

August 31, 2008

6147-3

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**SUBJECT: FOCUSED CARILLON SOUND STUDY for "ST. JOHN FISHER" CHURCH**

Dear Shelly:

Dudek has completed a carillon bells sound level study for the St. John Fisher Church in the City of Rancho Palos Verdes, California. The purpose of this study is to evaluate the potential impact of the carillon bells sound level upon surrounding land uses.

The results of our analysis are summarized in this report, which includes the following sections: 1) Project Background and Setting; 2) Terminology; 3) Criteria; 4) Impact Analysis; 5) Conclusions.

## **I.0 PROJECT BACKGROUND AND SETTING**

The St. John Fisher Church is located at 5448 Crest Road, at the intersection with Crenshaw Boulevard, in the City of Rancho Palos Verdes, California. (*Figures 1 and 2*). The project proposes to develop a new church building at the site that would include a carillon. The purpose of this sound study is to evaluate the carillon bells' sound levels and its potential noise impact upon surrounding land uses.

Sensitive receivers nearest to the church site potentially impacted by the sound of the carillon bells include: the Daughters of Mary and Joseph Retreat Center to the East; the Ridgecrest Rancho residential neighborhood to the North; the Villa Verde residential neighborhood to the Northwest; the Island View residential neighborhood to the West; and the Rancho Crest residential neighborhood to the south (*Figure 2*).

The anticipated carillon schedule is:

- Monday through Saturday: 8:00 a.m.; 12:00 noon; 5:05 p.m.; 6:00 p.m.
- Sunday: 8:50 a.m.; 10:35 a.m.; 12:00 noon; 12:20 p.m.; 4:50 p.m.; 6:00 p.m.

In addition to the above regular schedule, the carillon may also be used for funerals, weddings, Holy Day masses (7 times per year). In no case would the carillon be used prior to 8:00 a.m. or after 6:00 p.m.

**2.0 COMMUNITY NOISE CHARACTERISTICS**

To evaluate impacts upon areas that are sensitive to community noise, measurement scales that simulate human perception are customarily used. These measurement scales, basic noise terminology, concepts, and human perception of sound are described in the following paragraphs.

Sound (noise) levels are measured in decibels (dB). Community noise levels are measured in terms of an A-weighted sound level. The A-weighted scale of frequency sensitivity accounts for the sensitivity of the human ear, which is less sensitive to low frequencies, and correlates well with human perception of the annoying aspects of sound. The A-weighted decibel scale (dBA) is cited in most community noise criteria. All sound levels discussed in this report are A-weighted.

Human activities cause community noise levels to be widely variable over time. For simplicity, sound levels are usually best represented by an equivalent level over a given time period (Leq). The Leq, or equivalent sound level, is a single value (in dBA) for any desired duration, which includes all of the time-varying sound energy in the measurement period, usually one hour. Technical terms used in this report are summarized in *Table I*

<b>Table I Terms and Definitions</b>	
<b>TERM</b>	<b>DEFINITION</b>
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Decibel, dB	A unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Equivalent Noise Level, Leq	The sound level corresponding to a steady state sound level containing the same total energy as a time varying signal over a given sample period. Leq is designed to average all of the loud and quiet sound levels occurring over a time period.

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Community noise levels are usually related to the intensity of nearby human activity. Community noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. In wilderness areas, the noise levels can be below 35 dBA. In small towns or wooded and lightly used residential areas, the noise levels are more likely to be around 50 or 60 dBA. Community noise levels around 75 dBA are more common in busy urban areas and levels up to 85 dBA occur near major freeways and airports. Common A-weighted sound levels for various indoor and outdoor noise sources are shown in *Table 2*.

Table 2 Common Outdoor and Indoor Noise Levels (dBA)		
Common Outdoor Noise Levels	Noise Level	Common Indoor Noise Levels
	110	Rock Band
Commercial Jet at 200 ft	105	
	100	Inside Subway Train
Gas Lawnmower at 3 ft	95	
	90	
Diesel Truck at 50 ft	85	Food Blender at 3 ft
Noisy Urban Daytime	80	Garbage Disposal at 3 ft
Automobile at 50 ft	75	Shouting at 3 ft
Gas Lawnmower at 30 ft	70	Vacuum Cleaner at 10 ft
Commercial Area	65	Normal Speech at 3 ft
Heavy Traffic at 300 ft	60	
Quiet Urban Daytime	50	Large Business Office
Quiet Urban Nighttime	40	Small Theater, Large Conference Room
Quiet Suburban Nighttime	35	Library
	30	Bedroom at Night
Quiet Rural Nighttime	35	Concert Hall
Whisper at 6 ft	20	Broadcast and Recording Studio
Human Breathing	10	
	0	Threshold of Hearing

It is widely accepted in the acoustical industry that a community noise level change of 3 dBA is barely perceptible to most people, a 5-dBA change in noise level is considered readily perceptible, and a 10-dBA change is perceived as a doubling or halving of noise.

### **3.0 CRITERIA**

The City of Rancho Palos Verdes has no Ordinance or Municipal Code with quantitative criteria that would apply to the carillon’s sound levels. The adjacent City of Rolling Hills’ Municipal Code (*Title 8 – Health and Safety, Chapter 8.32 Noise*) includes the following standards applicable to residential zoned areas:

Extract of the City of Rolling Hills Municipal Code Exterior Noise Standards

A. The following exterior noise levels, unless otherwise specifically indicated, shall apply to all receptor properties within a designated noise zone and shall constitute the ambient noise level for the purpose of establishing standards:

<b>Designated Noise Zone Land Use</b>	<b>Time Interval</b>	<b>Exterior Noise Level (dBA)</b>
Residential and Agricultural	7:00 a.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	45

B. Unless otherwise herein provided, no person shall operate or cause to be operated any source of sound at any location within the city, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property to exceed the following standards:

1. “Standard No. 1” means the applicable ambient exterior noise level as set forth in subsection A of this section plus five dB for a cumulative period of more than twenty minutes in any hour.
2. “Standard No. 2” means the applicable ambient exterior noise level as set forth in subsection A of this section plus ten dB for a cumulative period of more than ten minutes in any hour.
3. “Standard No. 3” means the applicable ambient exterior noise level as set forth in subsection A of this section plus fifteen dB for a cumulative period of more than one minute in any hour.

In summary, the City of Rolling Hills’ Municipal Code requires 55 dBA daytime (7:00 a.m. to 10:00 p.m.) and 45 nighttime (10:00 p.m. to 7:00 a.m.) ambient noise level not to be exceeded by five dBA for a cumulative period of more than twenty minutes in any hour, by ten dBA for a cumulative period of more than ten minutes in any hour, or by fifteen dBA for a cumulative period of more than one minute in any hour.

#### **4.0 MONITORED CARILLON SOUND LEVELS**

The carillon sound levels have been monitored on Friday, August 22, 2008, between approximately 10:30 a.m. and 1:00 p.m. during the operation of a carillon demonstration model at the site. The carillon loudspeaker was placed at approximately the same location and height as the planned carillon speaker, and positioned to direct the carillon sound to the church parking lot area/southerly property line. The amplifier used during the sound level readings was set at the “medium” loudness level.

The measurements were taken with a calibrated Rion NL 32 (Serial Number 01030561) integrating sound level meter equipped with a ½-inch pre-polarized condenser microphone with pre-amplifier. This sound level meter meets the current American National Standards Institute standard for a Type I precision sound level meter. The sound level meter was positioned at a height of approximately five feet above the ground. Sound levels were monitored at the following locations (*Figure 3*):

- Site 1: On-site, at approximately 160 feet from, and in front of the carillon loudspeaker;
- Site 2: At the church’s southerly property-line (PL) shared with the Rancho Crest residential neighborhood, with a direct line-of sight (not shielded by existing buildings) and in front of the carillon loudspeaker;
- Site 3: At the church’s shared property-line with the Daughters of Mary and Joseph Retreat Center to the East;
- Site 4: Off-site, near the property-line of the Ridgecrest Rancho residential neighborhood to the North;
- Site 5: Off-site, near the property-line of the Villa Verde residential neighborhood to the Northwest;
- Site 6: Off-site, near the property-line of the Island View residential neighborhood to the West;
- Site 7: Off-site, in the backyard of a Rancho Crest neighborhood residence at 5465 Valley View Road (shielded by existing buildings).

It should be noted that the sound level readings were taken during periods with no vehicles on Crest or Crenshaw Boulevard near the monitor locations.

A summary of the sound level measurement results in terms of fast A-weighted sound pressure level  $L_{eq}$  is presented in *Table 3*.

<b>Monitor Site<sup>1</sup></b>	<b>Noise Level</b>
1	66 dBA
2	50 dBA
3	45 dBA
4	47 dBA
5	49 dBA
6	49 dBA
7	46 dBA

The data in Table 3 indicates that the on-site carillon sound level was 66 dBA at approximately 160 feet from, and in front of, the carillon loudspeaker (monitor Site 1). Sound levels monitored at the off site property line locations (Sites 2 through 6) ranged between 45 dBA to 50 dBA. The sound level monitored in the backyard of a residence (monitor location 7) was 46 dBA.

It should be noted that the carillon sound was barely audible at monitor locations 4, 5, and 6, and the readings at these locations were within one dBA, with and without the carillon being operated. With vehicles present, vehicle noise levels at the monitor site 4, 5, and 6 ranged between 65 and 70 dBA. The carillon sound was not audible at all at monitor location 7, due to distance sound attenuation and shielding by buildings and topography.

## **5.0 CONCLUSIONS**

Based on sound level measurements conducted by Dudek staff, it is anticipated that carillon sound levels will be 50 dBA or less at the nearest sensitive receptor location. This 50-dBA carillon sound level, occurring for short time periods (1 to 2 minutes) only, is well below the City of Rolling Hills’ Municipal Code daytime 65-dBA noise level allowed for a cumulative period of ten minutes in any hour, and the 60 dBA noise level allowed for a cumulative period of twenty minutes in any hour.

The 65 dBA noise level generated by normal speech at 3 ft or the 70 dBA noise level generated by a gas lawnmower at 30 feet distance (Table 2), are 15 to 20 dBA higher, or more than double the 50 dBA carillon bells sound level at the nearest sensitive location.

In conclusion, the noise impacts from the carillon sound levels are considered *less than significant*.

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<sup>1</sup> See Figure 3

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Should you have any questions regarding the above information, please do not hesitate to contact me at (805) 208-4827 or [coverweg@dudek.com](mailto:coverweg@dudek.com).

Respectfully submitted,

**DUDEK**



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Enclosures:

- Figure 1 – Regional Location
- Figure 2 – Project Vicinity
- Figure 3 – Monitor Locations

**REFERENCES**

CITY OF ROLLING HILLS. *Municipal Code (Title 8 – Health and Safety, Chapter 8.32 Noise)*

HYNDMAN & HYNDMAN ARCHITECTURE. *Project and Site Plans*

MAAS-ROWE CARILLONS, INC. *Carillon and loudspeaker setup and operation.*



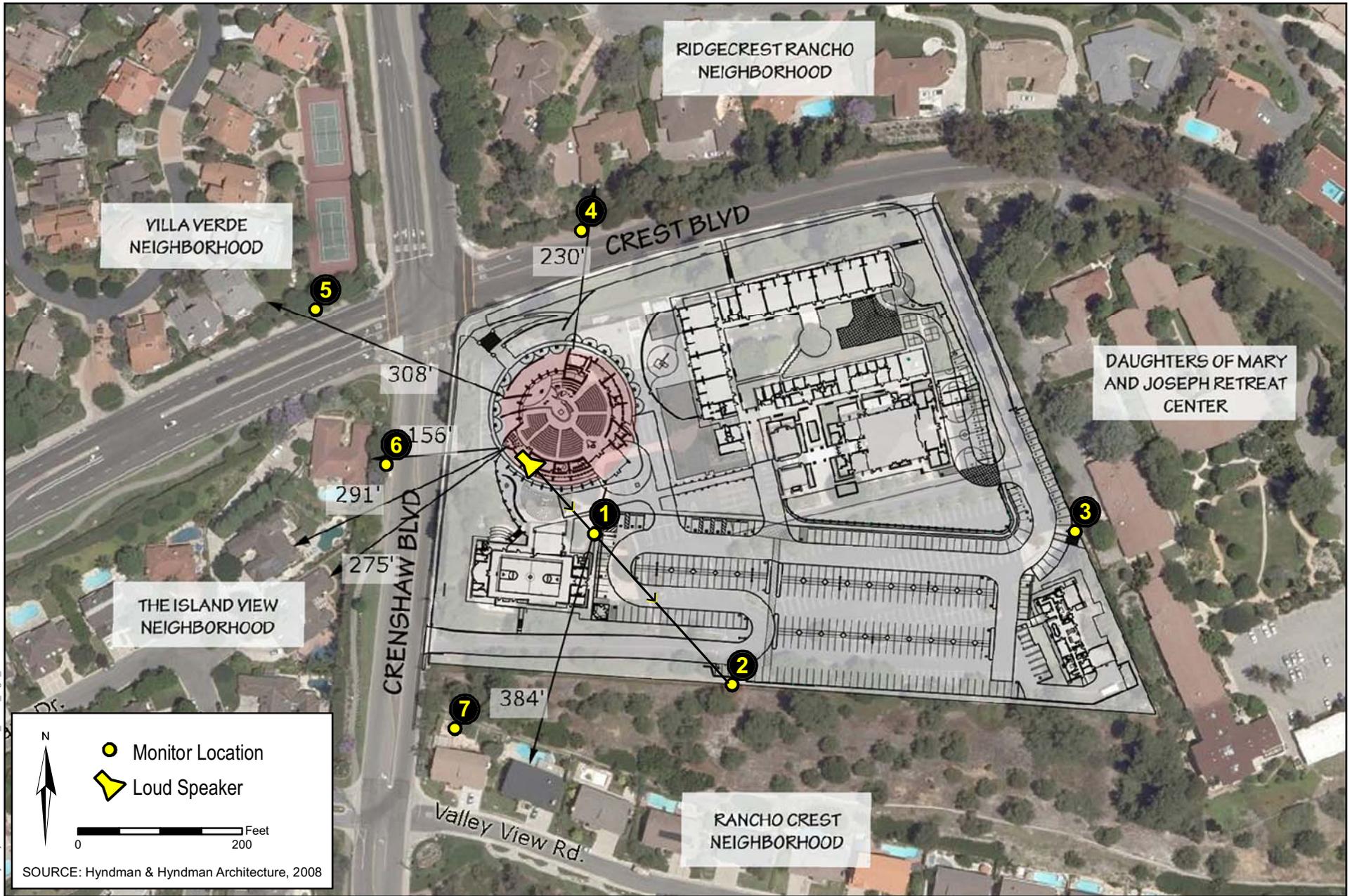


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**DUDEK**

St. John Fisher Church - Noise Study  
**Project Vicinity**

**FIGURE**  
**2**



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**DUDEK**

St. John Fisher Church - Noise Study  
**Monitor Locations**

**FIGURE  
 3**