EXHIBIT B

7843 Railroad Avenue

Newark, California

Environmental Noise and Ground-Borne Rail Vibration Assessment

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CSA Project Number: 13-0492

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INTRODUCTION

This report summarizes our environmental noise and ground-borne rail vibration assessment for the residential project at 7843 Railroad Avenue in Newark, California. The site is located between Locust and Walnut Streets, adjacent to the existing railroad right-of-way. The site is near a larger area planned for transit oriented development as outlined in the Dumbarton Transit Oriented Development Specific Plan FEIR[1] (Dumbarton TOD FEIR) dated July 2011.

Following is a summary of our findings:

- Standard construction-grade dual-pane windows and sliding glass doors are expected to reduce environmental noise to the DNL 45 dB criterion indoors, exclusive of train noise.
- Outdoor use spaces will meet the City's goal of DNL 60 dB or lower without mitigation, exclusive of train noise.
- If trains operate along the railroad right-of-way to the south of the site, then estimates suggest that train noise may be DNL 75 dB or higher, with typical instantaneous noise levels of 106 dB or higher, at the setback of residences.
    - Windows and doors with sound insulation ratings up to STC 40 would likely be needed, as well as higher STC exterior walls and special treatment to vents and openings, to meet the DNL 45 dB criterion. Resulting maximum instantaneous noise levels may cause sleep disturbance.
    - Since windows would need to be closed to achieve the interior noise criterion, units would need to include ventilation or air conditioning systems to provide a habitable interior environment.
    - Twelve or seventeen foot tall noise barriers would likely be needed along the railroad right-of-way and along perpendicular sides of the site to reduce train noise to DNL 70 or 65 dB, respectively.

DESCRIPTION

The project consists of six, 2-story residential units in two buildings. Outdoor use space will be provided between and around the buildings, at grade. Existing residences surround the site on the north, east and west, and the railroad right-of-way is adjacent to the south. Future residents will access the site via a driveway from Locust Street (see Figure 1, attached). The site plan shows that future residences will be approximately 55 feet from the existing tracks. For reference, the nearest at-grade rail-roadway crossings are at Spruce Street, approximately 0.1-mile to the west, and Ash Street, which is approximately 0.2-mile to the east.

The Dumbarton TOD FEIR, and the San Mateo Transit Authority (SMTA) document titled Dumbarton Rail Corridor Project Study Report[2] (SMTA PSR) dated 2004, provide a framework for future rail use along the SMTA right-of-way. This includes reconstructing the tracks in the rail corridor adjacent to the site, and over San Francisco Bay, to be used for commuter and freight rail. Following are additional items from these studies:

- The three existing railroad tracks adjacent to the site will be replaced with two new tracks
- Commuter rail service will be provided from the Union City transit center across the Dumbarton Bridge to Menlo Park, and connect to the Caltrain service that runs from San Francisco to San Jose
- Commuter trains will consist of Caltrain, Altamont Commuter Express (ACE), and Amtrak's Capitol Corridor line; freight trains will be operated by the Union Pacific Railroad (UPPR)

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[1] "Dumbarton Transit Oriented Development Specific Plan: Final Environmental Impact Report", July 2011, prepared by RBF Consulting for the City of Newark.

[2] "Dumbarton Rail Corridor Project Study Report (PSR)", May 2004.

- The SMTA PSR provides weekly train count projections as follow: 60 Caltrain, 40 ACE, 154 Capitol Corridor, and 12 UPPR
- A planned Newark Station will serve commuter rail and be located approximately ½-mile west of the site

ACOUSTICAL CRITERIA

Newark General Plan

The Noise Element of the Newark General Plan 1992 (Update Project 2007) contains land use compatibility guidelines for environmental noise in the community. Table 1, below, summarizes these guidelines for residential land uses. Additional programs and goals are summarized in the bulleted list below the table.

Table 1: Summary of Figure 10-2: Exterior Noise Exposure Limits for Multi-Family Residential

DNL[3] or CNEL Value in Decibels	Compatibility for Community Noise Environments
65 dB[4] or less	*Normally Acceptable:* Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
65 to 70 dB	*Conditionally Acceptable:* New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise reduction features included in the design.
Greater than 70 dB	*Unacceptable:* New construction or development should be discouraged. If new construction or development proceeds, a detailed noise analysis must be performed.

- Discourage placement of windows and doors in walls facing noise sources that exceed the noise compatibility standards in residential buildings.
- Encourage design of residential units to place bedrooms on sides of units away from noise sources that exceed noise compatibility standards.
- Require construction of berms or walls between arterials and new residential developments to establish an exterior noise level of 60 dB DNL or less for outdoor living areas.

Newark Draft General Plan Update

In August of 2013, the City of Newark published a draft General Plan Update for public review. The Noise and Vibration section includes policies and guidelines that vary from the current General Plan as follow:

- The noise compatibility guidelines have added a *clearly unacceptable* category for multi-family land uses where the noise level exceeds DNL 75 dB.
- The General Plan includes existing (2013) and future (2035) noise contours for traffic and rail noise. For reference, the site is located outside both the existing and future CNEL 60 dB noise contours.
- The outdoor noise goal is DNL 60 dB, and projects shall incorporate berms, walls, or buffer zones to reduce noise to the greatest extent feasible where the goal is not achievable
- An action item states: "...where the noise source in question consists of intermittent single events, the report should address the effects of maximum noise levels in sleeping rooms and potential sleep disturbance issues."
- The guidelines call for vibration studies for development sites within 200 feet of railroad tracks.

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[3] Day-Night Average Sound Level (DNL)--A descriptor established by the U.S. Environmental Protection Agency to describe the average day-night level with a penalty applied to noise occurring during the nighttime hours (10 pm - 7 am) to account for the increased sensitivity of people during sleeping hours.

[4] A-Weighted sound pressure level (dB) represents the noisiness or loudness of a sound by weighting the amplitudes of various acoustical frequencies to correspond more closely with human hearing. A 10-dB (decibel) increase in noise level is perceived to be a doubling of loudness. A-Weighting is specified by the U.S. EPA, OSHA, Caltrans, and others for use in noise measurements.

Acceptable vibration levels are identified for residential land use as follow:

- Frequent Events (more than 70 per day): 72 VdB[5]
- Occasional Events (between 30 and 70 per day): 75 VdB
- Infrequent Events (less than 30 per day): 80 VdB

California Building Code (CBC)

The California Building Code limits indoor noise from outdoor sources to DNL 45 dB in habitable rooms of attached housing.[6] Projects exposed to an outdoor DNL greater than 60 dB require an acoustical analysis during the design phase showing that the proposed design will limit outdoor noise to the prescribed allowable interior level. Additionally, if windows must be closed to meet the interior standard, "the design for the structure must also specify ventilation or air-conditioning system to provide a habitable interior environment."

NOISE AND GROUND-BORNE RAIL VIBRATION ENVIRONMENT

To quantify the existing noise environment at the site, a sound level meter continuously logged sound levels between 18 and 20 September 2013. The Day/Night Average Sound Level (DNL) at the monitor location was 56 dB. For reference, the highest noise levels measured were identified as distant train horns (not on the adjacent tracks) and birds, which generated levels up to 80 dB. Further, the data suggests that the tracks to the south of the track were not used during the measurement period. Figure 1, attached, shows the approximate measurement location.

The traffic noise contours included in the City's draft General Plan Update indicate a 4-decibel increase in traffic noise along nearby Thornton Avenue for the year 2030. At the site, the noise contours show that both existing and future year 2030 noise levels are CNEL 60 dB or below. The General Plan and draft General Plan Update do not account for future rail use on the tracks adjacent to the site. Transportation noise may be significantly higher if these tracks are used in the future.

The Dumbarton TOD FEIR and SMTA PSR do not include forecast or estimated future noise or vibration levels from trains. In the absence of this information, future levels have been estimated based on methodology provided in the document titled Transit Noise and Vibration Impact Assessment, dated May 2006, published by the Federal Transit Administration (FTA Document). Following are a list of assumptions used for this estimate:

- Residences will be located approximately 55 feet from the near track
- 37 commuter trains will pass the site daily (29 during daytime hours, 8 at night)
- 2 freight trains will pass the site daily (1 during daytime hours, 1 at night)
- 15% of the trains will use horns adjacent to the site
- Trains passing the site will travel at 30 mph[7]
- Tracks will be smooth and in good working order
- "Normal" ground-borne soil propagation, train suspension and wheels, and track conditions

Based on the assumptions above, the FTA Document methodology indicates the following noise and vibration levels. Note that noise and vibration may vary significantly from the estimated levels if the

[5] VdB – Vibration in decibels re: 1 micro inch per second
[6] 2010 California Building Code, California Code of Regulations, Title 24, Part 2, Chapter 12, Section 1207: Sound Transmission.
[7] The U.S. Department of Transportation (U.S. DOT) provides railroad information for at-grade roadway and railway crossings, including for Ash and Spruce Streets, which are the nearest at-grade crossings on either side of the site. They indicate that the typical maximum speed for trains is 15 miles per hour (mph) at Ash Street and 35 mph at Spruce Street. In the absence of more specific data, this analysis assumes a typical train speed of 30 mph adjacent to the site. Information is available at: http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/crossing/xingqryloc.aspx.

variables outlined above are changed, including track location and condition, train characteristics (such as speed, suspension or wheels), and ground effects including soil propagation.

- Environmental noise: DNL 75 dB; typical maximum noise level of 106 dB[8]
- Ground-borne vibration at-grade: 80 VdB

ANALYSIS AND RECOMMENDATIONS

As indicated above, the existing and estimated future noise environment, exclusive of rail use on the adjacent tracks, is DNL 60 dB and below. This falls into the City's *normally acceptable* land use category for residential land use. Based on this, standard dual-pane construction-grade windows and doors are expected to meet the DNL 45 dB noise criterion indoors, and exterior noise levels meet the City's goal without mitigation measures.[9]

However, if the railroad tracks to the south of the site are used, then train noise may exceed the City's goals without mitigation measures. As described above, future rail noise may be DNL 75 dB, with typical maximum noise levels of 106 dB, or higher at Building A if the right-of-way is used as outlined in the Dumbarton TOD FEIR and SMTA PSR. Further, rail vibration may be 80 VdB or higher at grade at the approximate building setback. Consider the following:

1. Exterior-to-Interior Noise
   A. Sound-rated windows, doors, and exterior wall assemblies would be needed to reduce train noise to the DNL 45 dB criterion indoors, and to address maximum instantaneous noise levels. While neither the City nor the State currently regulate maximum noise levels from intermittent sources such as trains or train horns, some cities have adopted noise goals to address this. The most common of which are attempting to limit maximum intermittent noise to 50 dB in bedrooms and 55 dB in other habitable rooms.

      Preliminary estimates assume a typical room size of 12 by 14 feet with windows comprising approximately 40% of the exterior wall area. Walls are expected to be wood-stud assemblies with three coat stucco over wood sheathing with insulation in stud cavities and at least one layer of gypsum board on the interior. The southern façade of Building A is expected to be staggered- or double-stud construction. Based on these assumptions, preliminary estimates suggest the following:

      i DNL 45 dB Criterion – Windows and doors with sound insulation ratings up to STC 40 would be needed along the southern façade of Building A. Needed STC ratings would decrease along the east and west façades, to the northern façade of Building B, where standard construction-grade, dual-pane windows and doors will likely suffice.

      ii L_{max} 50/55 in Bedrooms and other Habitable Rooms – It will not be feasible to reduce maximum noise levels from instantaneous events (including train horns) at units with a line-of-sight to the tracks with standard construction materials to the L_{max} 50/55 goals adopted by some cities.

      iii Special attention should be given to vents and openings to help maintain sound insulation ratings. Details would be determined during the design phase.

   B. Since windows at Buildings A and B would need to be closed to meet the interior noise criterion of DNL 45 dB, units would need to include ventilation or air-conditioning systems to provide a habitable interior environment as required by the CBC. This should be discussed with the project mechanical engineer, and must not compromise sound insulation of the exterior assemblies.

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[8] Greene, Rob, "Max Level Intrusion Noise Limit," 1982 National Conference on Environmental and Occupation Noise. Typical maximum uses the Lmax-30, obtained by logarithmically averaging the loudest 30-percent of trains and train horns.

[9] For reference typical dual-pane construction-grade windows and sliding glass doors have sound insulation ratings in the range of STC 26 to 28.

2. Outdoor Use Spaces – Outdoor noise levels will vary, depending on the location on-site and shielding from the planned buildings. Incorporating approximately a 12-foot tall noise barrier along the southern edge of the site, and wrapping it along the east and western edges, would reduce estimated train noise to approximately DNL 70 dB for outdoor residents at-grade. For reference, preliminary estimates suggest that reducing train noise to DNL 65 dB would require approximately a 17-foot tall barrier, and it would likely not be feasible to reduce train noise to the City's goal of DNL 60 dB. Effective barriers should be solid from bottom to top with no cracks or gaps, and should have a minimum surface density of approximately three pounds per square foot.
3. Ground-Borne Vibration Due to Rail
   A. As indicated above, ground-borne vibration due to trains may be 80 VdB or higher at the site. This exceeds the City's draft General Plan Update goal by approximately 5 VdB for occasional events. For reference, the FTA Document states the following:

      "Projected ground-borne vibration is 0 to 5 decibels greater than the impact threshold. In this range there is still a significant chance that actual ground-borne vibration levels will be below the impact threshold. In this case, the impact would be reported in the environmental document as exceeding the applicable threshold and a commitment would be made to conduct more detailed studies to refine the vibration impact analysis during final design and determine appropriate mitigation, if necessary. A site-specific Detailed Analysis may show that vibration control measures are not needed."

      Note that the FTA guidelines are intended to help assess the potential impact of new rail projects onto existing land uses.
   B. Ground-borne vibration propagating into a structure can use interior elements (e.g., furniture, wall pictures, lamps, etc.) to vibrate. Although it is generally at a very low level, these vibrating components radiate noise that can sometimes be audible. The design team should consider options to reduce vibration amplification in the structure. This may include limiting the length of joist spans, using deeper and stiffer joists than typical, and using thick plywood subfloors that are screwed and glued to joists. In addition, prospective buyers should be made aware of the potential for audible and feel-able noise and vibration through a full disclosure statement.
4. It should be noted that the noise and vibration estimates described above are based on methodology outlined in the FTA Document, and available information included in the Dumbarton TOD and SMTA PSR. They are dependent on several factors, many of which are not clearly known at this time. Therefore, actual noise and vibration levels may be higher or lower than estimated above. It is expected that rail noise and vibration, and the potential impacts and mitigation measures for trains, will be studied in a future EIR if rail plans proceed for this corridor.

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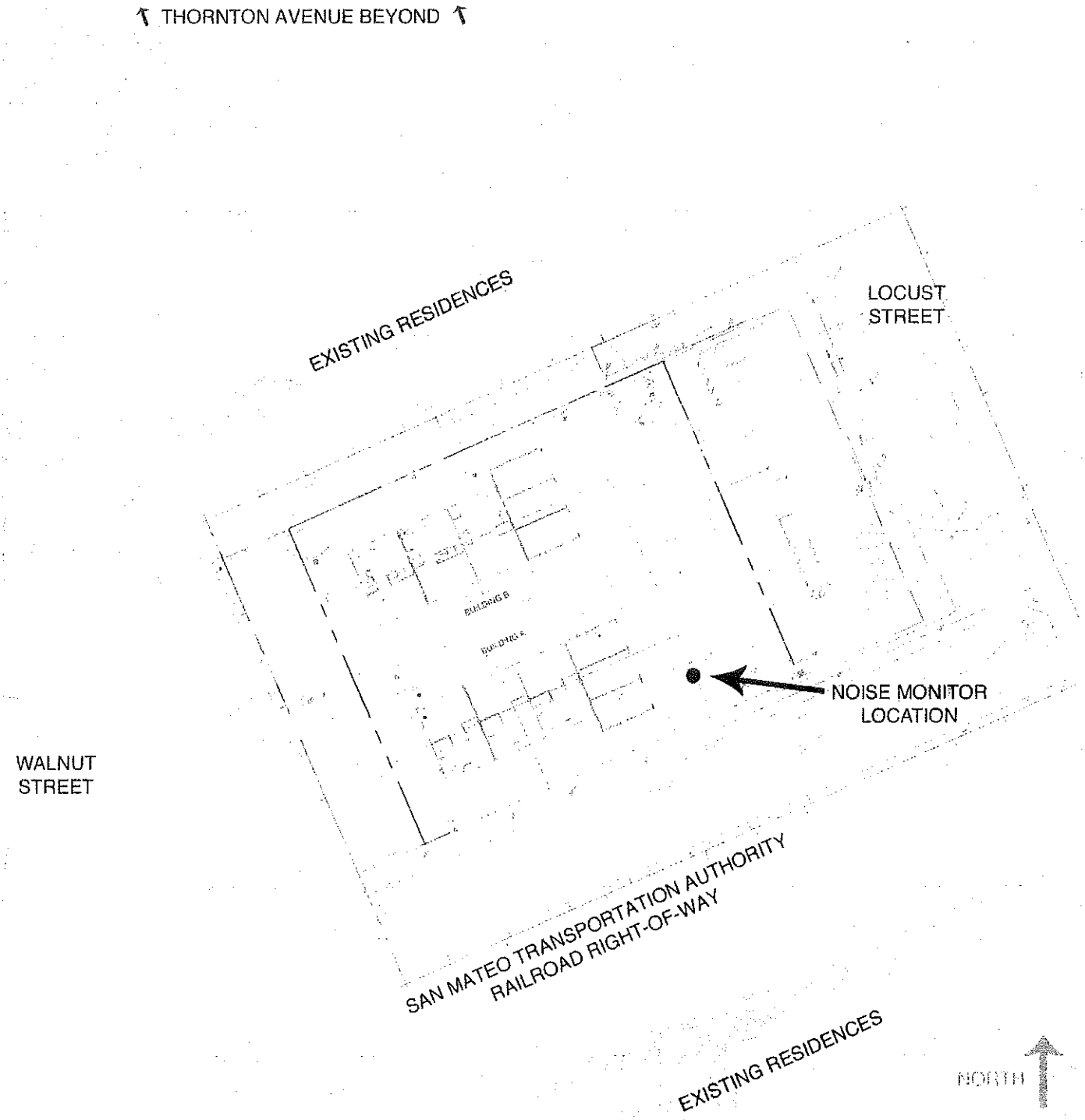

● INDICATES APPROXIMATE NOISE MEASUREMENT LOCATION

NOTE: DRAWING PROVIDED BY OTHERS; NO SCALE

7843 RAILROAD AVENUE
SITE PLAN INDICATING
NOISE MEASUREMENT LOCATION

FIGURE 1

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JMR