

Steelwave (747 Bancroft Way)
Berkeley, CA

CONSTRUCTION NOISE REDUCTION PROGRAM

21 July 2022

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INTRODUCTION

This report provides a site-specific construction noise reduction program for the Steelwave project at 747 Bancroft Way. The project is located at the northwest corner of Bancroft Way and Fourth Street in Berkeley. We have reviewed the proposed construction noise equipment and schedule and predicted the noise levels expected at the nearby buildings.

Construction is expected to begin in August 2022 and be completed within approximately 21 months thereafter. Construction will only occur between the hours of 7 am and 6 pm on weekdays and between 9 am to 4 pm on Saturdays, per the project Conditions of Approval.

The project and all adjacent properties are in the Mixed Use-Light Industrial (MULI) zone. However, a Mixed Use-Residential (MUR) zone begins approximately 190 feet to the east (between 4th Street and 5th Street). The nearest noise-sensitive receiver is the residence at 2209 5th Street, which is approximately 390 feet to the northeast.

This report summarizes the results of our analysis and provides recommendations for construction noise reduction measures. The analysis follows the previously approved Mitigated Negative Declaration (dated March 2022). The report consists of the following sections:

- 1.0 Executive Summary
- 2.0 Applicable Criteria
- 3.0 Construction Noise Analysis
- 4.0 Noise-Reduction Measures

1.0 EXECUTIVE SUMMARY

1. Construction noise levels and duration of noise will vary depending on the type and location of the construction activities. When construction is occurring on portions of the site nearest to the adjacent properties, we expect that noise levels could temporarily exceed the ordinance criteria.
2. The project Conditions of Approval will be followed, and site-specific noise reduction measures will be implemented. Additional noise reduction measures, such as equipment relocation away from residential receivers and additional barriers, could be considered to further reduce the construction noise levels, as needed. This is discussed in Section 4.0.

2.0 APPLICABLE CRITERIA

2.1 Berkeley Municipal Code

The City of Berkeley Municipal Code (BMC), Section 13.40.070 provides provisions for construction noise levels¹. These provisions are as follows:

- a. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work before 7 am on a weekday (or before 9 am on a weekend or holiday) or after 7 pm on a weekday (or after 8 pm on a weekend or holiday)² such that the sound therefrom across a residential or commercial real property line violates Section 13.40.050 or 13.40.060, except for emergency work of public service utilities or by variance issued by the EHD.
- b. Noise Restrictions at Affected Properties. Where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum sound levels at affected properties will not exceed those listed in the following schedule.

Table 13.40-3: Maximum Noise Levels for Short-Term Operation of Mobile Equipment (dBA)

	Residential (R-1, R-2)	Multi-Family Residential (R-3)	Commercial/ Industrial
Weekdays (7 am to 7 pm)	75	80	85
Weekends/Holidays (9 am to 8 pm)	60	65	70

Table 13.40-4: Maximum Noise Levels for Long-Term Operation of Stationary Equipment (dBA)

	Residential (R-1, R-2)	Multi-Family Residential (R-3)	Commercial/ Industrial
Weekdays (7 am to 7 pm)	60	65	70
Weekends/Holidays (9 am to 8 pm)	50	55	60

The City of Berkeley Municipal Code, Section 13.40.050 also states:

If the measured ambient noise level is greater than the level permissible within any of the noise limit categories above, the sound level when measured on any other property shall not exceed:

- a. The ambient noise level for a cumulative period of more than 30 minutes in any hour
- b. The ambient noise level plus 5 dBA for a cumulative period of more than 15 minutes in any hour

1 Repetitively scheduled and relatively long-term operation of stationary equipment is defined as a period of 10 days or more.
2 The project's approved construction hours are between 7 am and 6 pm on weekdays and between 9 am to 4 pm on Saturdays, per the project Conditions of Approval.

- c. The ambient noise level plus 10 dBA for a cumulative period of more than 5 minutes in any hour
- d. The ambient noise level plus 15 dBA for a cumulative period of more than 1 minute in any hour
- e. The ambient noise level plus 20 dBA for any period of time

2.2 Conditions of Approval

Construction Noise Reduction Program

The applicant shall develop a site-specific noise reduction program prepared by a qualified acoustical consultant to reduce construction noise impacts to the maximum extent feasible, subject to review and approval of the Zoning Officer. The noise reduction program shall include the time limits for construction listed above, as measures needed to ensure that construction complies with BMC Section 13.40.070. The noise reduction program should include, but shall not be limited to, the following available controls to reduce construction noise levels as low as practical:

- A. Construction equipment should be well maintained and used judiciously to be as quiet as practical.
- B. Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment.
- C. Utilize "quiet" models of air compressors and other stationary noise sources where technology exists. Select hydraulically or electrically powered equipment and avoid pneumatically powered equipment where feasible.
- D. Locate stationary noise-generating equipment as far as possible from sensitive receptors when adjoining construction sites. Construct temporary noise barriers or partial enclosures to acoustically shield such equipment where feasible.
- E. Prohibit unnecessary idling of internal combustion engines.
- F. If impact pile driving is required, pre-drill foundation pile holes to minimize the number of impacts required to seat the pile.
- G. Construct solid plywood fences around construction sites adjacent to operational business residences, or other noise-sensitive land uses where the noise control plan analysis determines that a barrier would be effective at reducing noise.
- H. Erect temporary noise control blanket barriers. If necessary, along building facades facing construction sites. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling. Noise control blanket barriers can be rented and quickly erected.
- I. Route construction related traffic along major roadways and away from sensitive receptors where feasible.

2.3 Existing Noise Environment

We conducted multi-day measurements between 12 to 14 May 2021 (Locations L1 to L3) for the project's environmental noise study. We also conducted a measurement at the nearest residential property

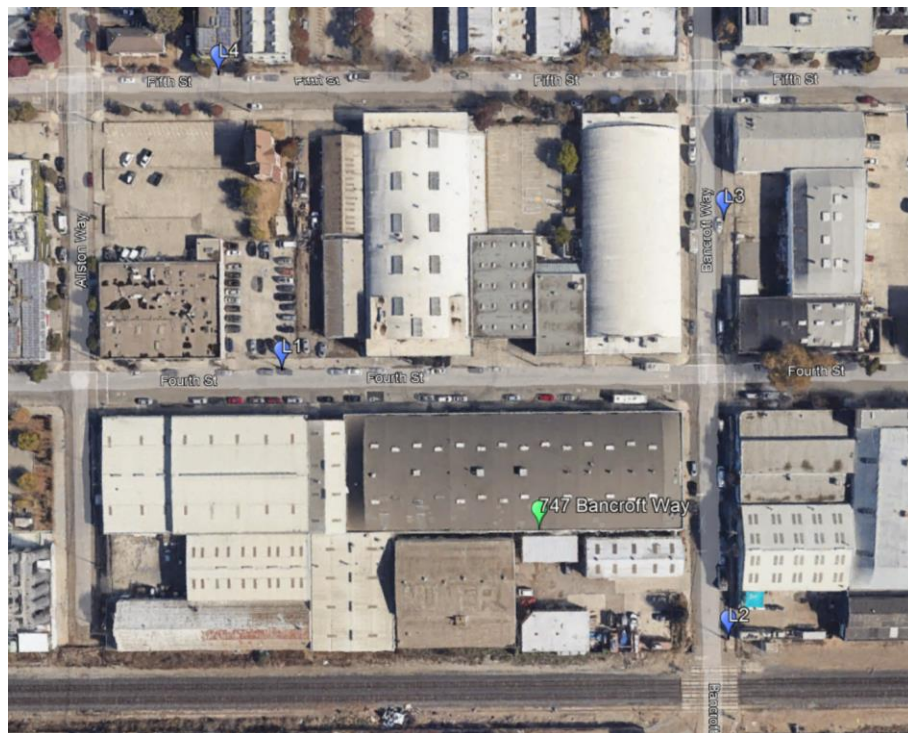


between 7 to 11 July 2022. **Table 1** shows the existing noise environment during the proposed construction hours (i.e., weekdays from 7 am to 6 pm and Saturday from 9 am to 4 pm). Noise levels are shown as the range of hourly L_{eq}^3 in $dB(A)^4$. See **Figure 1** for the measurement locations. See **Figures 2 to 5** for graphical representations of the measured noise levels during the entire measurement periods.

Table 1: Range of Existing Noise Environment During Construction Hours (in dBA)

Location	Measured $L_{eq}(h)$	Noise Ordinance Limit for Short-Term Operation	Noise Ordinance Limit for Long-Term Operation
4th Street (L1)	62 to 70	85	70
Bancroft Way (L2)	68 to 81	85	70
Bancroft Way (L3)	64 to 76	80	65
5th Street (L4)	58 to 67	80	65

Figure 1: Existing Noise Environment Measurement Location



- 3 L_{eq} – The equivalent steady-state A-weighted sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period.
- 4 A-Weighted Sound Level – The A-weighted sound pressure level, expressed in decibels (dB). Sometimes the unit of sound level is written as $dB(A)$. A weighting is a standard weighting that accounts for the sensitivity of human hearing to the range of audible frequencies. People perceive a 10 dB increase in sound level to be twice as loud.

Figure 2: Measured Hourly Noise Levels at 4th Street (L1)

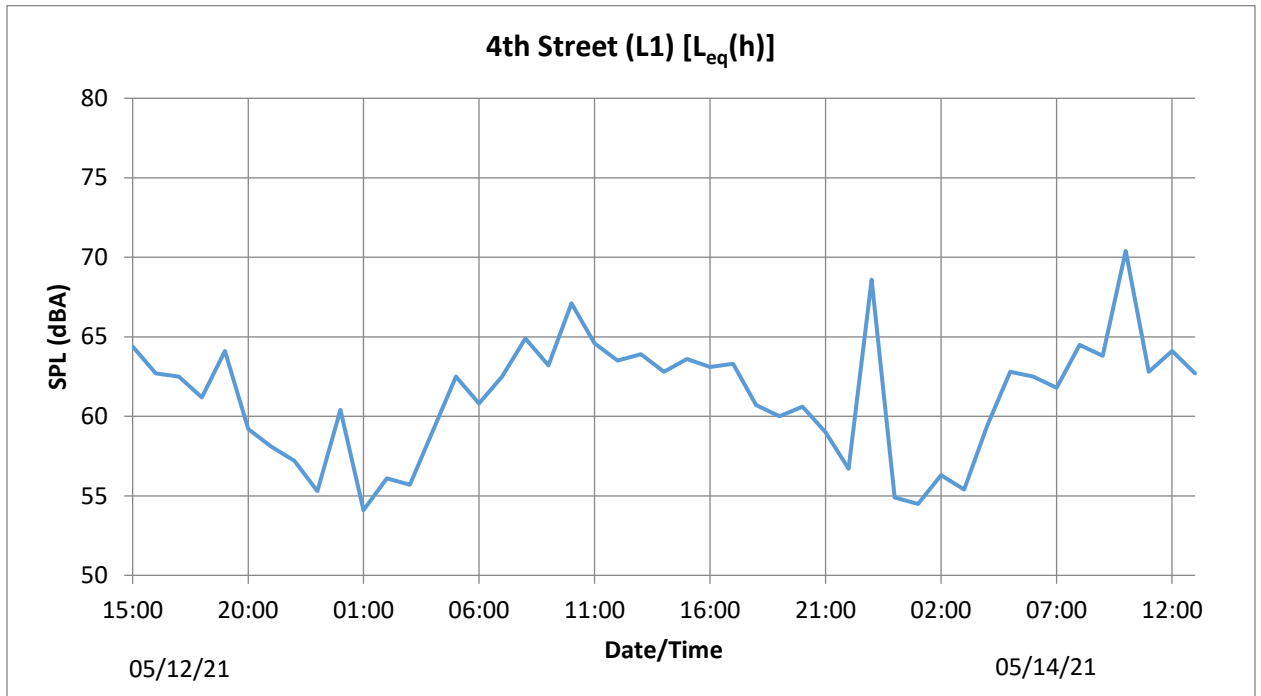


Figure 3: Measured Hourly Noise Levels at Bancroft Way (L2)

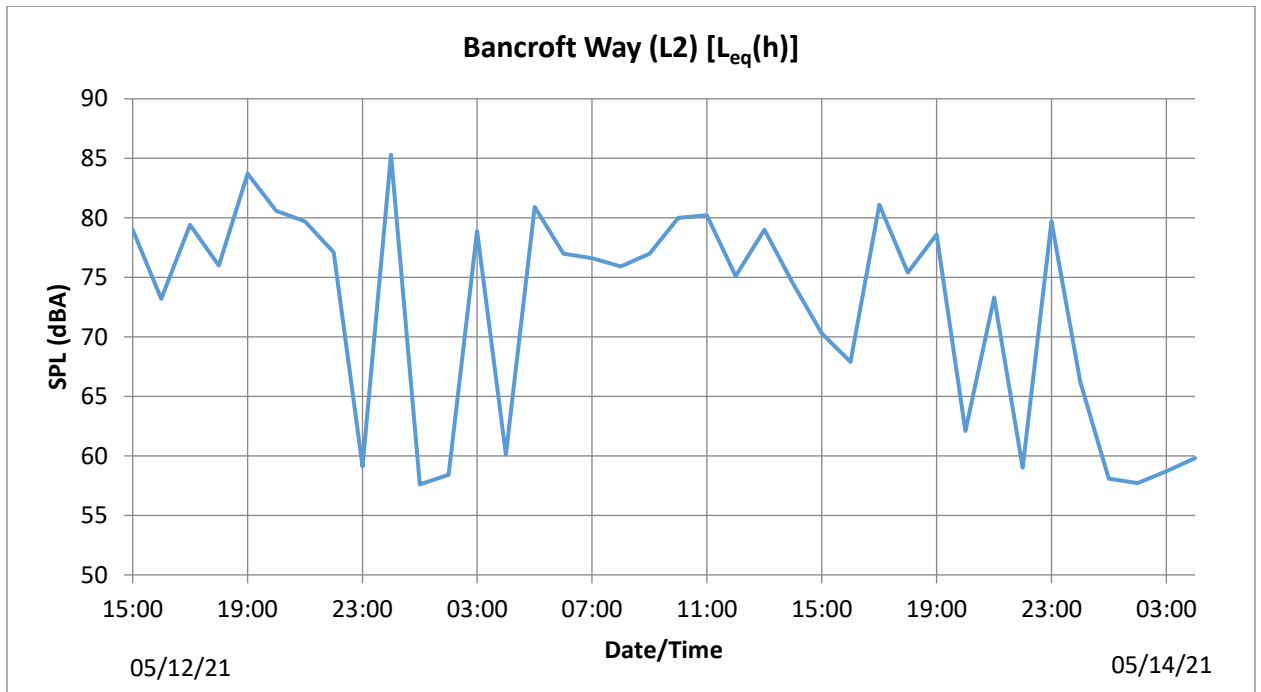


Figure 4: Measured Hourly Noise Levels at Bancroft Way (L3)

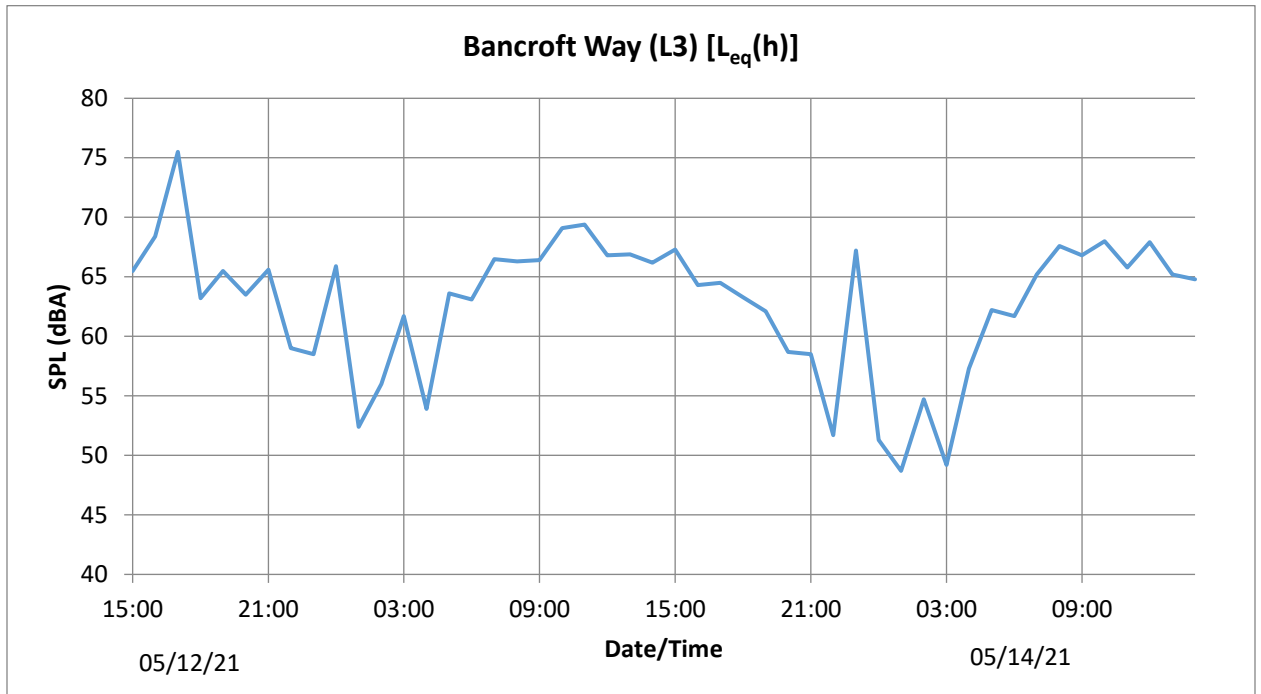
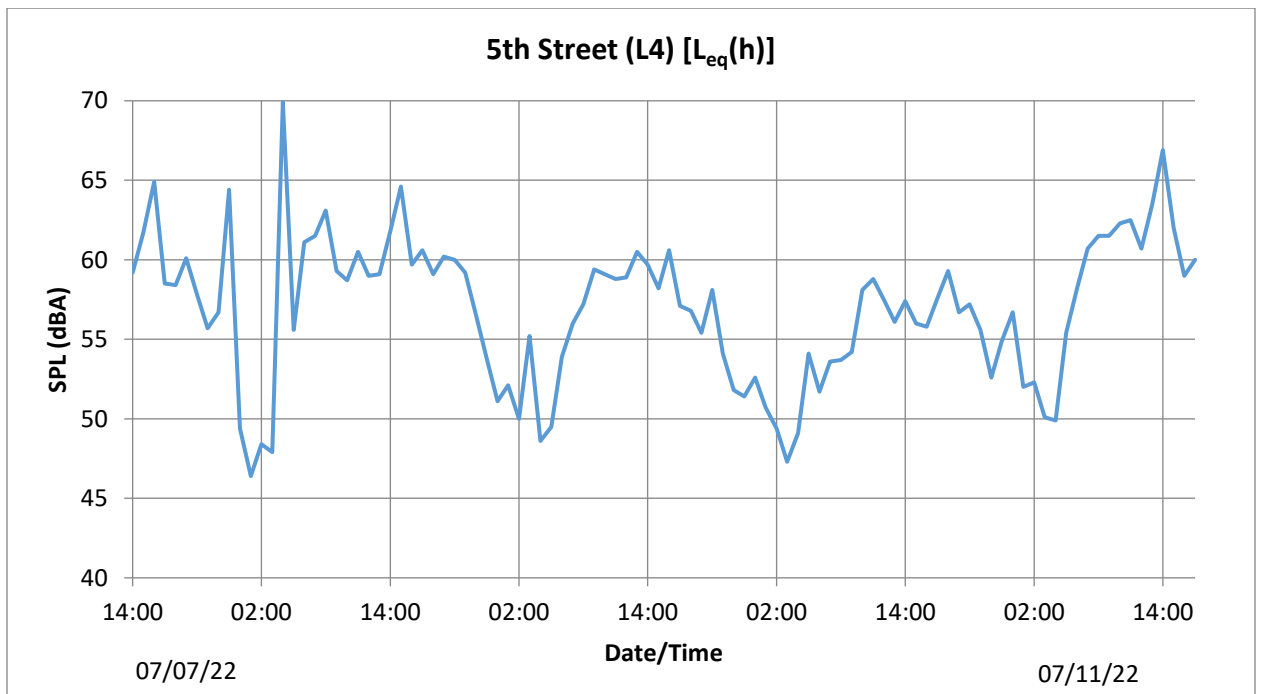


Figure 5: Measured Hourly Noise Levels at 5th Street (L4)



3.0 CONSTRUCTION NOISE ANALYSIS

3.1 Phases of Construction

We understand that the construction will be completed in four main phases across 21 months with multiple activities in each phase. Phase 1 will include demolition. Phase 2 will include site preparation and utility trenching. Phase 3 will include the building construction. Phase 4 will include the interior finishing and landscaping.

A general description of the phases and potential tools and activities that might happen on site during construction is listed below. This does not constitute a comprehensive list of activities, tools, and potential impacts. Actual tools used, activities completed, suggested areas of noise, and durations described might vary depending on site conditions, subcontractor techniques, and general sequencing of the project's schedule.

Phase 1: Demolition

Duration: 2 Months

Activities: Include (but not limited to):

- Demolition of existing structure
- Demolition of asphalt
- Rough grading and off-haul of soils

Tools and Noise: Concrete saws, excavators, dozers, reach lifts, water trucks, and dump trucks will be used. Most noise will be near grade.

Phase 2: Site Preparation and Utility Trenching

Duration: 2 Months

Activities: Include (but not limited to):

- Installation of utilities and foundations
- Building slab pours

Tools and Noise: Dozers, tractors, loaders, backhoes, water trucks, excavators, graders, concrete saws, and air compressors will be used. Most noise will be near grade.

Phase 3: Building Construction

Duration: 15 Months



Activities: Include (but not limited to):

- Framing of the structure
- Installation of sheathing, waterproofing, windows, and exterior doors
- Application of architectural coating
- Mechanical, electrical, and plumbing rough-in and routing
- Installation of temporary shoring and PG&E meters
- Installation of interior drywall and flooring

Tools and Noise: Cranes, forklifts, generators, tractors, loaders, backhoes, and welders will be used. Most noise will be inside the building and/or on-grade. However, the building will have most of the exterior envelope installed towards the end of this phase.

Phase 4: Interior Finishing, Landscaping, and Close Out

Duration: 3 Months

Activities: Include (but not limited to):

- Finishing of interior trim and doors
- Interior and exterior painting
- Finish grading and paving
- Placement and stamp of asphalt
- Landscaping

Tools and Noise: Pavers, rollers, air compressors, backhoes, water trucks, and a ditch witch will be used. Most noise will be inside the building and/or on-grade. The entire building envelope will be installed.

3.2 Predicted Construction Equipment Noise Levels

Project construction would result in short-term noise impacts on the nearby sensitive receptors. The closest residential receptor is located approximately 390 feet east of the project site. The closest commercial receptor is approximately 60 feet south of the project site. Maximum construction noise would be short-term, generally intermittent depending on the construction phase, and variable depending on receiver distance from the active construction zone.

The duration of noise impacts generally would be from one day to several days depending on the phase of construction. The entire construction duration is expected to be approximately 21 months. The level and types of noise impacts that would occur during construction are described below.

Short-term noise impacts would occur during demolition, grading, and site preparation activities.

Table 2 lists typical construction equipment noise levels (L_{max}) and usage factors per the proposed construction equipment list, based on a distance of 50 feet from the equipment. Construction-related

short-term noise levels would be higher than existing ambient noise levels currently in the project area but would no longer occur once construction of the project is completed.

Table 2: Typical Construction Noise Levels⁵

Equipment	Usage Factor (%)	Maximum Noise Level (L _{max}) at 50 Feet (in dBA)
Backhoe	40	80
Compressor (pneumatic tools)	40	80
Concrete Saws	50*	90
Dozer	40	82
Dump Truck	40*	76
Excavator	40	81
Flat Bed Trucks	40	74
Forklift	40	83
Front Loader	40	80
Generator	50*	81
Grader	40	85
Reach Lift	50*	83
Roller	20	80
Small Crane	50*	81
Water Truck	50*	75

**Usage factor estimated*

Two types of short-term noise impacts could occur during construction of the project. The first type involves construction crew commutes and the transport of construction equipment and materials to the site (i.e., activity on the nearby roadways), which would incrementally increase noise levels on roads leading to the site. As shown in **Table 2**, there would be a relatively high single-event noise exposure potential at a maximum level of 76 dBA L_{max} at 50 feet from dump truck passbys.

The second type of short-term noise impact is related to noise generated at the project site during demolition, grading, and construction on the project site. Construction is performed in phases, each with its own mix of equipment and noise characteristics. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

⁵ Sources: U.S. Environmental Protection Agency (1971), FHWA Construction Noise Handbook Tables 9.1 and 9.9

3.3 Analysis

Based on the noise levels listed in **Table 2**, typical noise levels range from L_{max} 74 to 90 dBA at 50 feet during the noisiest construction phases. The site preparation and rough grading phases – including demolition and grading of the site – tend to generate the highest noise levels because earthmoving machinery is the noisiest construction equipment. Typical operating cycles for these types of loud construction equipment might involve a couple minutes of full-power operation followed by several minutes at lower-power settings.

As identified above, the project site is approximately 390 feet from the closest residential receptor (i.e., 2209 Fifth Street). At a 390-foot distance, the construction noise would be approximately 18 dB quieter than the noise at 50 feet. Therefore, the closest off-site residences could be subject to short-term construction noise levels of L_{max} 56 to 72 dBA when construction is occurring near the northern (nearest) property line.

According to the City of Berkeley Noise Ordinance (BMC Section 13.40.070), noise from construction activities is permitted to exceed the established maximum allowable noise performance standards, provided that the activities occur during the permissible hours for construction and all technically and economically feasible noise reduction measures are incorporated. Construction impacts at residential land uses, although permitted and exempted during the construction hours specified by the City, would exceed the suggested maximum noise levels for stationary sources as established by the City.

Implementation of the project Conditions of Approval (listed in Section 4.1) would reduce construction noise impacts on the off-site nearby sensitive receptors and would require the project sponsor to implement all technically and economically feasible measures to reduce construction noise consistent with the requirements of BMC Section 13.40.070.

Although the estimated noise levels exceed the BMC construction noise thresholds during some phases, the levels will vary as the project progresses around the site and construction moves to the interior of the building. All feasible techniques prescribed in Section 4.0 shall be implemented to reduce the noise impacts.

4.0 NOISE-REDUCTION MEASURES

4.1 Conditions of Approval

The noise-abatement measures set forth and required by the City's Conditions of Approval will be implemented throughout the project. Statements of compliance are based on conversations with the general contractor and email dated 18 July 2022.

Conditions of Approval	Action
A. Construction equipment should be well maintained and used judiciously to be as quiet as practical.	Will comply.
B. Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment.	Will comply.
C. Utilize "quiet" models of air compressors and other stationary noise sources where technology exists. Select hydraulically or electrically powered equipment and avoid pneumatically powered equipment where feasible.	Will comply.
D. Locate stationary noise-generating equipment as far as possible from sensitive receptors when adjoining construction sites. Construct temporary noise barriers or partial enclosures to acoustically shield such equipment where feasible.	Will comply.
E. Prohibit unnecessary idling of internal combustion engines.	Will comply.
F. If impact pile driving is required, pre-drill foundation pile holes to minimize the number of impacts required to seat the pile.	Will comply.
G. Construct solid plywood fences around construction sites adjacent to operational business, residences, or other noise-sensitive land uses where the noise control plan analysis determines that a barrier would be effective at reducing noise.	Will comply.
H. Erect temporary noise control blanket barriers, if necessary, along building facades facing construction sites. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling. Noise control blanket barriers can be rented and quickly erected.	Will comply.
I. Route construction related traffic along major roadways and away from sensitive receptors where feasible.	Will comply.

4.2 Site-Specific Noise Reduction Measures (All Phases)

The following are additional noise-reduction measures that the contractor has acknowledged by email (dated 18 July 2022) will be implemented throughout construction.

- Manage truck traffic to reduce idling
- Minimize drop height when loading excavated materials onto trucks
- Minimize drop height when unloading or moving materials on-site
- Sequence the noisiest activities to coincide with the noisiest ambient hours (see **Figures 2 to 5**)
- Locate noisy equipment within the building structure once the facade is installed