction equipment to 70 dBA on weekdays and 65 dBA on weekends and holidays at limited commercial uses (hotels), and 85 dBA any day at other commercial uses (office/retail). The easiest way to ensure compliance with these limits is to prohibit construction operations between 7 pm and 7 am on weekdays and to prohibit all construction operations on weekends and holidays.

3.0 EXISTING NOISE LEVELS

3.1 ROADWAYS

A measurement was performed on the site. The measurement was conducted using a Larson-Davis Model 700 Integrating Sound Level Meter. The average noise level reported from the measurement taken at a point 225 feet from the centerline of State Route 99 was 71 dBA Leq.

Ten minute traffic counts were taken during the measurement period. The results of the counts are listed in Table 3.

TABLE 3

OBSERVED TRAFFIC COUNTS -- SR 99

	AUTOS	MEDIUM TRUCKS	HEAVY TRUCKS	TOTAL
TEN MINUTES				
Highway 99	958	31	105	1,094
Golden State	107	5	14	126
HOURLY EQUIVALENT				
Highway 99	5,748	186	630	6,564
Golden State	642	30	84	756
PERCENTAGE				
Highway 99	84.5	4.0	11.1	100.0
Golden State	87.6	2.8	9.6	100.0

The primary function of the measurements is to calibrate the Noise Model (FHWA RD-77-108) used to compute the CNEL data. The model relies on the acoustical metric of the average noise level (Leq). By taking the traffic count during the measurement, calculating the Leq value for that traffic sample, and comparing it the measured Leq value, it is possible to calibrate the CNEL model for any factors that are present and not adequately identified in the prediction equations.

The Leq value computer calculation printout is contained in Appendix 2. The calculated and measured Leq values are compared in Table 4 on the following page.

TABLE 4

COMPARISON OF CALCULATED AND MEASURED AVERAGE NOISE LEVELS

Calculated	79
Measured	71
DIFFERENCE	- 8

The results of Table 4 show that area conditions (mainly edge shielding) produce significant shielding of the project site from the freeway noise source. The resulting shielding factor will be applied to the ground floor design noise level (CNEL) calculations.

3.2 RAILROAD

A line of the Union Pacific railroad passes west of the project site at a distance of approximately 600 feet. Calculations according to the HUD Methodology were carried out to determine this rail line's impact on the project site. The calculations are contained in Appendix 3. The results of these calculations yield an uncorrected railroad noise level of 71 dBA CNEL. The parameters used for the calculations are listed in Table 5.

TABLE 5

RAILROAD PARAMETERS

PARAMETER	FREIGHT
Number of daily trains	25
Percentage at night	50%
Number of Locomotives	3
Number of railroad cars	75
Speed	40 MPH
Horn signal	Yes

3.3 AIRCRAFT

There are no concentrated aircraft operations in the vicinity of the project site. Aircraft noise does not impact the project site.

4.0 DESIGN NOISE LEVELS

4.1 ROADWAYS

The expected future roadway noise impact was projected using the Federal Highway Administration's Highway Noise Prediction Model (TNM 3.0) 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.

The N. Golden State Boulevard and W. Taylor Road forecast traffic volumes were obtained from Appendix C of the Turlock General Plan. 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 6.

TABLE 6

ARTERIAL TRAFFIC INPUT DATA

		% DAY	% EVENING	% NIGHT	% VOLUME
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	=	35,403 ADT			
Speed	=	50 MPH			

The State Route 99 forecast traffic volume was obtained from published Caltrans data. The percentage of truck traffic and distribution by time of day was also taken from published Caltrans data. The input data is listed in Table 7 on the following page.

TABLE 7

TRAFFIC INPUT DATA – SR 99 FREEWAY

	% DAY	% EVENING	% NIGHT	% VOLUME
Autos	73.00	8.60	18.40	83.7
Medium Trucks	73.00	8.60	18.40	4.2
Heavy Trucks	69.10	6.70	24.20	12.1

Volume = 100,000 ADT

Speed = 65 - 70 MPH

The calculations are contained in Appendix 4. The calculations yield a design noise level of 72 dBA CNEL at 100 feet from the center of Golden State Boulevard. The calculations also yield an uncorrected 100-foot design noise level of 86 dBA CNEL for the SR 99 Freeway. Freeway edge shielding calculations contained in Appendix 5 show that a -8 dBA shielding correction must be applied to the first floor level, a -5 dBA shielding correction applied to the second floor level, and no shielding correction applies to the third and fourth floor levels. This results in future west building face exterior noise levels of 73 dBA CNEL at the first floor, 76 dBA CNEL at the second floor, and 81 dBA CNEL at the third and fourth floors.

4.2 RAILROAD

Railroad noise levels are not expected to increase. Thus, a reference future railroad noise level of 71 dBA CNEL at 600 feet will be used to determine the railroad noise impact. It must be noted that the elevated freeway right-of-way is between the railroad and the project site. The elevated freeway will act as a sound barrier, shielding the project site from the railroad noise source. Because the amount of shielding will vary for each floor of the building, calculations contained in Appendix 6 were performed to determine the amount of shielding at each floor. The calculations show that railroad noise levels will not exceed 63 dBA CNEL at the first floor, 64 dBA CNEL at the second floor, 65 dBA CNEL at the third floor, and 66 dBA CNEL at the fourth floor.

4.3 AIRCRAFT

Aircraft noise, though sometimes audible, will not impact the project site.

4.4 COMBINED NOISE LEVELS

The roadway and railroad source noise levels will combine on the project site. The worst-case combined fourth floor exterior noise level at the west end of the proposed building will be as high as 81 dBA CNEL.

5.0 MITIGATION MEASURES

5.1 EXTERIOR

The City of Turlock requires exterior use spaces be mitigated to no more than 60 dBA CNEL. The mitigation of exterior noise will require a sound barrier around the exterior patio area. For purposes of analysis, the barrier height calculations assume that the barrier is intended to reduce exterior noise to 60 dBA CNEL at the first floor level. The assumptions for the barrier height calculations are listed in Table 8.

TABLE 8

BARRIER ANALYSIS GENERAL ASSUMPTIONS
FOR RECEIVER AND SOURCE GEOMETRY

RECEIVER ASSUMPTIONS	
HORIZONTAL GEOMETRY	**VERTICAL GEOMETRY**
Distance behind top-of-roadways barrier: 5' to 10'	Height above pad for ground level receivers: 5'
Distance behind individual patio and balcony barriers: 1' to 3'	Height above pad for second level receivers: 14'

SOURCE ASSUMPTIONS	
HORIZONTAL GEOMETRY *	**VERTICAL GEOMETRY**
For roadways with grades no greater than 2%, all vehicles were located at the single lane equivalent acoustic center of the full roadway. For roadways with over 2% grade, vehicle count was divided in half and located at the single lane equivalent acoustic center for each side of the roadway.	Automobiles: 0' above center of road grade Medium Trucks: 2.3' above center of road grade Heavy Trucks: 8' above center of road grade

* = Single Lane Equivalent (SLE) location.

The barrier calculations are contained in Appendix 7. These calculations show that sound barrier at least eight feet (8') high must be erected around the exterior patio area. The required noise control barriers may be constructed using any of the following materials:

(1) Masonry block

(2) Stucco on wood frame

(3) 3/4" plywood

(4) 1/4" tempered glass or 1/2" Lexan

(5) Earthen berm

(6) Any combination of the above materials or any material with a surface weight of at least 3.5 pounds per square foot.

Each completed noise control barrier must present a solid face from top-to-bottom. Cutouts and/or openings are not permitted except for drain holes.

5.2 INTERIOR

The City's exposure criteria for new residential construction require that the interior noise environment, attributable to outside noise sources, be limited to 45 dBA CNEL. 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 9.

TABLE 9

BASIC BUILDING SHELL CHARACTERISTICS

PANEL	CONSTRUCTION
Exterior Wall	Siding or stucco, 2" X 4" studs, R-13 fiberglass insulation, 5/8" drywall
Windows	Double pane
Sliding Glass Door	Double pane
Roof	Built-up over 1/2" plywood, fiberglass insulation, 5/8" drywall, vented
Floor	Carpeted except baths
PTAC	Sound Rated STC 35

Table 9 construction minimums will provide around 20 dBA of interior noise reduction.

For convenience of assessment, the specific noise levels at the building faces are given in Table 10.

TABLE 10

NOISE LEVELS AT THE BUILDING FACES

	FACE			
FLOOR	NORTH	EAST	SOUTH	WEST
1	70	72	70	73
2	73	72	73	76
3	78	74	78	81
4	78	74	78	81

The results of Table 10 show that interior noise reduction levels as high as 36 dBA will be required for units at the west end of the building. Since Table 9 construction will yield only around 20 dBA, specific room calculations were carried out to determine whether additional mitigation is needed. The calculations are contained in Appendix 8, and the results are given in Table 11 on the following page.

TABLE 11

ROOM NOISE REDUCTION VALUES

ROOM	GLAZING STC VS. NOISE REDUCTION								
	24	26	28	30	32	34	36	38	40
Wide Queen	24	25	26	27	28	29	29	29	30
Extended King	25	26	27	28	29	30	30	30	30
King/Double Queen	24	26	27	28	29	30	31	31	31

The results of Table 11 show that window upgrades alone cannot achieve the required 36 dBA of interior noise reduction. Thus, additional building envelope upgrades will be necessary. The exterior wall assemblies can be upgraded acoustically by installing RC-1 resilient channels and two layers of 5/8" drywall on the interior side of all exterior walls. The fourth floor roof/ceiling assemblies can be upgraded by installing RC-1 resilient channels and two layers of 5/8" drywall in place of the Table 9 ceiling.

Additional interior noise reduction calculations were performed to determine the required glazing upgrades when combined with the above wall and ceiling upgrades. The calculations are contained in Appendix 9 and the results are given in Table 12.

TABLE 12

ROOM NOISE REDUCTION VALUES
WITH EXTERIOR WALL AND CEILING UPGRADES

ROOM	GLAZING STC VS. NOISE REDUCTION								
	24	26	28	30	32	34	36	38	40
Wide Queen	25	26	28	30	32	33	35	36	37
Extended King	26	28	30	32	33	35	36	37	38
King/Double Queen	25	27	28	30	32	34	35	36	37

The results of Table 12 show that Table 9 construction should be adequate for all rooms with the following mitigation upgrades:

(1) Add STC 26 glazing units to all first floor units facing north or south (except west and east end units).

(2) Add STC 30 glazing units to all first and second floor rooms on the east end of the building.

(3) Add STC 32 glazing units to all second floor units facing north or south, and all first and second floor units on the west end of the building.

(4) Add STC 34 glazing units to all third and fourth floor units facing north, south or east (except west end units).

(5) Add STC 38 glazing units to all third and fourth floor units on the west end of the building.

(6) Add RC-1 resilient channels and two layers of interior drywall to all exterior walls and fourth floor ceilings of all third and fourth floor units facing north or south, and all second, third and fourth floor units on the west end of the building.

5.3 VENTILATION

If interior allowable noise levels are met by requiring that windows be unopenable or remain 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 dwelling unit or guest room noise reduction.

5.4 UNIT-TO-UNIT NOISE CONTROL

Common floor/ceiling assemblies between units are subject to Title 24 Sound Transmission Class(STC) and Impact Insulation Class (IIC) requirements. The plan set provided for this analysis did not include common floor/ceiling assembly details. It is highly recommended that one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) 8" concrete slab (Riverbank Acoustical Labs, TL 76-77, 1977, 16f, Pre-stressed Concrete Institute, STC 58 -- IIC 71 with carpet, IIC 34 for bare floor)

(2) 1 1/2" lightweight concrete, sub-floor, R-11 insulation, resilient channel, drywall ceiling (Geiger and Hamme CCA-14MT, CCA-15MT, 1972, 16f, Cellular Concrete Associates, STC 60 --IIC 73 with carpet, IIC 47 with vinyl tile)

(3) 1 3/8" Gyp-Crete, sub-floor, 2" by 10" joists, R-11 insulation, resilient channel, 1/2" drywall ceiling (Riverbank Acoustical Labs TL 81-16, Gyp-Crete Corp., 1981, STC 60 -- Riverbank Acoustical Labs IN 81-14, Gyp-Crete Corp., 1981, IIC 51 with sheet vinyl)

As can be seen by the above list, some of the recommended assemblies cannot meet the IIC 50 minimum requirement without carpet. Uncarpeted areas above other living units will require some form of proprietary isolation product under the floor to achieve the required rating. Such products include Enkasonic, Acousti-Mat, Monsanto

SC50, and others. Such products are designed to be installed atop the bare sub-floor and topped with either a LWC/Gyp-Crete pour or additional layers of plywood. Each product has its own specific installation requirements. These products can produce both design and field IIC compliance with sheet vinyl or wood flooring. While various lab tests have shown these same products to produce design IIC compliance when used with ceramic tile, field testing experience has proven that actual ceramic tile installations are marginal. The use of ceramic tile or marble flooring is not recommended, regardless of the installation method.

The plan set provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) Two layers 1/2" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, fiberglass insulation, two layers 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-55-69, 1969, 16f, Owens/Corning Fiberglas, STC 54)

(2) Two layers 5/8" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, R-11 insulation, two layers 5/8" direct nailed drywall (National Gypsum Co. NGC 2376, 1970, 16f, STC 53)

(3) 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, R-11 insulation, 1" airspace at plate, 2" by 4" plate with 2" by 4" studs, 5/8" direct nailed drywall (Owens/Corning Fiberglas OCF 448, 1967, 16f, STC 56)

(4) Same as #3 with two layers of R-11 insulation (Riverbank Acoustical Labs TL75-83, 1975, 16f, U.S. Department of Agriculture, STC 57)

(5) Two layers 5/8" drywall direct nailed, 2" by 4" plate with 2" x 4" studs, 1" air space, 2" by 4" plate with 2" by 4" studs, R-11 insulation, two layers 5/8" drywall (National Gypsum Co. NGC 3056, 1970, 16f, Gypsum Association, STC 58)

(6) Same as #5 with two layers of R-11 insulation (Riverbank Acoustical Labs TL 75-82, 1975, 16f, U.S. Department of Agriculture, STC 63)

All wall assemblies between any common space and a living unit must be an STC 50 minimum rated assembly. All Plumbing and electrical installations shall be installed per the instructions contained in Appendix 10. Put all details onto Plans.

5.5 PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 60 dBA CNEL means that exterior noise sources will remain clearly audible in the

mitigated exterior space. Compliance with an interior noise limit of 45 dBA CNEL means that exterior noise sources will remain audible on the interior of a structure.

Due to quality control and other field related problems, the code minimum laboratory rating of STC/IIC 50 for common assemblies does not guarantee that all common assemblies will pass a field test. In fact, there is a 50% chance that half of all laboratory rated STC/IIC 50 common assemblies could fail field tests. An STC 50 rated assembly will produce around 45 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

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.

6.0 PROJECT GENERATED NOISE

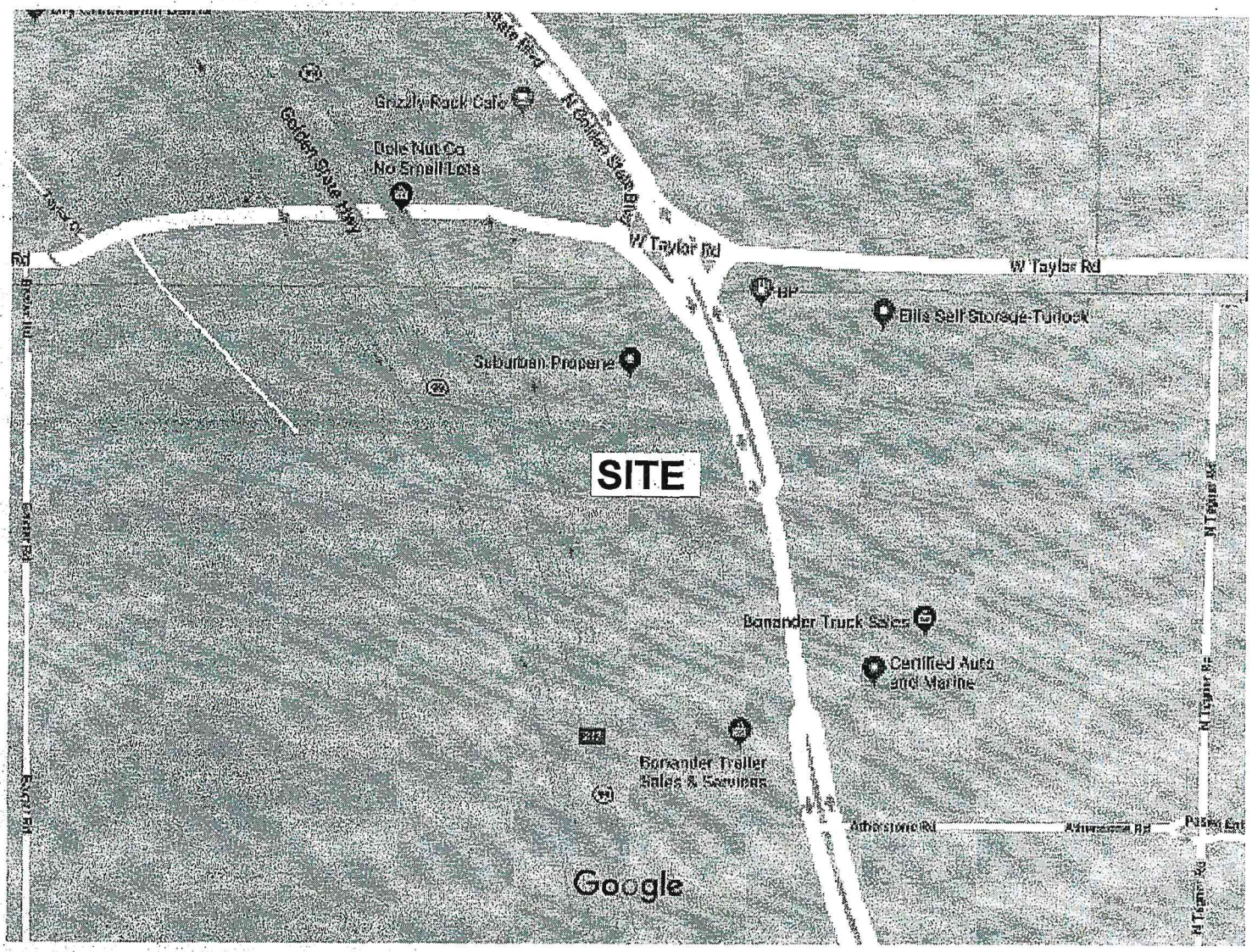
Even worst-case operations of the completed project are not likely to generate noise exceeding the Table 2 "Other Commercial" nighttime noise limits at the surrounding land uses. Thus, project generated noise will not violate the Turlock Noise Ordinance.

7.0 CONSTRUCTION NOISE

The Noise Ordinance restricts construction noise between 7 pm and 7 am on weekdays and between 8 pm and 9 am on weekends and holidays. It also limits noise levels from mobile construction equipment to 75 dBA on weekdays and 70 dBA on weekends and holidays at limited commercial uses (nearby hotels), and 85 dBA any day at other commercial uses (nearby offices and retail uses). The Ordinance further limits noise levels from stationary construction equipment to 70 dBA on weekdays and 65 dBA on weekends and holidays at limited commercial uses (hotels), and 85 dBA any day at other commercial uses (office/retail). The easiest way to ensure compliance with these limits is to prohibit construction operations between 7 pm and 7 am on weekdays and to prohibit all construction operations on weekends and holidays.

EXHIBIT 1
SITE LOCATION

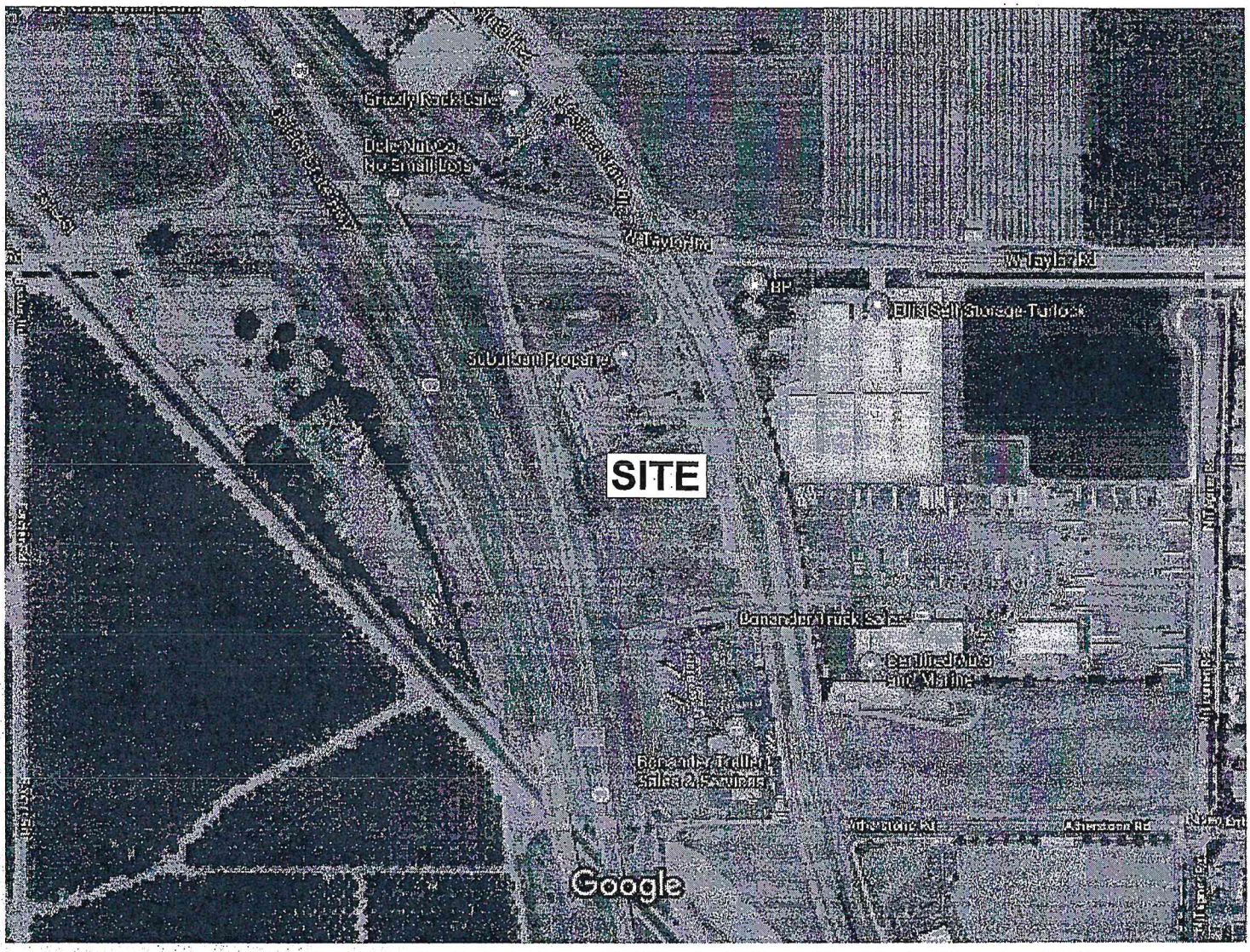
Google Maps La Quinta Inns & Suites, Turlock CA



Map data ©2018 Google 200 ft

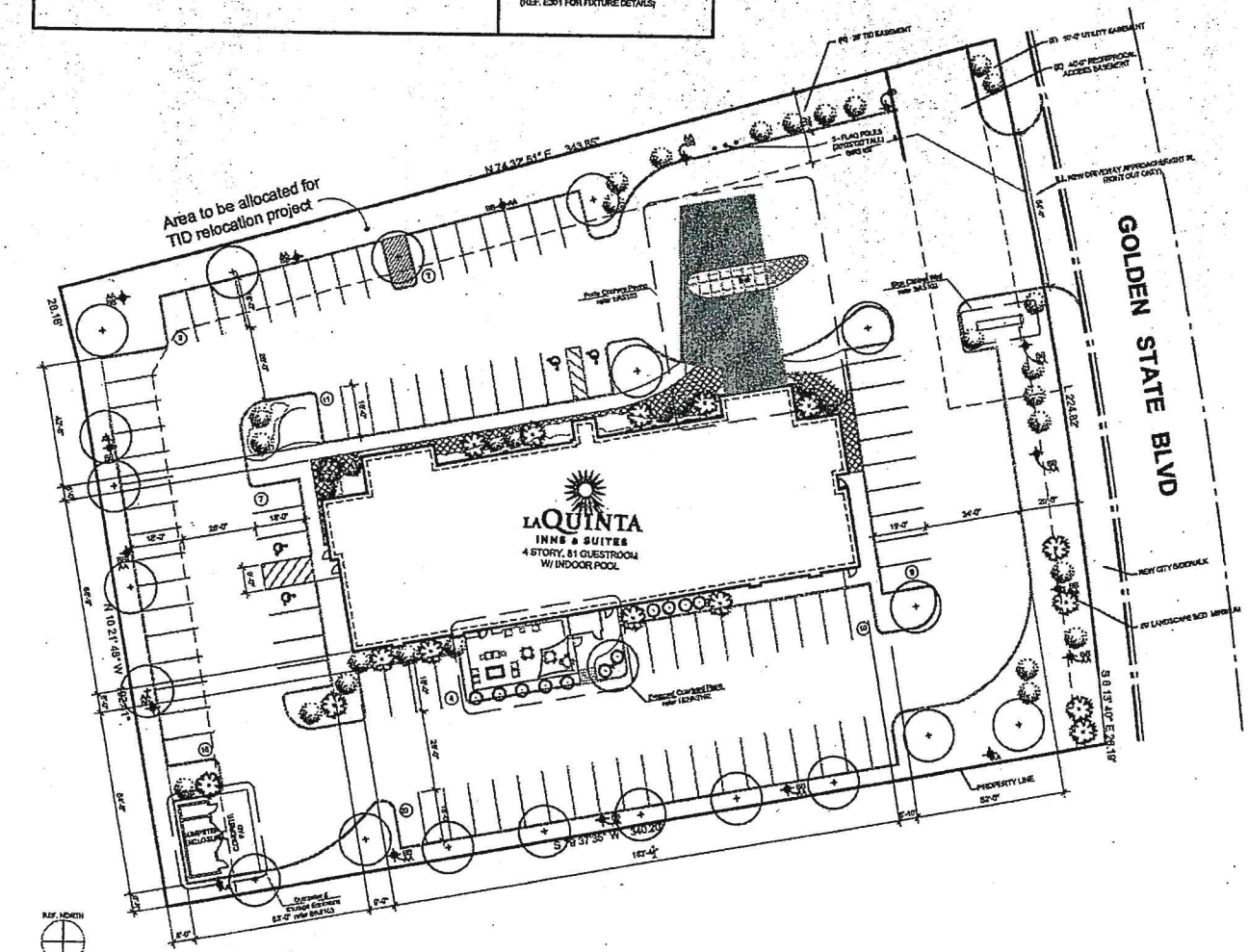
EXHIBIT 2
AERIAL PHOTO

Google Maps La Quinta Inns & Suites, Turlock CA



Imagery ©2018 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2018 Google 200 ft

LANDSCAPE GENERAL NOTES	SITE LIGHTING LEGEND
1. A MINIMUM OF FIFTEEN PERCENT (15%) OF OF THE SITE SHALL BE LANDSCAPED. 2. THE MINIMUM PLANT SIZE REQUIREMENTS PROVIDED ARE THE MINIMUM SIZES ALLOWED. 3. COMPLY WITH GOVERNING AUTHORITIES WHEN LOCAL STANDARDS EXCEED PROTOTYPE STANDARDS. 4. SELECT PLANTS ADAPTABLE TO SITE LOCATION, UTILIZING NATIVE SPECIES WHEN FEASIBLE. 5. TREES AT THE BUILDING ENTRANCE SHALL EXCEED THE MINIMUM REQUIRED SIZE BY TWO SIZES. 6. ALL PLANTS SHOULD CONFORM TO THE LATEST ADDITION OF THE AMERICAN NURSERYMEN'S STANDARDS FOR PLANT MATERIAL. 7. WHERE MULTIPLE SIZES ARE PROVIDED FOR CALIPER (CAL.), HEIGHT (HT.), OR CONTAINER (CONT.), THE LARGEST SIZE SHALL PREVAIL. 8. ALL PLANTED AREAS SHALL BE IRRIGATED AND EQUIPPED WITH A "RAIN GAUGE" CONTROL SYSTEM. 9. PROVIDE PET FRIENDLY RELIEF AREA. 10. VERIFY FLAG POLE ORIENTATION AND SIZE WITH LOCAL REQUIREMENTS	✦ - X-2 PARKING POLE LIGHT ✦ - X-3 BUILDING WASH LIGHT ATTACHED TO X-2 ▣ - X-4 BOLLARD ▣ - X-5 POOL/PATIO PEDESTRIAN LIGHT ○ - X-8 IN-GROUND FLAG POLE LIGHTS PROVIDE SLEEVES FOR POWER AS REQUIRED (REF. E301 FOR FIXTURE DETAILS)



AREA SUMMARY	
4-Story, 81 Guestroom, Indoor Swimming Pool	
Site	80,589 s.f. (1.85 acres)
Total Parking	93 Spaces (including 4 H.C. Spaces)
Building Total	45,139 s.f.
1st Floor	11,338 s.f.
2nd Floor	11,287 s.f.
3rd Floor	11,287 s.f.
4th Floor	11,287 s.f.
Building Public Areas	
Great Room (Lobby, Print Station, Breakfast Seating)	2,253.14 s.f.
Breakfast Serving Area	259.03 s.f.
Luggage Carts/Stor	78.00 s.f.
Vest Indoor Pool	1,028.00 s.f.
Fitness Center	547.00 s.f.
Meeting Room	315.00 s.f.
Heart of House	1,529.05 s.f. (Includes Hotel Laundry) (Includes Pantry)
Public Restrooms	245.00 s.f.
Sundry	73.00 s.f.
Guest Laundry	141.41 s.f.

GUESTROOM MIX (Mix of Std King and Double Queen Rooms determined by market)					
Room Type	1st Flr	2nd Flr	3rd Flr	4th Flr	Total
King Guestroom (328 s.f.)	1	7	7	7	22
Double Queen Guestroom (340 s.f.)	2	12	12	12	38
Extended King Suite (416 s.f.)	2	5	5	5	17
ADA King Guestroom (360 s.f.)	1	1	1	1	4
Total	6	25	25	25	81

NOTE: DELETE TWO (2) KING SUITES WHERE 2-STORY LOBBY IS AVAILABLE

CONTACT FRANCHISE SERVICE DIRECTOR PRIOR TO FINALIZING ROOM MIX

NOTE LANDSCAPE PLAN TO BE FINALIZED BY ARCHITECT. PLANT SPECIES, SIZES, TYPES, ETC TO BE SELECTED BY ARCHITECT AND SUBMITTED WITH SET FOR APPROVAL.

Property Owner: SRIHARI INVESTMENT LLC
Operated by: Trishul Managment Inc

LAQUINTA INNS & SUITES
May 22, 2018

CONCEPTUAL DRAWING NOT FOR FINAL DESIGN OR CONSTRUCTION

ARCHITECTURAL SITE PLAN - I

EXHIBIT 3
SITE PLAN

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 1

NOISE RATING METHODOLOGY

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

NOISE RATING METHODOLOGY

The A-weighted decibel (dBA) or "A" scale on a sound level meter is typically used for environmental noise measurements because the weighting characteristics of the "A" scale approximate the subjective response of the human ear to a broad frequency band noise source by discriminating against the very low and very high frequencies of the audible sound spectrum.

Since community noise is seldom constant, varying from moment to moment and throughout the day, the "A" weighted noise level needs to be further described to provide meaningful data. The Environmental Protection Agency, the Federal Department of Transportation, several foreign countries and many private consultants are now using three time-exceeded percentile figures to describe noise, which are:

(1) L_{90} is the noise level that is exceeded 90 percent of any sample measurement period (such as 24 hours) and is often used to describe the background or ambient noise level.

(2) L_{50} is the noise level that is exceeded 50 percent of any sample measurement period. It is generally considered to represent the median noise level.

(3) L_{10} is the noise level that is exceeded 10 percent of any sample measurement period. It is a good descriptor of fluctuating noise sources such as vehicular traffic. It indicates the near-maximum noise levels that occur for groups of single noise events. Being related to the subjective annoyance to community noise, the L_{10} is a good design tool in the planning of acoustical barriers.

More recent noise assessment methods are based on the equivalent energy concept where Leq(x) represents the average energy content of a fluctuating noise source over a sample measurement period. The subscript (x) represents the period over which the energy is computed and/or measured. Current practice references the time quantity to either one (1) hour, eight (8) hours, or twenty-four (24) hours. When referenced to one (1) hour, Leq is also called the HNL (Hourly Noise Level).

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

Since Leq is the summation of the functional products of noise level and duration, many different combinations of noise levels, duration times and time histories can produce similar Leq values. Thus a value of Leq(24) equals 50 means only that the average noise level is 50 dB. During that 24-hour period, there can be times when the noise level is higher than 50 dB and times when it is lower than 50 dB.

If the period of the measurement is only a single event, the energy content is not averaged. The energy expression for a single event is simply the sum of the functional product of the noise level and duration time of the event. This term is called the Le or SENEL (Single Event Noise Exposure Level). The summation of Le values averaged over one hour is Leq(1), over eight hours is Leq(8), over 24 hours is Leq(24), etc.

Leq is further refined into Ldn (Level Day-Night) and CNEL (Community Noise Equivalent Level), where noise that occurs during certain hours of the day are weighted (or penalized) in an attempt to compensate for the general perception that such noise is more annoying during these time periods (typically evening and nighttime hours).

(1) Ldn is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a ten (10) dBA weighting penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. The Ldn is a noise rating method recommended by the Environmental Protection Agency because it takes into account those subjectively more annoying noise events that occur during normal sleeping hours.

(2) CNEL is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a five (5) dBA penalty for noise that occurs during the evening hours between 7:00 PM and 10:00 PM, and a ten (10) dBA penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. For typical highway vehicular traffic situations, computer analysis has shown that the Ldn and CNEL values correlate within 0.5 dBA.

The percentile figures L_{10}, L_{50} and L_{90} can be directly scaled from a graphical recording of the measured noise sample over a particular time period. These figures can also be measured directly using modern automatic noise measuring equipment. Measurement of the parameters Le, Leq, Ldn and CNEL requires even more sophisticated and correspondingly expensive noise measuring equipment. As a result, engineers have devised ways of estimating Leq (and hence, Ldn) using standard instrumentation and methods.

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 2

EXISTING ROADWAY NOISE CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

HOURLY NOISE LEVEL

PROJECT : LA QUINTA INNS
STREET NAME : GOLDEN STATE BL
SITE TYPE : SOFT

INPUT DATA

	AUTO	METK	HVTK
SPEED:	50	50	50
% VOLUME:	84.9	4	11.1

VOLUME = 756
HVY TRK GRADIENT = 0 DBA

NOISE LEVEL

AUTO	67.0
MED.TRK.	63.8
HVY.TRK.	72.5
TOTAL	74.0

NOISE LEVEL AT 400 FT

AUTO	MEDIUM TRK	HEAVY TRK	TOTAL
53.5	50.3	58.9	60.5

LEQ AT SPECIFIED DISTANCES

DISTANCE	LEQ
50	74.0
75	71.4
100	69.5
125	68.0
150	66.9
175	65.9
200	65.0
250	63.5
300	62.3
350	61.3
400	60.5
450	59.7
500	59.0
550	58.4
600	57.8
650	57.3
700	56.8
750	56.4
800	55.9
1000	54.5

HOURLY NOISE LEVEL

PROJECT : LA QUINTA INNS
STREET NAME : HIGHWAY 99
SITE TYPE : HARD

INPUT DATA

	AUTO	METK	HVTK
SPEED:	65	65	65
% VOLUME:	87.6	2.8	9.600001

VOLUME = 6564
HVY TRK GRADIENT = 0 DBA

NOISE LEVEL

AUTO	79.8
MED.TRK.	74.4
HVY.TRK.	82.9
TOTAL	85.0

NOISE LEVEL AT 225 FT

AUTO	MEDIUM TRK	HEAVY TRK	TOTAL
73.2	67.8	76.4	78.5

LEQ AT SPECIFIED DISTANCES

DISTANCE	LEQ
50	85.0
75	83.3
100	82.0
125	81.0
150	80.2
175	79.6
200	79.0
250	78.0
300	77.2
350	76.6
400	76.0
450	75.5
500	75.0
550	74.6
600	74.2
650	73.9
700	73.6
750	73.3
800	73.0
1000	72.0

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 3

RAILROAD NOISE CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

ADJUSTMENTS FOR DIESEL LOCOMOTIVES

	9 No. of Locomotives 2		10 Average Speed Table 9		11 Horns (enter 10)		12 Night-time Table 5		13 No. of Trains (line 2)		14 Adj. No. of Trains		15 DNL Workchart 3		16 Barrier Attn.		17 Partial DNL
Railway #1	1.5	x	75	x	10	x	2.34	x	25	=	658		71	-	ϕ	=	71
Railway #2		x		x		x		x		=				-		=	
Railway #3		x		x		x		x		=				-			

ADJUSTMENTS FOR RAILWAY CARS AND RAPID TRANSIT TRAINS

	18 Number of cars 50		19 Average Speed Table 10		20 Bolted Rails (enter 4)		21 Horns (enter 100)		22 Night-time Table 5		23 No. of Trains (line 2)		24 Adj. No. of Trains		25 DNL Work-chart 4		26 Barrier Attn.		27 Partial DNL
Railway #1	1.5	x	1.78	x	1	x	1	x	2.34	x	25	=	156		53	-	ϕ	=	53
Railway #2		x		x		x		x		x		=				-		=	
Railway #3		x		x		x		x		x		=				-		=	

Combined Locomotive and Railway Car DNL

Railway #1 71

Railway #2

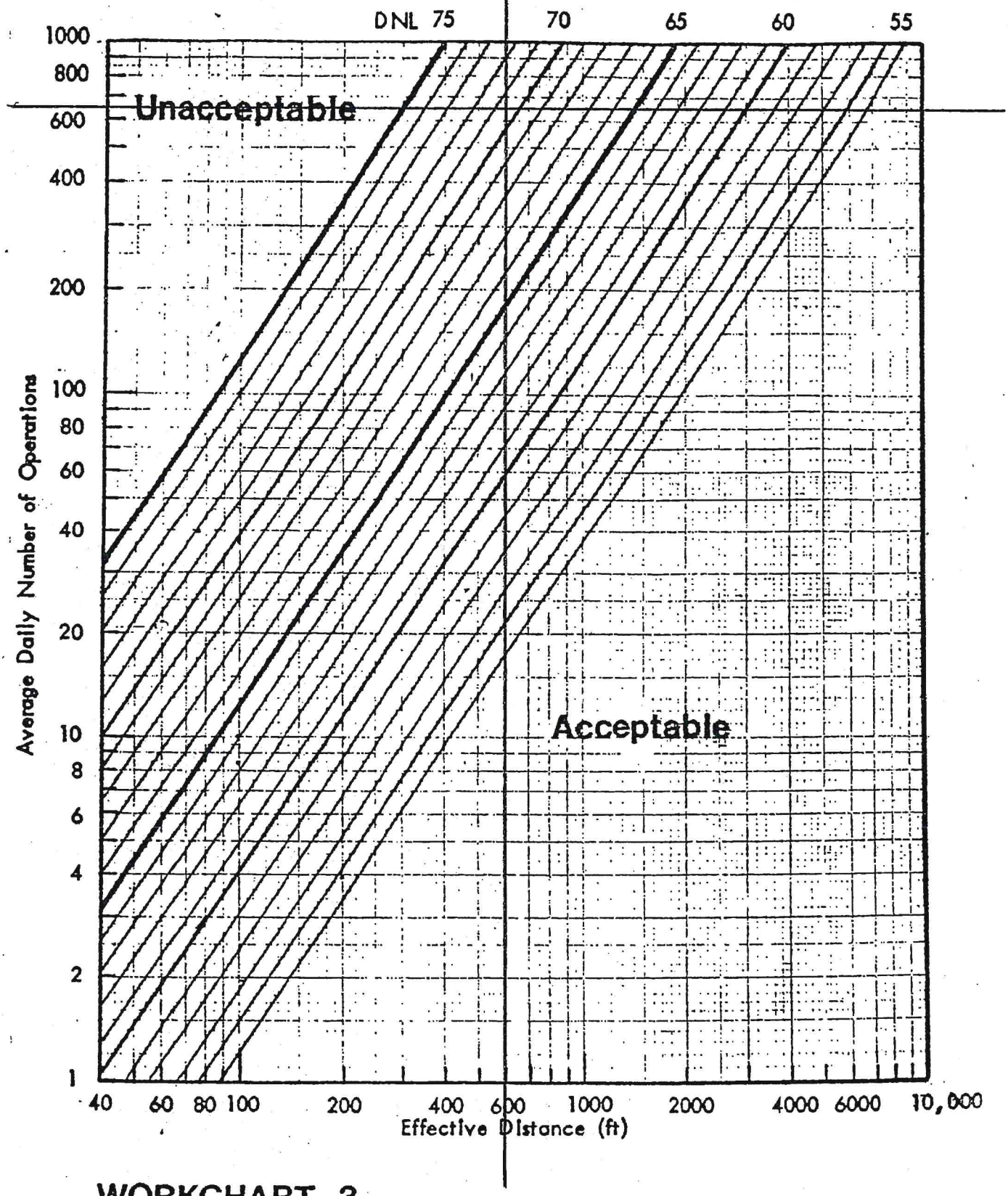
Railway #3

Total DNL for all Railways 71

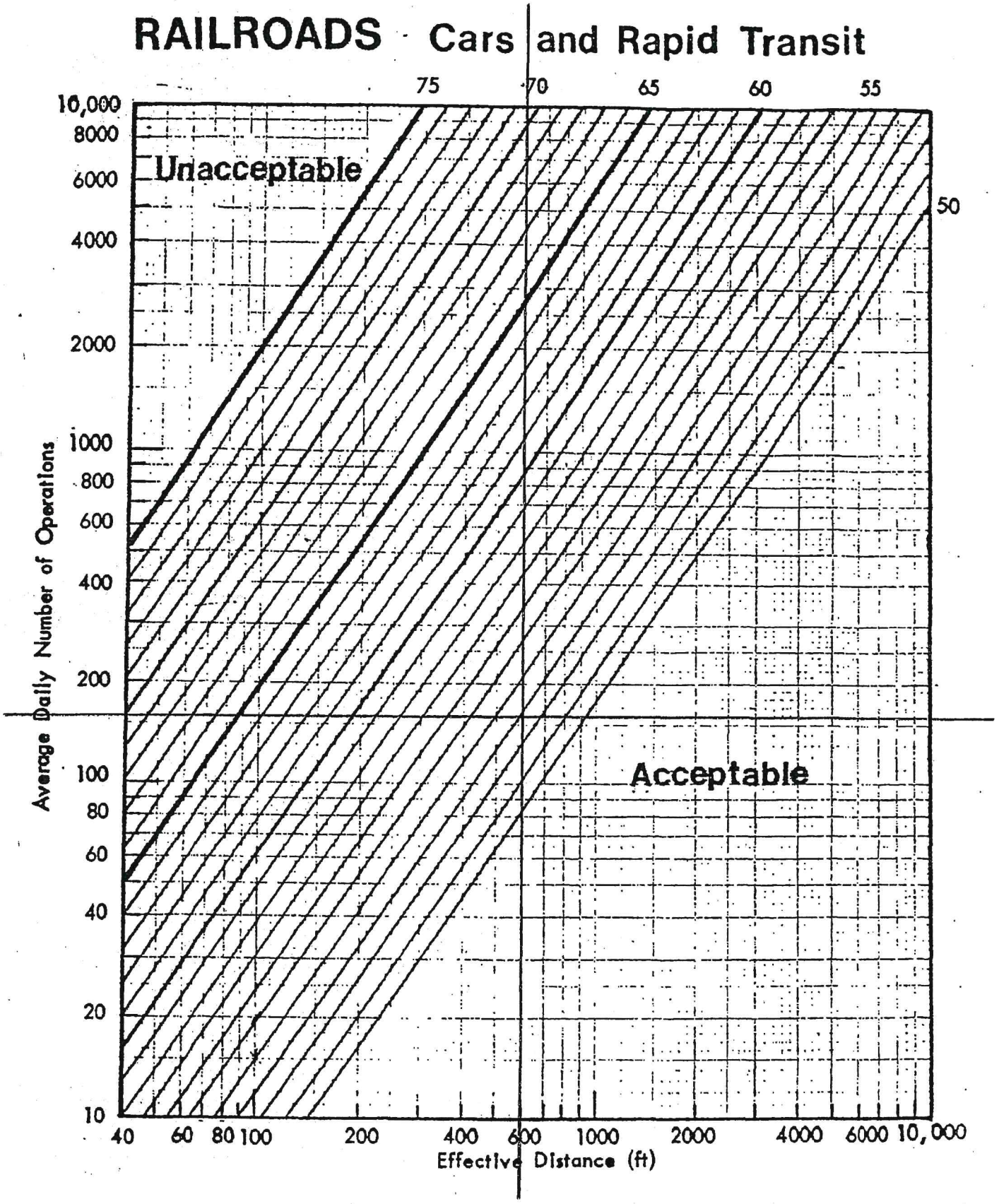
Date: 6/13/18

Signature:

RAILROADS - Diesel Locomotives



WORKCHART 3


RAILROADS · Cars and Rapid Transit
75
70
65
60
55
50
10,000
8000
6000
4000
2000
1000
800
600
400
200
100
80
60
40
20
10
Unacceptable
Acceptable
Average Daily Number of Operations
40
60
80
100
200
400
600
1000
2000
4000
6000
10,000
Effective Distance (ft)

WORKCHART 4

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 4

FUTURE ROADWAY NOISE CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME	:LA QUINTA INNS
SITE LOCATION	:TURLOCK
DESCRIPTION	:N GOLDEN STATE/TAYLOR RD
SITE TYPE	:HARD

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100
VOLUME	35403		

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	72.45	70.69	64.63	70.55	73.82
MEDIUM TRK.	65.64	59.27	57.74	63.34	66.41
HEAVY TRK.	66.00	56.97	58.22	63.62	66.69
TOTAL	74.02	71.16	66.19	71.99	75.20

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	75.20
75	73.44
100	72.19
125	71.22
150	70.43
175	69.76
200	69.18
225	68.67
250	68.21
275	67.80
300	67.42
325	67.07
350	66.75
375	66.45
400	66.17
450	65.66
500	65.20
550	64.79
600	64.41
650	64.06
700	63.74
750	63.44
800	63.16

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME	:LA QUINTA INNS
SITE LOCATION	:TURLOCK
DESCRIPTION	:HIGHWAY 99
SITE TYPE	:HARD

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	65	65	65
% DAY	73	73	69.1
% EVENING	8.60	8.60	6.70
% NIGHT	18.4	18.4	24.2
% VOLUME	83.7	4.2	12.1
VOLUME	100000		

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	79.25	75.98	74.51	77.60	82.12
MEDIUM TRK.	75.80	72.54	71.07	74.16	78.68
HEAVY TRK.	83.34	79.22	80.03	81.93	87.13
TOTAL	85.29	81.50	81.52	83.80	88.77

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	88.77
75	87.01
100	85.76
125	84.79
150	84.00
175	83.33
200	82.75
225	82.24
250	81.78
275	81.37
300	80.99
325	80.64
350	80.32
375	80.02
400	79.74
450	79.23
500	78.77
550	78.36
600	77.98
650	77.63
700	77.31
750	77.01
800	76.73

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 5

FREEWAY EDGE SHIELDING CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 82.12
M.TRUCK.....= 78.68
H.TRUCK.....= 87.13

PROJECT.....LA QUINTA INNS
DESCRIPTION..FREEWAY EDGE SHIELDING AT FIRST FLOOR
SOURCE ELEVATION..... 20
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 20
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 140
DISTANCE TO RECEIVER... 85
AUTO NOISE LEVEL..... 75.58788
M.TRK NOISE LEVEL..... 72.14788
H.TRK NOISE LEVEL..... 80.59787
SOURCE NOISE LEVEL..... 82.24

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	66.31	63.32	73.18	74.35	7.89
FN	0.8052	0.6844	0.3678		
0.10	66.25	63.26	73.12	74.29	7.95
FN	0.8225	0.7004	0.3796		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 82.12
M.TRUCK.....= 78.68
H.TRUCK.....= 87.13

PROJECT.....LA QUINTA INNS
DESCRIPTION..FREEWAY EDGE SHIELDING AT SECOND FLOOR
SOURCE ELEVATION..... 20
RECEIVER ELEVATION..... 10
BARRIER ELEVATION..... 20
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 140
DISTANCE TO RECEIVER... 85
AUTO NOISE LEVEL..... 75.58788
M.TRK NOISE LEVEL..... 72.14788
H.TRK NOISE LEVEL..... 80.59787
SOURCE NOISE LEVEL..... 82.24

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	69.62	66.56	75.60	76.99	5.25
FN	0.0885	0.0518	0.0000		
0.10	69.56	66.52	75.59	76.97	5.27
FN	0.0943	0.0563	0.0003		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 82.12
M.TRUCK.....= 78.68
H.TRUCK.....= 87.13

PROJECT.....LA QUINTA INNS
DESCRIPTION..FREEWAY EDGE SHIELDING AT THIRD FLOOR
SOURCE ELEVATION..... 20
RECEIVER ELEVATION..... 30
BARRIER ELEVATION..... 20
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 140
DISTANCE TO RECEIVER... 85
AUTO NOISE LEVEL..... 75.58788
M.TRK NOISE LEVEL..... 72.14788
H.TRK NOISE LEVEL..... 80.59787
SOURCE NOISE LEVEL..... 82.24

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	75.59	72.15	80.60	82.24	0.00
FN	0.0000	0.0000	0.0000		
0.10	75.59	72.15	80.60	82.24	0.00
FN	0.0000	0.0000	0.0000		

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 6

RAILROAD NOISE SHIELDING CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 63.79
M.TRUCK.....= 0
H.TRUCK.....= 81.79

PROJECT.....LA QUINTA INNS
DESCRIPTION..RAILROAD SHIELDING AT 1ST FLOOR
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 235
DISTANCE TO RECEIVER... 365
AUTO NOISE LEVEL..... 52.99819
M.TRK NOISE LEVEL.....-10.79181
H.TRK NOISE LEVEL..... 70.99818
SOURCE NOISE LEVEL..... 71.07

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
20.00	42.71	%-20.66	62.50	62.54	8.53
FN	1.1250	0.9851	0.6037		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 63.79
M.TRUCK.....= 0
H.TRUCK.....= 81.79

PROJECT.....LA QUINTA INNS
DESCRIPTION..RAILROAD SHIELDING AT 2ND FLOOR
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 10
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 235
DISTANCE TO RECEIVER... 365
AUTO NOISE LEVEL..... 52.99819
M.TRK NOISE LEVEL.....-10.79181
H.TRK NOISE LEVEL..... 70.99818
SOURCE NOISE LEVEL..... 71.07

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
20.00	44.16	%-19.19	63.94	63.98	7.08
FN	0.6871	0.5788	0.2975		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 63.79
M.TRUCK.....= 0
H.TRUCK.....= 81.79

PROJECT.....LA QUINTA INNS
DESCRIPTION..RAILROAD SHIELDING AT 3RD FLOOR
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 20
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 235
DISTANCE TO RECEIVER... 365
AUTO NOISE LEVEL..... 52.99819
M.TRK NOISE LEVEL.....-10.79181
H.TRK NOISE LEVEL..... 70.99818
SOURCE NOISE LEVEL..... 71.07

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
20.00	45.63	%-17.76	64.93	64.98	6.08
FN	0.3565	0.2798	0.0984		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 63.79
M.TRUCK.....= 0
H.TRUCK.....= 81.79

PROJECT.....LA QUINTA INNS
DESCRIPTION..RAILROAD SHIELDING AT 4TH FLOOR
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 30
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 235
DISTANCE TO RECEIVER... 365
AUTO NOISE LEVEL..... 52.99819
M.TRK NOISE LEVEL.....-10.79181
H.TRK NOISE LEVEL..... 70.99818
SOURCE NOISE LEVEL..... 71.07

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
20.00	46.78	%-16.76	65.92	65.97	5.09
FN	0.1335	0.0884	0.0067		

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 7

SOUND BARRIER HEIGHT CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 82.12
M.TRUCK.....= 78.68
H.TRUCK.....= 87.13

PROJECT.....LA QUINTA INNS
DESCRIPTION..EXTERIOR PATIO SOUND BARRIER -- FREEWAY NOISE
SOURCE ELEVATION..... 20
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 350
DISTANCE TO RECEIVER... 20
AUTO NOISE LEVEL..... 73.42769
M.TRK NOISE LEVEL..... 69.98769
H.TRK NOISE LEVEL..... 78.43768
SOURCE NOISE LEVEL..... 77.07

ANGULAR CORRECTION(DB) - 3.0103

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL	-8dB EDGE SHIELD
4.00	70.42	66.98	75.43	77.07	-0.00	69.07
FN	0.0000	0.0000	0.0000			
5.00	70.42	66.98	75.43	77.07	-0.00	69.07
FN	0.0000	0.0000	0.0000			
6.00	65.41	61.98	75.43	76.01	1.05	68.01
FN	0.0008	0.0001	0.0000			
7.00	65.00	61.63	70.25	71.82	5.24	63.82
FN	0.0365	0.0305	0.0148			
8.00	64.24	60.85	69.55	71.10	5.97	63.10
FN	0.1243	0.1128	0.0801			
9.00	63.53	60.18	68.90	70.44	6.63	62.44
FN	0.2633	0.2464	0.1966			
10.00	62.58	59.25	68.03	69.55	7.52	61.55
FN	0.4523	0.4299	0.3630			
11.00	61.57	58.24	67.03	68.54	8.52	60.54
FN	0.6897	0.6619	0.5780			
12.00	60.58	57.24	66.03	67.55	9.52	59.55
FN	0.9740	0.9408	0.8397			

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 73.82
M.TRUCK.....= 66.41001
H.TRUCK.....= 66.69

PROJECT.....LA QUINTA INNS
DESCRIPTION..EXTERIOR PATIO SOUND BARRIER -- GOLDEN STATE NOISE
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 220
DISTANCE TO RECEIVER... 20
AUTO NOISE LEVEL..... 67.00758
M.TRK NOISE LEVEL..... 59.59759
H.TRK NOISE LEVEL..... 59.87759
SOURCE NOISE LEVEL..... 68.39

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
4.00	67.01	59.60	59.88	68.39	0.00
FN	0.0000	0.0000	0.0000		
5.00	61.95	54.58	59.88	64.51	3.88
FN	0.0045	0.0016	0.0000		
6.00	61.40	54.12	54.70	62.87	5.53
FN	0.0538	0.0423	0.0151		
7.00	60.68	53.36	53.97	62.13	6.26
FN	0.1574	0.1373	0.0829		
8.00	59.86	52.60	53.31	61.35	7.05
FN	0.3148	0.2861	0.2044		
9.00	58.84	51.60	52.40	60.35	8.04
FN	0.5250	0.4877	0.3787		
10.00	57.80	50.55	51.37	59.31	9.08
FN	0.7869	0.7410	0.6048		
11.00	56.79	49.54	50.34	58.30	10.09
FN	1.0990	1.0445	0.8810		
12.00	55.87	48.60	49.37	57.36	11.03
FN	1.4595	1.3964	1.2057		

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 8

INTERIOR NOISE REDUCTION CALCULATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 24

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	22	.05	10	0.06310
WINDOW 2	25	.05	25	0.07906
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.18367
-10LOG(ET*S)				7.4
10LOGA				22.1
NOISE REDUCTION				23.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 26

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	24	.05	10	0.03981
WINDOW 2	27	.05	25	0.04988
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.13121
-10LOG(ET*S)				8.8
10LOGA				22.1
NOISE REDUCTION				25.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 28

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	26	.05	10	0.02512
WINDOW 2	29	.05	25	0.03147
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.09811
-10LOG(ET*S)				10.1
10LOGA				22.1
NOISE REDUCTION				26.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 30

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	28	.05	10	0.01585
WINDOW 2	31	.05	25	0.01986
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.07722
-10LOG(ET*S)				11.1
10LOGA				22.1
NOISE REDUCTION				27.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 32

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	30	.05	10	0.01000
WINDOW 2	33	.05	25	0.01253
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.06405
-10LOG(ET*S)				11.9
10LOGA				22.1
NOISE REDUCTION				28.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 34

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	32	.05	10	0.00631
WINDOW 2	35	.05	25	0.00791
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.05573
-10LOG(ET*S)				12.5
10LOGA				22.1
NOISE REDUCTION				28.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 36

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	34	.05	10	0.00398
WINDOW 2	37	.05	25	0.00499
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.05049
-10LOG(ET*S)				13.0
10LOGA				22.1
NOISE REDUCTION				29.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 38

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	36	.05	10	0.00251
WINDOW 2	39	.05	25	0.00315
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.04718
-10LOG(ET*S)				13.3
10LOGA				22.1
NOISE REDUCTION				29.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN + STC = 40

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		129	0.01290
EXT.WALL 2	43		87	0.00436
EXT.WALL 3	50		0	0.00000
INT.WALL			244	
WINDOW 1	38	.05	10	0.00158
WINDOW 2	41	.05	25	0.00199
WINDOW 3	48	.05	0	0.00000
SGD	38	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	230	0.02300
FLOOR		.6	230	
ET*S				0.04509
-10LOG(ET*S)				13.5
10LOGA				22.1
NOISE REDUCTION				29.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 24

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	22	.05	0	0.00000
WINDOW 2	25	.05	37	0.11700
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.15922
-10LOG(ET*S)				8.0
10LOGA				22.9
NOISE REDUCTION				24.8

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 26

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	24	.05	0	0.00000
WINDOW 2	27	.05	37	0.07382
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.11604
-10LOG(ET*S)				9.4
10LOGA				22.9
NOISE REDUCTION				26.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 28

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	26	.05	0	0.00000
WINDOW 2	29	.05	37	0.04658
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.08879
-10LOG(ET*S)				10.5
10LOGA				22.9
NOISE REDUCTION				27.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 30

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	28	.05	0	0.00000
WINDOW 2	31	.05	37	0.02939
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.07160
-10LOG(ET*S)				11.5
10LOGA				22.9
NOISE REDUCTION				28.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 32

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	30	.05	0	0.00000
WINDOW 2	33	.05	37	0.01854
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.06076
-10LOG(ET*S)				12.2
10LOGA				22.9
NOISE REDUCTION				29.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 34

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	32	.05	0	0.00000
WINDOW 2	35	.05	37	0.01170
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.05391
-10LOG(ET*S)				12.7
10LOGA				22.9
NOISE REDUCTION				29.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 36

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	34	.05	0	0.00000
WINDOW 2	37	.05	37	0.00738
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.04960
-10LOG(ET*S)				13.0
10LOGA				22.9
NOISE REDUCTION				29.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 38

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	36	.05	0	0.00000
WINDOW 2	39	.05	37	0.00466
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.04687
-10LOG(ET*S)				13.3
10LOGA				22.9
NOISE REDUCTION				30.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING + STC = 40

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		103	0.01030
EXT.WALL 2	43		61	0.00306
EXT.WALL 3	50		0	0.00000
INT.WALL			280	
WINDOW 1	38	.05	0	0.00000
WINDOW 2	41	.05	37	0.00294
WINDOW 3	48	.05	0	0.00000
SGD	38	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	276	0.02760
FLOOR		.6	276	
ET*S				0.04515
-10LOG(ET*S)				13.5
10LOGA				22.9
NOISE REDUCTION				30.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 24

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	22	.05	0	0.00000
WINDOW 2	25	.05	37	0.11700
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.14037
-10LOG(ET*S)				8.5
10LOGA				21.4
NOISE REDUCTION				23.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 26

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	24	.05	0	0.00000
WINDOW 2	27	.05	37	0.07382
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.09719
-10LOG(ET*S)				10.1
10LOGA				21.4
NOISE REDUCTION				25.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 28

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	26	.05	0	0.00000
WINDOW 2	29	.05	37	0.04658
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.06994
-10LOG(ET*S)				11.6
10LOGA				21.4
NOISE REDUCTION				27.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 30

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	28	.05	0	0.00000
WINDOW 2	31	.05	37	0.02939
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.05275
-10LOG(ET*S)				12.8
10LOGA				21.4
NOISE REDUCTION				28.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 32

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	30	.05	0	0.00000
WINDOW 2	33	.05	37	0.01854
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.04191
-10LOG(ET*S)				13.8
10LOGA				21.4
NOISE REDUCTION				29.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 34

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	32	.05	0	0.00000
WINDOW 2	35	.05	37	0.01170
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.03506
-10LOG(ET*S)				14.6
10LOGA				21.4
NOISE REDUCTION				30.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 36

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	34	.05	0	0.00000
WINDOW 2	37	.05	37	0.00738
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.03075
-10LOG(ET*S)				15.1
10LOGA				21.4
NOISE REDUCTION				30.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 38

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	36	.05	0	0.00000
WINDOW 2	39	.05	37	0.00466
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.02802
-10LOG(ET*S)				15.5
10LOGA				21.4
NOISE REDUCTION				30.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN + STC = 40

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		0	0.00000
EXT.WALL 2	43		58	0.00291
EXT.WALL 3	50		0	0.00000
INT.WALL			352	
WINDOW 1	38	.05	0	0.00000
WINDOW 2	41	.05	37	0.00294
WINDOW 3	48	.05	0	0.00000
SGD	38	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	40	.04	192	0.01920
FLOOR		.6	192	
ET*S				0.02630
-10LOG(ET*S)				15.8
10LOGA				21.4
NOISE REDUCTION				31.2

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 9

INTERIOR NOISE REDUCTION CALCULATIONS WITH EXTERIOR WALL AND CEILING UPGRADES

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 24

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	22	.05	10	0.06310
WINDOW 2	25	.05	25	0.07906
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.14743
-10LOG(ET*S)				8.3
10LOGA				22.1
NOISE REDUCTION				24.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 26

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	24	.05	10	0.03981
WINDOW 2	27	.05	25	0.04988
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.09497
-10LOG(ET*S)				10.2
10LOGA				22.1
NOISE REDUCTION				26.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 28

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	26	.05	10	0.02512
WINDOW 2	29	.05	25	0.03147
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.06187
-10LOG(ET*S)				12.1
10LOGA				22.1
NOISE REDUCTION				28.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 30

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	28	.05	10	0.01585
WINDOW 2	31	.05	25	0.01986
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.04099
-10LOG(ET*S)				13.9
10LOGA				22.1
NOISE REDUCTION				30.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 32

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	30	.05	10	0.01000
WINDOW 2	33	.05	25	0.01253
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.02781
-10LOG(ET*S)				15.6
10LOGA				22.1
NOISE REDUCTION				31.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 34

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	32	.05	10	0.00631
WINDOW 2	35	.05	25	0.00791
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.01950
-10LOG(ET*S)				17.1
10LOGA				22.1
NOISE REDUCTION				33.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 36

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	34	.05	10	0.00398
WINDOW 2	37	.05	25	0.00499
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.01425
-10LOG(ET*S)				18.5
10LOGA				22.1
NOISE REDUCTION				34.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 38

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	36	.05	10	0.00251
WINDOW 2	39	.05	25	0.00315
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.01094
-10LOG(ET*S)				19.6
10LOGA				22.1
NOISE REDUCTION				35.8

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME WIDE QUEEN W/ UPGRADES + STC = 40

FLOOR AREA 230

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		129	0.00129
EXT.WALL 2	53		87	0.00044
EXT.WALL 3	60		0	0.00000
INT.WALL			244	
WINDOW 1	38	.05	10	0.00158
WINDOW 2	41	.05	25	0.00199
WINDOW 3	48	.05	0	0.00000
SGD	38	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	230	0.00230
FLOOR		.6	230	
ET*S				0.00885
-10LOG(ET*S)				20.5
10LOGA				22.1
NOISE REDUCTION				36.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 24

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	22	.05	0	0.00000
WINDOW 2	25	.05	37	0.11700
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.12236
-10LOG(ET*S)				9.1
10LOGA				22.9
NOISE REDUCTION				26.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 26

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	24	.05	0	0.00000
WINDOW 2	27	.05	37	0.07382
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.07918
-10LOG(ET*S)				11.0
10LOGA				22.9
NOISE REDUCTION				27.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 28

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	26	.05	0	0.00000
WINDOW 2	29	.05	37	0.04658
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.05193
-10LOG(ET*S)				12.8
10LOGA				22.9
NOISE REDUCTION				29.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 30

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	28	.05	0	0.00000
WINDOW 2	31	.05	37	0.02939
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.03474
-10LOG(ET*S)				14.6
10LOGA				22.9
NOISE REDUCTION				31.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 32

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	30	.05	0	0.00000
WINDOW 2	33	.05	37	0.01854
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.02390
-10LOG(ET*S)				16.2
10LOGA				22.9
NOISE REDUCTION				33.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 34

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	32	.05	0	0.00000
WINDOW 2	35	.05	37	0.01170
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.01705
-10LOG(ET*S)				17.7
10LOGA				22.9
NOISE REDUCTION				34.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 36

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	34	.05	0	0.00000
WINDOW 2	37	.05	37	0.00738
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.01273
-10LOG(ET*S)				19.0
10LOGA				22.9
NOISE REDUCTION				35.8

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 38

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	36	.05	0	0.00000
WINDOW 2	39	.05	37	0.00466
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.01001
-10LOG(ET*S)				20.0
10LOGA				22.9
NOISE REDUCTION				36.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME EXTENDED KING W/ UPGRADES + STC = 40

FLOOR AREA 276

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		103	0.00103
EXT.WALL 2	53		61	0.00031
EXT.WALL 3	60		0	0.00000
INT.WALL			280	
WINDOW 1	38	.05	0	0.00000
WINDOW 2	41	.05	37	0.00294
WINDOW 3	48	.05	0	0.00000
SGD	38	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	276	0.00276
FLOOR		.6	276	
ET*S				0.00829
-10LOG(ET*S)				20.8
10LOGA				22.9
NOISE REDUCTION				37.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 24

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	22	.05	0	0.00000
WINDOW 2	25	.05	37	0.11700
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.12047
-10LOG(ET*S)				9.2
10LOGA				21.4
NOISE REDUCTION				24.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 26

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	24	.05	0	0.00000
WINDOW 2	27	.05	37	0.07382
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.07729
-10LOG(ET*S)				11.1
10LOGA				21.4
NOISE REDUCTION				26.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 28

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	26	.05	0	0.00000
WINDOW 2	29	.05	37	0.04658
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.05005
-10LOG(ET*S)				13.0
10LOGA				21.4
NOISE REDUCTION				28.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 30

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	28	.05	0	0.00000
WINDOW 2	31	.05	37	0.02939
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.03286
-10LOG(ET*S)				14.8
10LOGA				21.4
NOISE REDUCTION				30.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 32

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	30	.05	0	0.00000
WINDOW 2	33	.05	37	0.01854
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.02201
-10LOG(ET*S)				16.6
10LOGA				21.4
NOISE REDUCTION				32.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 34

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	32	.05	0	0.00000
WINDOW 2	35	.05	37	0.01170
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.01517
-10LOG(ET*S)				18.2
10LOGA				21.4
NOISE REDUCTION				33.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 36

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	34	.05	0	0.00000
WINDOW 2	37	.05	37	0.00738
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.01085
-10LOG(ET*S)				19.6
10LOGA				21.4
NOISE REDUCTION				35.0

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 38

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	36	.05	0	0.00000
WINDOW 2	39	.05	37	0.00466
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.00812
-10LOG(ET*S)				20.9
10LOGA				21.4
NOISE REDUCTION				36.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME KING/DOUBLE QUEEN W/ UPGRADES + STC = 40

FLOOR AREA 192

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		0	0.00000
EXT.WALL 2	53		58	0.00029
EXT.WALL 3	60		0	0.00000
INT.WALL			352	
WINDOW 1	38	.05	0	0.00000
WINDOW 2	41	.05	37	0.00294
WINDOW 3	48	.05	0	0.00000
SGD	38	.05	0	0.00000
DOORS	36	.04	5	0.00126
ROOF	50	.04	192	0.00192
FLOOR		.6	192	
ET*S				0.00641
-10LOG(ET*S)				21.9
10LOGA				21.4
NOISE REDUCTION				37.3

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 10

PLUMBING AND ELECTRICAL INSTALLATIONS

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

PLUMBING NOISE REDUCTION REQUIREMENTS FOR COMPLIANCE WITH THE CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 2, APPENDIX CHAPTER 35

REQUIRED PLUMBING DESIGN FEATURE IN COMON WALL AND FLOOR/CEILING ASSEMBLIES

The plumbing system, by its nature, can degrade the acoustical integrity of a common wall or floor/ceiling assembly. This is primarily due to the fact that the plumbing system, a sound carrier and a sound source, is generally attached to the studs, plates, joists and drywall of a building's walls and floors. In order to alleviate the problem of plumbing system noise, one hundred percent of the plumbing system must be isolated from the building structure (not just at the common assemblies). Special installation requirements are necessary in order to:

(1) reduce the level of noise from the plumbing system, and

(2) isolate the total plumbing system from the building structure.

These special isolation procedures may be accomplished by using an approved commercial isolation system. Hard plastic "isolators" are **NOT** acceptable. Examples of approved commercial isolation systems in order of preference are:

(1) "Acousto-Plumb" ™ system by Specialty Products, Inc. (www.ispproducts.com),

(2) Holdrite Silencer System by Holdrite, Inc. (www.holdrite.com), and

(3) the felt lined series of isolators, clamps and hangers from Tolco, Inc.

Only when appropriate commercial isolation products are not available for unusual applications or extra large pipe sizes, will it be acceptable to use high density, 1/4" thick, 2" wide, adhesive backed felt wrap and/or 1/2" thick pre-formed, self-adhesive foam rubber pipe insulation such as Armaflex or Rubatex. If the felt wrap or pre-formed pipe insulation is used,

great care must be taken not to compress the insulation material when strapping or anchoring the attachment points. Use of expanding foam products as plumbing isolation is **strictly prohibited**.

SUPPLY LINES

- All hot and cold water pipes, fittings and valves shall NEVER come in direct contact with either the building structure framing or drywall. Supply lines are to be isolated using Acousto-Plumb, Holdrite Silencer System, Tolco I.S.P. felt lined isolator products, 1/4" high density felt wrap or 1/2" pre-formed pipe insulation. Acousto-Plumb products and installation details can be found at www.lspproducts.com. Holdrite Silencer System products and installation details can be found at www.holdrite.com. Tolco I.S.P. products can be found at www. cooperindustries.com. Installation details for use of felt wrap or pre-formed pipe insulation are available upon request and approval. If felt wrap or pre-formed pipe insulation are used (and only with prior written approval by the acoustical consultant when appropriate commercial isolation products cannot be located), these installation details must be followed to the letter. No deviations from these details will be allowed.

- All sink and shower faucets, spouts and risers shall be isolated with resilient gaskets that are positioned between the faucet, spout or riser and its mounting surface.

- Water supply stub-outs shall be temporarily isolated from the drywall using the Acousto-Sleeve ™ during drywall installation, and then permanently isolated using the Acousto-Scutcheon ™ or resilient caulking and a standard plumbing escutcheon.

- Water pressure shall not exceed 65 psi.

- Shower head flow restrictors shall be used to limit water flow to less than three (3) gallons per minute.

- The pipe stubs commonly installed to combat water hammer are not effective. A commercially produced water hammer device consisting of a bellows, similar to that made by Plumbing Products, Inc., is recommended.

- Sections of the plumbing supply system employing PEX (cross linked polyethylene tubing) do not require acoustical isolation except where it transitions to or from conventional copper lines.

WASTE LINES

- The cavity under plastic or fiberglass tubs and showers shall be packed with fiberglass or spray-on insulation materials and/or lightweight concrete pours. The bottoms of such tubs shall be blocked or supported by lightweight concrete to reduce drumming.

- All waste lines above the slab and at the penetrations of any floor/ceiling assemblies and any walls (including non-common walls) shall be cast iron. The use of ABS waste lines is not recommended. If ABS is used, the entire framing cavity surrounding the ABS pipe shall be completely packed with fiberglass, mineral wool or spray–on adhesive cellulose insulation materials. All elbows below toilet and tub waste outlets shall be isolated from all positioning blocks using carpet padding or high-density 1/4" felt material. The entire framing cavity surrounding these elbows shall be completely packed with fiberglass, mineral wool or spray-on adhesive cellulose insulation materials.

- Waste lines of a diameter greater than two and a half inches (2.5") shall never be installed in a wall framed with less than 2" by 6" studs. Walls framed with 2" by 4" studs simply don't allow sufficient clearance to properly insulate and isolate waste lines and/or avoid pipe contact with the drywall.

Failure to COMPLETELY isolate the plumbing system from the building structure will result in a significant transfer of plumbing noise into the building. Therefore, it is important that all of the above measures and techniques are employed. Collectively, these measures and techniques act as parts of a complete system, each designed to perform a particular function of the total effort. Any circumvention of the function of any one component, whether intentional or not, will ultimately lessen the effectiveness of the entire system. **QUALITY CONTROL IS CRITICAL TO PROPER PLUMBING SYSTEM ISOLATION.**

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

ELECTRICAL SYSTEM INSTALLATION NOTES

The following items shall be incorporated into the building plans:

COMMON WALLS

- Electrical outlets, switches, phone jacks, television antennae boxes and computer outlet boxes installed in opposite sides of a common wall shall be offset a minimum of 24" to comply with the fire code. This offset is not needed for acoustical reasons if insulation is used in the framing cavities and Lowry's #10 putty pads or 3M fire pads are applied around the backs and sides of all outlets, switches, phone jacks, etc.
- All electrical outlets, switches, phone jacks, television antennae boxes and computer outlet boxes installed in common walls shall be backed by and Lowry's #10 putty pads, 3M fire pads or equivalent. Pads shall be stapled to the studs to insure that they remain in place indefinitely (the adhesive backing of the pads deteriorates over time).
- Wiring shall avoid crossing over the air gap of common walls. Where unavoidable, wiring crossovers between common wall studs shall include a loop where the depth is equal to its width.
- Electrical panel boxes, fixture boxes or outlet boxes greater than 25 square inches shall be set in raised boxes that do not touch the opposite side of the common wall.

COMMON FLOOR/CEILINGS

- Recessed lighting shall be set in recessed and airtight boxes made of plywood or drywall.
- All other precautions applicable to common wall installations shall also apply to common floor/ceiling installations.

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115