APPENDIX 3.1-A **PROJECT MEASURES**

Los Angeles County
Metropolitan Transportation Authority

PROJECT MEASURES

K LINE NORTHERN EXTENSION

Metro

JULY 2024

K LINE NORTHERN EXTENSION TRANSIT CORRIDOR PROJECT

PROJECT MEASURES

Prepared for:

Metro

Los Angeles County
Metropolitan Transportation Authority

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JULY 2024

TABLE OF CONTENTS

ABBREVIATIONS/ACRONYMS

ACRONYM	DEFINITION
ADA	Americans with Disabilities Act
BMP	best management practices
Cal/OSHA	California Division of Occupational Safety and Health Administration
CalGEM	California Geologic Energy Management Division
CARB	California Air Resources Board
DOGGR	Division of Oil, Gas, and Geothermal Resources
FEMA	Federal Emergency Management Agency
FTA	Federal Transit Administration
GBV	ground-borne vibration
HDPE	high density polyethene
LARWQCB	Los Angeles Regional Water Quality Control Board
LEL	lower explosive limit
LID	Low-Impact Development
Metro	Los Angeles County Metropolitan Transportation Authority
MRDC	Metro Rail Design Criteria
MSF	maintenance and storage facility
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
ppm	parts per million
PPV	peak particle velocity
SCAQMD	South Coast Air Quality Management District
SWPPP	Stormwater Pollution Prevention Plan
TBM	tunnel boring machine
TMP	Traffic Management Plan
VdB	vibration decibels

CHAPTER 1: INTRODUCTION

Project measures are design features, best management practices (BMPs), or other commitments that the Los Angeles County Metropolitan Transportation Authority (Metro) implements as part of all alignments and stations, the design option, and the Maintenance and Storage Facility (MSF) to reduce or avoid environmental effects associated with the project. Project measures are not the same as mitigation measures that are used to reduce an environmental impact's significance level.

The following Metro project measures are identified in the evaluation of the environmental resource areas in Chapter 3 of this Draft Environmental Impact Report and would be implemented to minimize impacts related to the respective resources.

CHAPTER 2: LIST OF PROJECT MEASURES

There are a total of 15 unique project measures identified across the multiple resource sections. These include project measures for Aesthetics, Air Quality, Biological Resources, Geology and Soils, Hydrology and Water Quality, Noise and Vibration, Hazards and Hazardous Materials, and Transportation. Project measures identified for Energy and Greenhouse Gas Emissions are taken from Section 3.3, Air Quality. Project measures identified for Growth Inducing Impacts, Hazards and Hazardous Materials, and Public Services and Recreation are taken from Section 3.16, Transportation.

2.1 AESTHETICS

2.1.1 PM AES-1: CONSTRUCTION LIGHTING

Safety and security lighting would be used during construction but would be directed toward the construction staging areas and/or shielded with temporary screening to minimize light spillover and glare onto adjacent areas. Any nighttime construction required for the alignments and stations, the design option, and the MSF would not be a substantial source of light and glare because other nighttime lighting sources already exist around the construction area, including streetlights and building illumination.

2.2 AIR QUALITY

2.2.1 PM AQ-1: METRO GREEN CONSTRUCTION POLICY

Established by formal adoption of the Green Construction Policy in 2011, Metro commits to the following construction equipment requirements, construction BMPs, and implementation strategies for all construction projects performed on Metro properties or rights-of-way (Metro 2011):

- Construction equipment shall incorporate, where feasible, emissions-reducing technology such as hybrid drives and specific fuel economy standards.
- Maintain equipment according to manufacturer specifications.
- Idling of construction equipment and heavy-duty trucks shall be restricted to a maximum of five minutes when not in use (certain exceptions apply based on California Air Resources Board [CARB] exemptions).
- All off-road diesel-powered construction equipment greater than 50 horsepower shall meet Tier 4 off-road emission standards at a minimum.
- All on-road heavy-duty trucks with a gross vehicle weight rating greater than or equal to 14,000 pounds must have engines meeting U.S. 2010 on-road emission standards.
- Where applicable and feasible, work with local jurisdictions to improve traffic flow by signal synchronization during construction activities.
- Use electric power in lieu of diesel power where available.

- Generators: every effort shall be made to utilize grid-based electric power at any construction site, where feasible. Where access to the power grid is not available, on-site generators must:
  - Meet a 0.01 gram per brake-horsepower-hour standard for particulate matter; or
  - Be equipped with Best Available Control Technology for particulate matter emissions reductions.
- Inspections: Metro shall conduct inspections of construction sites and affected off-road and on-road equipment and generator as well as compliance with air quality rules.
- Records: Prior to Notice to Proceed to commence construction and to be verified afterwards consistent with project contract requirements and through enforcement provisions above, the Contractor shall submit to Metro the following information for all construction equipment to be used on Metro properties or rights-of-way:
  - A certified statement that all construction equipment used conform to the requirements specified above;
  - A list of all the equipment and vehicles (i.e., off-road equipment, include the CARB-issued Equipment Identification Number) to be used; and
  - A copy of each Contractor's certified United States Environmental Protection Agency rating and applicable paperwork issued either by CARB, South Coast Air Quality Management District (SCAQMD), and any other jurisdiction that has oversight over the equipment.

2.2.2 PM AQ-2: SCAQMD RULE 403

Construction of the project would implement the following BMPs in compliance with SCAQMD Rule 403 – Fugitive Dust (SCAQMD 2005):

- Backfilling: Backfill material stabilization when actively handling or inactive and stabilize soil at completion of activity.
- Clearing/grubbing: Maintain stability of soil through watering of site prior to, during, and after all clearing/grubbing activities.
- Cut and fill: Pre-water soils prior to cut and fill activities using water trucks; stabilize soil during and after activities.
- Debris hauling: All trucks hauling dirt, sand, soil, or other loose materials are to be tarped with a fabric cover and maintain a freeboard height of 12 inches.
- Demolition activities: Prohibit demolition activities when wind speeds exceed 25 miles per hour; apply water to disturbed soils after demolition is completed or at the end of each day of cleanup.
- Disturbed soil: Stabilize disturbed soil throughout the construction site by limiting vehicular traffic and disturbance on soil where possible and applying water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes (Rule 401 – Visible Emissions).
- Disturbed surface areas: Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface; apply water at three-hour intervals to at least 80 percent of the unstabilized area.

- Earth-moving activities: Pre-apply water to depth of proposed cuts and reapply as necessary to maintain soils in a damp condition and to ensure that visible dust plumes do not exceed 100 feet in any direction.
- Importing/exporting of bulk materials: Stabilize material with tarps or other suitable enclosures on trucks while loading/unloading to reduce fugitive dust emissions and maintain at least six inches of freeboard on haul vehicle; provide water during loading/unloading to prevent dust plumes.
- Staging areas and unpaved roads: Stabilize surface areas and limit vehicle speeds to 15 miles per hour.
- Stockpiles/bulk material handling: stabilize stockpiled materials with intermittent watering and limit stockpiles to eight feet in height within 100 yards of off-site occupied buildings.
- Trenching: Stabilize surface soils with pre-watering where trencher or excavator and support equipment will operate; wash mud and soils from equipment at completion of activities.

2.2.3 PM AQ-3: METRO 2020 MOVING BEYOND SUSTAINABILITY STRATEGIC PLAN

Construction and operation of the project will adhere to the commitments established by the MBSSP 2020, including, but not limited to, the application of renewable diesel requirements for contractors, the implementation of the Construction and Demolition Debris Policy, the identification of opportunities to decarbonize fuel sources at construction sites, the use of electric medium- and heavy-duty equipment during construction, and the design and build of capital projects to CalGreen Tier 2 standards (Metro 2020).

2.2.4 PM AQ-4: METRO DESIGN STANDARDS

The project will be designed in accordance with the Metro Rail Design Criteria and the Metro Systemwide Station Design Standards Policy, which includes the installation of high-efficiency LED lighting in all fixtures to reduce electricity consumption (Metro 2017, 2018).

2.3 BIOLOGICAL RESOURCES

2.3.1 PM BIO-1: CONSTRUCTION AND OPERATIONAL BEST MANAGEMENT PRACTICES

To ensure biological resources are generally protected during construction and operation of the project, the following BMPs are recommended as project measures:

1. Project limits shall be clearly delineated with fencing or other boundary markers prior to the start of project construction or operational activities, as applicable. Workers shall strictly limit their activities, vehicles, equipment, and materials to the designated project limits and staging areas. The boundaries of the access roads will be clearly delineated so that activities do not extend beyond the authorized limits of road repairs.

2. During project construction and operation, the project limits shall be kept as clean of debris as possible to avoid attracting wildlife. All food-related trash items shall be enclosed in sealed containers and removed daily from the work zone.
3. Smoking will be prohibited in all areas except for clearly defined disturbed/developed areas where the potential to start a fire is minimal.
4. No pets, outside of approved service animals, will be permitted within the area of construction or operational activities.
5. During project construction and operation, a minimal amount of watering will be used for dust control. Water trucks will ensure that water is not running off roads and other surfaces into the environment.
6. Fueling of vehicles and equipment will be conducted only in authorized locations such as staging/laydown areas and will use secondary containment to prevent releases of fuel into the environment that could contaminate and/or degrade biological resources.
7. Spill kits will be kept readily available in project vehicles/equipment.

2.4 ENERGY

Refer to PM AQ-1, AQ-3, and AQ-4 under Section 2.1, Air Quality, for project measures applicable to energy resources.

2.5 GEOLOGY AND SOILS

2.5.1 PM GEO-1: DESIGN AND CONSTRUCT PROJECT PER THE METRO RAIL DESIGN CRITERIA

The Metro Rail Design Criteria (MRDC) incorporates various design specifications from the Federal Highway Administration, Caltrans, the State of California, Los Angeles County, and other sources by reference. Key compliance sections of the MRDC relative to geology and soils are presented in Section 5.3, Section 5.4, Section 5.6, and the MRDC Section 5 Appendix: Metro Supplemental Seismic Design Criteria. Section 5.6 of the MRDC provides detailed requirements for planning and conducting a geotechnical investigation, geotechnical design methodologies, and reporting. In addition, Caltrans and the Los Angeles County Building Code (based on the California Building Code) have independent design criteria for building structures (Los Angeles County) that are required. In accordance with the MRDC, geotechnical report recommendations shall be incorporated into project plans and specifications. These recommendations shall be a product of final design and shall address potential subsurface hazards. Without these report recommendations, the project plans and specifications shall not be approved, and the project will not be allowed to advance into the final design stage or into construction.

2.6 GREENHOUSE GAS EMISSIONS

Refer to PM AQ-1, AQ-3, and AQ-4 under Section 2.1, Air Quality, for project measures applicable to greenhouse gas emissions.

2.7 GROWTH INDUCING IMPACTS

Refer to PM TRA-1 and TRA-2 under Section 2.12, Transportation, for project measures applicable to growth inducing impacts.

2.8 HAZARDS AND HAZARDOUS MATERIALS

2.8.1 PM HAZ-1: RISK REDUCTION FOR SUBSURFACE GAS

The following construction approaches are implemented on Metro projects and will reduce risk associated with hazardous materials, in particular related to the risks associated with subsurface gas:

- Hazardous Gases: Methane in air is explosive in the range of concentration from 15 percent to five percent by volume. Very high concentrations of methane are not explosive; however, when diluted by air the mixture can readily become explosive. The level of five percent methane in air is termed the lower explosive limit (LEL), and below five percent methane in air does not ignite. Safety protocols typically require dilution of methane to 1/10th of the LEL.
- Monitoring and Recording of Air Quality at Worksites: Monitoring and recording of air quality within the underground worksites will be conducted. In areas of gassy soil conditions, air will be continuously monitored and recorded. Construction will be altered as required to maintain a safe working atmosphere. The working environment will be kept in compliance with federal, state, and local regulations, including South Coast Air Quality Management District and California Division of Occupational Safety and Health Administration (Cal/OSHA) standards.
- Techniques to Lower the Risk of Exposure to Methane and Hydrogen Sulfide: The primary method for reducing exposure to subsurface gases during tunneling is dilution through the ventilation system. In areas where high levels of hazardous gas are encountered, several additional techniques could be used to lower the risk of exposure. These include isolation of gas from the tunnel environment through use of enclosed tunneling systems such as pressurized-face TBMs, which is mandatory for use on all Metro soft-ground tunnel projects. Where earth pressure balance TBMs are used, a measure to manage hazardous off-gassing from tunnel muck on conveyors is to fully enclose the conveyor from the tunnel boring machine (TBM) back to the work shaft. This approach would safely discharge any hazardous gases to the atmosphere outside the tunnel. Increased ventilation capacity and possibly slower rates of tunneling could assist with dilution of gas concentrations to safe levels as defined by Cal/OSHA. Secondary measures for reduction in hydrogen sulfide levels could include pre-treatment of groundwater containing hydrogen sulfide by displacing and oxidation of the hydrogen sulfide by injecting water (possibly containing dilute hydrogen peroxide) into the ground and groundwater in advance of the tunnel excavation. This “in-situ oxidation” method reduces hydrogen sulfide levels even before the

ground is excavated. Air injection and gas extraction techniques have also been used to oxidize hydrogen sulfide in advance of tunneling. These methods may also be implemented at tunnel-to-station connections or at cross-passage excavation areas. If slurry-face TBMs are used, the excavated soil with the hazardous gases is transported to the ground surface in a slurry pipeline. When needed to reduce hydrogen sulfide to safe levels for slurry treatment, additives could be mixed with the bentonite (clay) slurry during the tunneling and/or prior to discharge into the slurry separation plant. Following petroleum industry practices with hydrogen sulfide gas in drilling mud, the hydrogen sulfide would be oxidized by injection of hydrogen peroxide. In all cases, air quality standards would comply with Cal/OSHA requirements for a safe working environment.

- Oil Well Locations and Abandonment: In areas where historic oil wells have been documented, pre-construction geophysical (magnetic) surveys will be conducted to more precisely detect the locations of oil wells. It is anticipated that the geophysical surveys will be performed along the proposed tunnel alignment prior to construction in the areas of known oil production and mapped wells. Detection of oil wells will include use of magnetic devices (magnetometers) to sense oil well casings within the tunnel alignment. This survey could also use techniques such as ground-penetrating radar and electromagnetic testing procedures to screen for oil well casings and other suspected subsurface obstructions along the tunnel. These methods could be initiated from the ground surface, in horizontal holes drilled using horizontal directional drilling techniques, or a combination of methods. Shallow excavations may be made to expose and observe anomalies that are detected. Where the tunnel alignment cannot be adjusted to avoid a well casing, The California Geologic Energy Management Division (CalGEM) will be contacted to determine the appropriate method to re-abandon the well. Oil well abandonment must proceed in accordance with California Laws for Conservation of Petroleum and Gas (1997), Division 3. Oil and gas, Chapter 1. Oil and Gas Conservation, Article 4, Sections 3228, 3229, 3230, and 3232. The requirements include written notification to CalGEM, protection of adjacent property, and before commencing any work to abandon any well, obtaining approval by CalGEM. Abandonment work, including sealing off oil/gas bearing units, pressure grouting, etc., must be performed by a state-licensed contractor under the regulatory oversight and approval of CalGEM. During construction, if an unknown well is encountered, the contractor will notify Metro, Cal/OSHA, and the Division of Oil, Gas, and Geothermal Resources (DOGGR) for well abandonment, and proceed in accordance with state requirements. See Appendix A for further information.
- Worker Safety for Gassy Tunnels: Cal/OSHA requires the use of W65 self-rescuers, a breathing apparatus required for safety during evacuation of fires.
- Gas Monitoring – Assessment: Gas monitoring wells will be installed along the alignment during the preliminary geotechnical investigations. Additional multistage (varying depths) soil gas wells (or probes) will be installed along the alignment in areas where elevated gas has been detected. The probes will be monitored for methane, hydrogen sulfide, oxygen, and carbon dioxide before, during, and after tunneling. Ambient air monitoring will also be performed at the ground surface to screen for indications of soil gas emissions. Any instance where methane is detected at or above a concentration of 5,500 parts per million (ppm) (10 percent LEL) or hydrogen sulfide is

detected at or above a concentration of 20 ppm (OSHA PEL) in a soil probe (5 feet below the ground surface) will be investigated. Where these levels are exceeded, combustible gas monitoring will be performed in the interior of the closest building. In the unlikely event that elevated gas levels are found—and persist—the affected building(s) will be ventilated to reduce the gas levels.

During design, construction, and operations, Metro will implement the following measures to further reduce risks associated with subsurface gas:

- Metro Rail Design Criteria (MRDC) has comprehensive and proven requirements for mitigating, to the point of practically eliminating, the hazard of subsurface gases. Elements of the MRDC are elaborated below.
- Hazardous Subsurface Gas Operations: As with the existing B (Red) and D (Purple) Lines, K (Crenshaw/LAX) Line, and Regional Connector, as well as the planned Metro E (Gold) Line Eastside Extension, Metro will install gas monitoring and detection systems with alarms, as well as ventilation equipment to dissipate gas to safe levels according to Metro's current design criteria and Cal/OSHA standards for a safe work or operating environment. Measures will include, but are not limited to, the following for both tunnel and station operation:
  - High volume ventilation systems with back-up power sources
  - Gas detection systems with alarms
  - Emergency ventilation triggered by the gas detection systems
  - Automatic equipment shut-off
  - Maintenance and operations personnel training
  - Emergency Ventilation Operating Procedures established during design to operate emergency ventilation that is customized to the specifics of each underground transit line
  - Gas detection instrumentation is set to send alarms to activate ventilation systems and evacuate the structures as follows: methane gas—minor alarm at 10 percent of the LEL (activate ventilation) and major alarms at 20 percent of the LEL (evacuation of area)
  - Hydrogen sulfide—Minor alarm at 8 ppm and major alarm at 10 ppm
- Hazardous Subsurface Gas Structural Design: Tunnels and stations will be designed to provide a redundant protection system against gas intrusion hazard. The primary protection from hazardous gases during operations is provided by the physical barriers (tunnel and station liner membranes) that keep gas out of tunnels and stations. High density polyethene (HDPE) is impermeable to and non-soluble in methane and hydrogen sulfide. As with the existing Metro B and D Lines and Regional Connector, as well as the planned Metro E Line Eastside Extension, tunnels and stations will be designed to exclude gas to below alarm levels and include gas monitoring and detection systems with alarms, as well as ventilation equipment to dissipate gas. At stations in elevated gassy ground (e.g., Wilshire/Fairfax), construction could be accomplished using slurry walls—or similar methods such as continuous drilled piles—to provide a reduction of gas inflow both during and after construction than would occur with conventional soldier piles and lagging excavation support. Other station design concepts to reduce gas and water leakage are the use of additional barriers, compartmentalized barriers to facilitate leak sealing, and flexible sealants such as poly-rubber gels, along with high-density polyethylene-type materials

used on Metro's underground stations. Consideration of secondary station walls to provide additional barriers or an active system (low- or high-pressure barrier) will also be studied further to determine if they will be incorporated into the project.

- Tunnel Advisory Panel Design Review: The Metro Tunnel Advisory Panel will review designs with respect to geologic hazards in areas of identified higher risk. The panel will be supplemented, as necessary, by qualified experts in seismic design, gas intrusion, and ground contaminant effects on underground structures.

Refer to PM TRA-2 under Section 2.12, Transportation, for project measures applicable to hazards and hazardous materials.

2.9 HYDROLOGY AND WATER QUALITY

2.9.1 PM HWQ-1: CONSTRUCTION BMPs

Construction BMPs for the project include, but shall not be limited to, the following:

- Establishment of an erosion and sediment control plan prior to the initiation of construction activities. The plan will outline temporary soil stabilization and sediment control BMPs to counter erosion and movement of sediment via wind, vehicles, and dust produced during construction activities. The erosion and sediment control plan may be included as an attachment to the construction Stormwater Pollution Prevention Plan (SWPPP). Rainfall erosivity risks outlined in the SWPPP can be reduced by limiting the number of rainy seasons associated with the project's construction timeline.
- Development of a SWPPP to comply with all requirements of the Construction General National Pollutant Discharge Elimination System (NPDES) Permit.
- Dewatering and groundwater disposal in compliance with applicable dewatering permits, including Los Angeles Regional Water Quality Control Board (LARWQCB) Order No. R4-2023-0429.
- Implementation of drainage and grading plans and treatment control BMPs designed to protect water quality, such as oil/water separators, catch basin inserts, storm drain inserts, media filtration, and catch basin screens.

2.9.2 PM HWQ-2: OPERATIONAL BEST MANAGEMENT PRACTICES

Operational BMPs for the project include, but shall not be limited to, the following:

- Implementation of Municipal Separate Storm Sewer System (MS4) permit post-construction water quality requirements, Low-Impact Development (LID) standards, and local policies protecting water quality, including design features to reduce impervious surfaces and treatment of stormwater runoff using LID infiltration BMPs such as bioretention facilities or pervious pavement.
- Treatment of pumped groundwater via media filtration BMPs or via a water treatment facility.

2.9.3 PM HWQ-3: FLOOD EVENTS (ALIGNMENTS ONLY)

If a flood event occurs in a Federal Emergency Management Agency (FEMA) flood zone during construction of the project, construction activities shall cease and equipment and materials shall be moved to a safe location outside the floodwaters.

2.10 NOISE AND VIBRATION

2.10.1 PM NOI-1: GUIDELINES TO PROTECT CATEGORY 1 AND CATEGORY 3 LAND USES, HISTORIC BUILDINGS AND HISTORIC NON-BUILDING STRUCTURES DURING CONSTRUCTION

The general guidelines to protect Category 1 and Category 3 land uses, historic buildings and historic non-building structures from damage during construction of the project alignments comprise project measure PM NOI-1 and are discussed below. These guidelines should be customized for listed or eligible historic properties. The detailed steps that may be required to protect historic and fragile buildings from damage during construction are:

- Pre-Construction Survey: Metro or the contractor should perform a pre-construction survey of the structural elements of historic buildings near major construction projects. Pre-construction surveys typically include inspecting building foundations, exterior, and interior elements and documenting any pre-existing defects such as cracks, settlement, subsidence, corrosion, or water damage. Defects that need to be monitored during construction should be noted and, where appropriate, crack monitors installed prior to the start of construction. For historic structures, the pre-construction survey also should include an inspection of the historically significant features of the buildings, such as stained-glass windows, ornaments and sheet metal cornices signboards in front of buildings, and engravings on the facade of buildings. The historical survey should be performed by historic architects and the structural survey should be performed by qualified professional engineers prior to the start of construction. The survey report will assist in the resolution of any damage claims that are made as a result of the construction. For Category 1 and Category 3 buildings, the survey will document the type of use, location of use and the existing vibration levels.
- Vibration Control Plan: Preliminary source vibration levels are presented in Table 2-1. These source levels are preliminary in nature and it is up to the contractor to verify and update information prior to and/or during construction. The contractor shall provide the results of the calculated vibration levels, with the locations for the calculations indicated on the site sketch in a Vibration Control Plan to be submitted to Metro for approval. If the results of the vibration calculations or representative field data indicate that the predicted construction vibration levels exceed the damage risk criteria, the plan will identify proposed vibration abatement measures and their anticipated vibration effects, include a schedule for their implementation, provide calculations demonstrating the effectiveness of the proposed abatement measures, and, if applicable, provide applicable drawings and sketches to indicate where such abatement measures will be placed.

TABLE 2-1.CONSTRUCTION VIBRATION

EQUIPMENT	PPV AT 25 FEET (INCH/SECOND)	APPROXIMATE L_V AT 25 FEET
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall) in soil	0.0008	66
Hydromill (slurry wall) 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
Load trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: FTA 2018
PPV = peak particle velocity; Lv = velocity level

- Vibration Monitoring: The primary goal of monitoring is to verify that the vibration limits are not exceeded. When construction activities that create high vibration levels will be performed near vibration-sensitive buildings, the contractor should be required to monitor vibration to verify that the construction activities do not exceed the vibration limits. In addition, the contractor should be required to perform testing to verify that the vibration levels will be below the applicable limits before starting the actual construction. For example, if vibratory compaction is needed near a historic building, a short test using the compactor should be monitored prior to starting the compaction to ensure that the vibration levels will be below the allowable limits. If vibration from the test approaches or exceeds the limits, the contractor should immediately cease operations and conduct an inspection of the nearest historic property to determine if any damage occurred. The contractor should be required to reduce the intensity of the vibratory compactor until the vibration amplitudes at all sensitive buildings are below the applicable limit before construction could resume. Only then should the actual vibratory compaction commence, with continued monitoring. The key guidelines for vibration monitoring are:
  - Minimize the use of impact devices, such as jackhammers, pavement breakers, and hoe rams that cause the highest vibration. Where possible, use concrete crushers or pavement saws rather than hoe rams for tasks such as concrete deck removal and retaining wall demolition.
  - Continuous vibration monitoring should be performed whenever construction activities that generate high vibration levels are active within 100 feet of vibration-sensitive structures.
  - If the vibration levels exceed the allowable amplitudes, construction activities should be halted immediately and the engineer should be notified. Construction should not be allowed to commence until the engineer approves the contractor's approach for reducing the vibration levels. The engineer should be responsible for notifying property owners that the vibration limits were exceeded.

  - For historic buildings, ground motion generated by construction activities should not exceed a peak particle velocity (PPV) limit of 0.20 inches per second at any location within 10 feet of any part of the building. For the non-historic structures, ground motion generated by construction activities should not exceed a PPV limit of 0.50 inches per second at any location within 10 feet of any part of the structure.

- Visual Inspection During Construction: Follow-up visual inspection of particularly sensitive building features should be performed during and after high-vibration construction activities near sensitive buildings.
- Remove or Secure Fragile Elements: Before construction begins, some of the fragile elements in a building, such as chandeliers or wall decorations, would be removed for the duration of the construction, or would be more safely secured to the wall to ensure that they are not damaged or displaced due to high vibration activities.
- Secure or Repair Lose Elements: Any elements identified on a building as loose or in danger of damage due to a pre-existing condition would be repaired prior to construction to ensure that high vibration activities will not exacerbate the problem. If it is not feasible to repair the element (which would be the building owner's responsibility), temporary means of securing the element should be used.
- Alternative Construction Procedures: For some construction processes, it may not be feasible to meet the vibration limits. In these cases, alternative construction processes may be required. Examples include the use of vibratory compaction near churches and theaters, and operating large tracked vehicles such as bulldozers, next to sensitive buildings. Alternative procedures include use of non-vibratory compaction in limited areas and using a bobcat in place of large bulldozers within 25 feet of buildings.

2.10.2 PM NOI-2: FTA DETAILED VIBRATION ASSESSMENT

The vibration assessment conducted for this project is based on the conceptual design plans as known in October 2023. Due to refinements that can occur in the design of the project, such as changes in depth or location of the tunnel, the predicted vibration impacts may be further analyzed once a preferred alignment is chosen. In the final design stage, Metro would prepare a Federal Transit Administration (FTA) Detailed Vibration Assessment for a more comprehensive analysis of the actual vibration impacts within the vicinity of the project.

This future vibration assessment would require borehole propagation tests at various locations within the vicinity of the project. The borehole tests would provide detailed data about which frequencies are transmitted through the ground.

The project is classified as a Frequent Event by the FTA vibration event criteria. Metro would commit to constructing and operating the project within the FTA Category 3 land use ground-borne vibration (GBV) impact threshold of 75 vibration decibels (VbB) for Frequent Events. The FTA methodology includes a safety buffer of +5 VdB for all FTA thresholds to account for uncertainty in building amplification, future

rail corrugations, and wheel roughness. Preparation of an FTA Detailed Vibration Assessment would ensure construction and operation of the project would not exceed this GBV impact threshold.

2.11 PUBLIC SERVICES AND RECREATION

Refer to PM TRA-2 under Section 2.12, Transportation, for project measures applicable to public services and recreation.

2.12 TRANSPORTATION

2.12.1 PM TRA-1 OPERATIONAL BEST MANAGEMENT PRACTICES

Operational BMPs for the alignments and stations, the design option, and the MSF shall include the following:

- Sidewalks shall not be altered to the extent that pedestrian circulation would be impaired or in violation of Americans with Disabilities Act (ADA) standards.
- Metro shall engage in first/last mile planning with local jurisdictions to improve the safety of station access for pedestrians and bicyclists. Examples of first/last mile improvements could include:
  - Signal timing for pedestrians and cyclists
  - Bike facilities and bike parking
  - Wayfinding signage to key destinations and transit connections
  - New or improved sidewalks and crosswalks
  - New or improved bus shelters and digital information signs
- Operation of the project shall not conflict with any identified local programs, plans, or policies for circulation elements in coordination with local jurisdictions.
- Stations shall be designed in accordance with the Metro Rail Design Criteria (MRDC), including fire/life safety design criteria, to ensure safety and to minimize potential hazards at all locations.
- The project shall be operated per applicable state, Metro, and city design criteria and standards, including adherence to design codes and standards such as the Occupational Safety and Health Administration (OSHA), Cal/OSHA, California Public Utilities Commission, and Metro safety and security programs and standards (i.e., MRDC, Metro Systemwide Station Design Standards Policy, and Metro Transit Service Policy).
- Any station curbside passenger pick-up/drop-off areas shall be designed according to applicable state, Metro, and city design criteria and standards.
- Driveway access to the MSF shall be designed according to applicable state, Metro, and city design criteria and standards.

2.12.2 PM TRA-2 CONSTRUCTION BEST MANAGEMENT PRACTICES

Construction BMPs for the alignments and stations, the design option, and the MSF shall include the following:

- Cooperation with the corridor cities and Caltrans shall occur throughout the construction process. Restrictions on haul routes may be incorporated into the construction specifications according to local permitting requirements.
- Pedestrian access to adjacent properties along the alignments and stations, the design option, and the MSF shall be maintained during construction.
- Construction activities shall comply with OSHA, Cal/OSHA, and Metro safety and security programs.
- Safety for pedestrians, bicyclists, and motorists shall be maintained during construction using signage, partial lane closures, construction barriers, and supervision by safety and security personnel at access points and throughout construction sites.
- Metro shall prepare a Traffic Management Plan (TMP) in coordination with Caltrans, cities, and local fire and police departments prior to initiating construction activities that includes the following:
  - Standard practices shall be followed that include scheduling of lane and/or road closures to minimize disruptions.
  - Detour plans shall be prepared for any streets requiring a full closure to provide safe alternate routes to vehicular traffic, pedestrians, and bicyclists during these closures.
  - Traffic control plans shall be prepared to route vehicles, bicyclists, and pedestrians around any partial closures of streets, bicycle facilities, and sidewalks.
  - Information on bus stop relocation and modification to bus routes shall be provided, as applicable. Signs shall be posted to inform transit users in advance of street closures.
  - Construction timings and street closure information shall be available to the public through media alerts, the project's website, and changeable message signs.
  - The nearest local first responders shall be notified, as appropriate, of traffic control measures in the TMP during construction to coordinate emergency response routing.
  - The delivery and pick up of construction material during non-peak travel periods shall be scheduled to the extent possible to reduce the potential of conflicts between construction trucks and commuter traffic.
  - Coordination shall occur with other construction projects in the vicinity.
- The project shall be designed and constructed per applicable state, Metro, and city design criteria and standards, including adherence to design codes and standards such as the OSHA, Cal/ OSHA, California Public Utilities Commission, California Manual on Uniform Traffic Control Devices (MUTCD), and Metro safety and security programs and standards (i.e., MRDC and Metro Systemwide Station Design Standards Policy). The construction TMP will be prepared in compliance with these standards.

- Financial assistance may be provided to small businesses along the proposed alignments and stations, the design option, and the MSF that are directly affected by construction activities through grants to cover certain fixed operating expenses such as utilities, rent or mortgage, and insurance.
- Metro shall coordinate with the Hollywood Bowl to maintain circulation and access to the Hollywood Bowl during construction of the optional Hollywood Bowl Station.

CHAPTER 3: REFERENCES

South Coast Air Quality Management District (SCAQMD). 2005. Rule 403 Fugitive Dust. Available at: https://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.

Los Angeles County Metropolitan Transportation Authority (Metro). 2011. Metro Green Construction Policy. Available at: http://media.metro.net/projects_studies/sustainability/images/Green_Construction_Policy.pdf.

Los Angeles County Metropolitan Transportation Authority (Metro). 2017. Metro Rail Design Criteria.

Los Angeles County Metropolitan Transportation Authority (Metro). 2018. Systemwide Station Design Standards Policy. Available at: http://libraryarchives.metro.net/DPGTL/Policies/2018-systemwide-station-design-standards-policy.pdf.

Los Angeles County Metropolitan Transportation Authority (Metro). 2020. *Moving Beyond Sustainability: Sustainability Strategic Plan 2020.* Available at: http://media.metro.net/2020/Moving-Beyond-Sustainability-Strategic-Plan-2020.pdf.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual. FTA Report No. 0123.* Office of Planning and Environment. September 2018.