

MEMORANDUM

To: Ross Duenas, Kimley-Horn and Associates
From: Brian Grover, Dudek
Subject: Acoustical Memorandum for the Proposed Robinson Avenue Bikeway Project,
City of San Diego, California
Date: August 31, 2015
cc: Mike Greene

SUMMARY

This memorandum evaluates the anticipated short-term noise impacts that would result from construction of the proposed Robinson Avenue Bikeway (proposed project). In summary, maximum construction noise levels at 50 feet would be approximately 88 dB during demolition activities (due to jackhammer use) and approximately 85 dB during the remainder of construction. At a distance of 10 feet, the maximum noise level at adjacent residential property lines would be approximately 102 dB during demolition activities and approximately 99 dB during the remainder of construction. The 12-hour average sound level during construction would be substantially less than these maximum noise levels due to the intermittent nature of construction noise; however, construction noise levels could exceed the City's noise criterion of 75 dB during the 12-hour period from 7:00 a.m. to 7:00 p.m. The project would be required to limit construction hours, place mufflers on equipment engines, and orient stationary sources to direct noise away from sensitive uses. These measures are included as a part of the noise mitigation (see *Mitigation* section below). Construction activities are anticipated to result in vibration below levels that typically are considered a nuisance to people, but would be below levels that can cause structural damage.

PROJECT DESCRIPTION

The San Diego Association of Governments (SANDAG) proposes to construct the Robinson Avenue Bikeway (proposed project) within the North Park community of the City of San Diego, San Diego County, California. The proposed project would involve physical improvements to Robinson Avenue, Georgia Street, Florida Street, and Alabama Street between Park Boulevard to the west and Alabama Street to the east. The project would provide a bicycle and pedestrian facility to connect a missing section of Robinson Avenue between Florida Street and Alabama Street.

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The proposed project is located in the North Park community of the City of San Diego, along an approximately 0.2 mile segment of the Robinson Avenue public right-of-way (ROW) from just east of Park Boulevard to Alabama Street. The project site also includes the approximately 150-foot long missing segment of Robinson Avenue between Florida Street and Alabama Street. Approximately 2,800 square feet of land would be acquired from a property to the north (Assessor Parcel Number 453-012-15-07 to 14). Residential properties abut the Robinson Avenue ROW on the north and south side of the project site.

The proposed project would construct a bicycle and pedestrian path (Class I bicycle lanes) to connect a missing section of Robinson Avenue between Florida Street and Alabama Street. The structural components of the proposed path would be comprised of several different materials. The project also includes buffered bike lanes, a mini-roundabout, a neighborhood traffic circle, and improvements to the Robinson Avenue/Alabama Street intersection.

Construction is expected to be phased over approximately 11 months, beginning in the fall of 2016 and ending in the summer of 2017. Construction equipment would include bulldozers, backhoes, water trucks, roller(s), concrete mixer truck, pavement scarifier, street sweeper, jackhammer, chainsaw, hand compaction, bobcat, trencher, concrete pump truck, crane, generator, asphalt cold planer, asphalt truck, asphalt paver, asphalt/concrete saw, and a roadway striping machine. Approximately 14 existing ornamental mature trees would be removed during construction. Construction would generally be phased as indicated in Table 1.

Table 1
Estimated Construction Phasing

Construction Phase	Duration	Expected Equipment
Demolition	1 month	2 backhoes, 1 bulldozer, street sweeper, jackhammer, 1 sawcut machine
Mass Site Grading	1 month	1 loader, 2 backhoes, 1 grader, 3 water trucks
Trenching/Utilities	3 months	1 backhoe, 1 bulldozer, 1 crane
Bikeway Bridge Construction	4 months	1 crane, 2 backhoes, 2 loaders, 1 concrete truck, 1 concrete pump
Paving/Striping	2 months	1 paving machine, 1 striping machine, 1 pavement scarifier, 1 asphalt cold planer, 1 asphalt truck, 1 concrete truck, 1 sawcut machine, 1 street sweeper

Source: Kimley-Horn and Associates 2015.

Operation

The proposed project would be primarily related to construction of the proposed bikeway path and related improvements. Operation of the proposed project would be limited to occasional maintenance and repairs.

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CITY NOISE CRITERIA

The City has established noise criteria in the City General Plan Noise Element and City Municipal Code.

City General Plan Noise Element

The City’s General Plan Noise Element contains noise guidelines (City of San Diego 2008a). The maximum noise exposure depends on the land use category. As depicted in Table 2, the City considers outdoor noise levels of up to 70 dB Community Noise Equivalent Level (CNEL) to be conditionally acceptable for the outdoor use areas of multifamily land uses. Interior noise levels are considered compatible up to 45 dB CNEL.

**Table 2
Land Use – Noise Compatibility Guidelines**

Land Use Category		Exterior Noise Exposure (dBA CNEL)				
		60	65	70	75	
<i>Residential</i>						
Single Units; Mobile Homes; Senior Housing			45			
Multiple Units; Mixed-Use Commercial/Residential; Live Work; Group Living Accommodations			45	45*		
<i>Sales</i>						
Building Supplies/Equipment; Food, Beverages, and Groceries; Pets and Pet Supplies; Sundries, Pharmaceutical and Convenience Sales; Wearing Apparel and Accessories				50	50	
<i>Commercial Services</i>						
Building Services; Business Support; Eating and Drinking; Financial Institutions; Assembly and Entertainment; Radio and Television Studios; Golf Course Support				50	50	
Visitor Accommodations			45	45	45	
<i>Offices</i>						
Business and Professional; Government; Medical, Dental and Health Practitioner; Regional and Corporate Headquarters				50	50	
	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.			
		Outdoor Uses	Activities associated with the land use may be carried out.			
	Conditionally Compatible	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level indicated by the number for occupied areas. Refer to Section I.			
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable. Refer to Section I.			

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**Table 2
Land Use – Noise Compatibility Guidelines**

Land Use Category			Exterior Noise Exposure (dBA CNEL)				
			60	65	70	75	
	Incompatible	Indoor Uses	New construction should not be undertaken.				
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.				

Source: City of San Diego 2008a.

*For uses affected by aircraft noise, refer to Policies NE-D.2. and NE-D.3.

City Noise Ordinance Criteria

The City has adopted a quantitative noise ordinance to control excessive noise generated in the City (City of San Diego 2008b). The noise ordinance limits are in terms of a 1-hour average sound level. The allowable noise limits depend upon the land use zone, time of day, and duration of the noise, as depicted in Table 3.

**Table 3
City of San Diego Sound Level Limits**

Land Use	Time of Day	1-Hour Average Sound Level (dB)
Single-Family Residential	7 a.m. to 7 p.m.	50
	7 p.m. to 10 p.m.	45
	10 p.m. to 7 a.m.	40
Multifamily Residential (up to maximum density of 1/2,000)	7 a.m. to 7 p.m.	55
	7 p.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
All other residential	7 a.m. to 7 p.m.	60
	7 p.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Commercial	7 a.m. to 7 p.m.	65
	7 p.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	60

Source: City of San Diego 2008b

The City also regulates noise associated with construction activities. Construction is permitted between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturdays, with the exception of legal holidays. Construction equipment shall be operated so as not to cause, at or beyond the

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property lines of any property zoned residential, an average sound level greater than 75 dB during the 12-hour period from 7:00 a.m. to 7:00 p.m (City of San Diego 2008b).

SHORT-TERM CONSTRUCTION NOISE AND VIBRATION

Construction Noise

Development activities and associated equipment necessary for project construction are described above in Table 1. As demonstrated in Table 1, construction equipment anticipated for project development includes only standard equipment that would be employed for any routine construction project of this scale; construction equipment with substantially higher noise and vibration generation characteristics (such as pile drivers, rock drills, blasting equipment, etc.) are not anticipated for development of the project. Maximum construction noise levels at 50 feet would be approximately 88 dB Leq during demolition activities (due to jackhammer use) and approximately 85 dB during the remainder of construction (FTA 2006).

Residential properties abut the Robinson Avenue ROW on the north and south side of the project site. For the purposes of this analysis, it is assumed that construction activities would occur within 10 feet of existing residential property lines, and within approximately 25 feet of existing structures.

At a distance of 10 feet, the maximum noise level at adjacent residential property lines would be approximately 102 dB during demolition activities and approximately 99 dB during the remainder of construction. The 12-hour average sound level during construction would be substantially less than these maximum noise levels due to the intermittent nature of construction noise; however, construction noise levels could exceed the City's noise criterion of 75 dB during the 12-hour period from 7:00 a.m. to 7:00 p.m.

Construction Vibration

The heavier pieces of construction equipment used at this site could include bulldozers, loaded trucks, water trucks and pavers. Ground-borne vibration information related to construction activities has been collected by Caltrans (Caltrans 2004). Information from Caltrans indicates that continuous vibrations with a peak particle velocity of approximately 0.1 inches/second begin to be a nuisance people. However, according to the American Society of Civil Engineers (ASCE 1974), this nuisance threshold is approximately half of the magnitude which is typically used for protection of "fragile buildings". The ASCE recommends the use of a 0.2 inches/second particle velocity to ensure the avoidance of damage to older existing structures in the project vicinity.

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Ground-borne vibration is typically attenuated over short distances. As stated previously, it is assumed that construction activities would occur within approximately 25 feet of existing structures. Based on published vibration data, the anticipated construction equipment would generate a peak particle velocity of approximately .09 inch/second or less at a distance of 25 feet (FTA 2006). Therefore, construction activities are anticipated to result in vibration below levels that typically are a nuisance to people, and below levels that can cause structural damage.

RECOMMENDATIONS

Prior to commencement of construction, SANDAG shall ensure that:

- All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers.
- Construction noise reduction methods such as shutting off idling equipment, installing temporary acoustic barriers around stationary construction noise sources, maximizing the distance between construction equipment staging areas and occupied residential areas, and use of electric air compressors and similar power tools, rather than diesel equipment, shall be used.
- Noise attenuation measures, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources, are implemented.
- During construction, stationary construction equipment shall be placed such that emitted noise is directed away from or shielded from sensitive noise receivers.
- During construction, stockpiling and vehicle staging areas shall be located away from noise sensitive receptors to the extent practicable.
- The engineer shall ensure that grading activities are limited to the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday.
- Two weeks prior to the commencement of construction, notification must be provided to surrounding land uses within 100 feet of the project site disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period. This notification shall give a contact phone number for any questions or complaints.

REFERENCES

American Society of Civil Engineers (ASCE). 1974. Journal of Construction Division, *Vibrations During Construction Operations*, 100 No. CO3, pp. 239-246, September.

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Caltrans. 2004. *Transportation Related Earthborne Vibrations*. January 23, 2004.

City of San Diego. 2008a. "Noise Element." In *City of San Diego General Plan*, R-303473. Adopted March 10, 2008.

City of San Diego. 2008b. City of San Diego Municipal Code, Chapter 5 (Noise Abatement and Control Ordinance), Section 59.5.0401, Sound Level Limits.

FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment*.