DRB_07082021_Exhibit - 9 - Vibration Memorandum (prepared by Meridian Consultants, LLC., dated October 28, 2020)

Meridian Consultants

Los Angeles Office
706 S. Hill Street, 11th Floor
Los Angeles, CA 90014
(213) 335-3434

Westlake Village Office
920 Hampshire Road, Suite A5
Westlake Village, CA 91361
(805) 367-5720

Date: October 28, 2020

To: EC+Associates Engineering
8207 Brookgreen Road
Downey, CA 90240

From: Christ Kirikian, Principal

Attn: Eduardo J. Carrillo
Principal Engineer

Subject: Vibration Memo for the Proposed Single Family Residence

Introduction

This memorandum, prepared by Meridian Consultants LLC, assesses vibration impacts during construction for the Proposed Single Family Residence located at 1248 Corona Drive (APNs #5679-016-001, 5679-016-002, and 5679-016-024) in the City of Glendale (refer to **Figure 1: Project Site Location**). The proposed building is expected to be a 2-story structure constructed over basement garage beneath the northern end of the proposed building. Living spaces are planned along the first and second level, with garage at ground (at or near the street level). Free standing retaining walls are planned for behind the dwelling to provide the required building setback from the ascending slope. Site grading work will involve excavation (cutting operations) in order to create the proposed finished grades.

Adjacent uses surrounding the Project site include the residential uses immediately to the east on the hillside along Vista Superba Street[1] and the residential uses to the west along Corona Drive[2] sloping down on the hillside (refer to **Figure 2: Site Rendering**).

Construction Description

Access for drilling of the hillside construction area would be provided by using an excavator (CAT 420, 308, or 305) to create a pathway on the steep hill lasting approximately 3 to 5 days. Concrete piles from neighbor footing to the east would be 10 feet to the retaining wall and 15 feet to the main house (refer to **Figure 3: Shoring Plan**). Once the hillside is accessible, drilling for shoring utilizing concrete caissons or soldier piles with a 24 inch to 30 inch diameter is anticipated with an approximate duration of 2 to 3 weeks. Concurrently, caissons rebar or soldier pile beam will be set in hole and concrete poured. The placement of rebar/w-shape soldier piles will be done using a mobile crane located on the street along Corona Drive. Concrete will be poured with a regular pump and hose. Excavated soil will be loaded directly

[1] 1239 Vista Superba, Glendale.
[2] 1253 Corona Drive, Glendale.

to trucks on the street right away along Corona Drive located approximately 60 feet from the adjacent neighbor.

Methodology

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. While ground vibrations from construction activities do not often reach the levels that can damage structures, fragile buildings must receive special consideration.

Impacts due to construction activities were evaluated by identifying vibration sources (i.e., construction equipment), measuring the distance between vibration sources and surrounding structure locations, and making a significance determination.

Section 8.36.210 of the City's Municipal Code states operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at 150 feet from the source if on a public space or public right-of-way shall be a violation.

The City currently does not have a significance vibration perception threshold to assess vibration impacts. However, the FTA guidelines set forth in FTA's *Transit Noise and Vibration Assessment guidance document,*[3] are used to evaluate potential impacts related to construction vibration. According to FTA guidelines, impacts relative to ground-borne vibration associated with potential building damage would be considered significant if any of the following future events were to occur:

- Project construction activities cause ground-borne vibration levels to exceed 0.5 PPV at the nearest off-site reinforced-concrete, steel, or timber building.

Table 1: Vibration Source Levels for Construction Equipment, presents average source levels in terms of velocity for various types of construction equipment measured under a wide variety of construction activities. The data in **Table 1** provide a reasonable estimate for a wide range of soil conditions. It is important to note, construction of the project would not be utilizing the following equipment listed in **Table 1** below: pile driver (impact and sonic); clam shovel drop (slurry wall); hydromill (slurry wall); vibratory roller; and hoe ram.

[3] FTA, *Transit Noise and Vibration Impact Manual, September 2018.*

Table 1
Vibration Source Levels for Typical Construction Equipment

Equipment		PPV at 25 ft, in/sec	Approximately Lv at 25 ft
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.17	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

_____
Source: FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018.

Summary

Table 2: On-Site Construction Vibration Impacts–Building Damage presents the construction vibration impacts associated building damage with the equipment that is expected to be on-site, which includes small and large bulldozer, caisson drilling, loaded trucks, and jackhammer. As mentioned previously, excavation activities would take place as close as 10 to 15 feet from the adjacent neighbor footing (refer to **Figure 2**). As shown in **Table 2**, the forecasted vibration levels due to on-site construction activities would not result in vibration impacts at 10 to 15 feet. Additionally, vibration levels related to loaded trucks would be further reduced as trucks would be located approximately 60 feet from the adjacent neighbor. Impacts related to building damage from on-site construction vibration would not be considered significant.

Table 2

On-Site Construction Vibration Impacts – Building Damage

Distance from Off-Site Building Structures	Estimated Vibration Velocity Levels at the Nearest Off-Site Structures from Typical Construction Equipment					Significance Threshold (PPV ips)	Exceeds Threshold?
	Large Bulldozer	Caisson Drilling	Loaded Trucks	Jackhammer	Small bulldozer		
FTA Reference Vibration Levels at 25 feet							
	0.089	*0.089*	*0.076*	*0.035*	*0.003*	0.5	**No**
10 feet	0.352	0.352	0.300	0.138	0.012	0.5	**No**
15 feet	0.191	0.191	0.164	0.075	0.006	0.5	**No**

Source: US Department of Transportation, Federal Transportation Authority, Transit Noise and Vibration Impact Assessment.
*Note: Refer to **Appendix A** for construction vibration worksheets.*

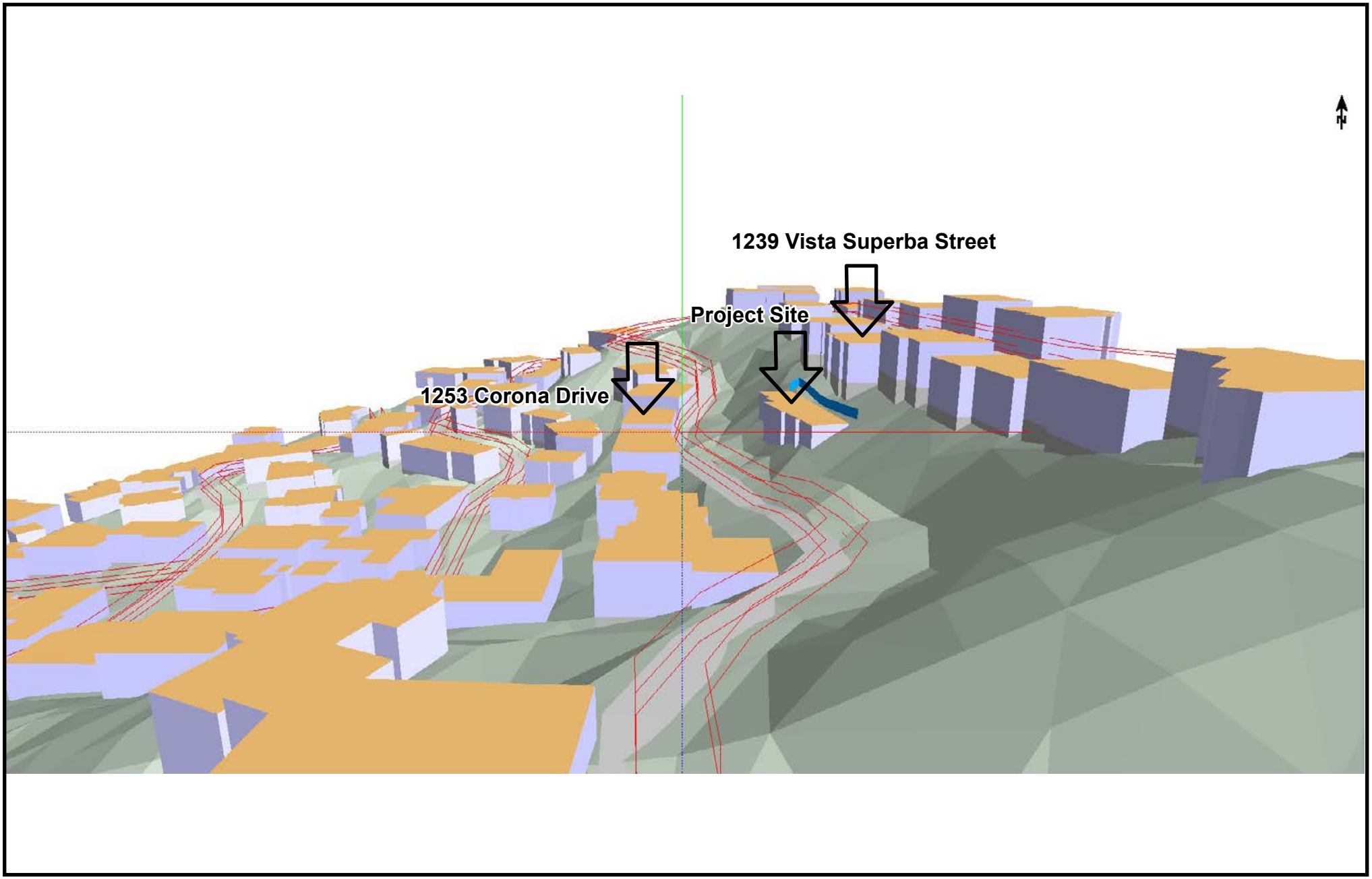
SOURCE: Google Earth - 2020

FIGURE **1**

Meridian Consultants

Project Site Location

300-001-20



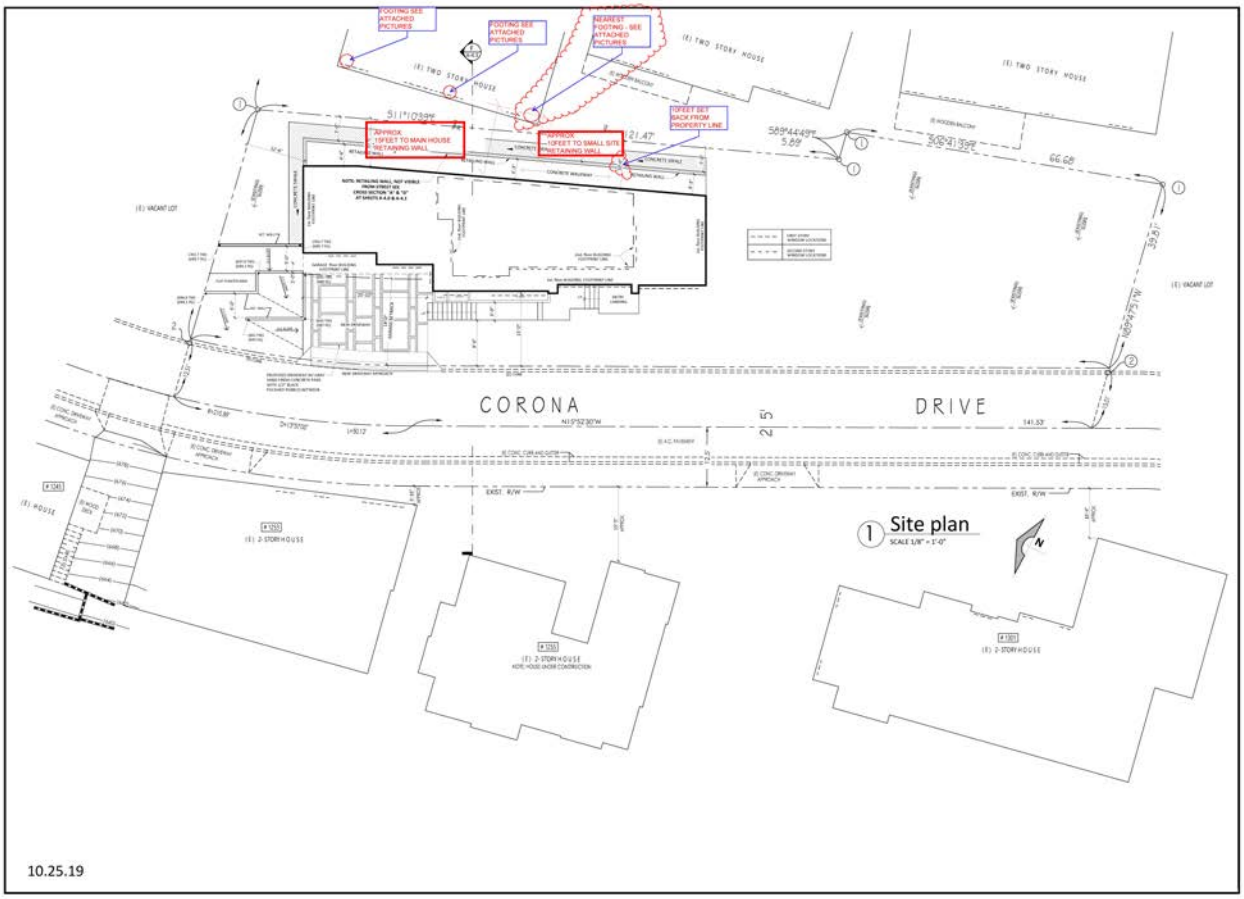
SOURCE: Google Earth - 2020

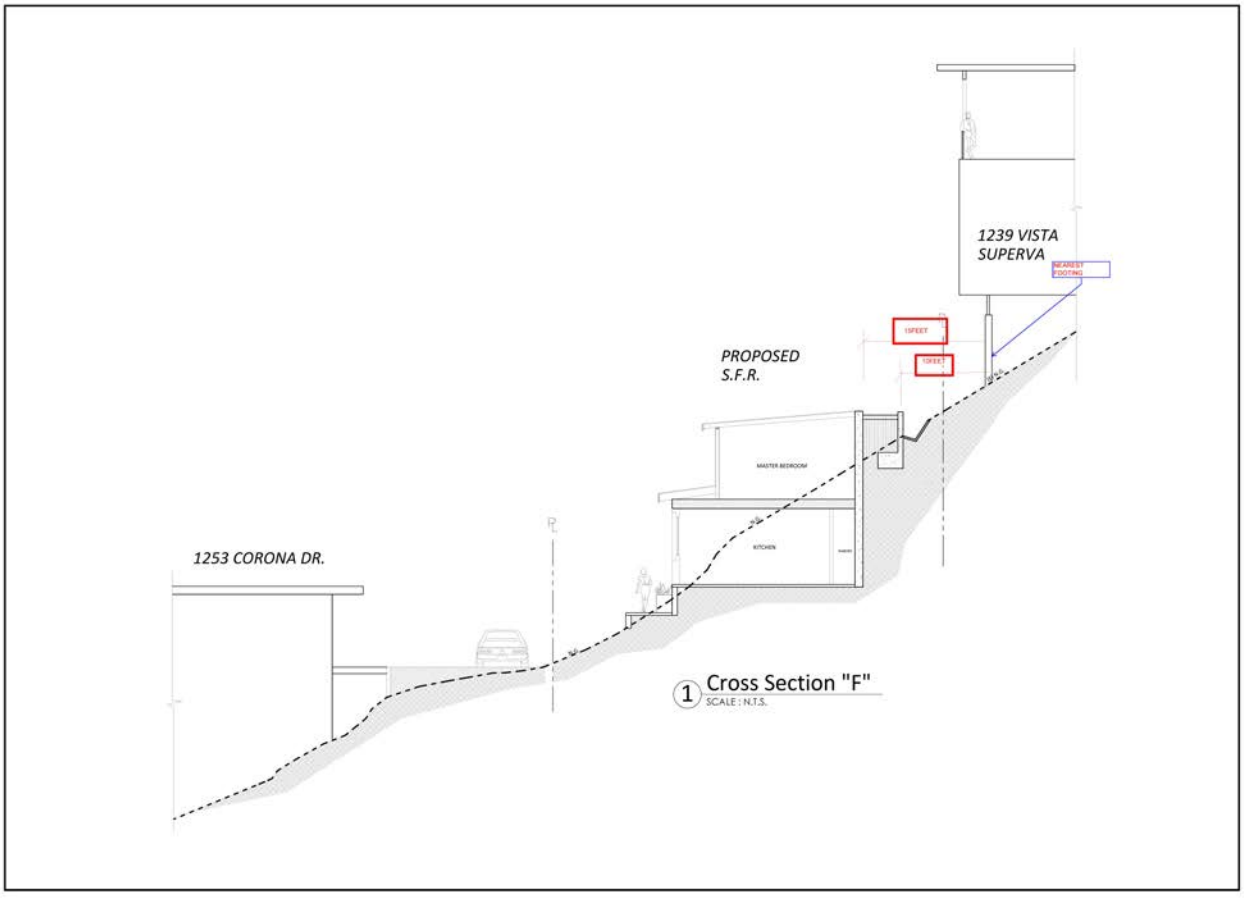
FIGURE **2**

Meridian Consultants

Site Rendering

300-001-20





SOURCE: Meridian Consultants LLC - 2020

FIGURE **3**

Meridian Consultants

Shoring Plan

300-001-20

APPENDIX A

Construction Vibration Worksheet

Equipment		Pieces of Equipment	PPV at 25 feet (in/sec)	Distance from Equipment	PPV at adjusted distance	RMS velocity amplitude in in/sec at adjusted distance[a]	RMS Vibration level in VdB at adjusted distance
Caisson drilling		1	0.089	10	0.352	0.088	99
Jackhammer		1	0.035	10	0.138	0.035	91
Large bulldozer		1	0.089	10	0.352	0.088	99
Loaded trucks		1	0.076	10	0.300	0.075	98
Pile Drive (impact)		1	0.644	10	2.546	0.636	116
Vibratory Roller		1	0.210	10	0.830	0.208	106
Small bulldozer		1	0.003	10	0.012	0.003	69

*** Suggested Vibration Thresholds per the Federal Transit Administration, United States Department of Transportation, Transit Noise and Vibration Impact Assessment September 2018, Table 7-4**

Equipment		Pieces of Equipment	PPV at 25 feet (in/sec)	Distance from Equipment	PPV at adjusted distance	RMS velocity amplitude in in/sec at adjusted distance[a]	RMS Vibration level in VdB at adjusted distance
Caisson drilling		1	0.089	15	0.191	0.048	94
Jackhammer		1	0.035	15	0.075	0.019	85
Large bulldozer		1	0.089	15	0.191	0.048	94
Loaded trucks		1	0.076	15	0.164	0.041	92
Pile Drive (impact)		1	0.644	15	1.386	0.346	111
Vibratory Roller		1	0.210	15	0.452	0.113	101
Small bulldozer		1	0.003	15	0.006	0.002	64

*** Suggested Vibration Thresholds per the Federal Transit Administration, United States Department of Transportation, Transit Noise and Vibration Impact Assessment September 2018, Table 7-4**