NOISE ANALYSIS REPORT

CHULA VISTA BAYFRONT PACIFICA

Chula Vista, CA

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SECTION 1 INTRODUCTION

This report assesses potential noise impacts associated with the proposed Pacifica project in Chula Vista, California (Figure 1). The analysis evaluates noise from surrounding roadways at outdoor usable areas of the project site, noise from project roadways at off-site locations, noise from construction at the closest noise-sensitive land uses; and provides performance criteria for on-site noise sources for compliance with the City Noise Ordinance at the property lines. The following sections describe the findings of the field investigation and acoustical calculations.

1.1 PROJECT DESCRIPTION

There would be two alternatives for this project, as described below:

Proposed Project Alternative

Approximately 1,500 residential units are proposed in Phase I on approximately 14 acres of primarily undeveloped land and a portion of the existing Marina Parkway. Proposed development consists of a combination of low-rise, mid-rise, and high-rise residential with a maximum of 1,500 units and up to 15,000 square feet supporting ancillary retail uses, public spaces, and visual connections which would relate the surrounding environment to the new development. The residential buildings would range from 4 to 19 stories (70 to 220 feet high). The retail uses would be included at the street level to create a village atmosphere and pedestrian-friendly area. The required parking would be located in parking structures both below-grade and above-grade, for a total of approximately 2,300 parking spaces. The above-grade structured parking would be located in the center of the residential structures, generally surrounded and enclosed by the residential and ancillary retail uses in order to minimize their visibility. Figure 2 illustrates the site plan for the Proposed Project alternative.

The proposed project alternative would include two outdoor usable area options. Option A would include 288 square feet (sf) per dwelling unit (du), located on the rooftops, community rooms, balconies, and the ground plane. Option B would include 165 sf/du, located on the rooftops, community rooms, and balconies (Carrier Johnson 2008).

Remediated L-Ditch Alternative

Approximately 1,500 residential units are proposed in Phase I on approximately 23 acres of primarily undeveloped land and a portion of the existing Marina Parkway. Proposed development consists of a combination of low-rise, mid-rise, and high-rise residential with a maximum of 1,500 units and up to 15,000 square feet supporting ancillary retail uses, public spaces, and visual connections which would relate the surrounding environment to the new development. The residential buildings would range from 4 to 17 stories (45 to 200 feet high). The retail uses (25 to 35 feet high) would be included at the street level to create a village atmosphere and pedestrian-friendly area. The required parking would be located in parking structures both below-grade and above-grade, for a total of approximately 2,300 parking spaces. The above-grade structured parking would be generally located in the center of the residential structures, surrounded and enclosed by the residential and ancillary retail uses in order to minimize their visibility. Figure 3 illustrates the site plan for the Remediated L-Ditch alternative.

The proposed project alternative would include two outdoor usable area options. Option A would include 489 sf/du, located on the rooftops, community rooms, balconies, and the ground plane. Option B would include 192 sf/du, located on the rooftops, community rooms, and balconies (Carrier Johnson 2008).

1.2 ENVIRONMENTAL NOISE BACKGROUND

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound typically associated with human activity and that interferes with or disrupts normal activities. The human environment is characterized by a certain consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels. If a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the human ear's sensitivity within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Because community noise fluctuates over time, a single measure called the Equivalent Sound Level (Leq) is often used to describe the time-varying character of community noise. The Leq is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the Lmax and Lmin indicators, which represent the root-mean-square maximum and minimum noise levels obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

Another sound measure known as the Community Noise Equivalent Level (CNEL) is an adjusted average A-weighted sound level for a 24-hour day. It is calculated by adding a 5-dB adjustment to sound levels during evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dB adjustment to sound levels during nighttime hours (10:00 p.m. to 7:00 a.m.). These adjustments compensate for the increased sensitivity to noise during the typically quieter evening and nighttime hours. The CNEL is used by the State of California and the City of Chula Vista (City) to evaluate land-use compatibility with regard to noise.

Table 1. A-Weighted Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level (decibels)	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud **Threshold of Pain**
Pile Driver (50 ft)	Rock Music Concert Inside Subway Station (New York)	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Gas Lawn Mower (3 ft)		100	8 times as loud **Very Loud**
Food Blender (3 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck (150 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Noisy Urban Daytime	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)	Commercial Areas	70	Reference Loudness **Moderately Loud**
Normal Speech (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Large Business Office Quiet Urban Daytime	50	1/4 as loud
Bird Calls (distant)	Quiet Urban Nighttime	40	1/8 as loud **Quiet**
Soft Whisper (5 ft)	Library and Bedroom at Night Quiet Rural Nighttime	30	1/16 as loud
	Broadcast and Recording Studio	20	1/32 as loud **Just Audible**
		0	1/64 as loud **Threshold of Hearing**

Source: Compiled by Kimley-Horn and Associates, Inc.

SECTION 2 APPLICABLE NOISE STANDARDS

2.1 CITY OF CHULA VISTA GENERAL PLAN

The City of Chula Vista requires new projects to meet exterior noise level standards as established in the Exterior Land Use / Noise Compatibility Guidelines of the City's General Plan (Table 2). This table displays a traffic noise goal of 65 dBA CNEL or less at outdoor use areas of residential development. The City applies this goal at common areas included in open space calculations only; mitigation is not required for common exterior use areas not included in these calculations. However, it is a City policy (City of Chula Vista 2007) that "ground-floor private outdoor use areas, such as patios, are subject to the 65 CNEL standard regardless of their exclusion from open-space calculations."

Table 2. City of Chula Vista Exterior Land Use / Noise Compatibility Guidelines

Land Use	Annual CNEL in Decibels					
	50	55	60	65	70	75
Residential						
Schools, Libraries, Daycare Facilities, Convalescent Homes, Outdoor Use Areas, and Other Similar Uses Considered Noise Sensitive						
Neighborhood Parks, Playgrounds						
Community Parks, Athletic Fields						
Offices and Professional						
Places of Worship (excluding outdoor use areas)						
Golf Courses						
Retail and Wholesale Commercial, Restaurants, Movie Theaters						
Industrial, Manufacturing						

2.2 CITY OF CHULA VISTA NOISE ORDINANCE

Construction activities must comply with the hours set by the City of Chula Vista Municipal Code. Section 17.24.040(C)(8): Power Machinery, Tools, and Equipment states:

> The use of any tools, power machinery, or equipment or the conduct of construction and building work in residential zones so as to cause noises disturbing to the peace, comfort, and quiet enjoyment of property of any person residing or working in the vicinity between the hours of 10:00 p.m. and 7:00 a.m., Monday through Friday, and between the hours of 10:00 p.m. and 8:00 a.m., Saturday and Sunday, except when the work is necessary for emergency repairs for the health and safety of any member of the community.

Therefore, construction may occur between the hours of 7:00 a.m. and 10:00 p.m., Monday through Friday, and between the hours of 8:00 a.m. and 10:00 p.m., Saturday and Sunday.

Exterior noise is also limited by the City's Noise Ordinance. Section 19.68.030 A4 describes that:

> 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 to exceed the environmental and/or nuisance interpretation of the applicable limits given in Table III.

Table 3 summarizes the exterior noise limits as described in Table III of Section 19.68.030 A4. Where two or more dissimilar land uses occur on a single property, the more restrictive noise limits shall apply.

Table 3. City of Chula Vista Exterior Noise Limits

Receiving Land Use Category	Noise Level (dBA)	
	10:00 p.m. to 7:00 a.m. (Weekdays)	7:00 a.m. to 10:00 p.m. (Weekdays)
	10:00 p.m. to 8:00 a.m. (Weekends)	8:00 a.m. to 10:00 p.m. (Weekends)
All residential (except multiple dwelling)	45	55
Multiple dwelling residential	50	60
Commercial	60	65
Light industry – I-R and I-L Zone	70	70
Heavy industry – I Zone	80	80

Environmental Noise – Leq in any hour.
Nuisance Noise – Not to be exceeded any time.

Environmental noise generated by light industrial land uses cannot exceed 70 dBA Leq at other light industrial land uses at any time, 65 dBA Leq at commercial land uses during the daytime (7:00 a.m. to 10:00 p.m. weekdays, 8:00 a.m. to 10:00 p.m. weekends), or 60 dBA at commercial land uses during the nighttime (10:00 p.m. to 7:00 a.m. weekdays, 10:00 p.m. to 8:00 a.m. weekends).

2.3 STATE OF CALIFORNIA

California Code of Regulations, Title 24: Noise Insulation Standards requires an acoustical analysis for multifamily dwellings located in an area exceeding 60 dBA CNEL. The analysis must show that the proposed design would limit interior noise in habitable rooms to 45 dBA CNEL or below. This analysis must be conducted prior to obtaining a building permit.

The interior noise analysis should identify sound transmission loss requirements for building elements exposed to exterior noise levels exceeding 60 dBA CNEL. If the interior 45 dBA CNEL limit can be achieved only with the windows closed, the residence design must include mechanical ventilation that meets applicable Uniform Building Code (UBC) requirements.

Worst-case noise levels, either existing or future, must be used. Future noise level predictions must be for a date at least 10 years from the time of the building permit application.

2.4 WILDLIFE HABITAT NOISE REGULATIONS

Section 7.5.2 of the Chula Vista Subarea Plan, Priority 1, Section 4(d): Noise states:

> Uses in or adjacent to the [Sweetwater Marsh National Wildlife Refuge] Preserve should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas and any other use that may introduce noises that could impact or interfere with wildlife utilization of the Preserve. Excessively noisy uses or activities adjacent to breeding areas, including temporary grading activities, must incorporate noise reduction measures or be curtailed during the breeding season of sensitive bird species, consistent with Table 3-5 of the MSCP Subregional Plan.
>
> Where noise associated with clearing, grading or grubbing will negatively impact an occupied nest for the least Bell's vireo during the breeding season (March 15 to September 15), noise levels should not exceed 60 LEQ. However, on a case-by-case basis, if warranted, a more restrictive standard may be used. If an occupied least Bell's vireo nest is identified in a pre-construction survey, noise reduction techniques, such as temporary noise walls or berms, shall be incorporated into the construction plans to reduce noise levels below 60 LEQ.
>
> Where noise associated with clearing, grubbing or grading will negatively impact an occupied nest for raptors between January 15 and July 31 or the coastal California gnatcatcher between February 15 and August 15 (during the breeding season), clearing, grubbing or grading activities will be modified if necessary, to prevent noise from negatively impacting the breeding success of the pair. If an occupied raptor or coastal California gnatcatcher nest is identified in a pre-construction survey, noise reduction techniques shall be incorporated into the construction plans.
>
> Outside the bird breeding season(s) no restrictions shall be placed on temporary construction noise.

SECTION 3 EXISTING NOISE ENVIRONMENT

The existing noise environment at the project site is dominated by vehicular traffic on Marina Parkway and J Street. Marina Parkway has an existing Average Daily Traffic (ADT) volume of 896 vehicles (KHA 2007). J Street has an exiting ADT volume of 8,617 vehicles (KHA 2007). The posted speed limits for Marina Parkway and J Street are 35 mph. In addition, Interstate 5 (I-5) is located approximately 800 feet east of the project site (Street A). The existing industrial buildings to the east on the HP-15 parcel would be removed as part of the Project. The Goodrich facility is located approximately 1,000 feet north of the project site. The South Bay power plant is located approximately 2,000 feet south of the project site (J Street); it is assumed that this power plant would be relocated in the future.

3.1 SOUND LEVEL MEASUREMENTS

Three ½-hour sound level measurements (ST1-ST3) were conducted during the afternoon peak traffic period of Wednesday, September 19, 2007 to quantify the existing onsite acoustical environment due to vehicle traffic. The measurement results are summarized in Table 4 and correspond to the locations depicted on Figure 4.

Table 4. Sound Level Measurements (dBA)

ID	Location	Date	Time	Leq	Lmin	Lmax	L10	L50	L90
ST1	East property line	9-19-2007	16:00 – 16:30	49.1	44.4	63.3	48.9	46.8	45.7
ST2	Northwest property line	9-19-2007	16:35 – 17:05	61.6	44.0	74.5	65.7	57.0	46.3
ST3	Southeast property line	9-19-2007	17:15 – 17:45	64.5	45.5	76.2	69.0	60.2	49.8

A Rion Model NA-28 American National Standards Institute Type 1 Integrating Sound Level Meter (SLM) was used as the data-collection device. The meter was mounted to a tripod roughly 5 feet above ground to simulate the average height of the human ear. The sound level meter was calibrated before and after the measurement period.

A 24-hour sound level measurement (LT1) was conducted at the F&G Street Marsh between 5:00 p.m. on September 19, 2007 and 5:00 p.m. on September 20, 2007 to quantify the existing ambient noise environment in the F&G Street Marsh near the project. The measurement results are summarized in Table 5 and correspond to the measurement location depicted on Figure 3. Noise sources during the site visits consisted of aircraft overflights, distant construction, distant mechanical equipment at the Southbay Boatyard located west of the F&G Street Marsh, and vehicle traffic on Marina Parkway. The average 24-hour Leq was 54.8 dBA, and the CNEL was 59.0 dBA.

Table 5. 24-Hour Sound Level Measurement at F&G Street Marsh (dBA)

Time	Leq	Lmin	Lmax	L10	L50	L90
17:00 -18:00	55.2	42.2	74.7	58.8	47.2	44.0
18:00 -19:00	54.7	42.9	69.8	59.0	48.3	44.5
19:00 -20:00	54.7	42.5	73.8	58.0	47.0	44.0
20:00 -21:00	49.5	41.4	67.3	51.7	44.8	42.9
21:00 -22:00	51.3	41.0	68.3	52.4	44.5	42.4
22:00 -23:00	47.7	41.2	65.7	48.4	44.5	42.3
23:00 -24:00	49.9	44.1	64.3	51.2	47.8	46.1
24:00 -01:00	52.7	44.6	79.5	51.1	47.8	46.2
01:00 -02:00	49.2	44.3	64.1	51.1	47.7	46.1
02:00 -03:00	49.3	44.5	62.6	51.4	48.2	46.4
03:00 -04:00	48.1	44.0	62.6	50.1	47.2	45.9
04:00 -05:00	44.4	38.5	62.4	45.7	41.4	39.7
05:00 -06:00	51.7	40.4	73.6	53.6	45.8	43.4
06:00 -07:00	56.5	40.8	77.0	59.4	47.2	43.3
07:00 -08:00	59.5	40.3	88.3	61.2	49.9	43.6
08:00 -09:00	56.0	41.7	77.2	59.7	48.2	44.2
09:00 -10:00	55.7	41.5	76.2	58.6	47.7	44.2
10:00 -11:00	56.9	42.2	72.8	59.9	51.1	47.6
11:00 -12:00	55.8	40.6	73.4	59.6	49.2	43.8
12:00 -13:00	55.5	45.2	70.7	59.1	51.2	48.3
13:00 -14:00	57.1	46.7	75.2	59.9	52.0	49.1
14:00 -15:00	55.1	42.9	70.2	58.9	50.7	46.0
15:00 -16:00	57.5	41.2	81.4	60.6	50.0	44.5
16:00 -17:00	58.1	40.9	74.4	61.3	51.0	44.2

Notes:

Measurements conducted between 9-19-2007 and 9-20-2007.
Average Leq: 54.8 dBA
CNEL: 59.0 dBA

SECTION 4 NOISE ASSESSMENT

4.1 ON-SITE TRAFFIC NOISE

Vehicular traffic noise would be the predominant external noise source affecting the project site. Future noise levels were predicted at outdoor usable areas and building façades. Outdoor usable areas on the project site include roof-top usable areas, a community park (on the east side of Street A), courtyards, and patios/balconies. Future noise levels at the community park were analyzed because the park was included in the outdoor usable space calculations (Carrier-Johnson 2008).

The Federal Highway Administration (FHWA) Traffic Noise Model version 2.5 was used to calculate future on-site traffic noise levels. The model considered project buildings, roadway alignments, estimated average vehicle speed, peak-hour traffic volume, and vehicle mix. The model assumed a default ground type of "hard soil." Modeled roadways included Marina Parkway, Street A, Street C, J Street, and I-5.

The Phase IV baseline plus Project ADT volumes obtained from the Traffic Impact Analysis (TIA) (KHA 2008) were used in the on-site traffic noise analysis. The peak-hour traffic volume was assumed to be 10% of the ADT for the local roadways. The TIA indicated peak-hour traffic volumes for I-5. The speed limits on the roadway segments were obtained from the SANDAG Transportation Forecast Information Center. The vehicle mix for the surface streets was estimated. The vehicle mix for I-5 was obtained from Caltrans' Traffic and Vehicle Data Systems Unit 2005 Truck Traffic.

The Proposed Project alternative and Remediated L-Ditch alternative would have different access roadways to the project site. As a result, in the Remediated L-Ditch alternative, 63 ADT would shift from Street A (between Street C and J Street) to Marina Parkway (between Street C and J Street), compared to the Proposed Project alternative. Table 6 presents traffic volumes for each alternative. Both conditions were included in the on-site traffic noise analysis.

Table 6. Vehicular Traffic for On-Site Traffic Noise Assessment (Proposed Project Alternative)

Roadway	Segment	ADT	Medium Trucks	Heavy Trucks	Speed (mph)
Marina Parkway	H Street to Street C	10,856	1%	0%	35
	Street C to J Street	14,050	1%	0%	35
Street A	H Street to Street C	11,388	1%	1%	35
	Street C to J Street	17,741	1%	1%	35
	J Street to Street B	4,091	1%	1%	35
Street C	Marina Parkway to Street A	2,482	1%	0%	35
J Street	Marina Parkway to Street A	25,039	1%	0%	35
	Street A to Bay Boulevard	36,657	1%	0%	35
Interstate 5	E Street to H Street	11,212*	2.08%	1.62%	65
		12,008†	2.08%	1.62%	65
	H Street to J Street	11,806*	2.08%	1.62%	65
		12,644†	2.08%	1.62%	65
	J Street to L Street	12,010*	2.08%	1.62%	65
		12,863†	2.08%	1.62%	65

Note:

I-5 traffic volumes are peak-hour:
* AM Northbound
† PM Southbound

Proposed Project Alternative

Calculations show that future exterior traffic noise levels at outdoor usable areas would range from below 55 dBA CNEL to approximately 72 dBA CNEL for Outdoor Usable Area Option A, as illustrated on Figure 5. Future exterior traffic noise levels at outdoor usable areas would range from below 55 dBA CNEL to approximately 69 dBA CNEL for Outdoor Usable Area Option B, as illustrated on Figure 6. Future exterior traffic noise levels at building façades would range from below 40 dBA CNEL to approximately 70 dBA CNEL, as illustrated on Figure 7.

Remediated L-Ditch Alternative

Calculations show that future exterior traffic noise levels at outdoor usable areas would range from below 40 dBA CNEL to approximately 72 dBA CNEL for Outdoor Usable Area Option A, as illustrated on Figure 8. Future exterior traffic noise levels at outdoor usable areas would range from below 40 dBA CNEL to approximately 70 dBA CNEL for Outdoor Usable Area Option B, as illustrated on Figure 9. Future exterior traffic noise levels at building façades would range from below 40 dBA CNEL to approximately 70 dBA CNEL, as illustrated on Figure 10.

For both alternatives, traffic noise levels at the outdoor usable areas are estimated to be greater than 65 dBA CNEL and mitigation would be required. An interior noise analysis would be required for habitable rooms with any façade exposed to exterior noise levels exceeding 60 dBA CNEL.

4.2 OPERATIONS

The proposed development consists of a combination of low-rise, mid-rise, and high-rise residential with a maximum of 1,500 units and up to 15,000 square feet supporting ancillary retail uses and public spaces. Noise sources associated with the proposed development operations include mechanical equipment.

4.2.1 Mechanical Equipment

The mechanical equipment for the proposed development would include rooftop heating, ventilation, and air conditioning (HVAC) systems, a central power plant (CPP), air handling units (AHUs), and a garage ventilation system. The locations and models of this equipment have not been determined at this time. The property line sound level limit for multiple dwelling residential is 50 dBA Leq for the weekdays from 10:00 p.m. to 7:00 a.m. and the weekends from 10:00 p.m. to 8:00 a.m., and 60 dBA Leq for the weekdays from 7:00 a.m. to 10:00 p.m. and the weekends from 8:00 a.m. to 10:00 p.m. The mechanical equipment would be designed and installed to not exceed a noise level of 50 dBA Leq at any property line. Noise control measures would need to be implemented.

4.3 OFF-SITE TRAFFIC NOISE

Existing and future off-site traffic noise levels at land uses adjacent to project roadways were estimated using a long single-lane roadway in TNM as described above. The land uses along the off-site roadway segments include manufacturing, office, retail, marina, and park. Marina land use is not considered noise sensitive. Existing land uses only were evaluated; any future projects in the influence area that would involve a land use designation change would be expected to evaluate compatibility and compliance with regard to noise as part of that project.

Noise levels were estimated at a distance of 50 feet from the centerline of each roadway segment, and the distances to the 60, 65, 70, and 75 dBA CNEL noise contours were estimated. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography.

The Phase I baseline plus Project traffic volumes were used in the off-site traffic noise analysis. Tables 7 and 8 show existing and future traffic noise levels along project roadways, respectively.

Table 7. Existing Off-Site Traffic Noise Levels

Roadway Segment	ADT	Medium Trucks	Heavy Trucks	Speed Limit (mph)	CNEL at 50' from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
						60	65	70	75
E Street									
I-5 Ramps to Woodlawn Ave	26,799	1%	1%	35	69	270	115	40	-
Woodlawn Ave to Broadway	26,558	1%	1%	35	69	265	115	40	-
Broadway to 3rd Ave	18,406	1%	1%	35	67	205	85	25	-
F Street									
Marina Pkwy to Bay Blvd	3,600	1%	0%	35	60	45	-	-	--
Bay Blvd to Broadway	4,344	1%	0%	35	60	50	-	-	-
Broadway to 4th Ave	10,303	1%	0%	35	64	115	40	-	-
4th Ave to 3rd Ave	9,797	1%	0%	30	62	80	25	-	-
H Street									
Bay Blvd to I-5 Ramps	15,841	2%	1%	35	67	190	75	25	-
I-5 Ramps to Broadway	28,750	1%	1%	35	69	280	120	40	-
Broadway to 3rd Ave	27,423	1%	1%	35	69	270	115	40	-
J Street									
Marina Pkwy to Bay Blvd	8,617	1%	0%	35	63	105	35	25	-
Bay Blvd to I-5 Ramps	17,199	1%	1%	35	67	195	75	25	-
I-5 Ramps to Broadway	17,199	1%	1%	35	67	195	75	25	-
L Street									
Bay Blvd to Industrial Way	15,100	2%	1%	35	67	185	70	30	-
Industrial Way to Broadway	20,399	2%	1%	35	68	230	95	30	-
Marina Parkway									
G St to Sandpiper Way	896	1%	0%	35	53	-	-	-	-
Sandpiper Way to J St	896	1%	0%	35	53	-	-	-	-
Bay Boulevard									
E St to F St	11,196	1%	1%	35	65	140	50	-	-
F St to H St	2,291	1%	1%	35	58	30	-	-	-
H St to J St	2,489	1%	1%	35	58	35	-	-	-
J St to L St	2,962	1%	1%	35	59	40	-	-	-
L St to I-5 Ramps	3,303	1%	1%	35	60	45	-	-	-

Roadway Segment	ADT	Medium Trucks	Heavy Trucks	Speed Limit (mph)	CNEL at 50' from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
						60	65	70	75
South of I-5 Ramps	3,303	1%	1%	35	60	45	-	-	-
Broadway									
C St to E St	26,007	1%	1%	35	69	260	110	40	-
E St to H St	25,664	1%	1%	35	69	260	110	35	-
H St to K St	29,228	1%	1%	35	69	285	120	40	-
K St to L St	26,599	1%	1%	35	69	265	110	40	-
South of L St	27,053	1%	1%	35	69	270	115	40	-

Notes:

Existing ADT from TIA addendum (KHA 2007).
Speed limits obtained from SANDAG's Transportation Forecast Information Center.

Table 8. Future Off-Site Traffic Noise Levels

Roadway Segment	ADT	Medium Trucks	Heavy Trucks	Speed Limit (mph)	CNEL at 50' from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
						60	65	70	75
E Street									
H St to Gaylord Driveway	6,035	1%	0%	35	62	75	25		
F St to Bay Blvd	2,294	1%	0%	35	58	30			
Bay Blvd to I-5 Ramps	15,834	1%	1%	35	67	205	70	25	
I-5 Ramps to Woodlawn Ave	28,355	1%	1%	35	69	300	125	40	
Woodlawn Ave to Broadway	27,988	1%	1%	35	69	295	120	40	
Broadway to 3rd Ave	19,468	1%	1%	35	67	230	85	30	
F Street									
Marina Pkwy to Bay Blvd	3,600	1%	0%	35	60	45	-	-	-
Bay Blvd to Broadway	5,746	1%	0%	35	62	70	-	-	-
Broadway to 4th Ave	11,202	1%	0%	35	64	125	45	-	-
4th Ave to 3rd Ave	10,755	1%	0%	30	62	85	30	-	-
H Street									
West of Marina Pkwy	15,031	1%	0%	25	62	75	25	-	-
Marina Pkwy to Street A	14,265	2%	1%	35	66	195	65	25	-
Street A to I-5 Ramps	29,624	2%	1%	35	70	330	135	45	-
I-5 Ramps to Broadway	35,402	1%	1%	35	70	365	155	50	-
Broadway to 3rd Ave	28,755	1%	1%	35	69	300	125	40	-
J Street									
Marina Pkwy to Street A	13,868	1%	0%	35	65	165	55	-	-
Street A to Bay Blvd	17,082	1%	0%	35	66	195	65	-	-
Bay Blvd to I-5 Ramps	24,675	1%	1%	35	69	295	110	-	-
I-5 Ramps to Broadway	19,198	1%	1%	35	67	230	85	30	-
L Street									
Bay Blvd to Industrial Way	17,330	2%	1%	35	67	225	80	25	-
Industrial Way to Broadway	21,874	2%	1%	35	68	260	100	35	-
Marina Parkway									
H St to Street C	5,382	1%	0%	35	61	65	-	-	-
Street C to J St	5,382	1%	0%	35	61	65	-	-	-

Roadway Segment	ADT	Medium Trucks	Heavy Trucks	Speed Limit (mph)	CNEL at 50' from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
						60	65	70	75
Bay Boulevard									
E St to F St	9,984	1%	1%	35	65	125	45	-	-
F St to H St	4,319	1%	1%	35	61	60	-	-	-
H St to J St	5,451	1%	1%	35	62	75	25	-	-
J St to L St	6,696	1%	1%	35	63	95	30	-	-
L St to I-5 Ramps	4,403	1%	1%	35	61	60	-	-	-
South of I-5 Ramps	4,403	1%	1%	35	61	60	-	-	-
Broadway									
C St to E St	26,304	1%	1%	35	69	285	115	40	-
E St to H St	26,312	1%	1%	35	69	285	115	40	-
H St to K St	30,316	1%	1%	35	69	310	130	45	-
K St to L St	26,878	1%	1%	35	69	290	120	40	-
South of L St	27,512	1%	1%	35	69	295	120	40	-
Street A									
Street C to J St	5,246	1%	1%	35	62	75	25	-	-

Notes:

Future Phase I with Project ADT from TIA (KHA 2008).
Speed limits obtained from SANDAG's Transportation Forecast Information Center.

Table 9 shows a comparison of the existing and future noise levels at 50 feet from the centerlines of project roadways. In cases where existing roadways would be removed in the future, the closest future cross street was used for comparison; the existing roadway name is shown in parentheses. In cases where the future roadway does not currently exist, quantification of a delta is not applicable and was noted as N/A

Table 9. Comparison of Existing and Future Off-Site Traffic Noise Levels

Roadway	Segment	Existing Noise Level at 50'	Future Noise Level at 50'	Delta
E Street	H St to Gaylord Driveway	-	62	N/A
	F St to Bay Blvd	-	58	N/A
	Bay Blvd to I-5 Ramps	-	67	N/A
	I-5 Ramps to Woodlawn Ave	69	69	0
	Woodlawn Ave to Broadway	69	69	0
	Broadway to 3rd Ave	67	67	0
F Street	E St (Marina Pkwy) to Bay Blvd	60	60	0
	Bay Blvd to Broadway	60	62	+2
	Broadway to 4th Ave	64	64	0
	4th Ave to 3rd Ave	62	62	0
H Street	West of Marina Pkwy	-	62	N/A
	Marina Pkwy to Street A	-	66	N/A
	Street A (Bay Blvd) to I-5 Ramps	67	70	+3
	I-5 Ramps to Broadway	69	70	+1
	Broadway to 3rd Ave	69	69	0
J Street	Marina Pkwy to Street A	63	65	+2
	Street A to Bay Blvd	63	66	+3
	Bay Blvd to I-5 Ramps	67	69	+2
	I-5 Ramps to Broadway	67	67	0
L Street	Bay Blvd to Industrial Way	67	67	0
	Industrial Way to Broadway	68	68	0
Marina Parkway	H St (G St) to Street C (Sandpiper Way)	53	61	+6
	Street C (Sandpiper Way) to J St	53	61	+6
Bay Boulevard	E St to F St	65	65	0
	F St to H St	58	61	+3
	Street C (H St) to J St	58	62	+4
	J St to L St	59	63	+4
	L St to I-5 Ramps	60	61	+1
	South of I-5 Ramps	60	61	+1
Broadway	C St to E St	69	69	0
	E St to H St	69	69	0

Roadway	Segment	Existing Noise Level at 50'	Future Noise Level at 50'	Delta
	H St to K St	69	69	0
	K St to L St	69	69	0
	South of L St	69	69	0
Street A	Street C to J St	-	62	N/A

The segments of H Street between Street A and the I-5 ramps, J Street between Street A and Bay Boulevard, and Bay Boulevard between F Street and H Street would experience an increase of approximately 3 dBA. The segment of Bay Boulevard between Street C and L Street would experience an increase of approximately 4 dBA. There are no noise sensitive land uses adjacent to these segments. Therefore, the noise level increases along these segments are considered to be not significant.

The segment of Marina Parkway between H Street and J Street would experience an increase of approximately 6 dBA. The Project site is the only property with noise sensitive areas adjacent to this segment; noise impacts to these areas are addressed in Section 4.1.

4.4 F&G STREET MARSH

The F&G Street Marsh is located north of the project site. Due to the traffic increase and roadway development in the vicinity of the Marsh, the future noise levels at the Marsh were analyzed. The Phase I baseline plus Project traffic volumes were used to analyze the noise impact at the Marsh.

The closest roadway to the F&G Street Marsh would be E Street. The ADT volume for E Street from H Street to its terminus at Gaylord Driveway is 6,035 vehicles, according to the TIA (KHA 2008). The noise level at the closest point (southern edge) of the F&G Street Marsh would be 53 dBA CNEL; this noise level is considered to be not significant. The ADT volume on this segment of E Street attributable to the Project is 2,790 vehicles, according to the TIA (KHA 2008).

4.5 CONSTRUCTION

Construction activities at the proposed site would result in a short-term, temporary increase in the ambient noise level. The increase in noise level would be primarily experienced close to the noise source. The magnitude of the impact would depend on the type of construction activity, noise level generated by various pieces of construction equipment, duration of the construction phase, and distance between the noise source and receiver.

Construction activity and delivery of construction materials and equipment would be limited to the hours between 7:00 a.m. and 10:00 p.m. Monday through Friday and between 8:00 a.m. and 10:00 p.m. on Saturday and Sunday, in accordance with the City noise ordinance. No impacts to residential receptors would occur from construction noise.

Noise from project construction would be generated during each phase of the project. The duration of construction would be 3-4 phases (4-5 years). The construction phasing and equipment list is not available

at this time. No blasting would occur. Noise levels of typical construction equipment are shown on Figure 9. Grading, construction, and paving activity on a project site typically produce an hourly average noise level of approximately 84 dBA Leq at 50 feet.

Suitable noise sensitive wildlife habitat is located in the F&G Street Marsh and Sweetwater Marsh to the north of the project. The noise level of 84 dBA Leq at 50 feet would attenuate to 60 dBA Leq at a distance of approximately 800 feet from the source. The closest point of the F&G Street Marsh is located over 2,500 feet north of the project site. The closest point of the Sweetwater Marsh is over 3,000 feet north of the project site. Therefore, no portion of the F&G Street Marsh or Sweetwater Marsh would be exposed to construction noise levels exceeding 60 dBA Leq.

SECTION 5 MITIGATION

5.1 OUTDOOR USABLE AREAS

As shown on Figures 5, 6, 8, and 9, the unmitigated future noise levels at the outdoor usable areas would exceed 65 dBA CNEL. Therefore, mitigation would be required.

Noise barriers such as walls are commonly used to reduce outdoor noise levels from transportation sources. The effectiveness of a barrier depends on the distance from the source to the barrier, the distance from the receiver to the barrier, and the relative height of the barrier above the line-of-sight between the source and receiver. To be effective, a barrier must block this line-of-sight, be constructed of solid material (such as concrete masonry), and be long enough to prevent sound from flanking around the ends. To preserve a view, glass or Plexiglas with a minimum density of 3.5 lb/ft^2 may be substituted for other construction materials. An earthen berm or a berm-wall combination may also be used.

TNM was used to evaluate the effectiveness of solid noise barriers. It was determined that noise barriers would reduce sound levels to 65 dBA CNEL or below at both ground level and rooftop outdoor usable areas. Figures 12, 13, 14, and 15 illustrate the location, height, and length of the barriers required for each area in the Proposed Project alternative and Remediated L-Ditch alternative, for Outdoor Usable Area Options A and B, respectively. Tables 10 and 11 present barrier locations, heights, and lengths for the Proposed Project alternative and Remediated L-Ditch alternative, respectively. The barrier specified for the community park would reduce the noise level in the park to below 65 dBA CNEL, with the exception of a small area near the park entrance along Street C. In both alternatives, ground-level barriers would not be necessary for Outdoor Usable Area Option B.

Table 10. Barrier Locations, Heights, and Lengths (Proposed Project Alternative)

Barrier Location	Height (ft)	Length (ft)
Ground Level		
Community Park: East, West, South	10	900
HD-1B: North	6	108
HD-1B: Northeast	10	258
HD-1B: Southeast	7	161
HD-2B: North	6	80
HD-2B: East	8	297
HD-3A / HD-4A: East	6	824
HD-4A: South	6	33

Barrier Location	Height (ft)	Length (ft)
Rooftop Parapet		
HD-1B: North Façade	5	224
HD-1B: East Façade	6	243
HD-2A: East / South Façades	5	313
HD-2B: North Façade	5	128
HD-2B: East Façade	6	188
HD-3A: East Façade	5	215
HD-3A: South Façade	5	350
HD-4A: East Façade	5	264
HD-4A: South Façade	5	336

Table 11. Barrier Locations, Heights, and Lengths (Remediated L-Ditch Alternative)

Barrier Location	Height (ft)	Length (ft)
Ground Level		
Community Park: East, West, South	10	650
HD-2B: Southeast	6	150
HD-3B: Northeast	6	179
HD-4A: North, East, South	6	630
Rooftop Parapet		
HD-1A: East Façade	5	165
HD-1B: Northwest Façade	5	167
HD-1B: Northeast Façade	5	74
HD-1B: East Façade	6	247
HD-2B-West: East Façade	5	207
HD-2B-East: East Façade	6	284
HD-2B-East: North Façade	5	83
HD-2B-East: South Façade	5	83
HD-3B: East Façade	6	284
HD-4A: East Façade	5	166

5.2 INTERIOR NOISE

As shown on Figures 7 and 10, the unmitigated future noise levels at the building façades would exceed 60 dBA CNEL. Therefore, mitigation would be required. An interior noise environment should be 45 dBA CNEL or below, as required by the Noise Insulation Standards. The interior noise analysis would be conducted in order to identify Sound Transmission Loss (STC) rates of each window.

5.3 OPERATIONS

Based on the Project building configuration, the cumulative sound level from mechanical equipment cannot exceed 40 dBA at 50 feet from the building façades adjacent to Marina Parkway, Street C and J Street; and 54 dBA at 50 feet from the building façades facing Street A. Potential noise control measures to achieve these limits include selection of quietest equipment, equipment setbacks, silencers, and/or acoustical louvers.

5.4 CONSTRUCTION

To minimize unnecessary annoyance from construction noise, the construction contractor should be required to comply with all provisions of the City Noise Ordinance. The following construction noise control measures should be used as necessary to comply with the noise ordinance:

- Limit construction activity and delivery of construction materials and equipment to the hours between 7:00 a.m. and 10:00 p.m., Monday through Friday, and 8:00 a.m. and 10:00 p.m., Monday through Saturday.
- Select equipment capable of performing the necessary tasks with the lowest sound level and the lowest acoustic height possible.
- Operate and maintain all construction equipment to minimize noise generation. Keep equipment and vehicles in good repair and fitted with "manufacturer-recommended" mufflers.

SECTION 6 REFERENCES

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1996b. ISO 1996-2. Acoustics – Description and Measurement of Environmental Noise – Part 2: Acquisition of Data Pertinent to Land Use.

1996c. ISO 1996-3. Acoustics – Description and Measurement of Environmental Noise – Part 3: Application to Noise Limits.

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2008. Traffic Impact Analysis. February.

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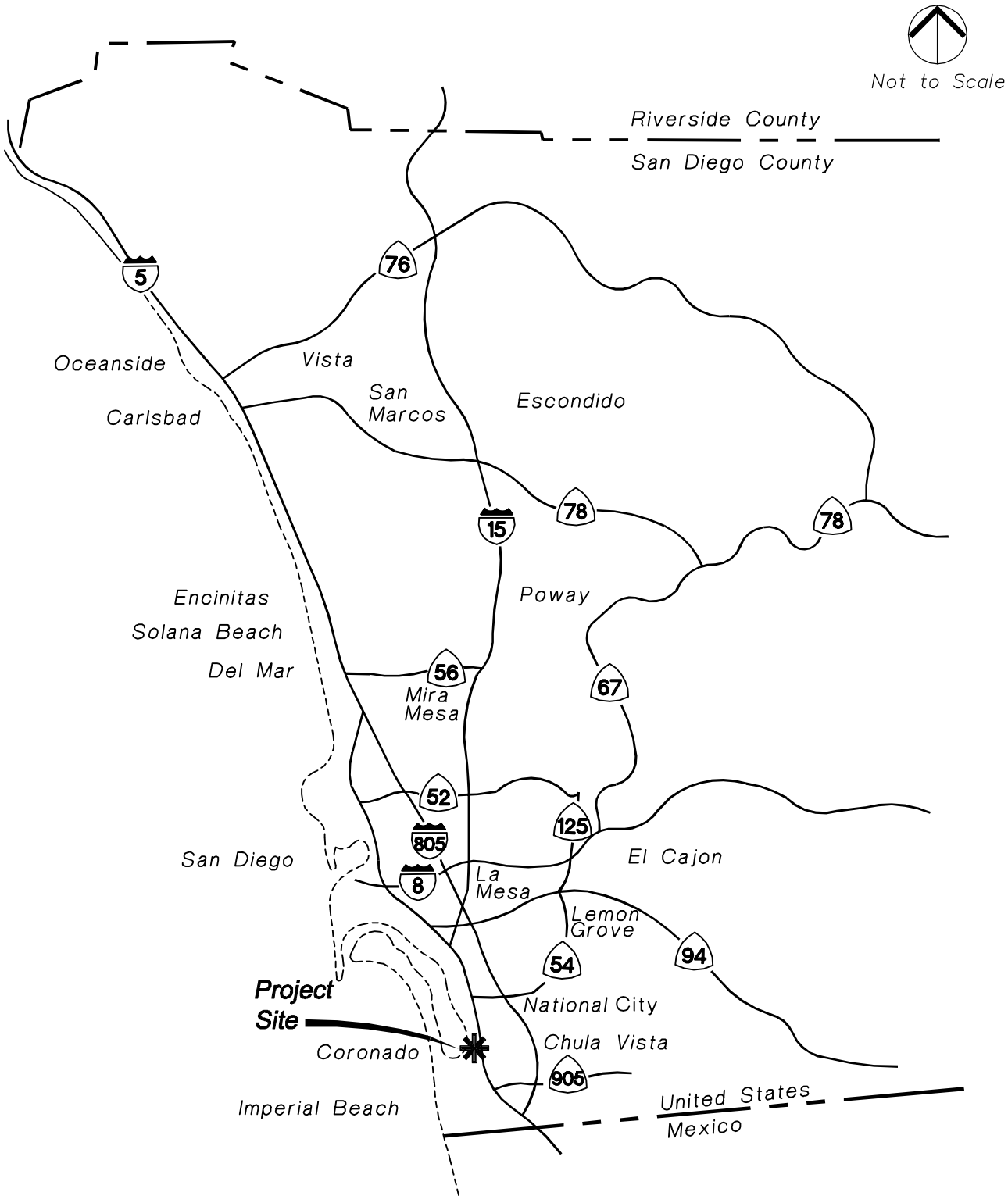

Figure 1

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Vicinity Map

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Scale: 1"=200'

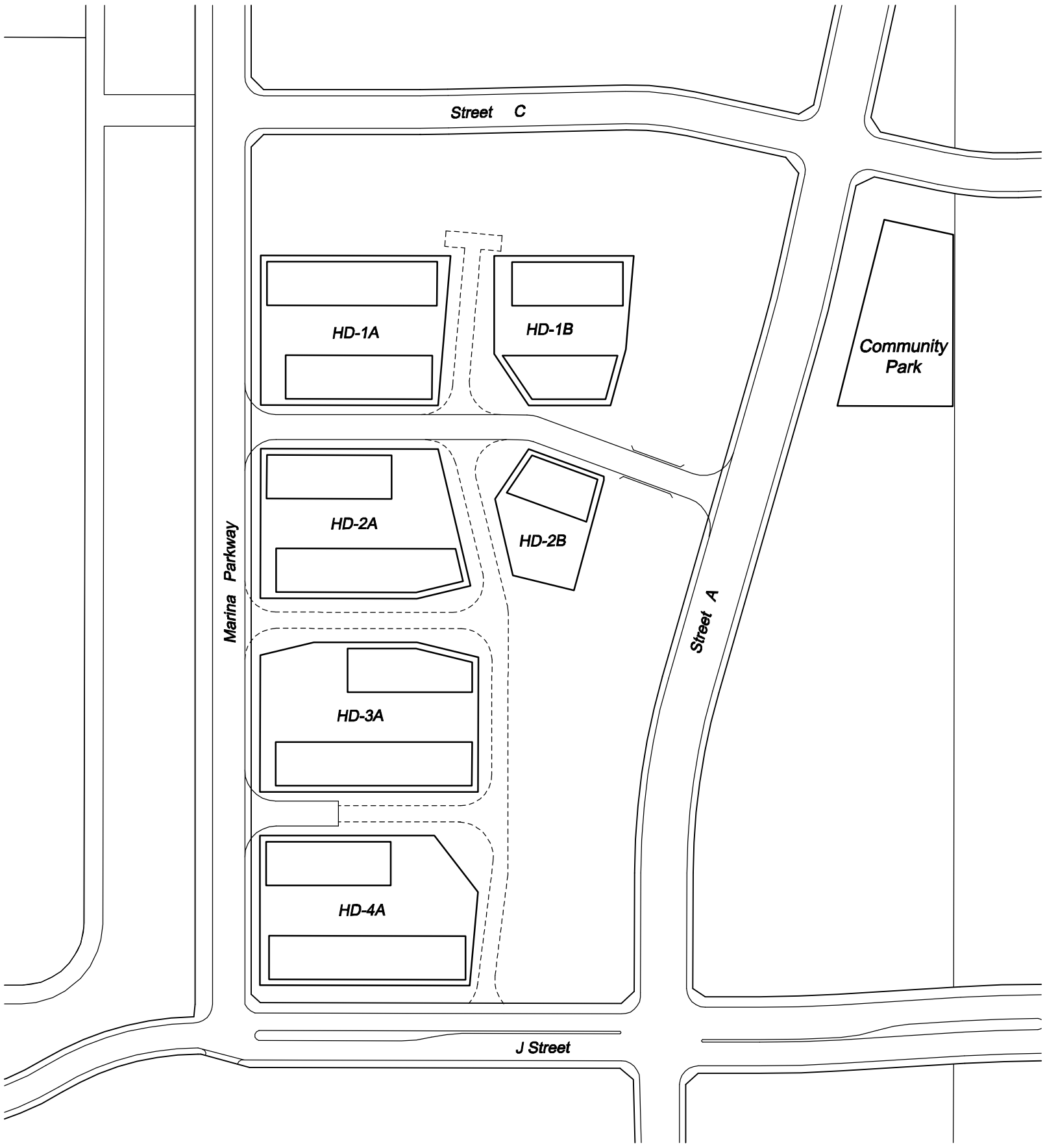


Figure 2
Site Plan
Proposed Project Alternative

Pacifica

Scale: 1"=200'

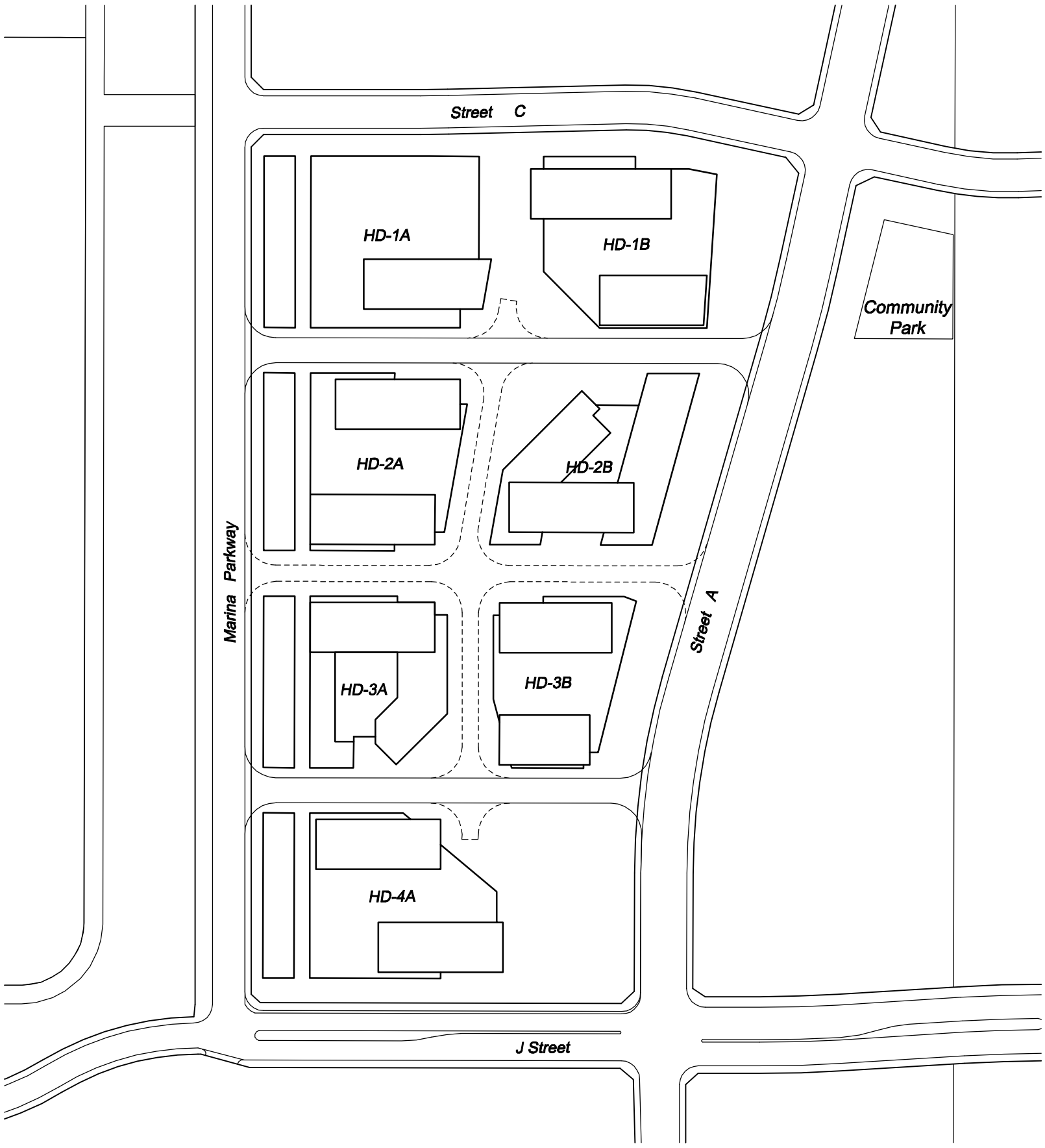
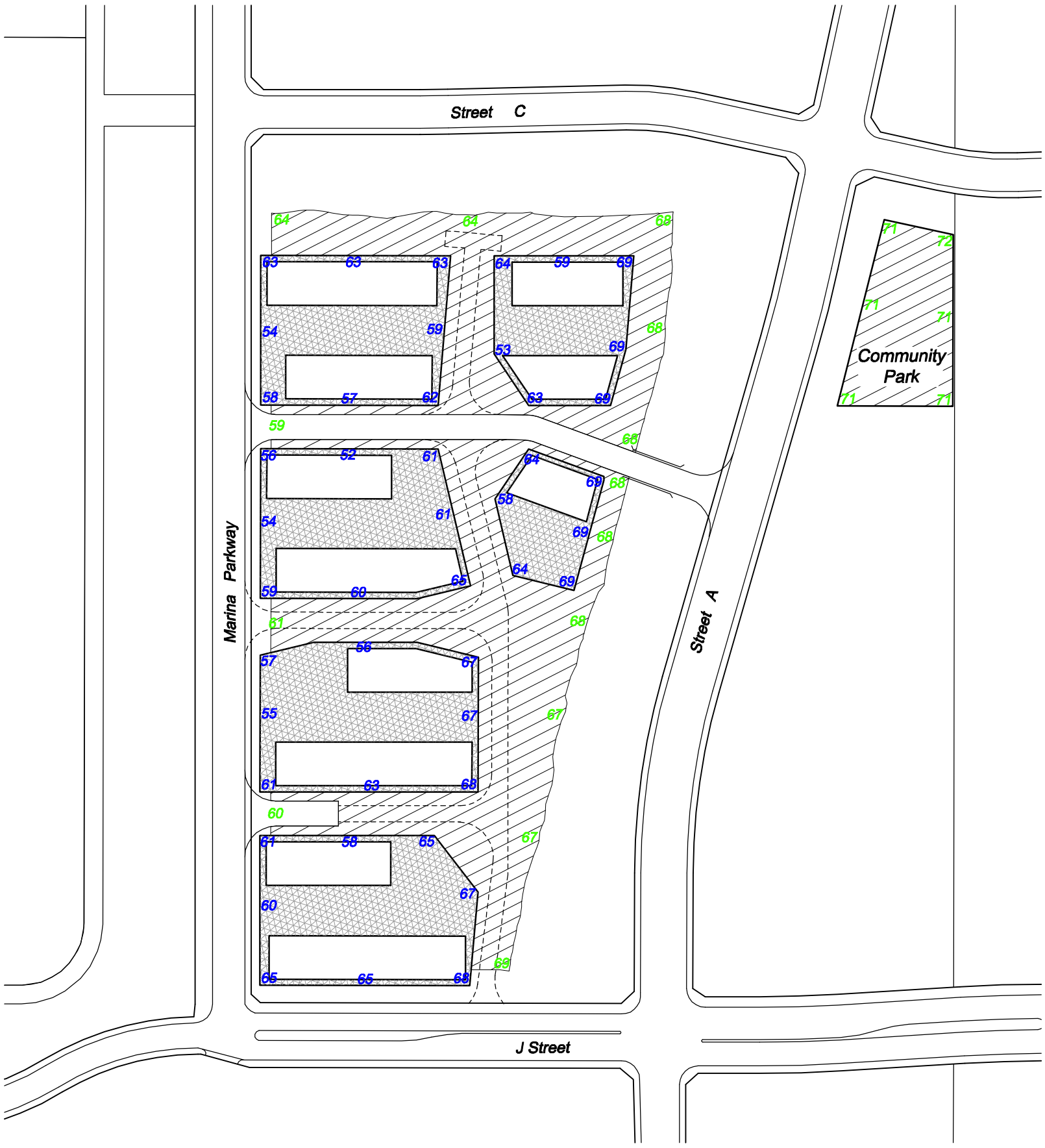


Figure 3
Site Plan
Remediated L-Ditch Alternative

Pacifica

Scale: 1"=200'



Legend

Outdoor Ground Level Usable Area	
Outdoor Rooftop Usable Area	
Noise Levels at Ground Level (dBA CNEL)	XX
Noise Levels at Rooftop (dBA CNEL)	XX

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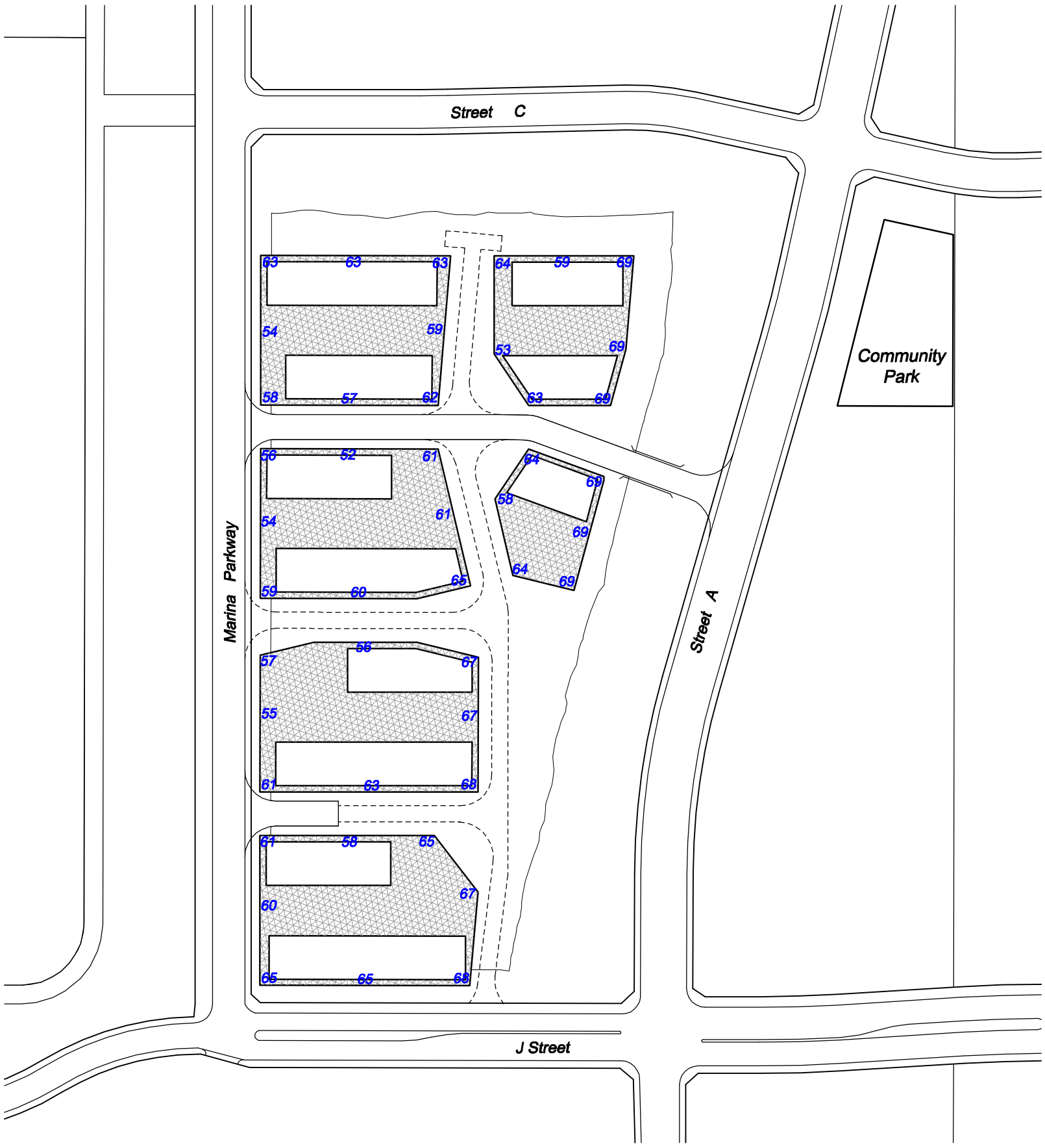
Figure 5
Future Unmitigated Outdoor Usable Area Noise Levels (dBA CNEL)
Proposed Project Alternative
Outdoor Usable Area Option A

Pacifica

Scale: 1"=200'



Legend

Outdoor Rooftop Usable Area

Noise Levels at Rooftop (dBA CNEL) XX

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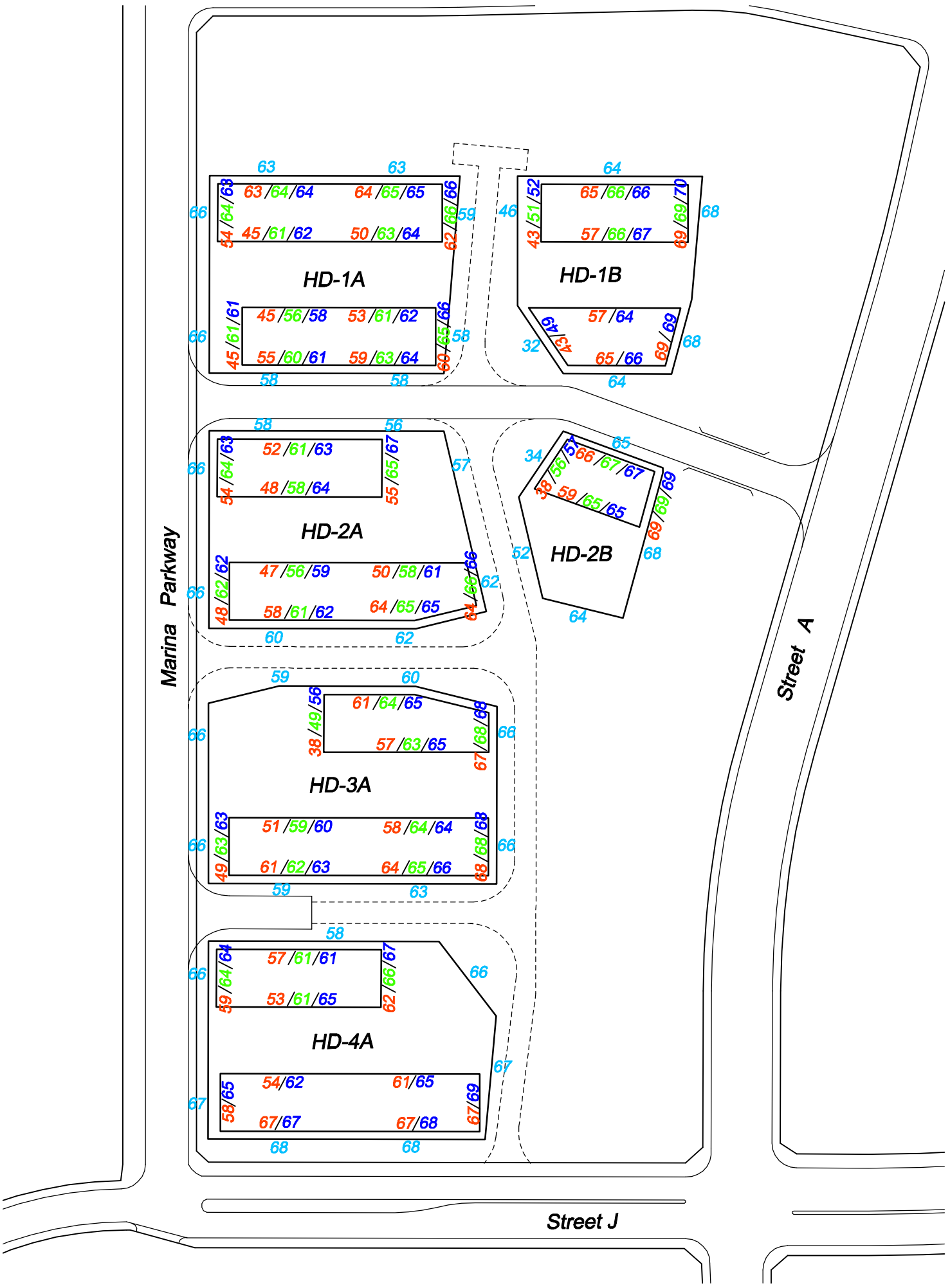
Figure 6
Future Unmitigated Outdoor Usable Area Noise Levels (dBA CNEL)
Proposed Project Alternative
Outdoor Usable Area Option B

Pacifica

Scale: 1"=150'



Legend

Building Facade Noise Levels

Ground Floor	XX	dBA CNEL
Low / Top Floor	XX/YY	dBA CNEL
Low / Middle / Top Floor	XX/YY/ZZ	dBA CNEL

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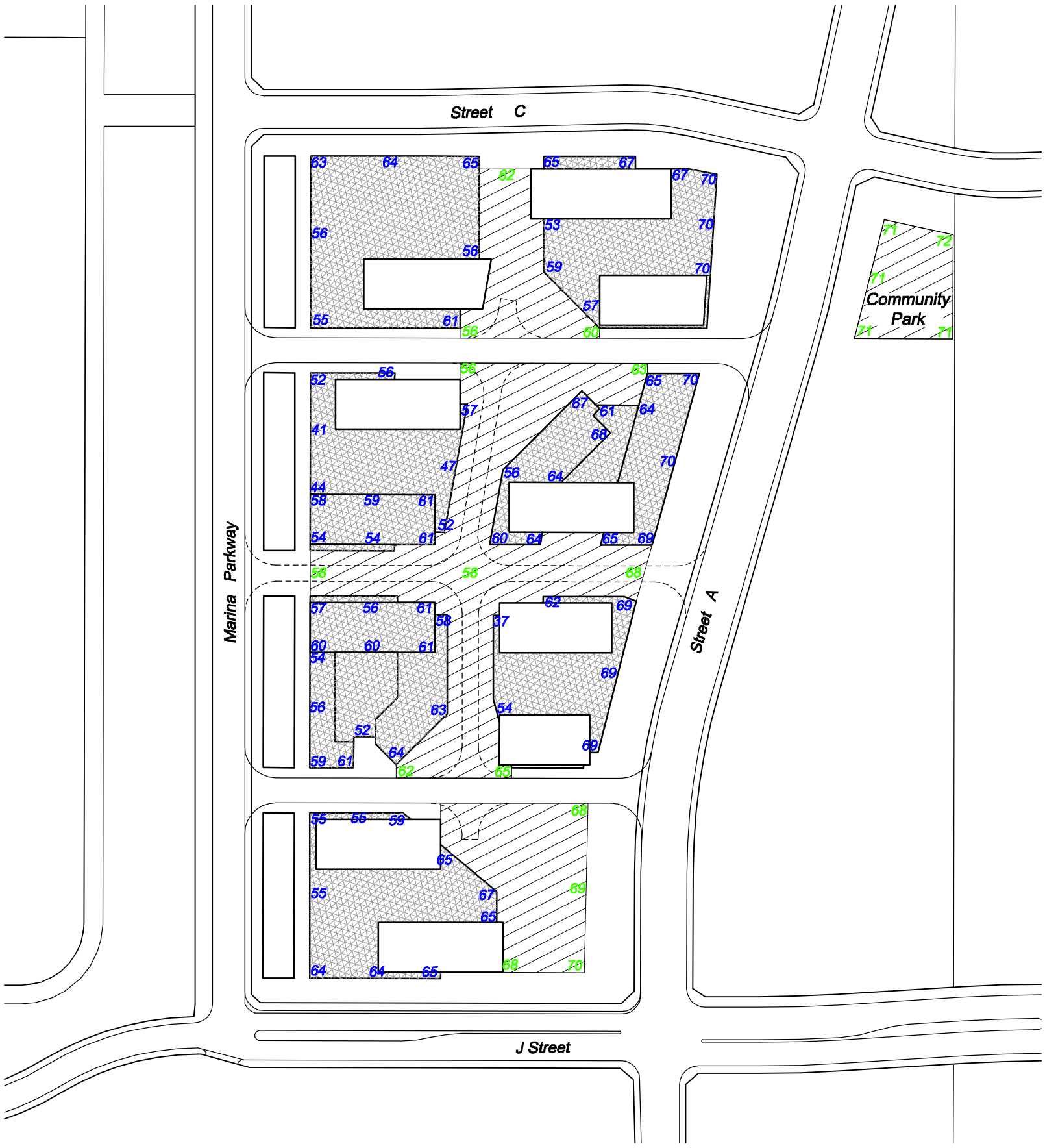
Figure 7
Future Unmitigated Building Facade Noise Levels (dBA CNEL)
Proposed Project Alternative

Pacifica

Scale: 1"=200'



Legend

Outdoor Ground Level Usable Area	
Outdoor Rooftop Usable Area	
Noise Levels at Ground Level (dBA CNEL)	XX
Noise Levels at Rooftop (dBA CNEL)	XX

Figure 8

Future Unmitigated Outdoor Usable Area Noise Levels (dBA CNEL)
Remediated L-Ditch Alternative
Outdoor Usable Area Option A

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Pacifica

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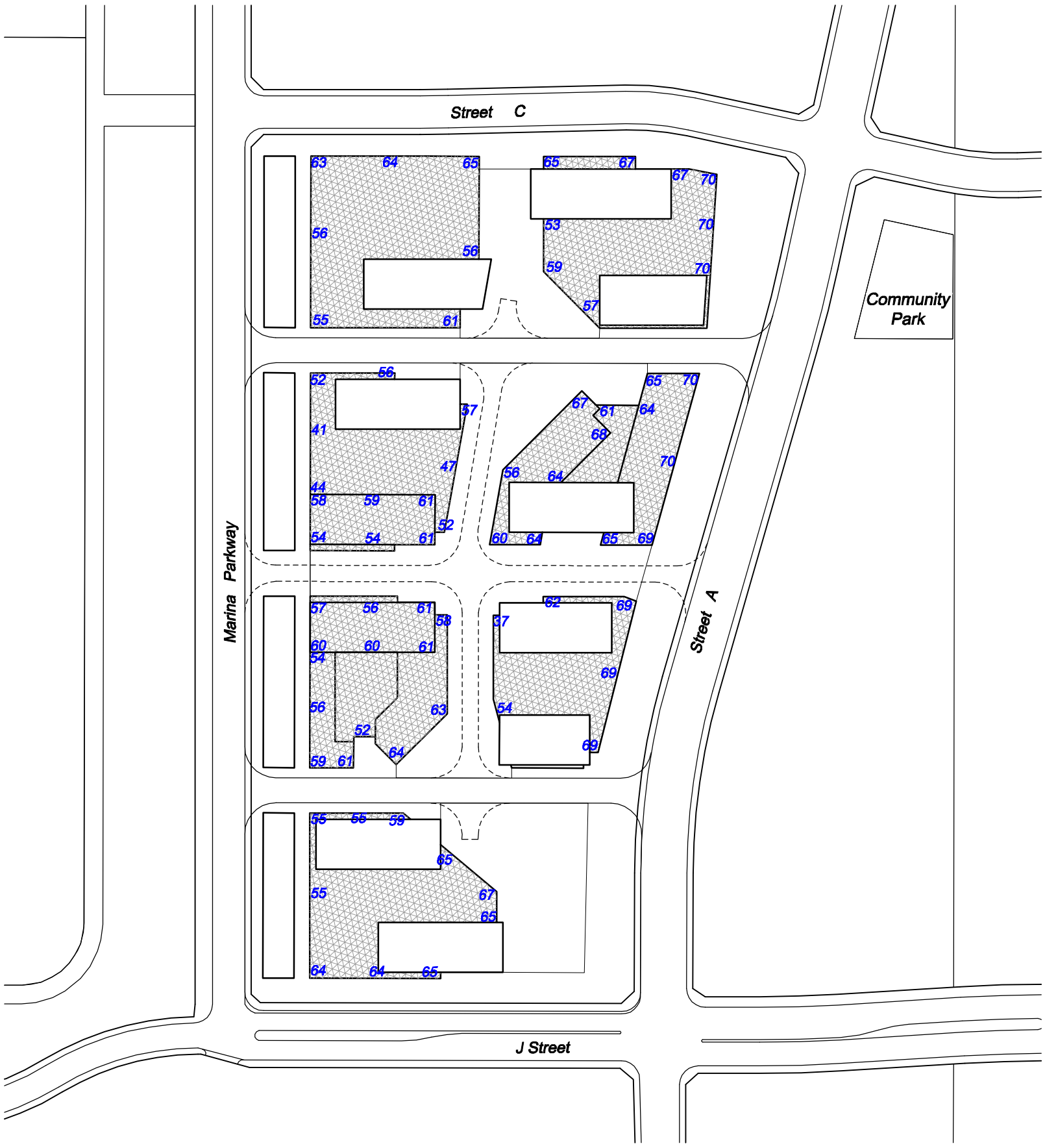

Legend

Outdoor Rooftop Usable Area

Noise Levels at Rooftop (dBA CNEL) XX

Figure 9

Future Unmitigated Outdoor Usable Area Noise Levels (dBA CNEL)
Remediated L-Ditch Alternative
Outdoor Usable Area Option B

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Pacifica

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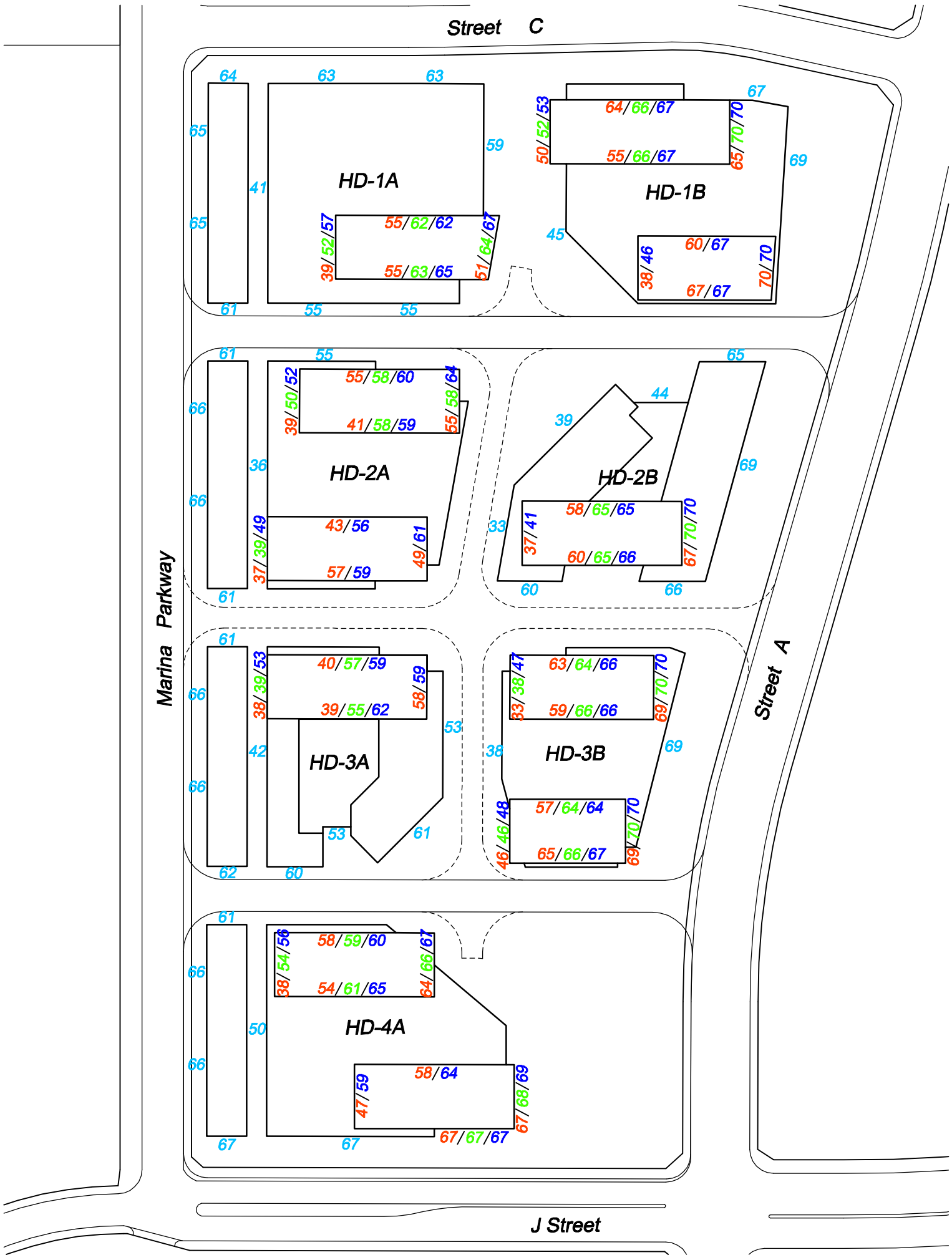

Legend

Building Facade Noise Levels

Ground Floor	XX	dBA CNEL
Low / Top Floor	XX/YY	dBA CNEL
Low / Middle / Top Floor	XX/YY/ZZ	dBA CNEL

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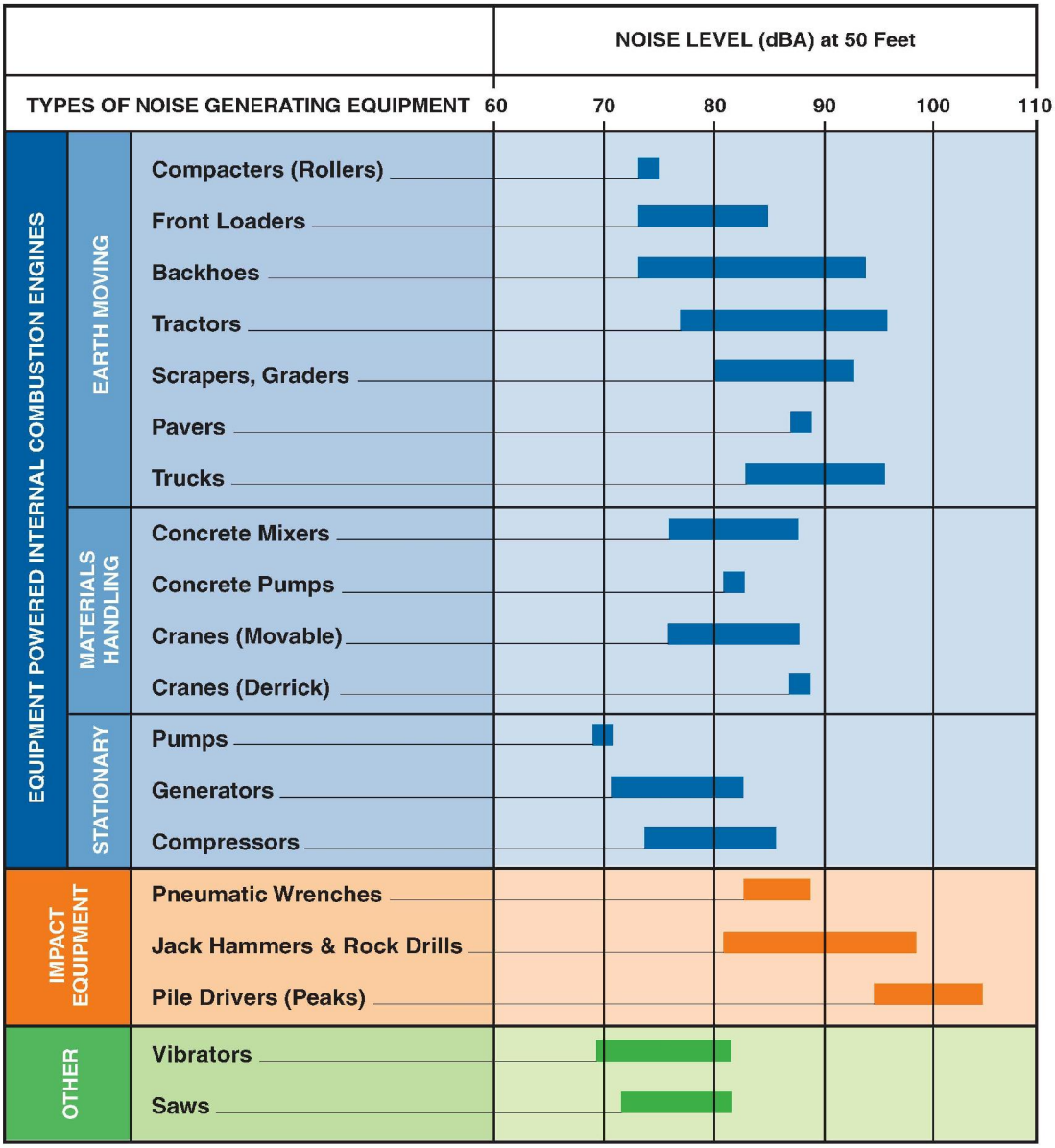
Figure 10
Future Unmitigated Building Facade Noise Levels (dBA CNEL)
Remediated L-Ditch Alternative



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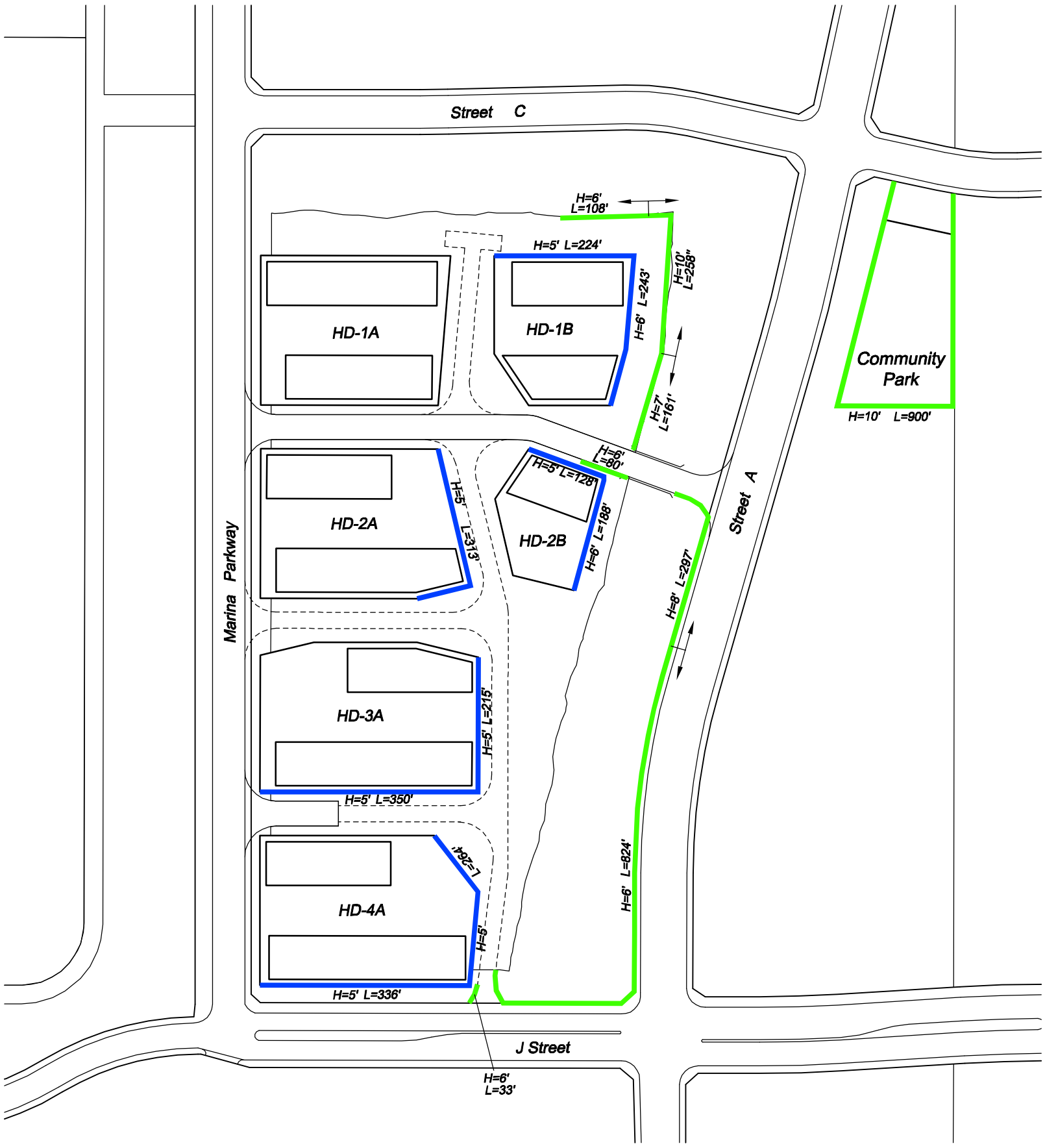

Legend

Proposed Sound Wall at Ground Level

Proposed Sound Wall on Rooftop
Note: Height is based on the roof elevation.

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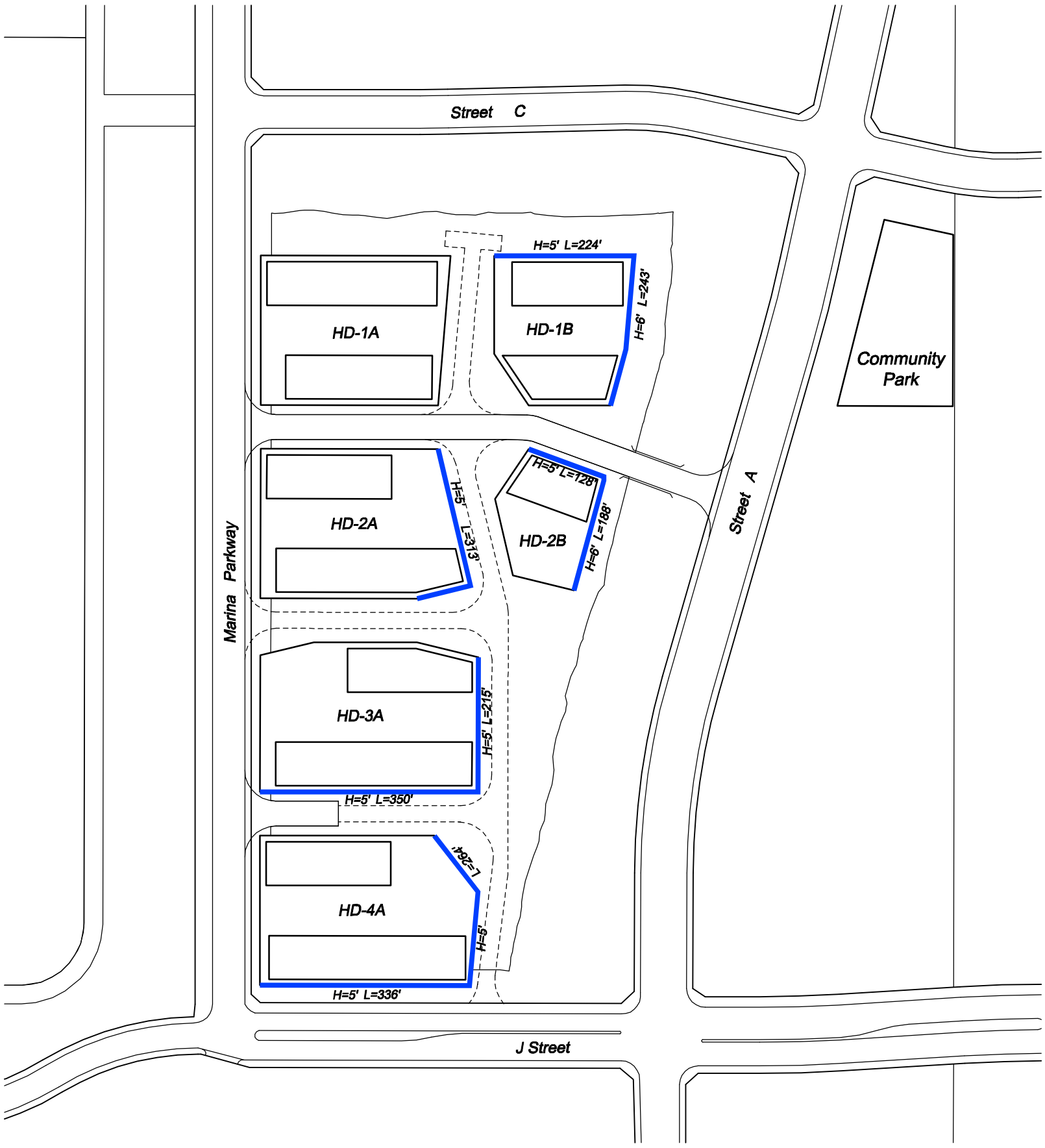
Figure 12
Mitigation for Outdoor Usable Areas
Proposed Project Alternative
Outdoor Usable Area Option A

Pacifica

Scale: 1"=200'



Legend

Proposed Sound Wall on Rooftop
Note: Height is based on the roof elevation.

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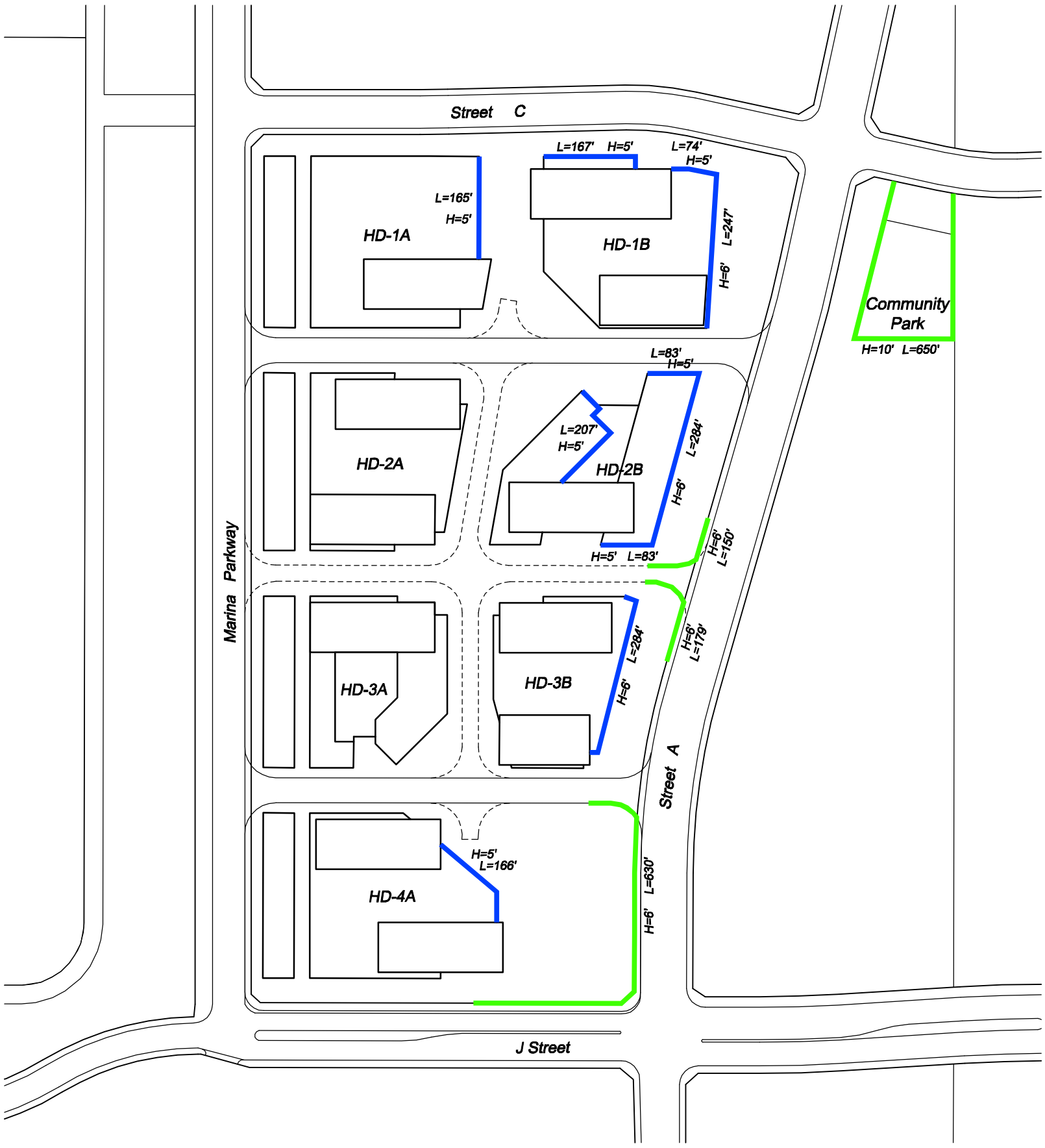
Figure 13
Mitigation for Outdoor Usable Areas
Proposed Project Alternative
Outdoor Usable Area Option B

Pacifica

Scale: 1"=200'



Legend

Proposed Sound Wall at Ground Level

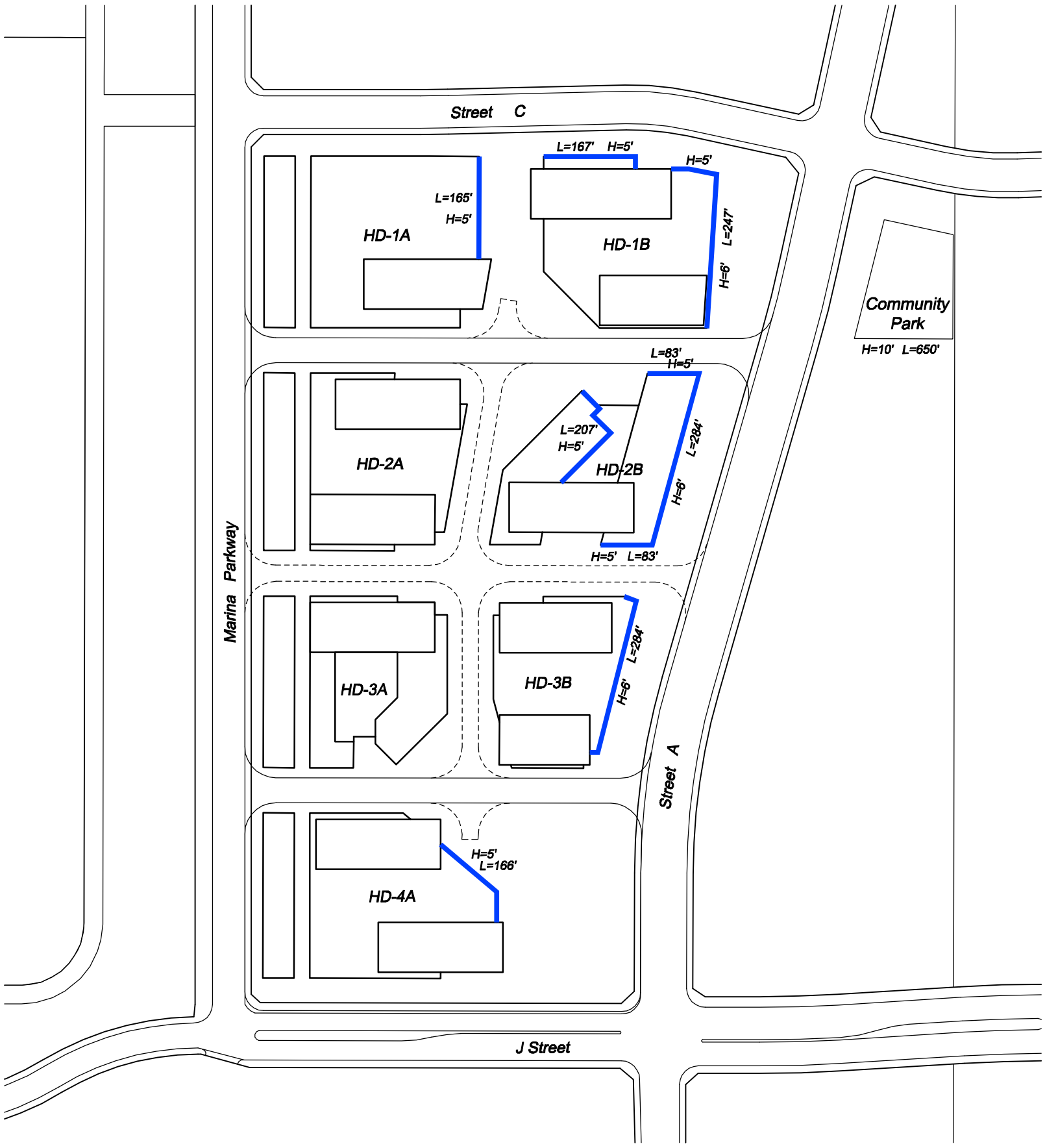
Proposed Sound Wall on Rooftop
Note: Height is based on the roof elevation.

Figure 14

Mitigation for Outdoor Usable Areas
Remediated L-Ditch Alternative
Outdoor Usable Area Option A

Pacifica

Scale: 1"=200'



Legend

Proposed Sound Wall on Rooftop
Note: Height is based on the roof elevation.

Figure 15

Mitigation for Outdoor Usable Areas
Remediated L-Ditch Alternative
Outdoor Usable Area Option B

APPENDIX A

ROADWAY NOISE CALCULATIONS