Technical Memorandum

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Re: Sidewalk and Transit Amenities Program
Noise and Vibration Impact Analysis

1.0 PURPOSE AND ORGANIZATION OF THIS MEMORANDUM

The purpose of this memorandum is to document the results of the Noise and Vibration Impact Analysis as it relates to potential environmental impacts associated with construction and operation of the proposed Sidewalk and Transit Amenities Program (STAP). In addition, this memorandum will support the findings of the Initial Study that will be prepared to identify the appropriate environmental document for the project, in compliance with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines.

2.0 PROJECT LOCATION AND SETTING

The City of Los Angeles (City) covers approximately 468.7 square miles and is generally located at the southwestern section of Los Angeles County (see Attachment A). Public transit services in the City are provided by the Los Angeles County Metropolitan Transportation Authority (Metro), City of Los Angeles Department of Transportation (LADOT), Southern California Railroad Authority (SCRRA or Metrolink), and bus services from adjacent cities. Current inventory indicated that there are 1,884 existing transit shelters in the City, which are located at scattered bus stop locations that are used by Metro, LADOT DASH and Commuter Express, Culver City, Santa Monica Big Blue Bus, and other regional and municipal bus operators.

Approximately 21 percent (63,888 acres) of all land in the City is developed as streets, storm drainage channels, utility facilities, and reservoirs. The City currently maintains an inventory of 1,884 transit shelters, 197 public amenity kiosks, 6 vending kiosks, and 15 automated public toilets as part of its Coordinated Street Furniture Program (CSFP). Table 1 provides an inventory of these facilities. The CSFP is entirely funded by advertising revenue from advertising panels at most existing program furniture locations.

Table 1 CSFP Inventory

Structures and Facilities	Number
Advertising Shelters	1,667
Non-Advertising Shelters	123
Rapid Bus Shelters	52
Los Angeles Neighborhood Initiative (LANI) Non-Advertising Shelters	42
Total Transit Shelters	1,884
Public Amenity Kiosks	197
Vending Kiosks	6
Total Advertising Panels (with 13% for public service programs)	3,679
Automatic Public Toilets (APTs) (owned/operated by a private firm)[1]	15

Source: StreetsLA, 2021.

3.0 PROJECT DESCRIPTION

3.1 Project Objectives

The STAP would be implemented by the Department of Public Works Bureau of Street Services (StreetsLA) and would provide shelter, shade, safety, and comfort to the City's transit riders, active transportation users, and pedestrians. The program would support public transit and shared use of the sidewalk; improve transit information and public service delivery; be a self-sustaining program through the reinvestment of advertising revenues to improve access and mobility; and create a dynamic program that incorporates flexibility and collaboration with other City goals and programs. These goals would be achieved through the efficient delivery of enhanced program elements and active management by the City.

The primary objectives of the STAP include the following:

- Promote and expand the use of transit, active transportation, and shared mobility by improving the quality and technological capability of associated physical program elements, such as transit shelters, kiosks, and other amenities
- Improve the intrinsic design qualities of street furniture and other public right-of-way infrastructure and streetscapes on a citywide basis
- Provide public benefits to help strengthen neighborhoods while facilitating an economically and physically sustainable project
- Foster a public-private collaborative approach to provide expanded and more equitable public services, regular STAP equipment maintenance, and revenue to the City using commercial advertising opportunities

1 APTs are currently considered an option for inclusion in the new STAP but are not a mandatory component of the incoming program. The City is considering its options to pursue a separate public toilet program. Were the City to create a stand-alone public toilet program, the current APT inventory would be included as part of that program and would not be part of STAP.

3.2 Project Implementation Features

Construction of the transit shelters under STAP would occur over a three- to six-year time span, from 2022–2024 or 2027 depending upon the negotiated terms of the final contract. During the initial program years, approximately 664 existing transit shelters would be upgraded, with a similar number of transit shelters refurbished and reinstalled at new locations. STAP will provide upwards of 1,116 new transit shelters at bus stops currently absent such amenities, in addition to the existing 1,884 shelters which will be replaced as part of the STAP roll-out process. Any existing furniture not reused/reinstalled is to be disposed of or salvaged for recycle content. At the end of the deployment period, the City would have upwards of 3,000 new transit shelters. As many as approximately 200 to 300 urban panels[2] and other optional program elements may also be installed in parallel with the transit shelters during the latter half of the roll-out process and beyond.

Maintenance and operation of all the transit shelters, existing and new, would be the responsibility of the contractor for 10 years with two potential 5-year extensions, in accordance with agreements with the City. In summary, program implementation would include the following activities:

- Dismantling and removal of existing transit shelters and amenities
- Refresh a number of existing shelter and construction of new transit shelters
- Maintaining the revitalized and new transit shelters
- Installation of urban panels at or within the vicinity of the transit shelters
- Installation of other optional program elements at or within the vicinity of the transit shelters

This section provides an overview of various elements to be performed to implement the STAP.

3.2.1 Construction Equipment

Construction equipment associated with implementation of the project under all scenarios would typically include power tools (e.g., concrete cutting saws, circular saws, drills, impact drivers, etc.); electric, compressed air, or hydraulic jack hammer; a skid steer loader; backhoe; 5- to 10-cubic yard dump truck; flatbed trailer; boom truck; and hand tools. This equipment would be in use from 2 to 8 hours per day.

3.2.2 Construction Crew

It is estimated that a crew of three to seven construction workers would be needed for each of the major actions of either physically dismantling an existing transit shelter or installing a refurbished or new shelter.

[2] Urban panels are digital displays that are positioned on the street level to be viewed by pedestrians and vehicular traffic.

3.2.3 Hours of Construction

Work would generally occur from 7:00 a.m. to 4:00 p.m., Monday through Friday (8 hours per day). On occasion, work may take place on a Saturday between 8:00 a.m. and 5:00 p.m. In select locations, work hours may be reduced to accommodate rush-hour restrictions. It is anticipated that no construction would occur on Sundays or holidays. (See General Conditions 00210 and Los Angeles Municipal Code Section 41.40.)

3.2.4 Site Access, Traffic Circulation, and Parking

All STAP elements would be installed to ultimately provide a clear path of travel with a minimum 5-foot width to allow for pedestrian circulation. Placement of new STAP elements would maintain minimum distance requirements from bus stops; rail station entrances; building/property ingress/egress points; fire hydrants; stand pipes; building fire safety equipment; belowground utilities and related structures; power outlets; utility/street light/traffic signal poles; utility cabinets/aboveground facilities; signs/sign posts; street trees and tree wells; landscaped planters and/or parkways; driveways; access ramps; and other permitted street improvements.

Sidewalk, curb, and lane closure is expected to last for approximately 2 hours per transit shelter removal site. For purposes of installing transit shelters, it is expected that intermittent closure of a sidewalk, curb, and/or traffic lane would occur over a 2.5-day period, with 1 day projected to get the shelter site prepared and 1.5 days to physically install and make the shelter operational. No curb-lane closure(s) would generally be allowed during peak traffic periods (i.e., the hours of 6:00 to 9:00 a.m. and 4:00 to 7:00 p.m.); occasional exemptions to peak traffic hour restrictions may be sought on a case by case basis to accommodate installation schedules. Bus stop operations may temporarily be relocated to the opposite side of a typical intersection, next nearest stop, or suspended during activities to either dismantle or install a shelter. No parking is anticipated to be affected by any STAP work.

3.2.5 Landscaping and Lighting

Where possible, STAP elements are intended to enhance or take advantage of tree canopies that provide natural shade and shelter. No trees are proposed to be removed with implementation of the STAP elements under most instances. However, there may be situations where tree root pruning that is required to make sidewalk repairs necessary to achieve Americans with Disabilities Act (ADA) compliance may destabilize an existing street tree beyond a reasonable level of liability and thus, may likely require the removal of such tree to minimize public safety risks and to bring liability levels down to an acceptable level. When the installation of a transit shelter brings with it the possibility that a street tree may have to be removed, the contractor would have to comply with existing City regulations, including the need for a street tree removal permit from the Board of Public Works; public notification of the proposed removal of three or more street trees; a Board of Public Works public hearing for consideration of removal of three or more street trees at a specific address; and provision of replacement trees on a 2:1 basis with 24-inch box size tree stock to be watered for a minimum 3-year period. .

As part of the Green New Deal, StreetsLA began to add cooling features, trees, and more shade at bus stops in October 2019. A coordinated effort between the STAP and other City efforts to achieve the Green New Deal goals would be undertaken.

The proposed project would comply with pertinent City's ordinances related to lighting. All transit shelters would come equipped with evening hour security lighting to illuminate passenger waiting areas beneath canopies. Shelter roofs may be equipped with solar panels or green roofs in limited quantities depending on need and/or appropriateness. Other optional shelter features may include free Wi-Fi, charging ports or stations, and possibly cooling systems.

Motion on digital screens would not be allowed, and limitations would be placed on their brightness. Digital elements would have ENERGY STAR ratings for efficiency with light-emitting diode (LED) screens. These devices must automatically control their brightness in response to the time of day and sunlight. All elements of STAP would also be controlled through a Content Management System, which would automatically adjust the brightness of specific devices by location to match the allowable increase over ambient light levels (not to exceed 0.3-foot candles).

3.2.6 Utilities/Utility Coordination

Subsurface utility work associated with the installation of new STAP elements would primarily be coordinated with the City's Department of Water and Power and the Bureau of Street Lighting to provide electrical power and water services that may be necessary for STAP program elements. STAP installation efforts will also be coordinated with any other utilities or subgrade infrastructure that may be located in the City's rights-of-way. Certain water and power system connections may be necessary within the roadway and sidewalk areas to accommodate new project components, such as shelter lighting, digital displays, and hydration stations.

No new utility boxes or power line relocations are required for the removal of existing transit shelters. It is anticipated that any existing shelters to be replaced with a new shelter would utilize the existing electrical services. New electrical service would be required for the proposed 1,116 new shelter locations. However, it is anticipated that existing electrical circuits and water service lines will be used; therefore, no utility line upgrades are anticipated.

3.2.7 Code Compliance

STAP's elements would comply with all applicable Structural, Seismic, Plumbing, and Electrical Codes, and other specific City-adopted policies and standards applicable to the public right-of-way. This includes compliance with Department of Public Works Standard Specifications, Standard Specifications for Public Works Construction, City amendments to the Standard Specifications for Public Works Construction (Brown Book) and various Standard Plans .

3.2.8 Operation and Maintenance

Maintenance of all STAP elements would be performed in accordance with performance based contract maintenance standards that takes into account historical data, including public comments and complaints received by the City's 311 Center, STAP web forms, crowd-sourced information, and data collected by StreetsLA's Asset Management Program.

Maintenance of program elements would include cleaning, removing graffiti and stickers, and removing litter in, on, and around each element. All physical shelter and associated street furniture amenities and digital devices would be maintained and kept in good working order by the removal of dust, grime, dirt, stickers, tags, and etchings. The digital technologies would possess a self-reporting feedback loop to alert the StreetsLA's Asset Management System of the need for repair, refurbishment, reconditioning, or replacement, and periodic onsite visual inspections by City staff would be used in tandem to ensure all STAP elements are properly maintained.

3.3 Construction and Implementation Scenarios

The three scenarios described below are developed for illustrative purposes to represent the most frequent STAP activities, including dismantling, removal, and relocation of existing transit shelters (Scenario 1) and the placement of new shelters at new locations/ bus stops that currently do not have transit shelters (Scenarios 2a and 2b). An additional scenario (Scenario 3) was also developed for a programmatic analysis of program elements that relate to operation and maintenance activities of transit shelters and associated furniture in place. These scenarios are representative of various configurations, depending on the conditions of each site. All components described below would not occur at each project location.

3.3.1 Shelter Dismantling and Removal

Under the STAP, approximately 1,884 existing transit shelters are slated to be dismantled and removed from their current locations over a 3- to 6-year time horizon beginning in 2022. Of these, up to 664 shelters are expected to be refurbished and re-distributed during the initial program years to provide a more immediate expansion of shade and shelter at bus stops currently absent such amenities until such time the refreshed transit shelters may be replaced by new transit shelters as a part of the STAP roll-out process. Any combination of the following activities would be required for this construction scenario:

- Dismantling and removal of existing transit shelters, kiosks, and associated amenities
- Temporary or permanent disconnection and proper capping of utility services to existing transit shelters, kiosks, and associated amenities for safety and future access where needed
- Transport of shelter components to a relocation/assembly site, recycling center, and/or appropriate disposal facility

- Refurbishing shelters and other street furniture removed from existing shelter sites
- Site preparation, including removal of existing sidewalks, foundations, and reestablishment of utility connections as needed

The dimensions of most existing transit shelter structures are approximately 5 feet by 13 feet and 9 feet in height, with an attached or detached bench and litter receptacle(s). For impact analysis purposes, it is estimated that approximately 10 square feet of the existing shelter area would be disturbed with a maximum of 0.5-foot excavation depth required. The excavation volume of soil and debris of approximately 5 cubic feet would be removed for disposal at the local landfill. The shelter's electrical components would be disposed of separately. Any steel or aluminum shelter components would be salvaged and recycled.

It is estimated that the average time to take down and transport an existing shelter would range between 2 and 3 hours, with one of these hours reserved per day for traffic lane management. A crew of three to five staff would be needed at each dismantling operation. Intermittent lane closure or curb restrictions would be required. No streets would be completely closed to vehicular traffic during the transit shelter dismantling process, but traffic flag persons and/or devices may need to be in place during the dismantling period to protect vehicles, bicycles, and pedestrians if adequate width for deployment of the equipment is not otherwise available. Bus stops would need to be temporarily relocated or suspended. No parking impacts are anticipated.

3.3.2 Shelter Construction and Installation

A total of 1,116 new transit shelters that would be constructed at designated locations, at existing bus stops without transit shelters, and the existing 1,884 transit shelters would be replaced. The dimension of each new structure would be approximately 5 feet wide, 14-20 feet long, and 9 feet tall. It would be equipped with seating, illumination for security and safety, and provide a separate stand-alone litter/recyclable receptacle.

Construction and installation of each new transit shelter would include any combination of the following activities:

- Installation of refurbished and renewed transit shelter or a new transit shelter at a bus stop that previously had a shelter or amenities
- Installation of refurbished and renewed transit shelter or a new transit shelter at a location that did not previously have a shelter or amenities
- The following program elements may be provided in the area adjacent to the shelter canopy:
  - Installation of litter/recycling receptacles, digital displays, interactive information kiosks, vending kiosks, urban panels, and eLockers
- Any of the following elements may also be incorporated within, or in the vicinity of transit shelters:

    - Shade structures; docks and/or corrals for scooters or bicycles; bollards; pillars; traffic barriers; electric vehicle charging stations[3]; hydration stations; handwashing stations or hand sanitizer dispensers; cooling stations; public Wi-Fi and Broadband 5G; charging ports or stations; public art and features that reflect local and/or architectural history;
- Sidewalk reconstruction related to the installation of new or replacement transit shelters[4], including fixing broken concrete, cracks, and making required accessibility improvements such as cross-slope work for ADA compliance
- Minor utility work, such as underground or overhead utility connections may be required

Each of the new and updated shelters would be equipped with a canopy, a bench, and a litter receptacle with the size of the canopy varied. The City intends to incorporate various amenities as part of STAP to take advantage of expanding innovations in transit and smart technology, including customized automated digitized advertising panels, some of which may be interactive with the capability of providing wayfinding, real-time bus arrival, and other public information. Media kiosks, approximately 4.5 feet by 2 feet wide and 8 feet tall, will each have two display panels containing a combination of digital graphics and/or static printed commercial advertising; wayfinding, bus arrival, or other public services message content, which may either be incorporated into the transit shelter or installed as separate, stand-alone structures. Newsstand vending kiosks, public amenity kiosks, and urban panels may be included as part of the project. Installation of transit shelters and associated amenities may require sidewalk reconstruction.

For impact analysis purposes, it is estimated that the installation of each transit shelter would disturb an area of approximately 105 to 128 square feet (i.e., 7-8 feet by 15-16 feet); the excavation volume of soil and debris would range from a minimum 25 cubic feet to a maximum of 220 cubic feet, depending on the shelter model and foundation; the maximum depth of excavation would be 3 feet. Construction would require temporary closure of the public sidewalk and temporary use of the public street in front of the bus stop/transit shelter site for up to 8 hours during each of the 2 to 3 days of construction because installation of transit shelters and associated amenities may require sidewalk reconstruction. A crew of 3 to 7 workers would be needed to complete the work at each shelter per day.

Intermittent lane closure or curb restrictions would be required over the approximately 2.5 days required to install shelters. No streets would be completely closed to vehicular traffic

[3] Electric vehicle charging stations would be incompatible with bus stop zones where no-parking is allowed; but ***may*** be a program feature provided away from/outside of bus stop zones.

[4] The STAP will not be making comprehensive sidewalk repairs throughout a bus stop zone. ADA related sidewalk reconstruction in particular, will be limited to the area immediately beneath the transit shelter, transition areas needed to access the ADA-compliant area beneath a transit shelter, and an ADA-compliant Pedestrian Access Route (PAR) from the waiting area beneath a transit shelter to the ADA-compliant 5-foot by 8-foot boarding/alighting area adjacent to the bus stop sign post. Sidewalk panels disturbed by transit shelter installations will likely be repaired replaced but the scope of additional sidewalk repairs beyond that will be reviewed and determined on a case by case basis depending upon the ability of the City to cover the costs of such work.

during the transit stop/shelter installation process, but traffic flag persons and/or devices may need to be in place during the installation period to protect vehicles, bicycles, and pedestrians if adequate width for deployment of the equipment is not otherwise available. All construction vehicles would be removed daily from the construction site location. Bus stops would need to be temporarily relocated or suspended. No permanent parking impacts are anticipated.

3.3.3 Shelter Operations and Maintenance

Maintenance of all of the program transit shelters and other amenities would be performed by the contractor on an ongoing basis over the 10-year period. The activities would include any combination of the following:

- Cleaning of shelter, associated program elements, and sidewalk area on a regularly scheduled (minimally twice per week) and emergency basis, including use of power-washing equipment
- Removal or abatement of graffiti and/or stickers
- Abatement of etching to the highest degree possible
- Litter and recyclable collection and disposal
- Shelter repair work, including fixing broken ad panels, inoperable lights, shelter structures, benches, litter receptacles, and other program elements
- Minor utility repair, such as replacing light elements, fuses, and utility box repairs
- Periodic re-painting or re-coating of transit shelters and their related components

A typical maintenance schedule is presented in Table 2.

Table 2 Typical Maintenance Schedule

Type of Maintenance	Description	Frequency	% of Total Inventory per Frequency
Preventive	Replacement of worn structural elements; original equipment manufacturer (OEM) recommended maintenance of digital displays	Monthly or as needed	15%
Regular	Removal of graffiti, stickers, etchings, and tags; replacement of broken structural elements; cleaning of digital displays; removal of litter and debris	Minimally 2 times per week	100%
Hot Spots	All preventive and regular	Minimum of 3 times per week	Based on need
Deep Cleaning	Power washing to pads and program elements; painting or repairs to structural damage; removal and refurbishment of program elements	Rotating schedule: quarterly for power washing; additional power washing at specific locations as needed biannually or as needed for painting and all other repairs	Power washing: 100% Painting & all other repairs: 50%

Table 2 Typical Maintenance Schedule

Type of Maintenance	Description	Frequency	% of Total Inventory per Frequency
Emergency	Replacement of broken glass, damaged structures, broken digital displays; safely secure and/or restrict access to furniture that cannot be repaired immediately to minimize liability concerns.	Upon notification and no later than 24 hours after notification	100%

Source: StreetsLA, 2021.

4.0 EXISTING CONDITIONS

There are approximately 1,884 existing transit shelters and several other transit stops without shelters located within the City. Land uses near the transit stops include a wide range of categories, including residential, school, recreational, medical, commercial, public, institutional, open space/undeveloped, and industrial. The primary source of ambient noise within the transit stops are adjacent streets, with varying vehicle capacity and number of travel lanes from surface streets to major arterials.

5.0 NOISE AND VIBRATION CONCEPTS

Noise, generally defined as unwanted sound, is measured and expressed in decibels (dB) to conveniently discuss quantities across the wide range of human hearing capacity. To better approximate the range of sensitivity of the human ear to sounds of different frequencies, standard “A-weighting” dB adjustments can be applied to measured sound levels that de-emphasize low frequencies and very high frequencies. When such A-weighting is used, the dB levels are noted with a “dBA” descriptor.

While a 10 dBA increase in sound level represents a 10-fold increase of sound energy, average healthy human hearing perceives such an order of magnitude increase as a doubling of loudness. Noise levels from point-type sources (e.g., a stationary air-conditioning unit) attenuate hemispherically at a rate of approximately 6 dB per doubling of distance, while line-type sources (e.g., roadway noise) attenuate cylindrically at a rate of approximately 3 dB per doubling of distance. For purposes of illustration, a stationary air conditioning unit might produce 60 dBA at a distance of 15 feet; therefore, its sound level at a distance of 60 feet would be 48 dBA (i.e., each doubling of distance from this point-type source lowers the sound level by 6 dBA).

Community Noise Equivalent Level (CNEL) represents an energy average of the A-weighted noise levels over a 24-hour period with 5 dBA and 10 dBA increases added for nighttime noise between the hours of 7:00 and 10:00 p.m. and 10:00 p.m. and 7:00 a.m., respectively. The increases were selected to account for reduced ambient noise levels during these time periods and increased human sensitivity to noise during the quieter periods of the day.

Vibration is an oscillatory motion through a solid medium in which amplitude can be described in terms of displacement, velocity, or acceleration. The average vibration amplitude (i.e., the root mean square [RMS] velocity) is the most appropriate descriptor for gauging human response to typical ground vibration. As with airborne sound, the RMS vibration velocity level is often expressed in dB notation as vibration dB (VdB), which serves to compress the range of numbers required to describe vibration. This VdB scale is based on a reference value of 1 micro-inch per second. According to Federal Transit Administration (FTA) guidance, the background vibration velocity level typical of residential areas is approximately 50 VdB (FTA, 2006). Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA, 2006).

6.0 RELEVANT REGULATORY SETTING

6.1 State

California requires each local government entity to adopt a noise element as part of its general plan. State land use guidelines for evaluating the compatibility of various land uses as a function of community noise exposure are presented below under Local Regulations and Standards.

6.2 Local

The City of Los Angeles has established policies and regulations concerning the generation and control of noise that could adversely affect its citizens and noise-sensitive land uses.

City of Los Angeles Municipal Code (LAMC)

City of Los Angeles *Noise Ordinance*: LAMC, Chapter IV, Article 1, Section 41.40; and Ordinance No. 161,574 and amended Ordinance No. 156,363 (The City *Noise Ordinance*) address noise generated at construction sites, including permissible hours of construction. In addition, operational noise from stationary and mobile sources is regulated by the City.

The City *Noise Ordinance*, Section 112.05 states that construction and industrial machinery shall not exceed a maximum of 75 dBA at a distance of 50 feet in a residential zone or within 500 feet of a residential zone, except where compliance is technically infeasible. In addition, LAMC Section 41.40, as referenced, restricts construction activities during different hours of the day (i.e., no person shall perform any construction or repair work that makes loud noises that disturb persons occupying sleeping quarters in any place of residence between the hours of 9:00 p.m. of one day and 7:00 a.m. of the following day).

There are no adopted City standards for groundborne vibration. In the absence of such local regulations, FTA provides guidance on appropriate vibration limits with respect to

sensitive receptors. According to FTA, vibration impacts associated with human annoyance would be significant if vibration caused by construction activity assessed at a receptor exceeded 85 VdB, a vibration velocity (Lv) level that is considered acceptable only for an infrequent number of events per day (FTA, 2006).

7.0 IMPACT ANALYSIS

This section addresses the potential impacts from construction activities, operational noise from the project, and the CEQA noise impact checklist.

7.1 Basis of Analysis

Based on review of the STAP implementation plan, construction activities for the STAP elements would typically occur Monday through Friday, with construction crews arriving at construction sites around 7:00 a.m. Construction start times may be delayed to 9:00 a.m. for sites in busy areas without on-street parking.

Dismantling, removal, and relocation of existing transit shelters (Scenario 1) and the placement of new shelters at new locations/bus stops that currently do not have transit shelters (Scenarios 2a and 2b) are prototypical construction scenarios. Each dismantling/removal of an existing shelter would be unique, and the construction needs would vary depending on several factors including, but not limited to, the condition of the shelter, the adjacent land uses, how busy the adjacent street is, the level of pedestrian traffic, and whether utilities need to be moved/abandoned.

The most conservative construction scenario of the transit shelters under STAP would occur over a 3-year time span, from 2022–2024. Table 3 illustrates the anticipated improvements during the first 3 years of the program.

Table 3. Overview of Anticipated Improvements during First 3 Years of the Program

Year	Existing Facilities Removed/ Upgraded	New Locations	Total Annual Improvements	Total Citywide Transit Shelter Locations	Maximum Weekly Improvements	Maximum Daily Improvements
1*	770	664	1,434	2,548	30	6
2**	889	226	1,115	2,774	25	5
3**	889	226	1,115	3,000	25	5

Notes:
* 664 New Locations in Year 1 use repurposed components from 770 removed.
** Upgrades in Year 2 and Year 3 include previous shelters constructed at sites using repurposed components from dismantled shelters (332 each).

Table 4 summarizes the anticipated daily construction activities that would likely occur for each construction scenario for the STAP.

Noise from STAP element construction has been predicted using the FTA "general assessment" method that focuses on the anticipated equipment and construction duration onsite per phase. Consistent with data provided by the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* (RCNM) (FHWA, 2006), the predictive analysis for this study also applies the "acoustical usage factor" to calculate an equivalent sound level (L_{eq}) for a typical hour during which the construction equipment is expected to generate noise. Other factors included in the analysis are as follows:

- On average, construction equipment noise emanates from a single point at the geographic center of the construction activity representing the mobility of construction activities and equipment locations across the entire transit shelter construction site as work proceeds
- Point-source sound propagation and the source emission point are 6 feet above grade
- First-floor receivers are 5 feet above property grade
- Due to the relatively short source-to-receptor distances studied, the effect of acoustical ground and air absorption is conservatively not included

The construction activities of the STAP elements are expected to involve equipment that includes concrete mixer; power tools (e.g., concrete cutting saws, chain saws); electric, compressed air, or hydraulic jack hammer; skid steer loader; backhoe; 5- to 10-cubic yard dump truck; flatbed trailer; boom truck; and hand tools (see Table 4). Reference maximum noise levels for such conventional construction equipment range between 65 and 89 dBA at a distance of 50 feet from the sound-producing source (FHWA, 2006).

Table 4. Daily Construction Activities of Construction Scenarios

Scenario	Activity Description	Duration	Daily Frequency (Sites/Day)	Crew Size/ Site	Equipment (Hours)	Max Equipment Operating Simultaneously	Vehicles
1	Dismantle/ Remove Existing Shelter	2 to 3 hours total (1 hour for traffic lane management)	6	3 to 5 workers 3 to 4 vehicles	Backhoe (1 hour)	2 pieces	Boom Truck
					Jackhammer (0.5 hour)	(e.g., jackhammer+backhoe; backhoe+skid steer)	Dump Trucks (2 per 6 sites)
					Air Compressor (0.5 hour)		Flatbed Trailer Truck
					Generator (0.5 hour)		Crew Vehicle
					Skid Steer Loader (0.5 hour)		
2	New Components Construction	2.5 days	see below	see below	see below	see below	see below
2a	Site Prep	1 day	6	3 to 7 workers 4 to 6 vehicles	Jackhammer (1 hour)	3 pieces	Boom Truck
					Backhoe (2 hours)		Dump Trucks (2 per site)
					Skid Steer (2 hours)		Flatbed Trailer Truck
					Generator (1 hour)		Crew Vehicle(s)
					Air Compressor (2 hours)		
2b	Construction	1.5 days	6	3 to 7 workers 4 to 5 vehicles	Backhoe (4 hours)	3 pieces	Boom Truck
					Air Compressor (2 hours)		Concrete Truck
					Generator (2 hours)		Flatbed Trailer Truck
					Electric/Hand Tools		Crew Vehicle(s)

The City's Noise Ordinance in LAMC Section 112.05 states that construction machinery shall not exceed a maximum of 75 dBA at a distance of 50 feet in a residential zone. If the estimated construction noise level exceeds the 75-dBA threshold at 50 feet, a noise impact would be assumed to occur.

7.2 Construction Noise and Vibration

Construction activities are divided into two basic phases consisting of (1) dismantling and removal of existing shelters and (2) construction and installation of new shelters. Table 5 presents the estimated noise levels during STAP element construction for the worst-case noise hour. During the construction phase, the projected construction activity noise levels have been calculated to range from 75 to 78 dBA at 50 feet, which would result in a noise impact for shelter sites that are within 50 feet of a residential property. At a distance of 75 feet, the calculated construction noise levels would range from 71 to 75 dBA; therefore, it can be assumed that any residential property beyond 75 feet of a site location would not be impacted by construction noise.

The removal and dismantling of an existing concrete sidewalk is the only construction activity with a potential for creating ground vibration. Any jackhammering of sidewalks occurring within the transit shelter construction sites should not generate excessive vibration. Some faint groundborne noise may be possible if there is an adjacent building adjoined with a sidewalk to be replaced as part of the project, but it would likely not be perceptible without the use of sensitive vibration measuring equipment. There are no anticipated vibration impacts due to construction activities.

7.3 Operational Noise

Because the project consists of adding or improving transit shelters along existing transit service lines, there is no assumed increase in transit or ambient noise due to implementation of the proposed project features. Maintenance of the transit shelters would be performed on an ongoing basis over a 10-year period. As previously shown in Table 2, the maintenance consists of weekly and some biannual deep cleaning for all shelter locations.

Table 6 presents examples of calculated noise levels for instances when noise-generating equipment may need to be employed during the operational life span of the shelters. The deep cleaning maintenance would likely be the only activity that has the potential to result in a noise impact. The use of power washers for the deep cleaning would generate a noise level of approximately 75 dBA at a distance of 50 feet, which would not exceed the City's noise limit of 75 dBA.

Table 5 Calculated Construction Noise Levels for STAP

Equipment Type	No. of Items	Maximum Equipment Noise Levels at 50 ft dBA	Hourly Equivalent Noise Levels at 50 ft, dBA	Hourly Equipment Usage Percentage	Percent Time at Full Power	Effective Equipment Usage Factor Percentage
Shelter Dismantling and Removal						
Dismantling and removal of existing transit shelters, kiosks and associated amenities						
Backhoe (Small, rubber-tired)	1	71	59	33%	21%	7%
Skid Steer Loader	1	80	69	17%	43%	7%
Jackhammer	1	89	74	17%	21%	4%
Air Compressor	1	65	54	17%	43%	7%
Generator	1	81	70	17%	50%	8%
Boom Truck	1	73	66	67%	30%	20%
Dump Truck	1	75	71	67%	59%	39%
Flatbed truck	1	73	60	17%	30%	5%
		Combined $L_{eq}(h)$	**78**			
Shelter Construction and Installation						
Site preparation, including removal of existing sidewalks, foundations, and utility connections						
Backhoe (Small, rubber-tired)	1	71	58	25%	21%	5%
Skid Steer Loader	1	80	70	25%	43%	11%
Jackhammer	1	89	73	13%	21%	3%
Air Compressor	1	65	55	25%	43%	11%
Generator	1	81	69	13%	50%	6%
Boom Truck	1	73	64	38%	30%	11%
Dump Truck	1	75	68	38%	59%	22%
Flatbed truck	1	73	56	6%	30%	2%
		Combined $L_{eq}(h)$	**77**			
Installation of a new/refurbished and renewed/ transit shelter or a new transit shelter at a bus stop that previously or did not previously have a shelter or amenities						
Backhoe (Small, rubber-tired)	1	71	61	50%	21%	11%
Air Compressor	1	65	55	25%	43%	11%
Generator	1	81	72	25%	50%	13%
Power Tools (Impact Driver)	1	80	69	25%	30%	8%
Boom Truck	1	73	62	25%	30%	8%
Ready-Mix Concrete Truck	1	72	62	25%	43%	11%
Flatbed truck	1	73	56	6%	30%	2%
		Combined $L_{eq}(h)$	**75**			

Table 6 Calculated Operational Maintenance Noise Levels for STAP

Equipment Type	No. of Items	Maximum Equipment Noise Levels at 50 ft dBA	Hourly Equivalent Noise Levels at 50 ft, dBA	Hourly Equipment Usage Percentage	Percent Time at Full Power	Effective Equipment Usage Factor Percentage
Shelter Operations and Maintenance						
Cleaning of shelter, associated program elements, and sidewalk area on a regularly scheduled (generally twice per week) and emergency basis, including use of power-washing equipment						
Utility Truck	1	69	64	100%	30%	30%
Power Washer	1	80	75	50%	59%	30%
		Combined $L_{eq}(h)$	**75**			
Shelter repair work, including fixing broken ad panels, shelter structures, benches, litter receptacles, and other program elements						
Utility Truck	1	69	64	100%	30%	30%
Power Tools (Impact Driver)	1	80	72	50%	30%	15%
		Combined $L_{eq}(h)$	**72**			
Minor utility repair, such as electrical and utility box repairs						
Utility Truck	1	69	64	100%	30%	30%
Boom Truck	1	73	68	100%	30%	30%
		Combined $L_{eq}(h)$	**69**			

7.4 CEQA Checklist

This section describes the CEQA noise analysis for the proposed project. The CEQA Guidelines included five CEQA issues related to noise. Using the Initial Study Checklist questions in Appendix G of the CEQA Guidelines and the City's thresholds, project impacts are analyzed for significance as follows:

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant	No Impact
Would the project result in:				
a) Generation of substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant	No Impact
c) Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above the existing without the project?	☐	☒	☐	☐
e) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

7.5 Thresholds of Significance

According to the *L.A. CEQA Thresholds Guide,* Section XI, (2006), a project would normally have a significant impact on noise levels from construction if:

- Construction activities lasting more than 1 day would exceed existing ambient exterior noise levels by 10 dBA or more at a noise sensitive use;
- Construction activities lasting more than 10 days in a 3-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use; or
- Construction activities would exceed the ambient noise level by 5 dBA at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

Because there are no construction activities that need to occur during night-time and lasting more than 10 days at any single transit shelter site, only the first item above is applicable to this project. Shelter construction and installation is planned to occur over a 2- to 3-day period. The CEQA Thresholds Guide Exhibit I.1-3 provides a table of presumed ambient noise levels categorized by zoning, such as residential, commercial, and industrial with day-time ambient noise levels as 50 dBA, 60 dBA, and 60–65 dBA, respectively. Because the project will upgrade and install transit shelters at approximately 3,000 sites across the entire City, the ambient noise levels could range from as low as 45 dBA in some areas to as high as 70 dBA in other areas. Therefore, this analysis will assume the suggested ambient noise levels for CEQA impact determination.

7.6 Response to CEQA Checklist

Using the Initial Study Checklist questions in Appendix I of the CEQA Guidelines and the City's thresholds, project impacts are analyzed for significance as follows:

a) *Would the project result in the generation of substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

Comment: A significant impact would occur if the project exposed persons to or generated noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Less than Significant Impact with Mitigation Incorporated. The STAP would generate noise during transit shelter construction and maintenance activities. As discussed above, the estimated construction noise levels would range from 75 to 78 dBA at a distance of 50 feet from the center of construction activities, which is more than 10 dB above the ambient noise levels for residential and commercial properties with noise-sensitive land uses. At a distance of 400 feet, the predicted construction noise levels would be reduced enough due to distance attenuation such that they would be below the 10 dB limit. Therefore, an impact could occur at residential and commercial properties with noise-sensitive land use that are within 400 feet of a transit shelter construction site. Mitigation measure NOI-1 would reduce impacts to less than significant levels.

Mitigation Measure

NOI-1 When applicable (i.e., at instances when noise levels may approach or exceed City noise criteria), the following Best Management Practices should be adhered to:

- Construction or use of noise barriers, enclosures, or blankets
- Use of low noise, low vibration, low emission-generating construction equipment (e.g., *[quieter]* Tier 4 engines), as needed
- Maintenance of mufflers and ancillary noise abatement equipment
- Scheduling high noise-producing activities during periods that are least sensitive when most people are at work during daytime hours
- Routing construction-related truck traffic away from noise-sensitive areas
- Reducing construction vehicle speeds

b) *Would the project result in the generation of excessive ground-borne vibration or ground-borne noise levels?*

Comment: A significant impact would occur if the project exposed persons to or generated excessive groundborne vibration or groundborne noise levels.

Less than Significant Impact. Any jackhammering of sidewalks occurring within the construction area of each transit shelter should not generate excessive groundborne vibration. Some faint groundborne noise may be possible if there is an adjacent building adjoined with a sidewalk to be replaced as part of the project, but it would likely not be perceptible without the use of sensitive vibration measuring equipment. Vibration impacts would be less than significant.

c) Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Comment: A significant impact may occur if the project were to substantially and permanently increase the ambient noise levels in the project vicinity above levels existing without the proposed project.

No Impact: STAP project features would not generate any additional noise at the existing and future transit shelter sites and transit lines. No permanent noise impacts would occur.

d) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above the existing without the project?

Comment: A significant impact may occur if the project were to result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above the existing without the project.

Less than Significant Impact with Mitigation incorporated. As discussed above, construction noise impacts would be temporary but could impact residential and noise sensitive land uses within 50 feet of the transit shelter construction sites. Mitigation measure NOI-1 would reduce impacts to less than significant levels. The only activity that would create substantial noise as part of the STAP operation and maintenance activities is the deep cleaning operations; however, it is not expected to last more than 1 day per site. This impact would be less than significant.

e) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. Some transit shelters may be located near an airstrip or airport, but the transit shelter construction and routine maintenance activities would not expose people residing or working in the project area to excessive noise levels. Construction and maintenance crews, as well as transit riders, would only be at the transit shelters for short periods of time. No impacts related to noise from aircraft operations would occur.

8.0 RECOMMENDED MEASURES

As shown in the impact analysis, some construction activities could result in an exceedance of the City *Noise Ordinance* of 75 dBA for single-family residential areas that are located within 50 feet of shelter construction locations. There are several measures

that can be used to reduce noise levels below this threshold. Implementation of the common potential mitigation measures set forth in the *City of Los Angeles, Bureau of Engineering, Master Specifications, Division 01, General Requirements, Section 01562, Part 1.1.C* would minimize the noise impacts to less than significant levels.

The project would not use all of the listed construction equipment simultaneously and only specific equipment would be used at any given time to complete the construction tasks. This will assist in reducing the maximum instantaneous noise experienced by any nearby noise-sensitive areas but may not lower the hourly equivalent noise levels below the 75 dBA threshold. If fences are to be used to cordon off the construction area during the 2- to 3-day shelter removal and/or installation period, the addition of acoustic blankets to the fencing would provide shielding for jackhammers, which were shown to be the loudest tool used during construction activities. The use of an acoustic barrier of this type has the potential of reducing the hourly equivalent noise levels below the 75-dBA threshold.

If noise complaints due to construction activities should arise, construction noise monitoring may be needed to analyze the area where the complaint occurred to determine which of the above recommendations may be needed, if any. Construction hours may need to be amended when using the loudest equipment, such as jackhammers. If a hoe ram attachment for either a backhoe or skid steer is used in place of hand-use jackhammers, vibration monitoring might be needed during instances of sidewalk removal where there is an adjoining structure next to the sidewalk which is to be removed.

NOI-1: When applicable (i.e., at instances when noise levels may approach or exceed City noise criteria), the following Best Management Practices should be adhered to:

- Construction or use of noise barriers, enclosures, or blankets
- Use of low noise, low vibration, low emission-generating construction equipment (e.g., *[quieter]* Tier 4 engines), as needed
- Maintenance of mufflers and ancillary noise abatement equipment
- Scheduling high noise-producing activities during periods that are least sensitive when most people are at work during daytime hours
- Routing construction-related truck traffic away from noise-sensitive areas
- Reducing construction vehicle speeds

9.0 REFERENCES

City of Los Angeles, 2021. City of Los Angeles Municipal Code. https://codelibrary.amlegal.com/codes/los_angeles/latest/lamc/0-0-0-107363.

———. 2006. City of Los Angeles CEQA Thresholds Guide.

U.S. Department of Transportation, Federal Highway Administration (FHWA). 2006. Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January.

U.S. Department of Transportation, Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. May.

Attachment A – Project Site Location