ENVIRONMENTAL RE-EVALUATION CONSULTATION

Note: The purpose of this worksheet is to assist sponsoring agencies in gathering and organizing materials for re-evaluations required under the National Environmental Policy Act (NEPA). Submission of the worksheet by itself does not meet NEPA requirements. FTA must concur in writing with its determination and/or the sponsoring agency's NEPA recommendation. Contact the FTA Region 2 office at (212) 668-2170 if you have any questions regarding this worksheet. We strongly encourage you to contact us to discuss your project changes or expiration of NEPA determination before you fill out this worksheet.

For Agency Use *Date Received:*	
Recommendation by Planner or Engineer: **Nina Chung** ☑ *Accept* ☐ *Return for Revisions* ☐ *Not Eligible*	*Reviewed By:* *Date:* 4/18/2019
Concurrence by Director of Planning and Program Development: **Donald Burns** ☑ *Accept Recommendation* ☐ *Return with Comments*	*Reviewed By:* *Date:* 4/19/2019
Comments:	
Concurrence by Regional Counsel: **Charles Dyer** ☑ *Accept Recommendation* ☐ *Return with Comments*	*Reviewed By:* *Date:* 4/19/2019
Comments:	
Concurrence by Approving Official:	*Date:* 4/19/19

Please answer the following questions, fill out the impact chart and attach project area and site maps. Using a site map from the previously approved NEPA document, show any project changes using a different color. Include additional site maps to help reviewer understand project changes.

PROJECT TITLE
Canarsie Tunnel Project: Revised Alternative Service Plan (ASP), Revised Construction Means/Methods, and Extended Work Hours

LIST CURRENT, APPROVED ENVIRONMENTAL DOCUMENTS (e.g. EIS/ROD, EA/FONSI, BA, RE-EVALUATION, etc.) If Re-evaluation, briefly describe.
Title: Canarsie Tube Restoration **Date:** February 11, 2015 **Type and Date of Last Federal Action:** Categorical Exclusion (c)(8)—February 11, 2015
Title: Canarsie Tube Resiliency **Date:** February 11, 2015 **Type and Date of Last Federal Action:** Categorical Exclusion (c)(3)—February 11, 2015
Title: Canarsie Core Capacity and State of Good Repair Project **Date:** March 10, 2016 (CatEx Worksheet) **Type and Date of Last Federal Action:** Categorical Exclusion (d)(6)—August 24, 2016
Title: MTA NYCT Canarsie Tunnel Project Supplemental Environmental Assessment and Section 4(f) Review/FONSI **Date:** July 2018 **Type and Date of Last Federal Action:** Finding of No Significant Impact (FONSI)—September 13, 2018

HAS THE MOST CURRENT AND OTHER PERTINENT APPROVED ENVIRONMENTAL DOCUMENTS BEEN *RE-READ* TO COMPARE ANY PROPOSED PROJECT CHANGES?

☐ **NO (STOP! The most current approved environmental document MUST be re-read prior to completing a re-evaluation.)**

☒ **YES NAME: Angelo Elmi, P.E., Principal Engineer DATE: April 16, 2019**

IS THE PROJECT CURRENTLY UNDER ☐ DESIGN OR ☒ CONSTRUCTION?

REASON FOR RE-EVALUATION

This Re-Evaluation considers proposed changes to the approved MTA NYCT Canarsie Tunnel Project (the "Project"). Four previous NEPA actions are associated with the approved Project:

A. **Canarsie Tube Restoration project**—Categorical Exclusion (CE) (c)(8) issued in February 2015 for the purpose of restoring the tunnel due to significant damage from salt water infiltration during Hurricane Sandy (Project A);

B. **Canarsie Tube Resiliency project**—CE(c)(3) issued in February 2015 for the purpose of minimizing and preventing damage from the entry of water into the subway system from major storms (Project B);

C. **Canarsie Core Capacity and State of Good Repair project**—CE(d)(6) issued in August 2016 for the purpose of capacity and state of good repair improvements needed to accommodate current and expected growth in L line ridership and improve circulation at some of its busiest stations (Project C); and

D. **Alternative Service Plan**—A Finding of No Significant Impact (FONSI) issued in September 2018 based on the MTA NYCT Canarsie Tunnel Project Supplemental Environmental Assessment (SEA, July 2018) for the Alternative Service Plan (ASP or 2018 ASP) with the purpose of providing transportation alternatives to the greatest possible number of diverted L train riders balanced against the needs of residents near existing L train service and other users of the transportation network (Project D).

This Re-evaluation provides analysis on the following proposed changes:

- Changes to the construction means and methods for the repair of Hurricane Sandy-related damage to the Canarsie Tunnel and related resiliency activities. These changes are associated with the Canarsie Tunnel Tube Restoration and Canarsie Tube Resiliency projects (A and B, above). Therefore, potential impacts of the proposed changes are compared to impacts related to the Projects A and B only. (Projects C and D are not relevant because they are not associated with repair or resiliency of assets damaged in the tunnel.)
- Changes to work hours for surface construction activities. These changes are associated with Canarsie Tube Restoration, Canarsie Tube Resiliency, and Canarsie Core Capacity and State of Good Repair projects (A, B, and C, above). Therefore, potential impacts of the proposed changes to work hours are compared to impacts related to projects A, B, and C only. (Project D is not relevant because it does not deal with surface construction activities related to work on the tunnel.)
- Changes to the 2018 ASP in order to reflect a substantial reduction in the number of diverted L train riders during Project construction. These changes are associated with the Alternative Service Plan (D, above). Therefore, potential impacts of the proposed changes are compared to impacts related to project D only because the subject of Project D is the 2018 ASP. (Projects A, B, and C are not relevant because the alternative transportation plan that would have been provided to customers affected by L train service changes during construction was not yet developed in detail at the time of the CE evaluations.)

No other substantive changes have been identified for work associated with the Canarsie Tunnel Project.

The subject of this Re-Evaluation is the proposed changes; therefore, it does not include aspects that are not proposed to change or aspects unaffected by the proposed changes. Since the 2015 NEPA evaluations, the existing conditions along the L train corridor, including within 14th Street, have not changed significantly. All changes along the L train corridor have been consistent with general growth in New York City. Census Bureau estimates show that both Brooklyn and Manhattan have had incremental population growth between 2015 and 2017; Brooklyn's population has grown by 1.54 percent, while Manhattan's has grown by 1.5 percent.[1]

The L train corridor, including 14th Street, is a dense urban area of mixed commercial, institutional, and residential uses, as well as historic resources and community facilities. It has experienced growth in retrofits and new construction of residential and mixed-use buildings. Currently, there are approximately 13 active major construction projects within a one block radius of 14th street between 10th Avenue and Avenue B.[2,3] In Brooklyn, there are approximately 15 active major construction projects along the L train corridor, that are within a one block radius of a subway entrance or exit between Bedford Av and Wyckoff Av. Furthermore, there are 49 active major construction projects within a one block radius of the proposed temporary B91 Williamsburg Link service and 44 active major construction projects within a one block radius of the proposed temporary B92 Williamsburg Link service.[4] MTA would coordinate, as needed, with developers and local agencies to ensure construction projects are taken into consideration when providing the 2019 ASP, to minimize potential impacts.

Additionally, since the 2015 NEPA findings, the Northern long-eared bat (*Myotis sptentrionalis*) has been added to the federal and New York State threatened and endangered list as a threatened species. However, it is unlikely that this species would exist in any of the areas within which either construction or transit modifications are proposed.

Reason for Changes to Construction Means and Methods

Background

The Canarsie Tunnel comprises two one-track tubes providing Manhattan-bound and Brooklyn-bound L train subway service. The *MTA NYCT Canarsie Tunnel Rehabilitation Project (L Tunnel Reconstruction) Alternatives Analysis* (June 2018 AA) identified a full-time, 15-month double-track closure of the Canarsie Tunnel as the preferred method for construction based on the prior determination that the entire bench wall and duct bank network embedded within it, which spans the length of the tunnel, would need to be demolished and reconstructed.[5] This prior determination was grounded in MTA NYCT's customary practice of encasing subway tunnel power and communication cables in duct bank conduits and built upon MTA NYCT's previous experience completing similar repairs in other subway tunnels damaged during Hurricane Sandy. As determined by the MTA NYCT and described in the June 2018 AA, the full-time, 15-month double-track closure was the preferred construction method by allowing for quick, safe, and efficient completion of the repairs using customary methods. The full-time, 15-month double-track closure would require suspension of L train service between Brooklyn and Manhattan and within Manhattan. The MTA NYCT eliminated two other alternatives that would have retained L train service

[1] U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

[2] NYC Department of Buildings Active Major Construction Mapper, Accessed April 1, 2019, www1.nyc.gov/assets/buildings/html/nyc-active-major-construction.html

[3] Active major construction projects are defined as projects that have a New Building permit or ALT 1 permit. ALT 1 permits cover major alterations to existing structures that change use, egress or occupancy of an existing building.

[4] There is some overlap in construction projects since the two routes overlap in some locations.

[5] Bench walls provide a walkway and serve as emergency egress from a disabled train to emergency exits. The CEs for the Canarsie Tube Restoration and Resiliency projects previously described removal and replacement of duct banks without specifically referencing the removal and replacement of bench walls. It should be noted that it would not be possible to remove the duct banks without also removing the bench walls. Construction documents for the approved Project generally refer to removal of bench walls, which implicitly includes removal of the duct banks within the bench walls.

during peak periods. The alternative to complete the work on nights and weekends was deemed infeasible by MTA NYCT largely because the nature of the demolition and reconstruction work would extend the duration of the work for several years and the steps needed to restore safe operations after weekend shutdowns would not be achievable within the limited weekend timeframe. The alternative to complete the work during a full-time, one-track closure was eliminated because the nature of the demolition work would extend the construction duration from 15 months to at least 33 months and could result in operational risks. Subsequently, in 2018, an SEA was prepared to evaluate potential environmental impacts of the ASP, which was designed to minimize service disruptions to diverted L train passengers during the closure. FTA issued a FONSI for the ASP described in the SEA (2018 ASP) in September 2018.

Proposed Changes to Construction Means & Methods

In response to continued public concerns regarding both the full-tunnel closure and the 2018 ASP, a panel of academic peer reviewers and professional experts conducted an alternative evaluation of opportunities to avoid full closure and reduce demands for ASP services. This panel examined the tunnel and its rehabilitation needs in collaboration with the MTA NYCT to seek project design alternatives that would accomplish project objectives with less customer impact. As noted above, the approved means and methods for the Canarsie Tube Restoration and Resiliency work was based on the determination that it was necessary to demolish and replace the full-length of bench wall, including removal and replacement of the duct banks that housed cables. The panel's evaluation of national and international best practices and new technologies provided an opportunity to change this prior determination with an innovative approach that would result in less demolition and less disruption to passengers. More specifically, instead of encasing the power and communication cables within the duct banks as is MTA NYCT's customary practice, the panel proposed using a racking system to hang new replacement cables attached to the tunnel liner. Damaged cabling within existing duct bank would be abandoned. Based on MTA NYCT's current practice, this racking system approach has previously not been applied in the retrofit of a subway tunnel environment, although it has been used in new construction. MTA NYCT accepted the panel's recommendation and this collaboration resulted in the new construction means and methods analyzed in this Re-Evaluation.

In summary, the MTA NYCT's proposed changes to construction means and methods would substantially reduce the amount of demolition required for bench walls, would place cables on racks along the tunnel wall (instead of within the bench wall), and would add smart sensor systems to monitor movement along the bench wall. In addition, the track bed would be repaired as needed rather than reconstructed. All the remaining rail, track, and other tunnel elements (e.g., ties and third rail) would be repaired or replaced as originally planned in Projects A and B noted above.

With the proposed construction means and methods, work would be done overnight and on weekends, with single tube, one-track closures (instead of a full-time, double-track closure) because the significant reduction in demolition would eliminate the need for a full-time, double-track closure. The tunnel repairs would be completed within the same 15- to 18-month timeframe. The proposed changes would continue to meet the Purpose and Need of the approved Canarsie Tube Restoration and Resiliency projects (Projects A and B) while greatly reducing impact on L train customers. The one-track closure would be in effect from 10:00 PM through 5:00 AM on weekdays and throughout weekends (Friday 10:00 PM to Monday 5:00 AM). Normal weekday service would be maintained for most of the day (from 1:30 AM to 8:00 PM). Starting two hours before the one-track closure, service would "ramp down" (i.e., start becoming less frequent) to allow for work train access and for single-tracking to start at 10:00 PM.

Reason for Changes to Work Hours

This Re-Evaluation also analyzes extending work hours for construction of the Canarsie Tube Restoration, Canarsie Tube Resiliency, and Canarsie Core Capacity and State of Good Repair projects (Projects A, B, and C, above). The approved work hours for "street-level work" reflected typical

construction work period of weekdays between 7:00 AM and 6:00 PM, with occasional work outside these hours. Underground work can occur at any time within the right-of-way. In 2018, approvals were granted by the local authority to work overnight hours and weekends. Typical work hours during 2018 were from 7:00 AM to 11:00 PM on weekdays and between 7:00 AM and 6:00 PM on Saturdays for street-level work. The 2018 changes to work hours were needed due to the discovery of unforeseen conditions and the need to expedite completion of the jet grouting and excavating. However, to address community concerns regarding noise impacts, effective March 18, 2019, the work hours on 14th Street (Manhattan) were reduced to 7:00 AM to 7:00 PM weekdays and 7:00AM to 5:00PM on Saturdays.

In summary, current hours for all Canarsie Tunnel Project locations have been reduced from the 2018 work hours. Typically, the last hour of work, 6:00 to 7:00 PM weekdays and 4:00 to 5:00 PM Saturdays, is used for demobilization activities and clean-up.

Occasionally, like many of MTA NYCT's construction projects, there may be short-term phases of street-level construction work (e.g., deliveries) that must occur outside of these hours. These extended hours have been coordinated with the applicable local oversight agencies (New York City Department of Environmental Protection [NYCDEP] and the New York City Department of Transportation [NYCDOT]).

Reason for Changes to the Alternative Service Plan

Based on the proposed changes to construction means and methods discussed above, a full-time, complete 15-month suspension of L train service between Brooklyn and Manhattan and within Manhattan would no longer be needed. Modifications to the approved 2018 ASP, as described in the SEA and FONSI (project D above) are now proposed.

MTA NYCT has reconfigured the 2018 ASP since there is substantially less diverted daily ridership with the continuance of weekday daytime L train service during construction of the Canarsie Tunnel Project. Under the approved construction means and methods, during weekday peak periods the subway system would have been unable to handle all diverted riders with a two-track closure. As a result, in addition to increasing alternate subway service to the extent possible, the approved 2018 ASP also incorporated non-subway alternatives such as the temporary ferry service, temporary M14 SBS service, temporary interborough bus service, and temporary street, pedestrian and bicycle enhancements to absorb a portion of the weekday peak ridership. As noted above, under the revised construction plan, normal L train service would operate for most of the day on weekdays, including peak periods. Therefore, the elements of the 2018 ASP that were needed primarily to address weekday peak period demand would no longer be needed, including the temporary ferry service; interborough bus service; temporary M14 SBS service; and temporary street, temporary bicycle, and temporary pedestrian modifications.

While the L train would still operate, it would operate with less capacity under the proposed construction means and methods on nights and weekends than under normal operating conditions due to the longer headways and use of a single track for bi-directional service between the Bedford Av and 3 Av interlockings. Some temporary measures would still be needed to provide an attractive alternative to the L train within Manhattan and between Manhattan and Brooklyn.

The proposed ASP ("2019 ASP") includes additional subway service on existing subway lines and additional bus services on an existing bus route and on new bus routes on weeknights and weekends, which not only provide ample capacity to absorb diverted L train riders during these time periods, but are also intended to provide competitive options to facilitate connections with other lines and disperse demand during periods of limited L train service.

DESCRIPTION OF PROJECT CHANGES, NEW INFORMATION OR REASON FOR DELAY IN CONSTRUCTION

This section provides a detailed description of the changes proposed in this Re-evaluation: changes to construction means and methods, changes to work hours, and changes to the approved ASP.

A. CONSTRUCTION MEANS & METHODS

A description of the proposed tunnel construction means and methods compared to the construction means and methods that were part of projects A and B above is provided below.

The approved Canarsie Tube Restoration and Resiliency projects (Projects A and B) included the demolition and reconstruction of the entire length of bench wall and internal conduits with the removal and replacement of various power and communication cables, and extension of fiber optic cables between the substation located in Brooklyn and the substation located in Manhattan, as well as between Union Square Station and First Avenue Station in Manhattan.

Changes from the approved Canarsie Tube Restoration and Resiliency projects are summarized for three key areas:

Bench Walls: While no longer serving as the duct bank for cables, the bench wall continues to function as a walkway and emergency egress in the tunnel. The proposed construction means and methods leaves the bench wall in place except where it is structurally compromised. Where structurally compromised, the bench wall would be fortified. Unstable bench wall sections would be removed and replaced with a walkway connecting adjacent segments of bench wall. Overall, the demolition of bench walls will be reduced from the 48,000 linear feet approved in the Categorical Exclusions for Canarsie Tube Restoration and Resiliency (Projects A and B, above) to an amount up to 5,000 linear feet. To monitor the integrity of the bench wall into the future, "smart" sensor systems would be installed. The proposed Project would continue to address leaks in the tunnel lining in areas where the bench wall is demolished and would replace all rail and track elements, and incorporate resiliency initiatives, as previously identified in the approved Project.

Cables: A key change in the construction means and methods is to develop a new cable system that does not require removal and replacement of the duct banks embedded in the bench wall. Cable system housing would be decoupled from the bench wall and the revised plan would implement a new power and control system and utilize a racking system for cables. The racking system has been implemented on rail tunnels nationally and internationally and the Canarsie Tunnel is an appropriate application of the technology. The new system would be fully compliant with NFPA 130 standards. In addition, an analysis was performed that concluded that the racking system would pose no risk to the tunnel lining based on the frequency and depth of bolt penetration necessary to support the weight of the system. The old cable would be abandoned in place. There is about 274,000 linear feet of replacement power and communications cables with the proposed means and methods compared to about 400,000 linear feet in the approved Categorical Exclusions for the Canarsie Tube Restoration and Resiliency projects (Projects A and B).

Dust and Silica Management: The previously designed construction plan included a movable ventilated gantry system to isolate the specific area within the tunnel where dust generating activities were being conducted. A particular section of the tunnel would have been partitioned, and air within the partitioned work area would have been moved by fans and then filtered by dry scrubbers before being exhausted. The new plan does not require the use of the gantry system since the proposed project encompasses much less demolition and smaller localized sections of tunnel. The new plan would utilize a combination of engineering controls, including tools with dust extractors, localized portable air scrubbers, and wet methods. The new plan (with smaller more open work areas) would most likely require additional air

sampling to ensure dust and silica levels are within acceptable levels. The new plan would be reviewed by State and City environmental regulatory agencies and a third party public health expert.

In summary, the proposed changes achieve all functional and life-cycle (useful life) outcomes established in the approved Project while maintaining overall safety and functionality. Specific to the changes assessed in this Re-evaluation, **Table 1** provides a detailed comparison of the approved construction program and the proposed means and methods.

B. CONSTRUCTION WORK HOURS

A description of the proposed construction work hours for surface-level activities compared to the planned work hours assumed in the projects A, B, and C is described below.

As noted above, work hours for construction as originally planned and approved provided for a typical construction work period of weekdays only between 7:00 AM and 6:00 PM, while the new construction hours beginning March 18, 2019 are from 7:00 AM to 7:00 PM on weekdays and between 7:00 AM and 5:00 PM on Saturdays for street-level work. Occasionally, like many of MTA NYCT's construction projects, there may be short-term phases of street-level construction work (e.g., deliveries) that must occur outside of these hours. These extended hours have been coordinated with and approved by the applicable local oversight agencies (New York City Department of Environmental Protection [NYCDEP] and the New York City Department of Transportation [NYCDOT]).

Table 1—Comparison of Approved Construction and Proposed Construction

Project Area	Approved Project	Proposed Project
▪ Bench Walls/ Power Cables/Communication Cables/Fiber Optics Cables	Bench Wall/Duct Banks ▪ **Full** Demolition and reconstruction of the inner and outer duct banks from the 1 Av station in Manhattan to the Bedford Av station in Brooklyn. Power Cables ▪ Removal and replacement of various power cables throughout the tunnel, including negative cables, positive cables, battery cables, control cables, and tunnel shell protection cables. Communication Cables ▪ Removal and replacement of **all** communications cables throughout the tunnel such as fiber optic cables, copper cables and radio/antenna cables on the walls and/or in the duct banks of the tunnel. ▪ Extension of the fiber optic cable from Bedford Avenue/North 6th Street substation in Brooklyn to 4th Avenue/11th Street substation in Manhattan, and from 1 Av Station to Union Sq Station in Manhattan.	Bench Wall/Duct Banks ▪ **Partial** demolition and partial repair of inner and outer bench walls on both tracks between 1 Av station and Bedford Av station. ▪ Installation of a new walkway to connect remaining segments of bench walls. ▪ No repairs to duct banks in bench walls. Abandonment and no replacement or further use of cables located in tunnel duct banks. ▪ Installation of a new monitoring system to measure any movement of the bench wall. Power Cables ▪ Removal and replacement of various power cable outside of the duct banks (instead of within newly constructed duct banks) including positive cables, control cables, battery cables and tunnel shell protection cables on racks to be mounted on the tunnel liner. ▪ Abandon negative power cables (instead of removing). Install negative return rail. The rail will replace the negative cable. Circuit Breaker House #62 ▪ Design modifications based on revised flood level. Communication Cables ▪ No removal of existing cables. ▪ Install new communications cables outside of the duct banks such as Fiber Optic Cable, copper cables and radio/antenna cables on racks to be mounted on the tunnel liner.

Project Area	Approved Project	Proposed Project
	Cable Resiliency ▪ Provide cable redundancy in addition to cable protection (achieved by encasing cables within newly built concrete duct bank).	Cable Resiliency ▪ Provide cable redundancy in addition to cable protection (achieved by cable redundancy, protective cable jackets, and location of cables on elevated wall racks (instead of within duct bank)).
▪ Tunnel Liner	▪ Repair of **all** structural defects such as dry cracks, active leaks and spalls, in the tunnel liner, as well as repair of leaking bolts and cast iron flanges.	▪ Repairs would be made to structural defects in the tunnel liner such as dry cracks, active leaks and spalls and to leaking bolts and cast iron flanges **only in the locations in which the bench walls are demolished.**
▪ Canarsie Track	▪ **Complete** Replacement of the track bed, tie blocks, plates, fasteners and track rails.	▪ Same as the approved plan except that track bed will be repaired **as needed** rather than replaced.
▪ Canarsie Signals	▪ Furnish and install signal cable, switches, radio cases, transponders, vital relays, timers, track case, power junction box (PKJ), junction box, line case, automatic signals, and stop machine. Modify existing communication-based train control (CBTC) database to support full tunnel shutdown.	▪ Same as the approved plan, except deletion of CBTC scope that was needed in support of the full tunnel shutdown.

C. ALTERNATIVE SERVICE PLAN

A description of the proposed 2019 ASP compared to the approved 2018 ASP described in the SEA and FONSI is provided below.

The 2018 ASP provided multiple options to the approximately 275,000 daily diverted L train riders. The approved 2018 ASP had several primary temporary components: ferry service; M14 SBS service; interborough bus service; and street, pedestrian and bicycle enhancements.

The 2018 ASP subway enhancements included a variety of measures to increase frequency and service on other lines that would be expected to absorb the majority of diverted riders as well as certain permanent physical changes to improve station access and circulation. The proposed 2019 ASP is substantially more limited in scope since no subway service changes are proposed during peak and midday periods and, as a result, all L train riders during these time periods would have normal service with no diversion to other lines or modes of transit. The proposed 2019 ASP would implement adequate alternative subway capacity to absorb diverted L train riders during the overnight and weekend construction periods. Thus, the proposed 2019 ASP would provide additional convenient options to riders overnight and on weekends when the one-track closure results in reduced L train service with 20-minute headways. There is no temporary East River ferry service as part of the 2019 ASP and there would be no HOV restrictions on the Williamsburg Bridge. New bike lanes and pedestrian amenities would no longer be part of the 2019 ASP. Essentially, the proposed 2019 ASP eliminates implementation of all primary elements of the 2018 ASP noted above, except certain MetroCard transfers and increased service on certain subway lines, as described in more detail in Table 2.

Those temporary 2018 ASP elements and permanent station enhancements that have been partially installed or already implemented in anticipation of the full-tunnel closure, and that are no longer part of the 2019 ASP, will not be federally funded. These elements include:

Station entrances and turnstile permanent improvements;

- M14 select bus service (SBS);
- 12th and 13th Street bicycle lanes;
- Union Square West bicycle lane;
- Grand Street bicycle lane;
- High capacity valet bike parking;
- Bicycle parking sleds;
- Various pedestrian infrastructure modifications.

MTA NYCT and/or NYCDOT as applicable, will determine independent utility for those elements, as needed, and will comply with applicable processes, including required planning and outreach, and other requirements related to planning and implementation of those elements. Elements of the proposed 2019 ASP by mode are summarized below and in **Table 2**.

Subways: Full service would be provided along the entire L line (from 8 Av to Canarsie-Rockaway Parkway) weekdays between 1:30 AM and 8:00 PM. Between 8:00 PM and 10:00 PM, L service would "ramp down" (i.e., start becoming less frequent) to allow for work train access and for single-tracking to start at 10:00 PM. Weeknights and weekends, the L train service would operate on a single track between the Bedford Av and 3 Av interlockings, necessitating a 20-minute headway between 8 Av and Bedford Av. L trains would run every 10 minutes between Lorimer St and Canarsie-Rockaway Parkway and every 20 minutes between 8 Av and Lorimer St between 10:00 PM and 1:30 AM on weeknights and on weekends between 6:00 AM and 1:30 AM. A 20-minute headway on the L train is what is normally operated between 1:30 AM and 5:00 AM, so there is no change in operating frequency during these times. Due to the anticipated crowding on the L, additional subway service would be provided on the G, M and

7 trains when L service is reduced in order to encourage customers to take alternative routes between Brooklyn and Manhattan.

The proposed 2019 ASP includes station crowd management measures that are new compared with the approved 2018 ASP when all stations in Manhattan would have been closed. The reduction in L service on weeknights and weekends would create increased platform congestion at high-volume stations such as Union Square and Bedford Av. At certain times, the congestion would likely spill back onto the mezzanine and/or street-level, and crowded platforms could delay train service. Single-tracking impacts at 1 Av and 3 Av would mean that customers going in both directions would be waiting to board and alight on the same platform. Those riders would have 50% less platform and stair capacity available to them, causing further crowding on the limited number of stairways in the station.

MTA NYCT is working closely with NYPD to develop and implement strategies to address potential station crowding during this project, to ensure that safe conditions are always maintained. MTA NYCT regularly works with NYPD to develop similar types of strategies for special events around the system (e.g., sporting events, parades, New Year's Eve) where high levels of station crowding are expected, as well as other planned and unplanned service outages.

MTA NYCT would have extra staffing deployed along the L train corridor to actively monitor conditions and implement crowd control measures when necessary. In addition, MTA NYCT would coordinate with NYPD to provide staff to monitor conditions and enforce crowd control measures.

Strategies to minimize train dwell and clearance times and ensure safe operations for customers are likely to include:

- Metering station entries—At crowded stations or platforms, reducing the rate at which customers enter the station or platform including decreasing the number of turnstiles or stairways that are used for entry, would increase available platform and stair capacity for exiting customers, who come in surges as trains discharge passengers. Metering entries may also include holding entering customers at street level to allow people to exit until the platform or stairs are less crowded.
- Queuing entries—At crowded platforms, where warranted, lining customers up in designated areas of the station mezzanine or at street level until there is capacity for them on the platform. This would ensure an orderly flow of customers and would allow for safer and more efficient station operations at locations where construction work may limit access to certain parts of the station.
- Directional flow—At locations where stair capacity is insufficient to handle bidirectional customer flows, or to complement metering of entries, certain stairs or control areas (where there are multiple fare arrays) may become entry-only or exit-only, depending on the time of day. This would reduce the friction between customers moving in opposite directions and maximize stair capacity for exiting customers.
- Exit-only stations—At stations where trains are fully loaded upon arrival, such as during single-tracking at 20-minute headways, stations would become exit-only because under such conditions, few, if any, boardings would be possible. This would reduce the time trains are in stations and would keep the trains evenly spaced.
- Station bypass—If trains are too crowded and there is insufficient platform capacity to handle entering and exiting loads, stations may need to be bypassed for certain periods of time.

MTA NYCT, in coordination with the NYPD, have reviewed projected ridership at each station during the hours when there would be single tracking to help anticipate where mitigation strategies would most likely be needed. They have surveyed the affected stations and are identifying how the strategies above would be applied at specific locations, with a goal of fully utilizing the available capacity of stairs and platforms, while ensuring customer safety. The expected ridership at stations and subsequent levels of crowding would be impacted by numerous factors, such as service on other subway lines, the availability of other travel options, including bus service in both Manhattan and Brooklyn, time of day, and weather. Decisions on location-specific crowd management strategies would be made in real time by staff in the field, who also would adjust strategies over the duration of the project to reflect changing conditions.

These strategies have been applied based on operating needs and crowding conditions during annual special events (e.g., New Year's Eve and parades), unplanned circumstances (e.g., labor strikes) and during construction projects (e.g., escalator rebuilds) to ensure safe operation for customers. These strategies are consistent with how MTA NYCT typically manages potential station crowding and are currently being employed for other projects and have been successfully employed in the past. For construction projects where these strategies are applied for an extended period, MTA NYCT experience has shown that customers adapt to the changed operating condition and take advantage of alternate routes and services. After this adjustment, MTA NYCT would continue to monitor and adjust the use of these strategies in a dynamic manner. Pedestrian congestion at street level, mezzanine level, and platform level would continue to be monitored as needed to ensure safety.

Buses: The proposed 2019 ASP eliminates implementation of the temporary SBS service and associated busway on 14th Street.[6] The proposed 2019 ASP also eliminates the implementation of temporary interborough bus routes utilizing the Williamsburg Bridge, and the implementation of HOV3+ on the Williamsburg Bridge. With the proposed 2019 ASP, there would be increased service on the M14A bus route on weekends and weekday evenings until 1:30 AM. During the highest demand hours during these times, combined M14A and M14D service would operate every 3 minutes, supplementing the 20-minute L train service along 14 St. Temporary "Williamsburg Link" bus service would be provided between Bedford Av (L), Metropolitan Av/Lorimer Av (L/G), and Marcy Av (J/M) on weekends and weekday evenings until 1:30 AM. The Williamsburg Link bus service would operate every 3 minutes in each direction during the highest demand hours during these times, supplementing the 20-minute L train service between Bedford Av and Lorimer St.

Bicycles: The proposed 2019 ASP would not include bike lanes on 12th Street, 13th Street, Union Square West, or Grand Street or high-capacity valet bike parking or temporary bicycle parking sleds.

Pedestrian Enhancements: The proposed 2019 ASP would not include the temporary pedestrianizing of Union Square West by closing the street to vehicles between 14th and 15th Streets and 16th and 17th Streets. The proposed 2019 ASP would also not include the temporary pedestrian space on University Place between 13th and 14th Streets.

Table 2 provides a detailed comparison of the approved 2018 ASP and the proposed 2019 ASP as analyzed in this Re-Evaluation. In summary, no ASP elements will be provided during weekdays (until 8:00 PM) when normal service would allow all users of the system to use the L train. The proposed 2019 ASP provides options for weekday overnights and weekends to supplement the more limited L train service at these times.

The 2018 *Measures to Minimize Harm* (Attachment B of FONSI) are not needed at this time and will be replaced by measures similar in nature. The 2019 ASP includes the following measures to minimize impacts:

1. MTA NYCT would commit to operating subway service on alternate subway lines and the additional bus services in the robust service pattern described in this document to ensure that as many displaced L train customers can be accommodated within the subway and bus systems as possible, as well as to ensure that the effect of the 2019 ASP on traffic flow is not significant. Subway and bus services and station crowding would be monitored and minor subway and bus service changes and crowd management measures would be made throughout the construction duration to improve conditions as needed.
2. Once the proposed 2019 ASP is implemented, MTA NYCT would monitor traffic conditions along their bus routes and request assistance from NYPD in a dynamic and responsive manner to help manage traffic flows as needed during the construction schedule.

[6] A different M14 SBS route will be pursued as a permanent and independent project by MTA NYCT, in coordination with NYCDOT.

3. MTA NYCT would work with NYCDOT to ensure that NYCDOT maintains roadways per agency standards to prevent large potholes or other poor pavement conditions to ensure vibration levels from bus operations are not significant.
4. MTA NYCT would adhere to all conditions and specifications related to any required federal, state, or local permit and would ensure all applicable federal, state, and local standards and requirements would be met, including, but not limited to, New York City Noise Control Code to minimize construction noise and vibration impacts, development and implementation of a Construction Health and Safety Plan to avoid exposure of workers and the public to any hazardous materials during construction.
5. MTA NYCT's supplemental bus service would utilize up to 20 electric buses with the remainder of the needed fleet consisting of existing diesel buses that achieve 95% particulate matter capture to ensure that no significant adverse air quality impacts occur.
6. MTA NYCT would not require displaced L riders to pay an additional MTA NYCT fare on NYCT services consistent with current MTA policy.
7. MTA NYCT would ensure an OSHA-compliant Dust Control and Monitoring Plan is in place prior to the start of construction and would update the plan as needed to minimize dust impacts.

Table 2—Comparison of Approved ASP and Proposed ASP

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
Subway		
L Train Service		
<u>Weekday/Weekend/Weeknight</u> ▪ L train service between Bedford Avenue and Rockaway Parkway with 6-minute headways during peak periods, 8-minute headways for all other times during the weekdays and weekends. ▪ No L train service between Brooklyn and Manhattan and within Manhattan. ***These subway service changes have not been implemented as of this Re-Evaluation.***	<u>Weekday</u> ▪ No subway service changes (existing regular L service remains) <u>Weekend</u> ▪ Temporarily reduce L service from Rockaway Parkway to 8 Avenue (20-minute headway) from existing. ▪ Additional L "overlay shuttle" in Brooklyn from Rockaway Parkway to Lorimer (20-minute headway), approximately 6:00 AM to 1:30 AM. Combined 10-minute average headway within most of Brooklyn when L "overlay shuttle" is operating. ▪ Additional staffing at stations between 8 Av and Lorimer St. Possible station crowd management measures implemented if needed. <u>Weeknight</u> ▪ Temporarily reduce L service from existing from Rockaway Parkway to 8 Avenue (20-minute headway), 10:00 PM to 5:00 AM. Reduced frequencies on L starting at 8:00 PM to ramp down service by 10:00 PM and to allow work trains to stage for overnight work. ▪ Additional L "overlay shuttle" in Brooklyn from Rockaway Parkway to Lorimer Street from approximately 10:00 PM to 1:30 AM. ▪ Additional staffing at stations between 8 Av and Lorimer St. Possible station crowd management measures implemented if needed.	No subway service changes during weekday service are required because normal L service operates during weekdays (1:30 AM to 8:00 PM). Proposed ASP crowd management measures included to facilitate passenger flow during construction period when L service will be limited weeknights (8:00 PM to 1:30 AM) and weekends (6:00 AM to 1:30 AM).

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
J/M/Z Train Service		
<u>Weekday</u> • Temporarily increase peak service across Williamsburg Bridge to 24 trains per hour (tph) from 21 tph: M train service would be increased from 9 tph to 14 tph in peak direction and J train service would be reduced from 12 tph to 10 tph in peak direction. Trains would make all stops between Marcy Avenue and Broadway Junction. J/Z skip stop may be suspended west of Broadway Junction and all service would operate local. ***These subway service changes have not been implemented as of this Re-Evaluation.***	<u>Weekday</u> ▪ No subway service changes (existing M and J/Z service remains).	No change to weekday service is required because normal L service operates during weekdays (1:30 AM to 8:00 PM).
G Train Service		
<u>Weekday</u> • Temporarily increase G train service serving Williamsburg and connecting with the A/C at Hoyt-Schermerhorn, J/M/Z trains at Broadway / Hewes and the E/M/7 at Court Sq. (12 G tph between Church Av/18 Av and Court Sq. during the peak – an increase from 9 tph; additional 3 tph between Bedford-Nostrand Avs and Court Sq. for 15 tph along this segment – an increase from 9 tph). G trains would also be lengthened to further increase capacity. ***These subway service changes have not been implemented as of this Re-Evaluation.***	<u>Weekday</u> ▪ No subway service changes, including no lengthening of trains (existing G service remains).	No change to weekday service is required because normal L service operates during weekdays (1:30 AM to 8:00 PM).

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
M/R Train Service		
Weekday ▪ Temporarily increase peak-hour M train service serving the Queens Blvd Line from 9 tph to 12 tph and reduce R train service from 10 tph to 8 tph. ***These subway service changes have not been implemented as of this Re-Evaluation.***	Weekday ▪ No subway service changes (existing M and R service remains).	No change to weekday service is required because normal L service operates during weekdays (1:30 AM to 8:00 PM).
Off-Peak Service on the A/E/F/G/J/M/7 Trains		
Weekday/Weekend/Weeknight • Temporarily increase off-peak service on the A, E, F, G, J, M and 7 trains. ***These subway service changes have not been implemented as of this Re-Evaluation.***	Weekday ▪ No subway service changes (existing service remains). Weekend ▪ Temporary additional M service extended to 96 Street / Second Avenue daytimes and evenings (8-minute headway instead of 10-minute headway). ▪ Temporary additional G service during daytimes and evenings (8-minute headway instead of 10-minute headway). Weeknight ▪ Temporarily extended M to 96 Street / Second Avenue until approximately 1:30 AM. ▪ Temporarily increased G frequencies from approximately 8:30 PM to 1:30 AM (5 additional trips). ▪ Temporarily increased 7 frequencies in evenings, adding 5 round trips.	Weekday No change to weekday service is required because normal L service operates during weekdays (1:30 AM to 8:00 PM). Weekend/Weeknight Refinements to service on other lines based on limited L service between 8:00 PM and 1:30 AM weeknights and on weekends and are provided as options to encourage utilization of other lines to disperse demand.
C Train Service		
Weekday/Weekend/Weeknight • Lengthen C trains to increase capacity (permanent change). ***These subway service changes have not been implemented as of this Re-Evaluation.***	Weekday/Weekend/Weeknight ▪ No subway service changes (existing service remains).	No overall increase in capacity is required to accommodate diverted L train ridership because normal L service operates during weekdays (1:30 AM to 8:00 PM).

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
MetroCard Transfers		
Weekday/Weekend/Weeknight ▪ Temporarily implement free MetroCard transfers between: – G and J/M/Z at Broadway/ Hewes – G and 7 at 21 St/Hunters Pt Av – L and 3 at Livonia Av/Junius St ***These subway service changes have not been implemented as of this Re-Evaluation.***	Weekday ▪ No subway service changes (existing service remains). Weekend/Weeknight ▪ Implement free MetroCard transfers temporarily between: – G and J/M at Broadway/ Hewes Street/ Lorimer Street – L and 3 at Livonia Avenue/Junius Street	Proposed ASP eliminates transfers during weekdays for all three stations and for the G and 7 lines at 21st St/Hunters Pt on weekends and weeknights, which are not necessary to accommodate diverted riders.
Station Entrances & Turnstiles –		
Weekday/Weekend/Weeknight ▪ Additional turnstile capacity at Nassau Street (G Line), Metropolitan Avenue (G Line), and Lorimer Street (L Line) (permanent change). ▪ Reopen Hope Street entrance at Metropolitan Avenue G Station (permanent change). ▪ Reopen station entrances at J/M/Z Hewes Street Station (permanent change).	Weekday/Weekend/Weeknight These elements are no longer part of the project.	These improvements are no longer needed because normal L service operates during weekdays (1:30 AM to 8:00 PM). ***These are permanent improvements that would remain in place upon completion of the Canarsie Tunnel Project.***

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
Bus and Operational Modifications		
Interborough Bus Routes		
<u>Weekday/Weekend/Weeknight</u> ▪ Temporary Interborough Bus Service (L1, L2, L3, L4). The B39 would be temporarily discontinued and incorporated into the L3 route. There would be up to 80 bus trips per direction in the peak hour (a net increase of 68 bus trips in comparison to the No Action Alternative). Service would be 24-hours with reduced and combined routes in the overnight period. ▪ Temporary HOV 3+ restrictions on Williamsburg Bridge from 5:00 AM to 10:00 PM, seven days a week. ▪ Temporary bus priority treatments on approaches to Williamsburg Bridge. ***As of this Re-Evaluation, no changes in Bus Service have been implemented.***	<u>Weekday</u> ▪ No bus service changes (existing service remains).	<u>Weekday</u> The capacity increases provided by interborough bus service and associated bus priority/street treatments are no longer needed because normal L service operates during weekdays (1:30 AM to 8:00 PM).
M14 Select Bus Service (SBS)		
<u>Weekday/Weekend/Weeknight</u> ▪ Temporary M14 select bus service (SBS) connecting to Stuyvesant Cove (2-minute headway during peak hours). M14A and M14D service would be unchanged. ▪ Temporary SBS street treatments (with the exception of 19 to 22 permanent fare machines). ▪ Temporarily convert 14th Street to a busway from 5:00 AM to 10:00 PM, seven days a week (Ninth to Third Avenues eastbound; Third to Eighth Avenues westbound).	<u>Weekend/Weeknight</u> ▪ Temporarily increase existing M14A bus service all weekend long and overnight.	Additional M14A bus service provides additional options for L train riders and can disperse demand off of limited L train service during weekends and overnight periods. ***MTA NYCT entered into a license agreement for the parking lot to be utilized as the Stuyvesant Cove SBS terminal. Parking uses have been temporarily suspended. The agreement is being terminated and the parking uses for the parcel will be reintroduced.***

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
▪ Temporary bus terminal at Stuyvesant Cove – bus parking, pedestrian path, ticket machines.		
Local Brooklyn Bus Service		
▪ Temporarily increase peak hour local bus service – B62, B48, B57, B60, B6, B103, and B32. An increase of up to approximately 10 trips per route in peak hours would be implemented.	<u>Weekday</u> ▪ No bus service changes (existing service remains). <u>Weekend/Weeknight</u> ▪ Temporary "Williamsburg Link" shuttle bus service between Bedford Avenue (L), Lorimer Street (L/G), and Marcy Avenue (J/M) on weekends and weekday evenings until 1:30 AM.	<u>Weekday</u> No change to weekday service is required because normal L service operates during weekdays (1:30 AM to 8:00 PM). <u>Weekend/Weeknight</u> In Brooklyn, additional "Williamsburg Link" bus service facilitates connections to other subway lines for L train riders during weekends and weeknight periods providing options to disperse demand off of limited L train service.
Temporary Bus Storage		
▪ Temporary overnight bus storage facilities.	No bus storage facilities would be provided.	With the elimination of the interborough bus service and M14 SBS, which would have temporarily increased system-wide peak bus requirements, additional bus storage is no longer required.
Ferry		
<u>Weekday/Weekend</u> ▪ Temporary ferry service between Stuyvesant Cove and N. Williamsburg (8 trips per hour in peak periods). Ferries would operate from 6:00 AM to Midnight on Sundays through Thursdays and from 6:00 AM to 2:00 AM on Fridays and Saturdays with 4 to 6 trips per hour in off-peak periods. ▪ Construct temporary landing at Empire Pier in North Williamsburg. ***As of this Re-Evaluation, no part of the temporary Ferry Service has been implemented.***	<u>Weekday/Weekend</u> ▪ No ferry service would be provided.	The capacity increases provided by the ferry are not required with normal L service during weekdays (1:30 AM to 8:00 PM). ***Permits and approvals were acquired and ferry operations contract was awarded. The contract award has been terminated.***

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
Bicycle Infrastructure		
12th Street and 13th Street Bicycle Lanes		
▪ Temporary one-way bicycle lanes on 12th Street and 13th Street (between Avenue C and Greenwich Avenue).	▪ No changes to bicycle infrastructure.	These approved ASP initiatives are not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional bicycle enhancements.
Union Square West Bicycle Lane		
▪ Temporary bicycle lane on Union Square West.	▪ No changes to bicycle infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional bicycle enhancements.
Grand Street Bicycle Lane		
▪ Temporary upgrades to Grand Street bicycle lane.	▪ No changes to bicycle infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional bicycle enhancements.
High-Capacity Valet Bike Parking		
▪ Temporary high-capacity valet bike parking.	▪ No changes to bicycle infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional bicycle enhancements.
Bicycle Parking Sleds		
▪ Temporary bicycle parking sleds	▪ No changes to bicycle infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional bicycle enhancements.
Pedestrian Infrastructure		
Union Square West		
▪ Temporarily close Union Square West to vehicles between 14th Street and 15th Street and between 16th Street and 17th Street.	▪ No changes to pedestrian infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional pedestrian enhancements.

Approved ASP (2018) Full Tunnel Closure	Proposed ASP (2019) Nights and Weekends Closure	Reason for Proposed Change or Implementation
University Place		
▪ Additional temporary pedestrian space on University Place between 13th Street and 14th Street.	▪ No changes to pedestrian infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional pedestrian enhancements.
Sidewalk Widening—14th Street, Houston Street, Grand Street		
▪ Temporary sidewalk widening and SBS loading areas along 14th Street and Houston Street and in Brooklyn along Grand Street corridor.	▪ No changes to pedestrian infrastructure.	This approved ASP initiative is not included in the proposed ASP as continued L train service would not generate the diversion of L train riders necessary to require additional pedestrian enhancements.

HAVE ANY NEW OR REVISED LAWS OR REGULATIONS BEEN ISSUED SINCE APPROVAL OF THE LAST ENVIRONMENTAL DOCUMENT THAT AFFECTS THIS PROJECT? If yes, please explain.

☒ **NO**
☐ **YES**

IS THE LIST OF THREATENED AND ENDANGERED SPECIES (NMFS AND USFWS) MORE THAN 6 MONTHS OLD?
☐ **NO**
☒ **YES (STOP! Endangered Species lists and analysis MUST be updated.)**

WILL THE NEW INFORMATION HAVE THE POTENTIAL TO CAUSE A CHANGE IN THE DETERMINATION OF IMPACTS FROM WHAT WAS DESCRIBED IN THE ORIGINAL ENVIRONMENTAL DOCUMENT FOR ANY OF THE AREAS LISTED BELOW? For each impact category, please indicate whether there will be a change in impacts. For all categories with a change, continue to the table at the end of this worksheet and provide detailed descriptions of the impacts as originally disclosed in prior environmental documents, describe all changes and possible impacts. For a project with delay(s) in implementation, confirm the accuracy and validity of the underlying studies. The change in impact may be beneficial or adverse.

Transportation	☒ **Yes**	☐ **No**
Land Use and Economics	☐ **Yes**	☒ **No**
Acquisitions, Displacements, & Relocations	☒ **Yes**	☐ **No**
Neighborhoods & Populations (Social)	☐ **Yes**	☒ **No**
Visual Resources & Aesthetics	☐ **Yes**	☒ **No**
Air Quality	☒ **Yes**	☐ **No**
Noise & Vibration	☒ **Yes**	☐ **No**
Ecosystems (Vegetation/Wildlife, incldg Endng'd Species)	☒ **Yes**	☐ **No**
Water Resources	☒ **Yes**	☐ **No**
Energy & Natural Resources	☐ **Yes**	☒ **No**
Geology & Soils	☐ **Yes**	☒ **No**
Hazardous Materials	☒ **Yes**	☐ **No**
Public Services	☐ **Yes**	☒ **No**
Utilities	☐ **Yes**	☒ **No**
Historic, Cultural & Archaeological Resources	☒ **Yes**	☐ **No**

Parklands & Recreation	☒ **Yes**	☐ **No**
Construction	☒ **Yes**	☐ **No**
Secondary and Cumulative	☒ **Yes**	☐ **No**
Environmental Justice	☐ **Yes**	☒ **No**

For each topic area with a potential to cause a change (checked with a "Yes"), detailed information is provided in the table below.

Will the changed conditions or new information result in revised documentation or determination under the following federal regulations/orders?

Endangered Species Act	☐ **Yes**	☒ **No**
Magnuson-Stevens Act	☐ **Yes**	☒ **No**
Farmland Preservation Act	☐ **Yes**	☒ **No**
Section 404-Clean Water Act	☐ **Yes**	☒ **No**
Floodplain Management Act	☐ **Yes**	☒ **No**
CERCLA (Hazardous Materials)	☐ **Yes**	☒ **No**
Section 106 National Historic Preservation Act	☐ **Yes**	☒ **No**
Uniform Relocation Act	☐ **Yes**	☒ **No**
Section 4(f)	☐ **Yes**	☒ **No**
Section 6(f) Lands	☐ **Yes**	☒ **No**
Wild & Scenic Rivers	☐ **Yes**	☒ **No**
Coastal Barriers	☐ **Yes**	☒ **No**
Coastal Zone	☐ **Yes**	☒ **No**
Sole Source Aquifer	☐ **Yes**	☒ **No**
National Scenic Byways	☐ **Yes**	☒ **No**
Environmental Justice	☐ **Yes**	☒ **No**
Other	☐ **Yes**	☐ **No**

If you checked yes to any of these, describe how the changes impact compliance and any actions needed to ensure compliance of the new project:

Will these changes or new information likely result in substantial public controversy?

☐ **Yes** ☒ **No**

Comments:
With the elimination of various aspects of the approved ASP, it is anticipated that stakeholders will prefer the proposed project. Based on public feedback, including comments received through the project website, at various open houses, community board meetings, as well as meetings with local-elected officials, MTA NYCT has compiled a list of Frequently Asked Questions (FAQs) to answer some of the main concerns the public has brought forward. These FAQs have been placed on the project website at https://new.mta.info/l-project and those who submitted questions and comments will receive an email as to where to find answers. The FAQs will be updated, as needed, throughout the project.

The process of public outreach can be found in the attached L Project Public Outreach Summary, dated April 3, 2019.

Will these changes or new information require any new or different mitigation measures? If yes, describe the measures in each category.

☐ **Yes** ☒ **No**

COMMENTS:

CONCLUSIONS AND RECOMMENDATIONS:

This re-evaluation has been prepared in accordance with 23 CFR Part 771.129. The proposed changes to construction means and methods and construction work hours are consistent with the CE findings issued for the Canarsie Tube Restoration, Canarsie Tube Resiliency, and Canarsie Core Capacity and State of Good Repair projects and would not result in any significant environmental impacts. The proposed changes to the approved ASP would not result in any significant impacts or new temporary or permanent adverse impacts not previously identified in the Canarsie Tunnel Project Supplemental Environmental Assessment. Therefore, MTA NYCT concludes that further environmental analysis is not necessary, and the previous environmental findings remain valid.

MTA NYCT will notify FTA of any additional substantive changes to the Canarsie Tunnel Project in writing prior to implementation of future changes.

LIST OF ATTACHMENTS:

1. Diagram of Proposed Alternative Service Plan (2019)
2. Diagram of Existing M14A Bus Route
3. Diagram of Proposed "Williamsburg Link" Bus Routes
4. Draft Construction Noise and Vibration Assessment, dated December2018
5. "L Project Public Outreach Summary", dated April 3, 2019
6. Alternative Noise Mitigation Plan, Manhattan, dated September 28, 2018
7. Construction Noise Re-evaluation Memo, dated April 5 2019

SUBMITTED BY:

By signing this, I certify that to the best of my knowledge this document is complete and accurate.

Name Angela Ee	Date 4/17/2019
Title Principal Engineer	

Submit two paper copies of this form, attachments, and a transmittal letter recommending a NEPA finding to the address below. Submit an electronic version to your area FTA Community Planner. Contact FTA at the number below if you are unsure who this is or if you need the email address. Modifications are typically necessary. When the document is approved, FTA may request additional copies.

Federal Transit Administration, Region II
1 Bowling Green, Room 429
New York, NY 10004

phone: (212) 668-2170
fax: (212) 668-2136

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
Transportation			**Overall, the proposed Project would result in reduced potential transportation impacts as compared to the approved Project.**
	Tunnel Construction Means/Methods: Construction debris and materials were planned to be removed via shaft sites on 14th Street, generating truck trips to remove debris throughout the construction corridor. MTA NYCT, in coordination with NYCDOT, developed a maintenance and protection of traffic (MPT) plan to address construction-related traffic. No significant impacts were identified as part of the approved project. *The approved construction means and methods would result in transportation impacts but they would not be significant.*	**Tunnel Construction Means/Methods:** The proposed means and methods would result in utilization of the operational track to remove demolition debris with loading and unloading of the debris occurring at MTA NYCT yard facilities. This would reduce certain trucking activities at the shaft site at Avenue A as removal of demolition materials and some deliveries would no longer use the shaft site. In addition, the change in construction means and methods would require less demolition resulting in fewer truck trips. The NYCT/NYCDOT MPT plans would remain in place to minimize impacts from construction-related traffic. *The proposed construction means and methods would result in transportation impacts but they would not be significant.*	**Tunnel Construction Means/Methods:** The proposed means/methods would result in significantly less demolition activities which would require fewer trucks for debris removal and material delivery and relocation of remaining truck trips to industrial areas. There would be fewer truck trips overall compared to the construction means and methods that were part of Projects A and B and proportionately fewer truck trips along 14th Street and within residential areas. *Compared to the approved construction means and methods, the proposed means and methods and work hours would result in reduced transportation impacts and there would be no significant adverse impacts.*
	Construction Work Hours: Street-level construction would have occurred during typical construction work periods of weekdays between 7AM and 6PM MTA NYCT, in coordination with NYCDOT, developed an MPT plan that manages traffic during construction to ensure an acceptable flow of traffic is maintained for vehicles and pedestrians. Full time lane delineation and parking restrictions were approved as part of the MPT plan for this project.	**Construction Work Hours:** Extended work hours on weekdays and Saturdays have been reviewed and approved by appropriate local authorities and incorporated into the MPT plan which would ensure that impacts to the local community are minimized. The addition of a shift on Saturdays would result in construction worker vehicles and additional truck traffic during off-peak hours.	**Construction Work Hours:** The extended work hours that are proposed would result in a minor increase in traffic resulting from additional shift changes and worker travel to and from the construction sites and pushing some construction worker commuter traffic later, outside of peak hours, and on Saturdays compared to the approved work hours.

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	The approved work hours would have resulted in no significant transportation impacts. **Alternative Service Plan (ASP):** In evaluating the ASP in the context of a No Action scenario with tunnel closure but no ASP, the SEA identified the following transportation related findings (see SEA Section ES.3). <u>Subways:</u> All passengers would be diverted from L train within Manhattan and between Brooklyn and Manhattan. Approved ASP would result in a 20 percent reduction in demand on adjacent subways and combined with other service enhancements would improve operating condition, reduce crowding, and improve overall service reliability. This would be a temporary beneficial impact on subway transit conditions.	*The proposed work hours would result in transportation impacts but they would not be significant.* **Alternative Service Plan (ASP):** Under the proposed ASP, transit and service options are only needed during the reduced L train service period between 8:00 PM and 1:30 AM weekdays and on weekends. <u>Subways:</u> L train service would be provided at all times. During reduced L train service periods (between 8:00 PM and 1:30 AM weekdays and on weekends), customers can continue to use the L train or find alternate subway routes between Brooklyn and Manhattan. Since stations would remain open but with limited service, MTA NYCT would provide station management and crowd control to ensure safe conditions.	*Compared to the approved, the proposed construction work hours would result in additional transportation impacts, but they would continue to not be significant.* **Alternative Service Plan (ASP):** <u>Subways:</u> Temporary beneficial impact to L train riders who would not have had access to the L train under the approved ASP. Substantial reduction in need to accommodate diverted L train riders and all stations would remain open in the proposed ASP (although during limited service hours, MTA NYCT would provide station management and crowd control to ensure safe conditions). Subway service on other lines would continue to provide a temporary beneficial impact on subway transit conditions.
	<u>Buses:</u> Levels of delay for bus passengers traveling between Brooklyn and Manhattan and on 14th Street would improve substantially and would be a temporary beneficial impact on bus transit conditions assuming full tunnel closure with no bus improvements.	<u>Buses:</u> With additional M14A service and Williamsburg Link buses, there would be no impacts from increased demand generated by L train riders on existing bus service.	<u>Buses</u>: The proposed ASP would reduce impacts on overall bus network due to the substantial reduction in diverted L train riders. While temporary beneficial impacts to bus travel times associated with the busway on 14th Street and HOV3+ lanes on the Williamsburg Bridge would no longer be applicable, the added M14A service and "Williamsburg Link" buses would continue to provide a temporary beneficial impact.

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	Ferries: New, temporary ferry service would reduce travel times for some riders by up to 30 minutes and would be a temporary beneficial impact.	Ferries: Not part of proposed ASP; no longer needed to serve diverted customers.	Ferries: All impacts previously presented are eliminated.
	Traffic: Vehicle restrictions and bus priority lanes would result in substantial improvements in overall travel times. HOV3+ restrictions on the Williamsburg bridge would change travel patterns including large reduction in vehicle trips on the bridge and local street networks but would increase trips on other crossings and adjacent streets. Traffic could also temporarily increase on side streets along the 14th Street corridor because of the 14th Street SBS and the projected increase would not be significant compared to the No Action. Overall, the approved ASP would not result in significant adverse impacts.	Traffic: Little or no traffic diversion with elimination of 14th Street SBS in Manhattan, Grand Street priority lanes in Brooklyn, and HOV3+ restrictions on Williamsburg Bridge. Closure of the block of N 7th Street (southbound one-way street) between Driggs Avenue and Roebling Street on weekends to accommodate passenger queuing while waiting for buses in the street would have a temporary impact on traffic.	Traffic: Little traffic diversion compared with approved ASP, which was already determined to have no significant adverse impacts. Traffic diversions as a result of the closure of N 7th Street on the weekends would not be significant since it would occur during off-peak hours, there are adjacent south bound one-way streets that would be able to absorb traffic running along N 7th St, and the closure would be coordinated with NYCDOT. Therefore, the proposed ASP would result in reduced impacts to traffic.
	Pedestrians: The approved ASP plan with approximately 50,000 square feet of additional temporary pedestrian space along 14th Street, University Place, and Union Square West would substantially improve pedestrian conditions and would provide a temporary beneficial impact.	Pedestrians: With continued L train service, there would be much less pedestrian traffic generated by L diverted L train riders along 14th Street and, as a result, the proposed 2019 ASP would eliminate all previously approved additional pedestrian circulation space along 14th Street, University Place, and Union Square West.	Pedestrians: There would be no change in weekday service; therefore, the 2019 ASP would not result in any pedestrian impacts during peak hours. In addition, all temporary impacts associated with removal of pedestrian circulation improvements from the ASP would be eliminated. Although no longer part of the ASP, MTA NYCT, in coordination with NYCDOT, would go through its typical outreach/review process as to whether to make them permanent as part of separate independent locally funded project(s).

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	Bicycles: Approximately 3.6 miles of temporary new bicycle lanes would be delineated. These bicycle lanes would improve safety and capacity of the bicycle network.	Bicycles: With continued L train service, there would be much less bicycle traffic generated by diverted L train riders along the 14th Street corridor and no bicycle lanes are included in the proposed ASP.	Bicycles: There would be no change in weekday L train service; therefore, the 2019 ASP would not result in any bicycle impacts during peak hours. In addition, all temporary impacts associated with removed bicycle network changes would be eliminated. Although no longer part of the ASP, MTA NYCT, in coordination with NYCDOT, would go through its typical outreach/review process as to whether to make them permanent as part of separate independent locally funded projects.
	Parking: Temporary displacement of approximately 970 on-street and 220-off-street parking spaces in Brooklyn and Manhattan (SEA Table 12, p. 45). Generally, there are on-street and off-street parking spaces within a quarter mile of locations where parking would be displaced and the temporary impact would not result in a significant adverse impact.	Parking: Temporary on-street parking displacement. In Manhattan, approximately 14 on-street parking spaces would be temporarily displaced for the additional M14A service on nights and weekends – 12 on-street spots would be needed for M14A staging and 2 additional spots would be needed in Manhattan for daylighting (i.e., removal of parking spaces at a corner or intersection to allow buses to make a turn). In Brooklyn, approximately 77 on-street parking spaces would be temporarily displaced for the Williamsburg Link bus service on nights and weekends. Approximately 39 spaces would be temporarily displaced for staging and up to 38 on-street parking spaces would be displaced for queuing at Bedford Av on the block of N 7th St between Driggs Av and Roebling St as part of a full weekend street closure of this block. This block of N 7th St is currently used for construction	Parking: All off-street parking displacement would be eliminated in the proposed 2019 ASP and the temporary impact would be eliminated. Approximately 91 on-street parking spots would be needed temporarily during nights and weekends only for the 2019 ASP, 880 fewer spots than for the 2018 ASP. Therefore, the proposed ASP would result in reduced impacts to parking compared to the approved Project. While the bike lanes on 12th and 13th Streets are no longer part of the proposed ASP, it is noted that they are already installed and the 550 parking spaces have already been displaced. MTA NYCT, in coordination with NYCDOT, would go through its typical outreach/review process as to whether to make them permanent, as part of separate independent locally funded projects.

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
		staging, and MTACC has a permit to fully close this block during certain hours.	
	The approved ASP would result in potential transportation impacts, but the impacts would not have been significant.	*The proposed ASP would result in potential transportation impacts only during weeknights and weekends; the impacts would not be significant.*	*Compared to the approved ASP, the proposed ASP would result in reduced transportation impacts.*
Land Use and Economics (Please refer to the analysis provided for "Acquisitions, Displacements, & Relocations" below.)			
Acquisitions, Displacements, & Relocations			**Overall, the proposed Project would result in reduced impacts compared to the approved Project.**
	Tunnel Construction Means/Methods and Construction Work Hours: *The approved tunnel construction means/methods and work hours would not result in any acquisitions, displacements and relocations.*	**Tunnel Construction Means/Methods and Construction Work Hours:** *The proposed tunnel construction means and methods and extended work hours would not result in any acquisitions, displacements and relocations.*	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would continue to be no acquisitions, displacements and relocations due to the construction means and methods and work hours. Therefore, there would be no change to impacts.*
	Alternative Service Plan (ASP): The approved ASP required temporary use of private property for bus operations or storage during the 15-month tunnel closure. In Manhattan, MTA NYCT would displace a privately-run parking facility under the FDR Drive with 83 spaces to be	**Alternative Service Plan (ASP):** With no ferry service, SBS service, or interborough bus service, the proposed ASP would not include any acquisition or use of private property.	**Alternative Service Plan (ASP):** Elimination of all temporary impacts associated with the temporary displacement of parking lot and storage uses and parkland use for the ferry landing.

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	used as the terminal of the temporary SBS service and would temporarily utilize lots currently owned by Port Authority of New York and New Jersey (PANYNJ), as well as a New York City-owned storage lot under the Williamsburg Bridge. In Brooklyn, the MTA NYCT would lease a privately-owned storage facility displacing up to 137 vehicles during the 15-month tunnel closure. In addition, temporary ferry service would have required minor alteration and approval to use the North 5th Street Pier and Park, which is managed by New York City Department of Parks and Recreation. These temporary uses of property were determined to have no significant impact. *The approved ASP would result in acquisitions, displacements, & relocations impacts, but they would not have been significant.*	*Therefore, the proposed ASP would result in no acquisitions, displacements, & relocations impact.*	*Compared to the approved ASP, the proposed ASP would result in reduced impacts.*
Neighborhoods & Populations (Social)			
Visual Resources & Aesthetics			

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
Air Quality			**Overall, the proposed Project would result in reduced potential for air quality impacts compared to the approved Project.**
	Tunnel Construction Means/Methods and Construction Work Hours: Construction debris and materials were planned to be removed via shaft sites on 14th Street, generating emissions from truck trips used to remove debris throughout the construction corridor. Impacts to dust and silica are addressed under 'Hazardous Materials.' *The approved construction means and methods would not result in significant air quality impacts.*	**Tunnel Construction Means/Methods and Construction Work Hours:** The proposed means and methods would result in utilization of the operational track to remove demolition debris with loading and unloading of the debris occurring at MTA NYCT yard facilities. This would reduce certain trucking activities at the shaft site at Avenue A. In addition, the change in construction means and methods would require less demolition resulting in fewer truck trips. This reduced trucking activity would result in reduced emissions from the vehicles. *The proposed construction means and methods would not result in significant air quality impacts.*	**Tunnel Construction Means/Methods and Construction Work Hours:** The proposed means/methods would result in substantially less demolition activity, few trucks trips overall, and proportionately fewer truck trips along 14th Street and within residential areas compared to the construction means and methods that were part of Projects A and B. This would result in reduced air quality impacts from construction traffic. Impacts to dust and silica are addressed under 'Hazardous Materials. *Compared to the approved construction means and methods the proposed means and methods and work hours would result in reduced air quality impacts.*
	Construction Work Hours: Street-level construction would have occurred during typical construction work periods generating emissions from construction worker vehicles, truck trips, and construction equipment. *The approved construction work hours would not result in significant air quality impacts.*	**Construction Work Hours:** Extended work hours on weekdays and Saturdays would increase emissions during the additional hour on weekdays and result in an increase in emissions from construction worker vehicles, truck traffic, and construction equipment during the additional shift on Saturdays. *The proposed construction work hours would not result in significant air quality impacts.*	**Construction Work Hours:** The extended work hours that are proposed would result in a minor increase in air emissions during weekday evenings and would increase emissions on Saturdays as a result of construction worker vehicles, truck traffic and construction equipment compared to the approved work hours. *Compared to the approved construction work hours, the proposed work hours would result in increased air quality impacts but the impacts would continue to not be significant.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	Alternative Service Plan (ASP): The approved ASP would reduce total vehicle miles and improve traffic speeds compared to the No Action. While individual locations in the larger network would experience additional volume and congestion, the temporary nature of the disruption is not expected to result in significant impacts to air quality. The potential for particulate matter impacts would be reduced since the supplemental bus fleet would meet Environmental Protection Agency (EPA) emissions standards for new buses and there would be 15 electric buses as part of the fleet. The additional ferry service would not result in significant impacts with respect to air quality based on the incremental emissions of the temporary services. Construction of facilities would be short-term and minor and would not produce significant air emissions. *The approved 2018 ASP would result in air quality impacts, but they would not have been significant.*	**Alternative Service Plan (ASP):** The proposed 2019 ASP would eliminate all aspects of the approved ASP that had a potential to impact air quality, including: no SBS bus service, no interborough buses or operational changes to the Williamsburg Bridge., The additional M14A and Williamsburg Link buses would result in additional volume during weeknights and weekends but would not be expected to significantly increase congestion. The temporary nature of the disruption is not expected to result in significant impacts to air quality. The potential for particulate matter impacts would be reduced since the supplemental bus fleet would meet EPA emissions standards for new buses. In addition, approximately 5 electric buses, out of a fleet of 6 buses on weeknights and out of a fleet of 22 buses on weekends would be used for the Williamsburg Link service immediately and approximately 15 articulated electric buses would be used for the M14A and M14D routes, out of a fleet of 23 buses on weeknights and Sundays and out of a fleet of 27 buses on Saturdays starting in late 2019. *Overall, the proposed ASP would result in air quality impacts, but they would not be significant.*	**Alternative Service Plan (ASP):** The proposed ASP would result in a reduced potential for traffic diversions and congestion associated with the approved ASP. *Compared to the approved 2018 ASP, the proposed 2019 ASP would result in reduced potential for air quality impacts.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
Noise & Vibration			**Overall, the proposed Project would result in comparable noise and vibration impacts to the approved Project.**
	Tunnel Construction Means/Methods and Construction Work Hours: For the approved tunnel construction means and methods, construction work contemplated activities that would take place between the hours of 7 AM and 6 PM. The MTA NYCT, through its contractor, would abide by the New York City Noise Code, which limits work hours to 7 AM to 6 PM on weekdays in the absence of a variance approved by NYCDEP. The previously evaluated projects also contemplated certain time-sensitive tasks would require overtime work. *The approved construction means/methods and construction work hours would not result in significant noise and vibration impact.*	**Tunnel Construction Means/Methods and Construction Work Hours:** Subsequent to completion of the prior Categorical Exclusions and after the start of construction, MTA NYCT determined that extended work hours were necessary to address unforeseen field conditions and to maintain the 15-month schedule at two locations: Avenue A at 14th Street and Avenue B at 14th Street. In general, the extended work hours run from 7 AM to 11 PM on weekdays and 7 AM to 7 PM on Saturdays, with only non-noisy clean-up activities allowed between 10 PM and 11 PM. Beginning March 18, 2019 work hours were revised and reduced to 7 AM to 7 PM on weekdays and 7 AM to 5 PM on Saturdays. In compliance with New York City Noise Code, MTA NYCT and the Joint Venture General Contractor applied for, and received approvals for, four separate time-specific variances to the Noise Code to allow the extended work hours. NYCDEP reviewed each application along with an Alternative Noise Mitigation Plan for MTA's busiest site for the project (see attachment 6; others are available upon request) and NYCDOT issued permits for the extended work hours along with stipulations that require implementation of	**Tunnel Construction Means/Methods and Construction Work Hours:** The proposed construction means and methods do not require any modification to the access shafts or any new activities on the surface that would generate greater noise levels than previously assessed. The new plan would reduce certain trucking activities at the shaft site at Avenue A as removal of demolition materials and some deliveries would no longer use the shaft site (work trains on the operational track would be utilized with loading and unloading occurring at MTA NYCT yard facilities). The March 2019 monitored noise (see attachment 7) was taken daily from excavation, concrete work and debris removal activities, which would be representative of the worst case scenario for noise impacts throughout the remainder of the proposed Project. The monitored noise did not exceed FTA noise thresholds; therefore, future noise is not expected to exceed FTA noise thresholds. The Alternative Noise Mitigation Plan for MTA's busiest site for the project (see attachment 6; others are available upon request) developed as part of the October 2018 assessment of extended work hours would continue to be applicable and would

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
		the Alternative Noise Mitigation Plan, which identifies monitoring methods and locations; noise mitigation and noise reduction strategies, methods, procedures, and technology; and complaint response procedures. Vibration monitoring is being conducted on all buildings that fall within the influence line of excavation, except for one or two, dependent on the approval of the building owner. Vibration monitoring is also being conducted on a ConEdison oil-o-static line. The system provides continuous monitoring and different level alarms to prevent any structural damage. The Alternative Noise Mitigation Plan (see attachment 6) developed by MTA NYCT's JV general contractor included placement of sound curtains attached to construction fencing surrounding each work zone, movable noise barriers around equipment, installation of white noise back-up alarms on trucks with permanent use in the work zones, and procurement of electric powered equipment to replace diesel powered equipment. The Noise Mitigation Plan was implemented beginning in April 2018 and remains active. The evaluations by the JV general contractor were validated by a separate noise and vibration study conducted by MTA NYCT in December 2018 (see attachment 4) which included an assessment of potential for impacts from construction activities during the weekday evening and Saturday hours and confirmed	protect against any potential exceedance of noise or vibration thresholds. *Compared to the approved construction means and methods and work hours, the proposed means and methods and work hours would continue to result in no significant impact.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
		the implementation of the noise monitoring and mitigation program that has been implemented in the affected community. The December 2018 (attachment 4) assessment concluded that there were no vibration impacts from construction activities, but established a vibration mitigation plan should different ground conditions exist that would result in higher than predicted vibration levels. The assessment did reveal many likely potential significant impacts during evening and Saturday hours from the construction activity which re-emphasized and summarized the mitigation options and monitoring program that are to be incorporated in the noise mitigation plan. As noted by MTA NYCT in the transmittal of the December 2018 noise study, mitigation measures have already shown results and recorded complaints have decreased and exceedances at street level have been reduced. An additional re-evaluation of the construction noise for the Canarsie Tunnel Project was conducted at the following construction sites for the activities occurring during March 2019: 1 Av Station (Ave A); Avenue B Substation; Bedford Av Station; and Maspeth Substation. The reevaluation is based on the monitored construction noise levels at these sites compared with the FTA eight-hour detailed construction noise criteria of Leq=80 dBA to determine if any	

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
		exceedances of the criteria occurred during March 2019. The monitored construction noise levels did not exceed the FTA residential eight-hour noise criteria. *The proposed construction means/methods and construction work hours would not result in significant noise and vibration impact.*	
	Alternative Service Plan (ASP): The SEA for the approved ASP concluded that the proposed ferry service and bus services would not result in significant noise or vibration levels. Construction of temporary facilities would be short term in duration and minor and is not expected to produce significant noise and vibration levels. *The approved ASP would result in no significant noise and vibration impacts.*	**Alternative Service Plan (ASP):** The proposed ASP has reduced and eliminated many of the additional transit options of the approved ASP. As a result, there would be little or no noise impacts generated by the proposed ASP. *The proposed ASP would result in no significant noise and vibration impacts.*	**Alternative Service Plan (ASP):** Compared to the approved ASP, the proposed ASP would reduce new transit options. *There would be no change in the determination that the proposed ASP, like the approved ASP, would not result in significant noise or vibration impacts.*
Ecosystems (Vegetation & Wildlife incldg Endng'd Species)	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would be no impacts to ecosystems associated with the approved tunnel construction means/methods or approved work hours.*	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would be no impacts to ecosystems associated with the proposed tunnel construction means/methods or extended work hour*s.	**Overall, the proposed Project would result in reduced ecosystem impacts compared to the approved Project.** **Tunnel Construction Means/Methods and Expanded Work Hours:** *There would continue to be no impact to ecosystems. Therefore, there would be no change to impacts.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	Alternative Service Plan (ASP): With the exception of the in-water work associated with the installation and removal of the temporary ferry landing in North Williamsburg, Brooklyn and the temporary walkway provided within Stuyvesant Cove Park, the approved ASP provides transit services that are on public streets and development or paved lots with no potential impacts on ecologically sensitive areas or habitat for rare, threatened, or endangered species. To evaluate the potential impacts from construction of a temporary ferry landing at North Williamsburg, FTA and MTA NYCT consulted with New York State Department of Environmental Conservation (NYSDEC), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS) regarding the construction of the temporary ferry landing. FTA and MTA NYCT conducted a screening for threatened, endangered and species of concern and contacted the USFWS, NMFS, and the New York State Natural Heritage Program. FTA and MTA NYCT's coordination with NMFS included consultation with the Protected Resources Division in accordance with the Endangered Species Act (ESA) for protected species under NMFS's jurisdiction (Atlantic and Shortnose sturgeon) and the Habitat Conservation Division in accordance with the	**Alternative Service Plan (ASP):** Elimination of the temporary ferry service would eliminate any potential effects on aquatic resources within the East River. *There would be no impacts to ecosystems associated with the proposed 2019 ASP.*	**Alternative Service Plan (ASP):** Elimination of any potential effects on aquatic resources within the East River. Since review of Federal and State databases for threatened and endangered species were more than six months old, these database queries were updated. The only difference identified was that New York State identifies the potential presence of Northern long-eared bat (*Myotis septentrionalis*) (a Federal and State Threatened species) in New York County. Since the summer habitat of Northern long-eared bat generally includes upland and riparian forest within predominantly forested landscapes, it is unlikely that this species would exist in any of the areas within which either construction or transit modifications are proposed. Further, since no tree clearing is contemplated as part of the tunnel construction means/methods or the proposed ASP no impacts to Northern long-eared bat are anticipated. *Compared to the approved 2018 ASP, the proposed 2019 ASP would result in reduced ecosystem impacts.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	Magnuson-Stevens Fishery Conservation and Management Act. The implementation of temporary ferry service between North Williamsburg and Stuyvesant Cove is not anticipated to result in significant adverse impacts to biological resources during construction of the temporary ferry landing in the East River or during ferry service operations. Consultations with NMFS Protected Resources Division indicate that the ASP would Not Likely to Adversely Affect (NLAA) endangered or threatened species protected by the Endangered Species Act (ESA) in the project area. NMFS Habitat Conservation Division determined that the ASP will have no substantial adverse effects on Essential Fish Habitat (EFH), subject to measures to mitigate harm during construction and removal of the temporary landings *There would be potential impacts to ecosystems associated with the approved 2018 ASP, however, they would not have been significant.*		
Water Resources	**Tunnel Construction Means/Methods and Construction Work Hours:**	**Tunnel Construction Means/Methods and Construction Work Hours:**	**Overall, the proposed Project would result in reduced impacts to water resources compared to the approved Project.** **Tunnel Construction Means/Methods and Construction Work Hours:**

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	There would be no impact to water resources associated with either the approved tunnel construction means and methods or approved construction work hours. **Alternative Service Plan (ASP):** Approved ASP elements would have been located within the flood plain; they would have been designed to be flood resident and would not have affected flood level, flood risk or the flow of flood waters within or around project sites. Due to temporary nature and limited extent of activities in coastal zone, the approved ASP would have been consistent with NYS coastal policies. *The approved ASP would have resulted in potential adverse impact to water resources, but they would not have been significant.*	*There would be no impact to water resources associated with either the proposed tunnel construction means and methods or extended construction work hours.* **Alternative Service Plan (ASP):** Elimination of the temporary ferry service and M14 SBS Stuyvesant Cove terminal would eliminate construction in coastal areas, removing any potential impact on coastal and water resources. *Therefore, the proposed 2019 ASP would result in no impact to water resources.*	*There would continue to be no impact to water resources. Therefore, there would be no change to impacts.* **Alternative Service Plan (ASP):** Elimination of any potential coastal and water resource impacts. *All potential impacts previously presented are eliminated.*
Energy & Natural Resources			
Geology & Soils			
Hazardous Materials	**Tunnel Construction Means/Methods and Construction Work Hours:**	**Tunnel Construction Means/Methods and Construction Work Hours:**	**Overall, the proposed Project would result in reduced hazardous materials impacts compared to the approved Project.** **Tunnel Construction Means/Methods and Construction Work Hours:**

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	Dust and Silica: Specific to the potential for Silica dust generated by demolition of concrete, MTA NYCT and its Contractor had designed a custom-built air filtration system which included a movable ventilated gantry system, fans and air scrubbers. A particular section of tunnel would have been partitioned and air within the partitioned work area would have been moved by fans and then filtered before being exhausted. With a two-track shutdown, cleaning operations would have been conducted on a daily basis, and appropriate air monitoring and visual inspection would have ensured acceptable levels of silica exposure for workers and the public at Bedford Av Station where service would have been terminated. MTA NYCT would comply with the most recent 2016 OSHA silica dust permissible exposure limit for construction workers. In previous documentation (*Canarsie Tunnel Rehabilitation Project Alternative Analysis*, June 2018) it was disclosed that MTA NYCT practice dictates before re-opening for service, after nighttime or weekend work involving demolition, a thorough visual inspection of the tunnel and adjacent areas would be performed to ensure visible dust in the air had cleared and debris had been removed. Based on the results of the visual inspection and prior (historic) air monitoring, a determination would be made as to whether air testing is needed to assure that	Dust and Silica: The proposed tunnel construction and means and methods reduces the amount of concrete duct bank that would have to be removed, thus reducing the amount of silica dust that would need to be managed. The new silica management plan, comprises smaller localized sections of tunnel, and would utilize a combination of engineering controls, including tools with dust extractors, air scrubbers, and wet methods. A combination of visual inspection and air testing (both laboratory generated and real-time) would determine the efficacy of dust control measures. A correlation would be developed between real-time dust and laboratory generated data to help determine action levels for work activities and reopening of service. MTA NYCT expects to utilize real-time dust measurements as an indicator of silica concentrations on a consistent basis, which is even more conservative than current practice. Laboratory generated silica results would be reviewed throughout the *entire* project to substantiate the real-time data in public areas, whereas the old plan required only a portion of demolition activities (depending on favorable results) to be sampled. The combination of engineering controls, visual inspection and air monitoring that would be utilized in the new plan is consistent with MTA NYCT practice and the objectives of the old plan-which is to provide a safe environment for the workers and public. MTA NYCT	

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	silica dust concentrations were below acceptable levels. MTA NYCT would implement standard industry practices and health and safety protocols that would be implemented if hazardous materials were found during excavation. *The approved construction means/methods and extended work hours would result in no significant adverse impacts associate with hazardous materials.* **Alternative Service Plan (ASP):** Fare Machines and Way-Finding Totems: No significant adverse impacts based in implementation of standard industry practices and health and safety protocols that would be implemented if hazardous materials were found during excavation for fare machines and way-finding totems. *The approved ASP would result in potential adverse hazardous materials impacts. However, the impacts would not be significant.*	would continue to comply with the most recent 2016 OSHA silica dust permissible exposure limit for construction workers. *The proposed construction means/methods and extended work hours would result in no significant adverse impact associated with hazardous materials.* **Alternative Service Plan (ASP):** Fare Machines and Way-Finding Totems are no longer part of the proposed 2019 ASP; therefore, no excavation associated with the installation of additional fare machines and way-finding totems for the additional ferry and bus services are required. *The proposed ASP would result in no potential for hazardous materials impacts.*	*There would be no change to impacts associated with construction means/methods and extended work hours.* **Alternative Service Plan (ASP):** There would be no construction work with the proposed ASP with the elimination of the ferry construction site and associated bus parking lot, and many of the street improvements that would require excavation. *There would be reduced hazardous materials impacts associated with the proposed 2019 ASP compared to the approved 2018 ASP.*
Public Services			
Utilities			

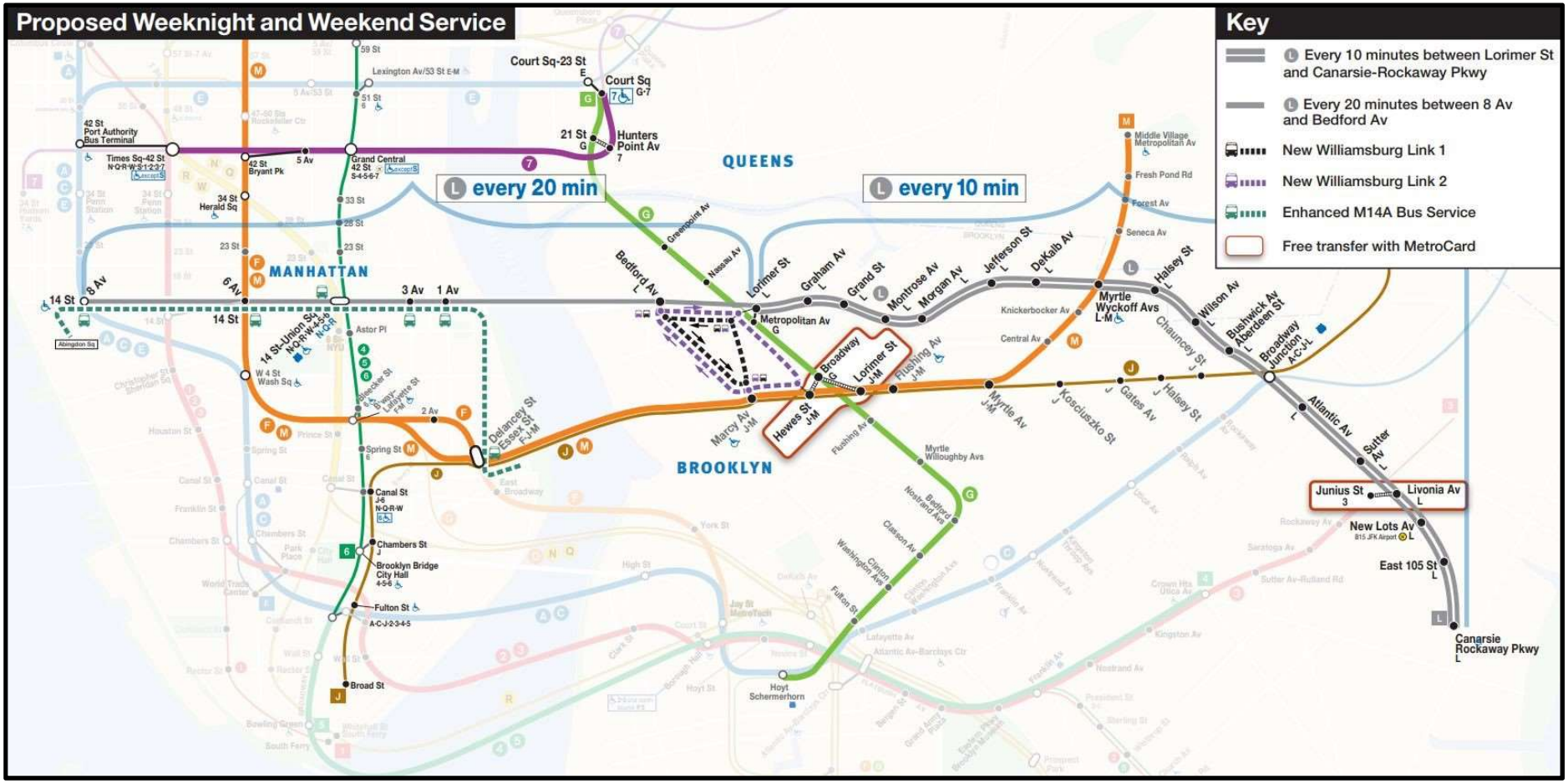
Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
Historic, Cultural & Archaeological Resources			**Overall, the proposed Project would not result in any impacts to historic, cultural & archaeological resources compared to the approved Project.**
	Tunnel Construction Means/Methods and Construction Work Hours: *There would be no impacts to historic, cultural, and archaeological resources associated with the approved construction means/methods or construction work hours.*	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would be no impacts to historic, cultural, and archaeological resources associated with the proposed construction means/methods or extended construction work hours.*	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would continue to be no impact to historic, cultural, and archaeological resources. Therefore, there would be no change to impacts*.
	Alternative Service Plan (ASP): *As set forth in the SEA and FONSI, the approved 2018 ASP included elements that could have potential impacts to Section 106 resources, which include historic, cultural, are archaeological resources, including those adjacent to elements of the ASP that would require minor construction for pedestrian and sidewalk improvements, bus storage and the temporary ferry landing.*	**Alternative Service Plan (ASP):** *With no pedestrian and sidewalk improvements, no bus storage facilities or temporary ferry landing, the proposed 2019 ASP would not result in any impacts to historic, cultural, or archaeological resources.*	**Alternative Service Plan (ASP):** *There would be no construction work needed for the new ASP; therefore, the proposed 2019 ASP would not result in any impacts to historic, cultural, or archaeological resources.*
Parklands & Recreation			**Overall, the proposed Project would result in reduced impacts to parklands & recreation compared to the approved Project.**
	Tunnel Construction Means/Methods and Construction Work Hours: *There would be no impacts to parkland and recreational resources associated*	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would be no impacts to parkland and recreational resources associated with*	**Tunnel Construction Means/Methods and Construction Work Hours:** *There would continue to be no impacts to parkland and recreational resources.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
	with the approved construction means/methods or construction work hours. **Alternative Service Plan (ASP):** The approved ASP would result in approximately 0.16 acres (7,012 sq. ft.) of disturbance to recreation area at Stuyvesant Cove Park and approximately 0.09 acres (4,300 sq. ft.) to parkland at North 5th Street Pier and Park. *The approved ASP would result in impacts to parklands and recreational areas, however, they would not be significant.*	*the proposed construction means/methods or extended construction work hours.* **Alternative Service Plan (ASP):** The proposed ASP would eliminate the need for disturbance at Stuyvesant Cove Park and North 5th Street Pier and Park. *The proposed ASP would result in no impacts to parklands and recreational areas.*	*Therefore, there would be no change in impacts.* **Alternative Service Plan (ASP):** Elimination of approximately 0.25 acres of disturbance to parklands and recreation. All impacts previously presented are eliminated. *Compared to the approved ASP, the proposed ASP would result in reduced impacts.*

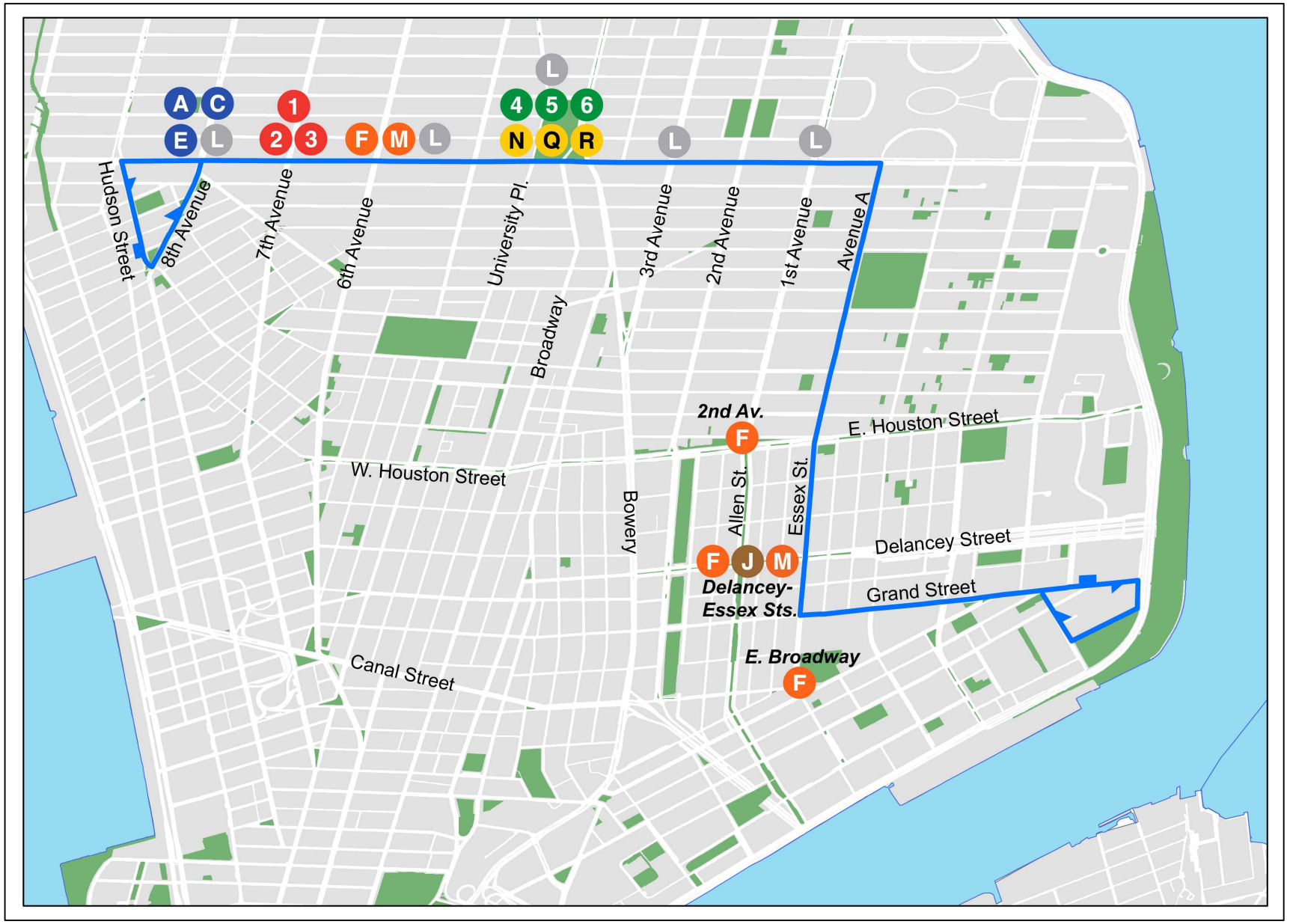
Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
Construction	**Tunnel Construction Means/Methods and Construction Work Hours:** See Transportation, Noise and Hazardous Materials, above. 15 month tunnel construction duration **Alternative Service Plan (ASP):** There would be minor temporary construction impacts under the approved ASP, including street and sidewalk treatments, installation of ticket machines, the Stuyvesant Cove bus terminal and the temporary North Williamsburg ferry landing. *Construction duration for each element would be short-term (less than six months) and would not result in significant adverse air, noise, or traffic impacts during construction of ASP elements.*	**Tunnel Construction Means/Methods and Construction Work Hours:** See Transportation, Noise and Hazardous Materials, above. 15-17 month tunnel construction duration **Alternative Service Plan (ASP):** No new impacts based on reduced construction anticipated with elimination of SBS and interborough bus services, ferry services, and pedestrian and bicycle enhancements. *There would be no construction activities associated with the proposed ASP; therefore, there would be no construction impacts.*	**Tunnel Construction Means/Methods and Construction Work Hours:** See Transportation, Noise and Hazardous Materials, above. An increase in tunnel construction between 0 and 2 months would not result in a significant change in impacts. **Alternative Service Plan (ASP):** *All impacts previously presented are eliminated.*

Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
Secondary and Cumulative	**Tunnel Construction Means/Methods and Construction Work Hours:** As described in the applicable CE evaluations, information on secondary and cumulative impacts was not presented because projects that fall under Categorical Exclusions are generally minor in nature and do not result in significant impacts. **Alternative Service Plan (ASP):** The 2018 SEA, which only addresses the 2018 ASP, did not present analysis of secondary and cumulative impacts because all ASP elements were temporary and impacts would be temporary only for the duration of the tunnel restoration activities.	**Tunnel Construction Means/Methods, Construction Work Hours and: Alternative Service Plan (ASP):** The potential impacts of the proposed construction means and methods, extended construction work hours, and 2019 ASP are temporary in nature and therefore are not expected to result in any significant secondary or cumulative impacts. In addition, the proposed Project would not induce growth along the L train corridor, including 14th Street, nor would it induce changes to land use, population density, and related effects on air, water and other natural ecosystems. There would be no changes to travel patterns during peak hour commutes. While the bike lanes on 12th and 13th Streets are no longer part of the proposed ASP, they are already installed and the associated 550 parking spaces have already been displaced. These bicycle lanes would add to the safety and capacity of the bicycle network and would not result in a cumulative adverse impact to vehicular congestion. There would be no significant cumulative change to bicycle ridership and utilization of bike lanes along the L train corridor because there will still be L train service at all times. Furthermore, bicyclists would still be able to use 14th Street as a	**Overall, the proposed Project would result in reduced secondary and cumulative impacts compared to the approved Project.** **Tunnel Construction Means/Methods, Construction Work Hours, and Alternative Service Plan:** There would be no secondary impacts associated with the change to construction means and methods, work hours, or the proposed 2019 ASP. Since the proposed Project would result in comparable impacts to noise and vibration and reduced impacts to all other impact categories, it is expected that secondary and cumulative impacts within the same project area and during the same time period would also be reduced. MTA NYCT would ensure close coordination with other local project sponsors and developers along the project corridor to minimize cumulative impacts during construction. Although the bike lanes are no longer part of the ASP, MTA NYCT and/or NYCDOT, as applicable, will determine independent utility for this element, as needed, and will comply with applicable processes, including required planning and outreach, and other requirements related to planning and implementation of this element. Although M14 SBS is no longer part of the ASP, MTA NYCT and/or NYCDOT as applicable, will determine independent utility

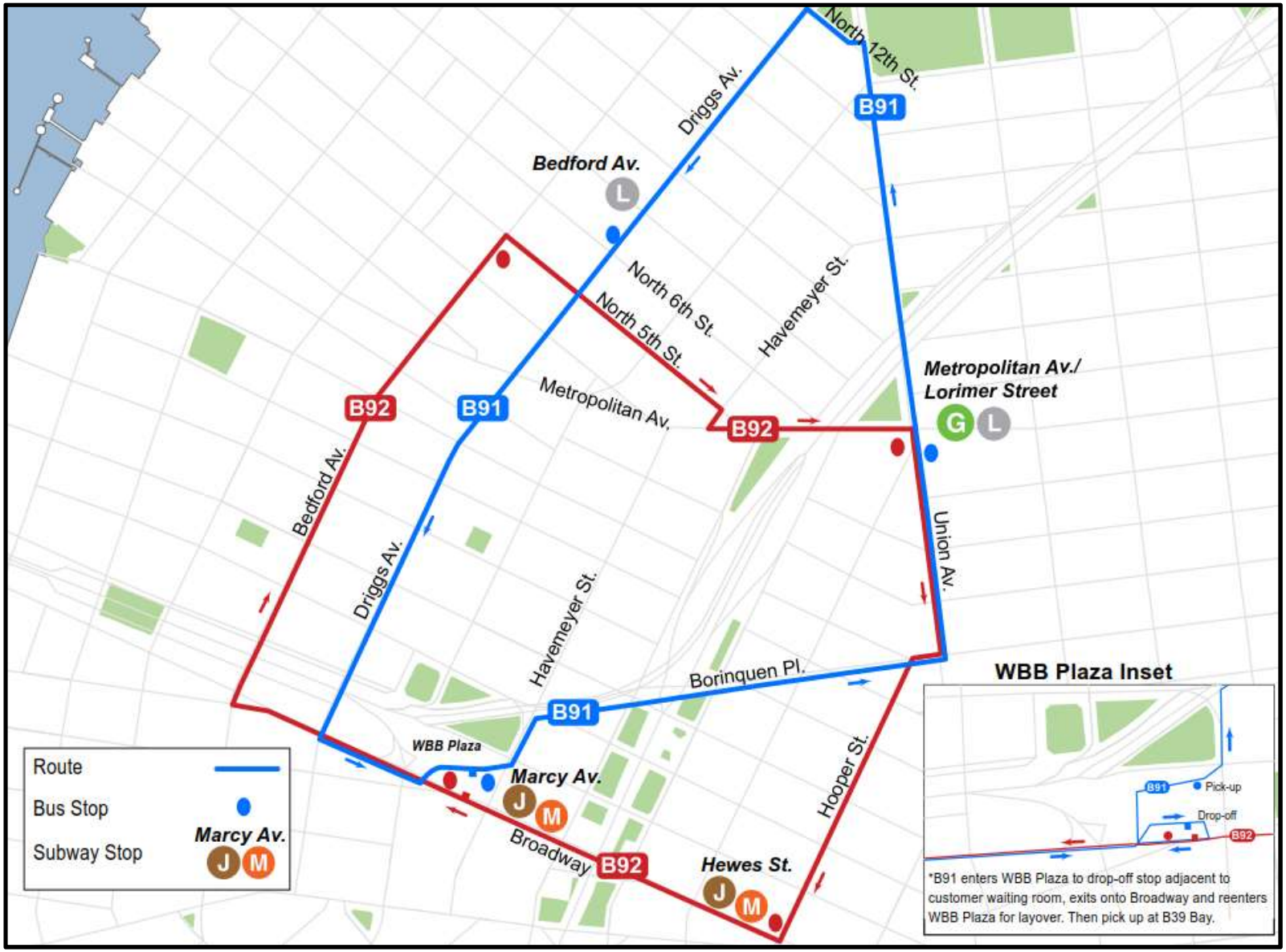
Impact Category	Impacts & any mitigation as Initially Disclosed	New Impacts or Updated Analysis	Change in Impacts
		cycling corridor, even though the road does not include bicycle lane markings. The temporary removal of parking spaces would not create a significant adverse cumulative impact on parking overall throughout the larger area. There would be no cumulative impacts associated with the temporary bus service and construction occurring along 14th Street or in Brooklyn. All ASP bus services would occur after peak hours and after normal construction and staging hours. An M14 Select Bus Service (SBS) is being developed by MTA and NYCDOT as part a separate independent project. Further information about its route, frequency, and required street treatments has been shared with the public and outreach is underway. Analysis of the impacts of this service would be performed by MTA and NYCDOT once the details are further refined.	for this element, as needed, and will comply with applicable processes, including required planning and outreach, and other requirements related to planning and implementation of this element. Any removal of the lane markings through repaving would not be part of the Canarsie Tunnel Project; it would be part of a separate, independent SBS project.
Environmental Justice			



Attachment 1: Proposed Alternative Service Plan (2019)



Attachment 2: Existing M14A Bus Route



Attachment 3: Proposed “Williamsburg Link” Bus Routes

Attachment 4: December 2018 Draft Construction Noise & Vibration Assessment

Canarsie Tunnel Project

Draft Construction Noise & Vibration Assessment

December 2018

Technical Memorandum

Project No. 183785_CPS

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1. INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this study is to assess the potential construction noise and vibration associated with the Canarsie Tunnel Project. The study includes an assessment of the change in work hours (i.e., hours outside of 7 am – 6 pm weekdays) for the project by analyzing weekday evening and weekend day work hours included in the Tables in this report. The construction noise modeling is a worst case assessment that assumes excavation, support of excavation (SOE)/Pile Drilling, and jet grouting will be conducted simultaneously.

There are seven construction sites associated with this project that are included in this assessment.

1. First Avenue Station (Ave A)
2. Avenue B Substation
3. Avenue D Shaft
4. N7th Shaft
5. Bedford Avenue Station
6. Maspeth Substation
7. Harrison Substation

The study at each of these sites includes:

- Identification of noise and vibration sensitive receivers
- Construction activities and equipment used
- Predicted construction noise and vibration levels at the sensitive receivers using the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (Guidance Manual), September 2018.
- Comparison of predicted noise levels with the FTA Guidance Manual, Contract Specification Section 1B.1.4 Noise Control and the New York City (NYC) Noise Code
- Comparison of predicted vibration levels with the contract requirements for building damage risk and the FTA damage risk criteria
- Noise and vibration control measures that may be required to meet the allowable noise and vibration thresholds
- Monitoring and reporting of construction noise and vibration where required

2. PROJECT OVERVIEW

The Metropolitan Transportation Authority (MTA)-New York City Transit (NYCT) is embarking on infrastructure improvements as part of the comprehensive reconstruction of the Canarsie Tunnel after extensive damage from Hurricane Sandy as well as core capacity enhancements for the Canarsie L Line of the New York City subway system, which extends approximately 10 miles from Eighth Avenue in Manhattan to the Canarsie section of Brooklyn. The enhancements analyzed in this construction noise assessment include the installation of three additional power substations, which are required to provide adequate power capacity to support the additional train service, and the installation of a new low-resistance contact rail in the Canarsie Tube to maintain adequate voltage between substations. The new substations would be located below ground in the street bed near the Canarsie L Line's First Avenue, Graham Avenue, and Jefferson Street Stations.

At the First Avenue Station (Ave A) in Manhattan (which currently has only one stairway to each train platform located at First Avenue and East 14th Street). The proposed improvements to the First Avenue Station (Ave A) will provide additional access to both platforms at Avenue A and East 14th Street, effectively doubling its circulation capacity from the street level to each of the station's platforms.

At the Bedford Avenue Station in Brooklyn, the project will provide additional access to the station's existing entrances at Bedford Avenue and North 7th Street and Driggs Avenue and North 7th Street, increasing stair capacity by 138 percent. The proposed improvements at the Bedford Avenue and North 7th Street station entrance would include:

- Installation of one new stairway and an ADA-compliant elevator from the sidewalk at the northeast corner of Bedford Avenue and North 7th Street to the station's mezzanine level. The width of the existing sidewalk at this location would be expanded by approximately six feet resulting in the loss of approximately 3 on-street parking spaces.
- Installation of one new stairway from the sidewalk at the southeast corner of Bedford Avenue and North 7th Street to the station's mezzanine level. The width of the existing sidewalk at this location would be expanded by approximately six feet resulting in the loss of approximately 3 on-street parking spaces.
- Installation of two additional stairways and an ADA-compliant elevator from the station's expanded mezzanine level to its platform level.

The proposed improvements at the Driggs Avenue and North 7th Street station entrance would include:

- Installation of one new stairway from the sidewalk at the northeast corner of Driggs Avenue and North 7th Street to the station's mezzanine level. The width of the existing sidewalk at this location would be expanded by approximately six feet resulting in the loss of approximately 2 on-street parking spaces.
- Installation of one new stairway from the sidewalk at the southeast corner of Driggs Avenue and North 7th Street to the station's mezzanine level. The width of the existing sidewalk at this location would be expanded by approximately six feet resulting in the loss of approximately 2 on-street parking spaces.

- Installation on one additional stairway from the station's expanded mezzanine level to its platform level.

The properties where the new street-level entrances (stairways and elevators) and power substations are proposed to be located are all within the street right-of-way, which is owned by the City of New York and is under the jurisdiction of the New York City Department of Transportation (NYCDOT). NYCT will consult with the NYCDOT regarding the use of these properties for the proposed project in accordance with the New York Public Authorities Law, which authorizes NYCT to occupy the street right-of-way for public transit improvements.

FIGURE 2-1: Map of Canarsie Tunnel Project

2.1 FIRST AVENUE STATION (AVE A)

The work at Avenue A has an end goal of creating new entrances at the east end of First Avenue Station (Ave A). During construction, these shafts will provide for debris removals and access to the Canarsie Tunnel, which travels under the East River in New York between First Avenue Station (Ave A) in Manhattan and Bedford Avenue Station in Brooklyn. Once competed each new entrance area will provide two stairs and an elevator. As the northbound side and southbound side of the station have no common areas, the work areas are separated by traffic lanes along 14th Street. Construction on the south side is approximately 5-ft from single-story businesses and on the north side, approximately 20-ft from Stuyvesant Town residences (apartment complex).

The support of excavation for this site consists of sheet piles, tie downs and jet grout bottom plug. Piles are drilled for sewer relocation work and south stair support. During debris removals, a gantry crane will be erected over the north side shaft. For tunnel rehabilitation work, the contractor will provide their own hi-rail equipment and dust-collector containment system. Concrete is expected to be pumped via the First Avenue Shaft(s) via slick line to re-construct the duct banks, pump rooms and track invert. Currently work here is performed over 2 shifts and Saturdays.

2.2 AVENUE B – SUBSTATION/ CBH 61

Part of the Sandy Repairs and Core Capacity Improvement initiative is to increase train service (trains/hour) along the L line. Thus, a new Substation is being constructed along 14th Street and Avenue B on the northwest corner of the intersection. Similar to the Avenue A sites, the support of excavation for this site consists of sheet piles, tie downs and jet grout bottom plug. This area currently serves and will continue to in the future as an emergency exit. Circuit Breaker House #61, currently mid-river, will be relocated here. Currently work here is performed over 2 shifts and Saturdays.

2.3 AVENUE D SHAFT

Avenue D Shaft is currently an emergency exit within Con Ed's property. The work there is mostly electrical, but a new pressure relief manhole is to be installed along with flood proof hatches for the exit and vent bays (louver system). Currently work here is performed during 1 weekday daytime shift.

2.4 N7TH SHAFT

The N7th Shaft in Brooklyn serves similar function as Avenue D Shaft in Manhattan. There is electrical work at this shaft – no heavy civil. Currently work here is performed during 1 weekday daytime shift.

2.5 BEDFORD AVENUE STATION

The work at Bedford Avenue Station is at three locations:

1. The intersection of N7th Street and Bedford Avenue (2 new stairs and 1 elevator)
2. Intersection of N7th Street and Driggs Avenue (2 new stairs)
3. N7th Street near Bedford for Mezzanine Extension

The support of excavation is primarily soldier-pile and lagging with steel bracing installed internally. Currently work here is performed during 1 shift except when there is weekend tunnel shutdown.

2.6 MASPETH SUBSTATION

The Maspeth Substation construction site is located on Maspeth Ave between Humboldt St. and Bushwick Ave. Work at this construction site includes relocation of utility lines on the proposed substation work location (Maspeth Ave.) followed by secant pile installation and deep excavation, and strut jacking.

2.7 HARRISON SUBSTATION

The substation construction site is located at Harrison Pl., between Flushing Ave. (eastern limit) and Stewart Ave. (western limit). The work at this site includes utility re-location, secant wall excavation and construction, jet grout bottom seal installation, mass excavation, and structural steel/concrete work required to complete the new substation structure. Currently work here is performed during 1 shift except when there is weekend tunnel shutdown.

3. NOISE AND VIBRATION SENSITIVE RECEIVERS

3.1 FIRST AVENUE STATION (AVE A)

The noise and vibration sensitive receivers along First Avenue at Avenue A are ten to eleven story apartment buildings with commercial spaces at the ground level. The façades of these buildings are within 20 to 22 feet of the construction site.

3.2 AVENUE B – SUBSTATION/ CBH 61

The noise and vibration sensitive receivers along First Avenue at Avenue B are like those at Avenue A ten to eleven story apartment buildings with commercial spaces at the ground level. The façades of these buildings are within 20 to 22 feet of the construction site.

3.3 AVENUE D SHAFT

Avenue D Shaft is currently an emergency exit within Con Ed's property. There are no noise and vibration sensitive receivers at this site.

3.4 N7TH SHAFT

The N 7th Street Shaft is located along the waterfront several hundred feet from the nearest residential buildings. Since this site is limited to electrical work within the shaft the potential for construction noise at the residential buildings is minimal and should not exceed the existing ambient noise levels.

3.5 BEDFORD AVENUE STATION

The land uses adjoining the Bedford Avenue Station Construction site on N 7th Street between Driggs Ave and Bedford Avenue are two story and taller residential buildings.

3.6 MASPETH SUBSTATION

The land use along Humboldt St, adjoining this construction site, is residential. The land uses to the north and south of Maspeth Ave between Humboldt St and Bushwick Ave is zones commercial with residential uses.

3.7 HARRISON SUBSTATION

The construction site is in an industrial area with warehousing uses. There are no noise and vibration sensitive receivers at this site.

4. CONSTRUCTION NOISE ASSESSMENT

4.1 FTA GENERAL ASSESSMENT CONSTRUCTION NOISE CRITERIA

FTA has not developed standardized criteria for assessing construction noise impact. Consequently, criteria must be developed on a project-specific basis unless local ordinances apply. Local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. However, for the Canarsie Tunnel Project, construction noise limits have been developed based on the NYC Department of Environmental Protection (DEP) requirements which account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Since it is not the purpose of the FTA Guidance Manual to specify standardized criteria for construction noise impact, the NYC Construction Noise Regulations and the contract noise control requirements, Specification Section 1B.1.4 Noise Control are used to assess the potential impacts of construction noise. The noise metric used by FTA is the equivalent sound level (Leq) and the metric used by NYCDEP is the level that occur 10 percent of the time (L_{10}). The L_{10} is approximately 3 dB higher than Leq.

4.2 NEW YORK CITY CONSTRUCTION NOISE REGULATION

New York City Local Law 113 of 2005 established the mandate to create a new set of construction noise regulations (i.e. Rules) for inclusion in Section 24-219, Title 15, of the Rules of the City of New York (i.e. the New York City Noise Code). To this end a completely new Chapter 28 was developed to specifically address construction noise and to provide requirements for proactive avoidance and options for mitigation. The new construction noise regulations went into effect on 1 July 2007 and apply to all work occurring within New York City.

Thus, contractors must adhere to the requirements contained in the City's new Construction Noise Regulations. These requirements include, but are not necessarily limited to, the following:

- Develop and follow a Noise Mitigation Plan,
- Erect noise barriers around the perimeter of the construction site when within 200 feet of a receptor,
- Use equipment whose noise emission levels comply with those found in the FHWA Roadway Construction Noise Model (RCNM®),
- Provide worker/supervisor training for quieter work methods,
- Inform the affected public about work schedule and mitigation plans,
- Use quieter-type adjustable backup alarms on equipment post 2008, and
- Select from a menu list of additional mitigation options for particularly noisy work involving pile driving, hoe-ramming, jackhammering or blasting.

In 2005, Mayor Bloomberg signed Local Law 113, the New York City Noise Code, to establish updated standards to reduce noise, including setting decibel (dB) level thresholds. The 2005 law mandated that the Commissioner of Environmental Protection adopt rules mitigating construction noise and required the development of Construction Noise Mitigation Plans.

The construction-related rules implementing the new law were adopted in 2007 and are codified in Title 15, Chapter 28 of the Rules of the City of New York. They include the requirements for a construction site Construction Noise Mitigation Plan that is maintained at the site and subject to inspection. The rules also enumerate the different steps to be taken to minimize noise from specific types of tools and equipment.

An Alternative Noise Mitigation Plan may be required in circumstances when it is impossible to precisely comply with the rules. The rules also provide that construction equipment may only be used between 7:00 am and 6:00 pm weekdays unless special authorization is granted to work after hours, known as an after-hours variance (AHV). The New York City Department of Environmental Protection (DEP) may require additional steps to mitigate noise if an AHV is granted.

Other relevant rules are codified at Title 15, Chapter 30 and contain requirements for construction activities that are regarded as having a minimal noise impact.

4.3 CONTRACT NOISE LEVEL LIMITS

The contract noise control requirements, Specification Section 1B.1.4 Noise Control, is presented in Appendix A of this assessment. The construction noise limits of the contract are based on the measured background noise levels at the receivers that would be affected during construction. Where there are no measured background levels there are minimum default noise limits. The noise limits are provided in Table 4-1 for daytime, evening and nighttime weekday hours and weekends.

TABLE 4-1: Construction Noise Lot-Line Limits[3]

Noise Monitoring Location Land Use	DEP Tunnel Permit Stipulation Noise Level - L_{10} (dBA) *(whichever is greater)*	Lmax Level[2] (dBA, slow)
DAYTIME (7 AM to 6 PM Weekdays)		15 above background noise Leq noise for impulsive sound[2] (2 seconds or less)
Residences, theaters, churches, schools, hospitals	75 or Background[1]+5	
Commercial Areas	80 or Background[1]+5	
Industrial Areas	80 or Background[1]+5	
EVENING (6 PM to 11 PM Weekdays)		
Residences, theaters, churches, schools, hospitals	65 or Background[1]+5	
Commercial Areas	80 or Background[1]+5	
Industrial Areas	80 or Background[1]+5	
NIGHTTIME (11 PM to 7 AM Weekdays)		
Residences, theaters, churches, schools, hospitals	60 or Background[1]+5	
Commercial Areas	80 or Background[1]+5	

Industrial Areas	80 or Background[1]+5
WEEKEND (Sat. 7 AM to 6 PM)	
Residences, theaters, churches, schools, hospitals	65 or Background[1]+5
Commercial Areas	80 or Background[1]+5
Industrial Areas	80 or Background[1]+5
WEEKEND (Sat. 6 PM through Sunday to 7 AM Monday)	
Residences, theaters, churches, schools, hospitals	55 or Background[1]+5
Commercial Areas	80 or Background[1]+5
Industrial Areas	80 or Background[1]+5

1. The Contractor shall take background measurements prior to start of construction.
2. Noise from impact equipment is exempt from the Leq requirement, however is subject to a lot-line Lmax limit of 15 dbas above Background noise levels.
3. All measurements shall be taken at the affected lot-line. *(In situations where the work site is within 50 feet of a lot-line, the measurement shall be taken from a point along the lot line such that a 50 foot distance is maintained between the sound level meter and the construction activity being monitored.)*
4. Leq L10 noise readings are logarithmically averaged over 20 minute intervals. Lmax noise is the maximum noise levels recorded over 20-minute periods.

4.4 MANHATTAN CONSTRUCTION SITES

To determine the allowable noise limits for this project, baseline noise levels were taken by Judlau Contracting Inc. prior to any construction activities and were used to calculate the approximate noise limits for this job. For two weeks, noise levels were recorded in 20 minute intervals to determine baseline Leq, L_{10} and Lmax values.

The L_{10} construction noise limit was calculated by taking the measured existing baseline noise and adding 5 dB as specified in the contract. The Lmax noise limits are not used in this assessment because they apply to impact equipment such as pile driving, hoe rams, and jack hammers which will not be used for the construction of this Project. Table 4-2 presents the construction noise limits for the two Manhattan sites.

TABLE 4-2: CONSTRUCTION NOISE LIMITS

Location	**Weekday Day, L_{10} (dBA)**	**Weekday Evening, L_{10} (dBA)**	**Weekday Night, L_{10} (dBA)**	**Saturday, L_{10} (dBA)**	**Sunday, L_{10} (dBA)**
First Avenue (Avenue A)	86	79	76	79	77
Avenue B	80	79	76	78	78

4.5 BROOKLYN CONSTRUCTION SITES

Baseline ambient noise levels were not conducted for any of the Brooklyn construction sites. Therefore, the default noise level limits presented in Table 4-1 for the different work shifts are used for the Brooklyn construction sites.

5. NOISE LEVEL MODELING AND METHODOLOGY

5.1 METHODOLOGY

The predicted equivalent one-hour noise levels (Leq) were calculated in accordance with the FTA Guidance Manual methodology as summarized below. FTA recommends using the metric Leq or L_{10} to assess construction noise. This unit is appropriate because Leq or L_{10} can be used to describe:

- Noise level from operation of each piece of equipment separately, and levels can be combined to represent the noise level from all equipment operating during a given period
- Noise level during an entire phase
- Average noise over all phases of the construction

The twenty -minute L_{10} was calculated according to the methodology recommended by the US Department of Transportation, Federal Highway Administration Special Report Highway Construction Noise: Measurement, Prediction and Mitigation, as follows:

First, the construction one-hour L_{10} was calculated at each property-line location for each item of equipment using the following equation:

$$\text{Twenty-minute } L_{10}\text{ (equipment)} = EL - 20\log_{10}(D/50) + 10\log_{10}(UF/100) + 10G\log(D/50)$$

Where:

EL = Estimated (or measured in the future) equipment noise level at 50 feet, in dBA.

D = Distance from the equipment to property-line location, in feet.

UF= "Usage factor," expressed as the percent of time that the equipment is operated at full power while onsite. This factor was estimated based on past operational experience by the acoustical engineer.

G = a constant that accounts for topography and ground effects.

Then, the individual contributions of each piece of equipment have been combined to obtain the overall construction one-hour L_{10} at each monitoring location as follows:

$$\text{Twenty-minute } L_{10}\text{ (overall)} = 10\log_{10}\left(\Sigma 10^{[\text{one-hour } L_{10}\text{ (equipment)}/10]}\right)$$

The calculated twenty-minute L_{10} values are then compared with the noise compliance limits presented in Table 4-1. The FTA construction equipment noise emission levels used for this assessment are presented in Table 5-1.

5.2 CONSTRUCTION NOISE PREDICTION MODELING

Construction noise prediction was performed by either modeling or calculations based on the formulas listed in Section 5.1. Noise modeling was performed for construction activities involving multiple equipment with various heights and other acoustical propagation factors that would be better estimated with modeling. This includes excavation, SOE/pile drilling, and jet grouting activities. Noise modeling

for this assessment was developed using the SoundPLAN® Version 7.3 computer program. This program calculates noise levels at selected spots or generates noise contours over a defined area of interest around the noise sources. SoundPLAN® has been internationally recognized as a leading noise modeling program for environmental and industrial applications. SoundPLAN® models sound propagation according to International Organization for Standardization (ISO) 9613, Acoustics – *Attenuation of Sound during Propagation Outdoors*. The inputs required in SoundPLAN® are noise source data – equipment acoustic energy, equipment geometry, ground topographical data, meteorological data, and receptor locations.

Noise sources for the analysis are modeled as three types of sources: point, line, and block. Smaller size pumps/motors, compressors, stack exhausts, small construction equipment with a diesel engine, and ventilation shafts are modeled as point sources, because these sources have relatively smaller noise emitting surface areas. Tall construction equipment such as soil auger drill rigs and hoe rams are modeled as line sources so that the computer model could properly simulate the noise emission over a linear pattern. This modeling practice is to distribute noise emission evenly over the surface area of larger size equipment and to eliminate a concentrated noise hot spot; thus, further enhancing modeling accuracy for near-field onsite work areas.

Non-noise emitting objects such as buildings and walls were modeled as an obstruction of noise propagation. Structures with glass or concrete facades were treated as reflective surface with minimal noise absorption.

TABLE 5-1: FTA CONSTRUCTION EQUIPMENT NOISE EMISSION LEVELS

Equipment	Typical Noise Level 50 ft from Source, dBA
Air Compressor	80
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	82
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	80
Paver	85
Pile-driver (Impact)	101
Pile-driver (Sonic)	95
Pneumatic Tool	85
Pump	77
Rail Saw	90
Rock Drill	95
Roller	85
Saw	76
Scarifier	83
Scraper	85
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	84

Source: FTA, 2018

5.3 CONSTRUCTION NOISE MODELING RESULTS

This section summarizes modeled construction noise levels at each of the construction sites. The primary means and methods of construction was assessed at residential receivers closest to the construction sites. Modeling was conducted at both street level and upper level receivers to represent the residential uses in the nearby apartment buildings. An inventory of the equipment modeled for these activities is presented in along with the results of the construction noise modeling.

The initial preparation and removal of the pavement at each of the sites has not been modeled because of the very short duration of this activity which is expected to occur during the daytime hours when the existing background noise is at its highest level.

5.3.1 AVENUE A AND AVENUE B CONSTRUCTION SITES

The major construction noise activities at these sites are the excavation, SOE/Piling and jet grouting. The construction equipment for the Avenue A and Avenue B sites that were modeled are presented in Table 5-2.

TABLE 5-2: EQUIPMENT USED FOR NOISE MODELING AT AVENUE A AND AVENUE B CONSTRUCTION SITE

Equipment	Noise Source Height in Feet	Usage Factor	Construction Noise Level at 50 ft, L_{10} (dBA)
Excavation			
Crawler Crane	8	67%	86
Compressor	4.9	40%	77
Excavator	6.5	40%	80
Jet Grouting			
Rotary Drill Rig	8	40%	75
Cement Truck	6	20%	77
Haul Truck	6	15%	87
HP Pump	4.9	50%	73
LP Pump	4.9	50%	73
Compressor	4.9	40%	81
Generator	4.9	50%	85
SOE/Pile Drilling			
Crawler Crane	8	20%	86
Augur Drill Rig	8	40%	80

The modeled construction noise presented in Table 5-3 for the Avenue A site, and Table 5-4 for the Avenue B site includes the excavation of the site, SOE/Pile Drilling, and jet grouting for both daytime and evening work shifts. The noise levels limits are based on the ambient background measurements conducted by Judlau Contracting Inc. (see Table 4-2). The construction noise was modeled at the ground and 2nd floor of each of the buildings closest to the construction site. Ground floor is predominately retail with some

residential uses while the 2nd floor is all residential. The locations of the modeling receivers are shown on Figure 5-1 and Figure 5-2.

AVENUE A CONSTRUCTION SITE

As summarized in Table 5-3 the modeled construction noise exceeds:

- weekday daytime noise limit of L_{10}=86 dBA in the range of 1 dBA to 20 dBA at 20 receivers
- weekday evening noise limit of L_{10}=79 dBA in the range of 4 dBA to 27 dBA at 27 receivers
- weekend daytime noise limit of L_{10}=79 dBA in the range of 4 dBA to 27 dBA at 27 receivers.

Higher noise levels are expected at upper floor receivers of the apartment buildings adjoining the construction site. Noise control measures to mitigate these exceedances are discussed in Section 6 of this assessment.

AVENUE B CONSTRUCTION SITE

As summarized in Table 5-4 the modeled construction noise exceeds:

- weekday daytime noise limit of L_{10}=80 dBA in the range of 2 dBA to 18 dBA at 31 receivers
- weekday evening noise limit of L_{10}=79 dBA in the range of 3 dBA to 19 dBA at 31 receivers
- weekend daytime noise limit of L_{10}=78 dBA in the range of 4 dBA to 20 dBA at 31 receivers.

Higher noise levels are expected at upper floor receivers of the apartment buildings adjoining the construction site. Noise control measures to mitigate these exceedances are discussed in Section 6 of this assessment.

Table 5-3: Modeled Construction Noise at Avenue A Site

Receiver	Floor Level	Weekday Daytime Limit, L_{10} (dBA)	Modeled Daytime Construction Noise, L_{10} (dBA)	Exceedance of Daytime Noise Limit, L_{10} (dBA)	Weekday Evening Limit, L_{10} (dBA)	Modeled Evening Construction Noise, L_{10} (dBA)	Exceedance of Evening Noise Limit, L_{10} (dBA)	Weekend Daytime Limit, L_{10} (dBA)	Modeled Weekend Construction Noise, L_{10} (dBA)	Exceedance of Weekend Daytime Noise Limit, L_{10} (dBA)
A1	Ground	86	83	None	79	83	4	79	83	4
A1	2nd	86	84	None	79	84	5	79	84	5
A2	Ground	86	86	None	79	86	7	79	86	7
A2	2nd	86	87	1	79	87	8	79	87	8
A3	Ground	86	99	13	79	99	20	79	99	20
A3	2nd	86	99	13	79	99	20	79	99	20
A4	Ground	86	103	17	79	103	24	79	103	24
A4	2nd	86	103	17	79	103	24	79	103	24
A5	Ground	86	106	20	79	106	27	79	106	27
A5	2nd	86	106	20	79	106	27	79	106	27
A6	Ground	86	92	6	79	92	13	79	92	13
A6	2nd	86	92	6	79	92	13	79	92	13
A7	Ground	86	89	3	79	89	10	79	89	10
A7	2nd	86	90	4	79	90	11	79	90	11
A8	Ground	86	83	None	79	83	4	79	83	4
A8	2nd	86	83	None	79	83	4	79	83	4
A9	Ground	86	76	None	79	76	None	79	76	None
A9	2nd	86	76	None	79	76	None	79	76	None
A10	Ground	86	86	None	79	86	7	79	86	7
A10	2nd	86	86	None	79	86	7	79	86	7
A11	Ground	86	89	3	79	89	10	79	89	10
A11	2nd	86	90	4	79	90	11	79	90	11
A12	Ground	86	93	7	79	93	14	79	93	14
A12	2nd	86	94	8	79	94	15	79	94	15
A13	Ground	86	101	15	79	101	22	79	101	22
A13	2nd	86	101	15	79	101	22	79	101	22
A14	Ground	86	99	13	79	99	20	79	99	20
A15	Ground	86	92	6	79	92	13	79	92	13
A15	2nd	86	93	7	79	93	14	79	93	14

Note: The receiver locations are shown on Figure 5-1.

FIGURE 5-1: MODELED CONSTRUCTION NOISE RECEIVERS AT AVENUE A SITE

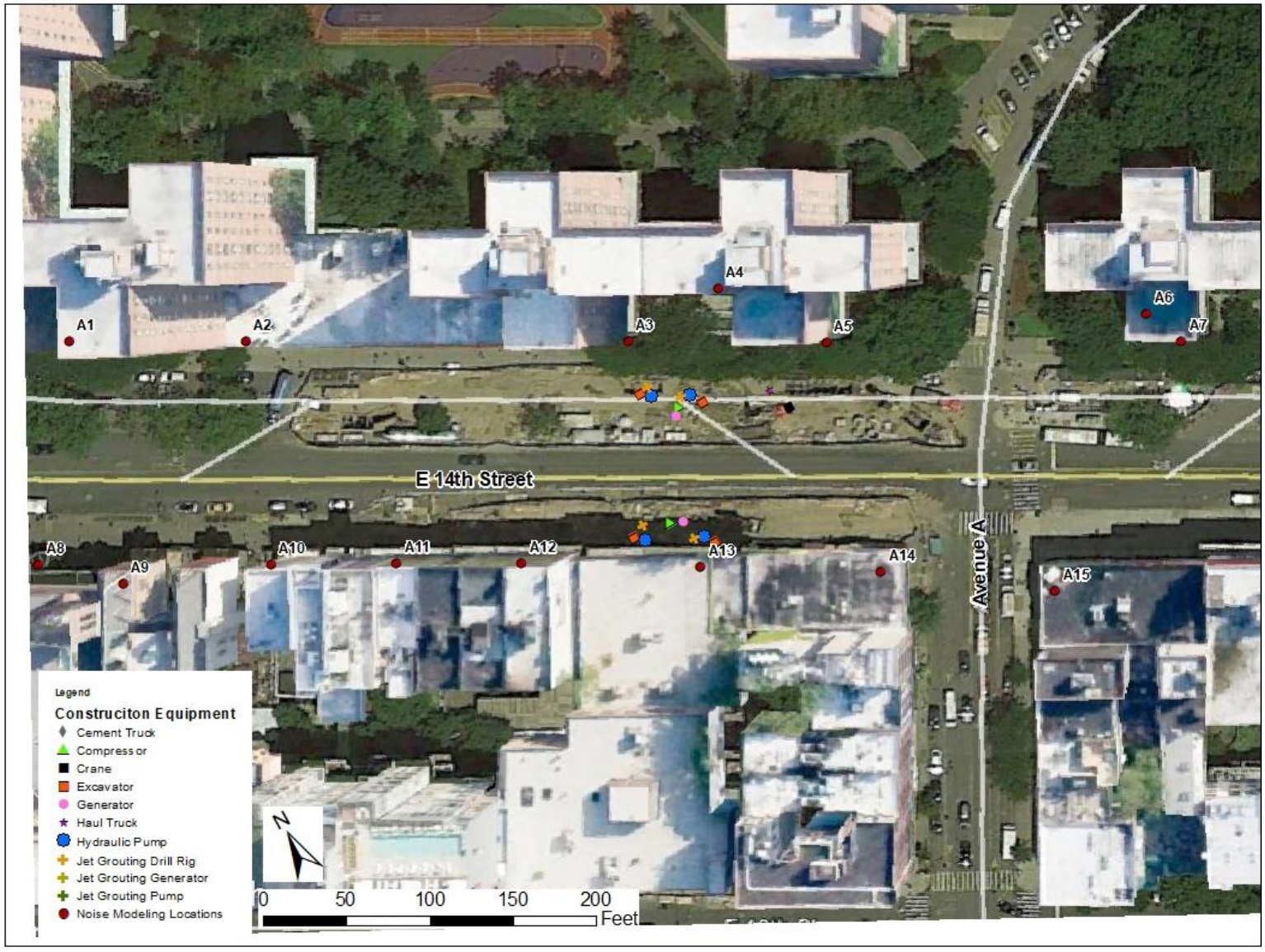

TABLE 5-4: MODELED CONSTRUCTION NOISE AT AVENUE B SITE

Receiver	Floor Level	Weekday Daytime Limit, L_{10} (dBA)	Modeled Daytime Construction Noise, L_{10} (dBA)	Exceedance of Daytime Noise Limit, L_{10} (dBA)	Weekday Evening Limit, L_{10} (dBA)	Modeled Evening Construction Noise, L_{10} (dBA)	Exceedance of Evening Noise Limit, L_{10} (dBA)	Weekend Daytime Limit, L_{10} (dBA)	Modeled Weekend Construction Noise, L_{10} (dBA)	Exceedance of Weekend Daytime Noise Limit, L_{10} (dBA)
B1	Ground	80	86	6	79	86	7	78	86	8
B1	2nd	80	87	7	79	87	8	78	87	9
B2	Ground	80	82	2	79	82	3	78	82	4
B2	2nd	80	82	2	79	82	3	78	82	4
B3	Ground	80	83	3	79	83	4	78	83	5
B3	2nd	80	83	3	79	83	4	78	83	5
B4	Ground	80	89	9	79	89	10	78	89	11
B4	2nd	80	89	9	79	89	10	78	89	11
B5	Ground	80	97	17	79	97	18	78	97	19
B5	2nd	80	97	17	79	97	18	78	97	19
B6	Ground	80	98	18	79	98	19	78	98	20
B6	2nd	80	98	18	79	98	19	78	98	20
B7	Ground	80	97	17	79	97	18	78	97	19
B7	2nd	80	97	17	79	97	18	78	97	19
B8	Ground	80	82	2	79	82	3	78	82	4
B8	2nd	80	83	3	79	83	4	78	83	5
B9	Ground	80	86	6	79	86	7	78	86	8
B9	2nd	80	87	7	79	87	8	78	87	9
B10	Ground	80	84	4	79	84	5	78	84	6
B10	2nd	80	85	5	79	85	6	78	85	7
B11	Ground	80	84	4	79	84	5	78	84	6
B11	2nd	80	84	4	79	84	5	78	84	6
B12	Ground	80	88	8	79	88	9	78	88	10
B12	2nd	80	89	9	79	89	10	78	89	11
B13	Ground	80	93	13	79	93	14	78	93	15
B13	2nd	80	94	14	79	94	15	78	94	16
B14	Ground	80	91	11	79	91	12	78	91	13
B14	2nd	80	92	12	79	92	13	78	92	14
B15	Ground	80	86	6	79	86	7	78	86	8
B16	Ground	80	84	4	79	84	5	78	84	6
B16	2nd	80	84	4	79	84	5	78	84	6

Note: The receiver locations are shown on Figure 5-2.

FIGURE 5-2: MODELED CONSTRUCTION NOISE RECEIVERS AT AVENUE B SITE

5.3.2 AVENUE D SHAFT

The Avenue D Shaft construction site is located on the Con Edison property. Since the activities at Con Edison are not considered noise and vibration sensitive construction noise modeling was not prepared for this site.

5.3.3 N7TH SHAFT

The N 7th Street Shaft construction site is in an industrial area. Since the activities at this location are not considered noise and vibration sensitive construction noise modeling was not prepared for this site.

5.3.4 BEDFORD AVENUE STATION

The surface construction activities at the Bedford Avenue Station construction site would include the equipment presented in Table 5-5. The results of the daytime weekday and daytime weekend construction noise modeling at this site is presented in Table 5-6 along with the construction noise limits. Since there were no background noise measurements conducted at this site the default construction noise lot-line limits, presented in Table 4-1, are used to assess potential noise impacts at the noise sensitive receivers near this site. As summarized in Table 5-5, the modeled construction noise exceeds:

- weekday daytime noise limit of L_{10}=75 dBA in the range of 1 dBA to 20 dBA at 54 receivers
- weekend daytime noise limits of L_{10}=65 dBA in the range of 5 dBA to 30 dBA 54 receivers

Higher noise levels are expected at upper floor receivers of the apartment buildings adjoining the construction site. Noise control measures to mitigate these exceedances are discussed in Section 6 of this assessment. The locations of the modeling receivers are shown on Figure 5-3.

TABLE 5-5: EQUIPMENT USED FOR NOISE MODELING AT BEDFORD AVENUE STATION CONSTRUCTION SITE

Equipment	Height in Feet	Usage Factor	Typical Equipment Noise level at 50 ft, L_{10} (dBA)
Excavator	6.5	40%	80
Cargo Van	4	25%	74
Box Truck	4	25%	87
Compressor	4.9	40%	80
Road Saw	1	40%	86

TABLE 5-6: MODELED CONSTRUCTION NOISE AT BEDFORD AVENUE STATION SITE

Receiver	Floor Level	Weekday Daytime Noise Limit, L_{10} (dBA)	Modeled Daytime Construction Noise, L_{10} (dBA)	Exceedance of Daytime Noise Limit, L_{10} (dBA)	Weekend Daytime Limit, L_{10} (dBA)	Modeled Weekend Construction Noise, L_{10} (dBA)	Exceedance of Weekend Daytime Noise Limit, L_{10} (dBA)
BD1	Ground	75	70	None	65	70	5
BD1	2nd	75	71	None	65	71	6
BD2	Ground	75	79	4	65	79	14
BD2	2nd	75	80	5	65	80	15
BD3	Ground	75	93	18	65	93	28
BD3	2nd	75	92	17	65	92	27
BD4	Ground	75	87	12	65	87	22
BD5	Ground	75	88	13	65	88	23
BD6	Ground	75	95	20	65	95	30
BD6	2nd	75	94	19	65	94	29
BD7	Ground	75	89	14	65	89	24
BD7	2nd	75	89	14	65	89	24
BD8	Ground	75	88	13	65	88	23
BD9	Ground	75	85	10	65	85	20
BD10	Ground	75	88	13	65	88	23
BD10	2nd	75	88	13	65	88	23
BD11	Ground	75	83	8	65	83	18
BD12	Ground	75	83	8	65	83	18
BD12	2nd	75	83	8	65	83	18
BD13	Ground	75	90	15	65	90	25
BD13	2nd	75	90	15	65	90	25
BD14	Ground	75	85	10	65	85	20
BD14	2nd	75	86	11	65	86	21
BD15	Ground	75	83	8	65	83	18
BD15	2nd	75	84	9	65	84	19
BD16	Ground	75	88	13	65	88	23
BD16	2nd	75	88	13	65	88	23
BD17	Ground	75	95	20	65	95	30
BD18	Ground	75	86	11	65	86	21
BD19	Ground	75	77	2	65	77	12
BD20	Ground	75	76	1	65	76	11
BD20	2nd	75	76	1	65	76	11
BD21	Ground	75	84	9	65	84	19
BD21	2nd	75	85	10	65	85	20
BD22	Ground	75	84	9	65	84	19
BD22	2nd	75	85	10	65	85	20
BD23	Ground	75	81	6	65	81	16
BD24	Ground	75	78	3	65	78	13
BD24	2nd	75	79	4	65	79	14
BD25	Ground	75	84	9	65	84	19
BD25	2nd	75	84	9	65	84	19
BD26	Ground	75	88	13	65	88	23
BD26	2nd	75	88	13	65	88	23
BD27	Ground	75	86	11	65	86	21
BD27	2nd	75	86	11	65	86	21
BD28	Ground	75	84	9	65	84	19
BD28	2nd	75	83	8	65	83	18
BD29	Ground	75	84	9	65	84	19
BD29	2nd	75	85	10	65	85	20
BD30	Ground	75	85	10	65	85	20
BD30	2nd	75	86	11	65	86	21
BD31	Ground	75	80	5	65	80	15
BD32	Ground	75	81	6	65	81	16
BD33	Ground	75	86	11	65	86	21
BD34	Ground	75	86	11	65	86	21
BD35	Ground	75	84	9	65	84	19

Note: The receiver locations are shown on Figure 5-3.

FIGURE 5-3: MODELED CONSTRUCTION NOISE RECEIVERS AT BEDFORD AVENUE STATION SITE

5.3.5 MASPETH SUBSTATION CONSTRUCTION SITE

The excavation and SOE/Pile Drilling activities at the Maspeth Substation construction site would include the equipment presented in Table 5-7. The results of the daytime weekday and daytime weekend construction noise modeling at this site is presented in

Table 5-8 along with the construction noise limits. Since there were no background noise measurements conducted at this site the default construction noise lot-line limits, presented in Table 4-1, are used to assess potential noise impacts at the noise sensitive receivers near this site. The locations of the modeling receivers are shown on Figure 5-4. The modeled construction noise exceeds:

- daytime weekday noise limit of L_{10}=75 dBA in the range of 5 dBA to 24 dBA at 26 receivers
- daytime weekend noise limit of L_{10}=65 dBA in the range of 15 dBA to 34 dBA at 26 receivers

Higher noise levels are expected at upper floor receivers of the apartment buildings adjoining the construction site. Noise control measures to mitigate these exceedances are discussed in Section 6 of this assessment.

TABLE 5-7: EQUIPMENT USED FOR NOISE MODELING AT MASPETH SUBSTATION CONSTRUCTION SITE

Equipment	Height in Feet	Usage Factor	Typical Equipment Noise level at 50 ft, L_{10} (dBA)
Excavation			
Excavator	6.5	40%	80
Dump Truck	4	20%	76
SOE/Pile Drilling			
Crawler Crane	8	20%	86
Drill Rig	8	40%	80

TABLE 5-8: MODELED CONSTRUCTION NOISE AT THE MASPETH SUBSTATION SITE

Receiver	Floor Level	Weekday Day Noise Limit, L_{10} (dBA)	Modeled Daytime Construction Noise, L_{10} (dBA)	Exceedance of Daytime Noise Limit, L_{10} (dBA)	Weekend Daytime Limit, L_{10} (dBA)	Modeled Weekend Construction Noise, L_{10} (dBA)	Exceedance of Weekend Daytime Noise Limit, L_{10} (dBA)
M1	Ground	75	80	5	65	80	15
M1	2nd	75	81	6	65	81	16
M2	Ground	75	81	6	65	81	16
M2	2nd	75	82	7	65	82	17
M3	Ground	75	94	19	65	94	29
M3	2nd	75	94	19	65	94	29
M4	Ground	75	90	15	65	90	25
M4	2nd	75	91	16	65	91	26
M5	Ground	75	99	24	65	99	34
M5	2nd	75	99	24	65	99	34
M6	Ground	75	96	21	65	96	31
M6	2nd	75	96	21	65	96	31
M7	Ground	75	87	12	65	87	22
M7	2nd	75	89	14	65	89	24
M8	Ground	75	82	7	65	82	17
M8	2nd	75	83	8	65	83	18
M9	Ground	75	85	10	65	85	20
M9	2nd	75	86	11	65	86	21
M10	Ground	75	89	14	65	89	24
M10	2nd	75	90	15	65	90	25
M11	Ground	75	91	16	65	91	26
M11	2nd	75	92	17	65	92	27
M12	Ground	75	86	11	65	86	21
M12	2nd	75	87	12	65	87	22
M13	Ground	75	88	13	65	88	23
M13	2nd	75	89	14	65	89	24

Note: The receiver locations are shown on Figure 5-4.

FIGURE 5-4: MODELED CONSTRUCTION NOISE RECEIVERS AT MASPETH SUBSTATION SITE

5.3.6 HARRISON SUBSTATION CONSTRUCTION SITE

The construction site is in warehouse district. Since these land uses are not considered noise and vibration sensitive construction noise modeling was not prepared for this site.

6. CONSTRUCTION NOISE MITIGATION METHODS

The noise modeling results indicated that construction noise limits would be exceeded at most of the sensitive locations closest to the construction sites. Mitigation measures will be required to reduce the construction noise using both site specific and project wide control measures. Implementing the following noise mitigation measures along with the noise control measures presented in this Section would result in a 10 dBA reduction in construction noise.

- Construct a perimeter noise barrier fence around each of the construction sites (see Section 6.3.1) that will provide a minimum of 10 dBA noise reduction.
- Use of moveable noise barriers at locations where stationary noisy equipment would be operating such as drill rigs (see Section Moveable Noise Barriers 6.3.2)
- Retrofit the construction equipment with high performance mufflers that would reduce the diesel engine exhaust a minimum of 5 dB.
- For jet grouting, install 10-ft high minimum moveable noise barriers for the loudest noise-generating equipment at the perimeter of jet grouting activities to protect affected receivers at the perimeter of the construction sites (see Section 6.3.2).
- If required for drilling of secant piles, use 10-ft high minimum moveable noise barriers for the loudest noise-generating equipment at the perimeter of drilling activities to protect affected receivers at the perimeter of the construction sites (see Section 6.3.2).
- Provide an acoustic enclosure for the air compressor skid with the STC rating of 25 or greater and NRC rating of 0.7. The enclosure shall be constructed with AC plywood or equal lined with glass fiber or mineral wool type noise-absorbing material at least two inches thick. The material shall be protected using wire mesh or perforated sheets that are corrosion resistant and that have at least 30 percent open area and provision for water drainage.
- If possible, position the diesel engine equipment in such a way that the engine grilles and the exhaust point away from the closest sensitive receivers.
- Replace traditional back-up alarms with white noise alarms on permanent equipment at site.

The resulting noise reduction at each of the construction sites would reduce the number of receivers where the noise level limits are exceeded and reduce the number of exceedances:

- Avenue A Site:
    - Weekday daytime noise limits at 20 receivers are exceeded in the range of 1 dBA to 20 dBA without mitigation and with mitigation reduced to 9 receivers in the range 3 dBA to 10 dBA.
    - Weekday evening noise limits at 27 receivers are exceeded in the range of 4 dBA to 27 dBA without mitigation and with mitigation reduced to 16 receivers in the range 1 dBA to 17 dBA.
    - Weekend daytime noise limits at 27 receivers are exceeded in the range of 4 dBA to 27 dBA without mitigation and with mitigation reduced to 18 receivers in the range 1 dBA to 17 dBA.

- Avenue B Site:
    - Weekday daytime noise limits at 31 receivers are exceeded in the range of 2 dBA to 18 dBA without mitigation and with mitigation reduced to 10 receivers in the range 1 dBA to 8 dBA.
    - Weekday evening noise limits at 31 receivers are exceeded in the range of 3 dBA to 19 dBA without mitigation and with mitigation reduced to 10 receivers in the range 2 dBA to 9 dBA.
    - Weekend daytime noise limits at 31 receivers are exceeded in the range of 4 dBA to 20 dBA without mitigation and with mitigation reduced to 13 receivers in the range 1 dBA to 10 dBA.
- Bedford Avenue Station Site:
    - Weekday daytime limits at 54 receivers are exceeded in the range of 1 dBA to 20 dBA without mitigation and with mitigation reduced to 25 receivers in the range 1 dBA to 10 dBA.
    - Weekend daytime noise limits at 54 receivers are exceeded in the range of 14 dBA to 34 dBA without mitigation and with mitigation reduced to 52 receivers in the range 4 dBA to 24 dBA.
- Maspeth Substation Site:
    - Weekday daytime noise limits at 26 receivers are exceeded in the range of 5 dBA to 24 dBA without mitigation and with mitigation reduced to 19 receivers in the range 1 dBA to 14 dBA.
    - Weekend daytime noise limits at 26 receivers are exceeded in the range of 15 dBA to 34 dBA without mitigation and with mitigation reduced to 19 receivers in the range 5 dBA to 24 dBA.

Since the weekend daytime noise level limits are 10 dBA lower than the weekday limits, scheduling of construction activities during this time should be restricted to activities that would not generate the same noise levels as those activities normally done during the weekdays.

6.1 CONSTRUCTION EQUIPMENT – PROJECT WIDE

1. Schedule truck loading, unloading, and hauling operations to minimize noise impact near noise sensitive locations and surrounding communities.
2. Locating stationary equipment to minimize noise impact on the community. Do not leave equipment idling when not in use.
3. Limit the use of enunciators or public address systems, except for emergency notifications. Any public address or music system must not be audible at any adjacent sensitive receiver.
4. Maintain equipment such that parts of vehicles and loads are secure against rattling and banging.
5. Grade surface irregularities on construction sites to prevent the generation of impact noise and ground vibration by passing vehicles.
6. Schedule work to avoid simultaneous activities that both generate high noise levels.

6.2 CONSTRUCTION OPERATION – PROJECT WIDE

1. Operate equipment to minimize banging, clattering, buzzing, and other annoying types of noises, especially near residential areas during the nighttime hours.
2. To the extent feasible, configure the construction site in a manner that keeps noisier equipment and activities as far as possible from noise sensitive locations and nearby buildings.
3. In no case shall the above restrictions limit the Contractor's responsibility for compliance with applicable Federal, state and local safety ordinances and regulations and other Sections of these construction specifications.
4. Maximize physical separation, as far as practicable, between noise generators and noise receptors. Separation includes following measures:
   - Provide enclosures for stationary items of equipment and barriers around particularly noisy areas on site.
   - Locate stationary equipment to minimize noise and vibration impact on community.
5. Minimize noise-intrusive impacts during most noise sensitive hours.
   - Plan noisier operations during times of highest ambient noise levels
   - Keep noise levels relatively uniform; avoid excessive and impulse noises.
   - Turn off idling equipment.
   - Phase in start-up and shut-down of site equipment.
6. Select truck routes for muck disposal so that noise from heavy-duty trucks will have minimal impact on sensitive land uses.
   - Conduct truck loading, unloading and hauling operations so noise and vibration are kept to a minimum. Provide sound deadening materials in truck beds.
   - Route construction equipment and vehicles carrying soil, concrete or other materials over streets and routes that will cause least disturbance to residents in vicinity of Work.
7. Maintain smooth surfaces for construction equipment and vehicles to travel on (e.g., truck routes, tunnel train rail) to minimize noise.

6.3 NOISE BARRIERS – PROJECT WIDE

Noise barrier fences and moveable noise barriers need to be implemented to meet construction noise requirements.

6.3.1 NOISE BARRIER FENCES

Noise barrier fences shall be installed around all construction staging areas. The following describes requirement of these temporary noise barrier fences:

1. Construct noise barrier fences using AC plywood or acceptable equal.

2. Line the construction site side of noise barrier fences with glass fiber or mineral wool type noise-absorbing material at least two inches thick. Protect this material using wire mesh or perforated sheets that are corrosion resistant and that have at least 30 percent open area and provision for water drainage, or provide a wall assembly with a STC-25 or greater, based on certified sound transmission loss data taken per ASTM E90 and a Noise Reduction Coefficient (NRC) rating of NRC-0.70 or greater, based on certified sound absorption coefficient data taken per ASTM C423.
3. Construct gates and doors in the fence either hinged or rolling of the same or equally effective material as the noise barrier fence. Construct gates and doors in the fence to ensure that the edges overlap the fence to eliminate gaps. During nighttime hours, maintain gates and doors in a closed position except for brief periods of time to allow access to the Construction Site.
4. Attach lagging to support posts designed so that the fence will withstand 80 mph wind loads plus a 30% gust factor.
5. Provide flush mating surfaces of wall sides when walls are joined together or at corners. Close gaps between wall sections and between bottom edge of walls and grade using material that will completely close the gaps and be dense enough to attenuate noise.
6. Design and install foundations or piers for fences that do not require excessive noise to remove.
7. Height of barriers shall break the line of sight to the first floor receivers at construction staging areas.
8. Post readily visible signs indicating “Noise Control Zone” on or near construction equipment operating close to noise sensitive sites.

6.3.2 MOVEABLE NOISE BARRIERS

At a minimum, moveable noise barrier shall be provided for construction activities that are impacting up floor residential receivers. These barriers shall be place near the construction activities and shall be readily removable so that they may be repositioned. The following describes requirements for moveable noise barriers:

1. Construct moveable barriers of AC Plywood sheeting, or other acceptable material with a STC25 rating or greater.
2. Line barriers on construction site side with glass fiber or mineral wool type sound absorbing material at least two inches thick. Protect this material by wire mesh or perforated sheets that are corrosion resistant and that have at least 30 percent open area, with provision for water drainage
3. Provide materials and details of construction sufficiently weather resistant to last through the duration of construction of this Contract.
4. Attach barrier panels to support frames constructed in sections to provide a moveable barrier utilizing the standard temporary precast concrete median barrier or other supports.
5. When barrier units are joined together, overlap the mating surfaces of the barrier sides or make flush with each other. Close gaps between barrier units, and between the bottom edge of the barrier panels and the ground, with material that will completely close the gaps and be dense enough to attenuate noise.

7. VIBRATION IMPACT ASSESSMENT

The vibration impact analysis intends to assess the major construction activities that would affect the vibration environment at the different construction sites.

7.1 CONTRACT VIBRATION LEVEL LIMITS

Contract Specification Section 2F – Maintenance, Support and Restoration of Buildings, Paragraph 3.2 Maximum Allowable Displacements specifies that maximum displacements and vibrations of ground, buildings and structures are not to exceed the limits shown in Table 7-1.

TABLE 7-1: MAXIMUM ALLOWABLE DISPLACEMENTS AND VIBRATIONS – RESPONSE VALUES

Type of Structure	Type of Displacement	Alert Threshold Values	Upset Limiting Values
Roadways, Sidewalks, Utilities	Total Settlement	0.5 in	1.0 in
	Vibration (peak particle velocity)	1.0 in/sec	2.0 in/sec
Existing Subways	Total Settlement	0.25 in	0.5 in
	Vibration (peak particle velocity)	0.5 in/sec	1.0 in/sec
Buildings in Good Condition	Total Settlement	0.5 inches	1.0 inches
	Horizontal Displacement	0.5 inches	1.0 inches
	Vibration (peak particle velocity)	0.5 in/sec	1.0 in/sec
Modern Frame Structures	Total Settlement	0.5 inches	1.0 inches
	Horizontal Displacement	0.5 inches	1.0 inches
	Vibration (peak particle velocity)	0.5 in/sec	1.0 in/sec

7.2 FTA VIBRATION CRITERIA

FTA specified vibration limits for four building categories based on the structural designs and conditions: I. Reinforced-concrete, steel or timber (no plaster), II. Engineering concrete and masonry (no plaster), III. Non-engineering timber and masonry buildings, and IV. Buildings extremely susceptible to vibration damage. Historical and cultural resources structures are considered Category IV buildings. Vibration limits are measured per peak particle velocity (PPV) in vertical direction. Vibration limits per

building categories are known as "single-event" limits; therefore, vibration limits shall not be exceeded per the applicable building categories. Since vibration limits are to protect the integrity of a structure, the limit is applicable at the façade of a building. Table 7-2 lists PPV vibration limits based on building damage criteria for four different building categories.

The groundborne vibration levels are also limited per root-mean-square (RMS) unweighted vibration velocity levels in vertical direction as shown in Table 7-3. These RMS limits are known as "time-weighted" levels that are divided into three durations: 1) Sustained for more than one hour per day, 2) Transient for less than 1 hour per day, and 3) Transient for less than 10 minutes per day. The RMS limits in Table 7-3 restrict vibration levels within building structures due to any construction activities.

TABLE 7-2: FTA CONSTRUCTION VIBRATION LIMITS – BUILDING DAMAGE CRITERIA

Building Category	Allowable Peak Vibration Peak Particle Velocity (PPV) in/sec	Allowable Peak Vibration VdB (re 10^{-6} in/sec)
I. Reinforced-concrete, steel or timber (no plaster)	0.50	114
II. Engineering concrete and masonry (no plaster)	0.30	110
III. Non-engineering timber and masonry buildings	0.20	106
IV. Buildings extremely susceptible to vibration damage	0.12	101

Source: FTA, 2018.

TABLE 7-3: FTA CONSTRUCTION VIBRATION LIMITS – ANNOYANCE CRITERIA

Aggregate Duration	Root Mean Square Limit
Sustained (>1 hr./day)	0.01 in/sec (80 VdB re 10^{-6} in/sec)
Transient (<1 hr./day)	0.03 in/sec (90 VdB re 10^{-6} in/sec)
Transient (<10 min/day)	0.10 in/sec (100 VdB re 10^{-6} in/sec)

Source: FTA, 2018

7.3 VIBRATION LEVEL MODELING AND METHODOLOGY

7.3.1 METHODOLOGY

The predicted vibration levels were calculated as specified in FTA Guidance Manual as summarized below.

a. Damage Assessment – Calculate the vibration according to the method outlined below:

$$PPV_{equipment} = PPV_{ref} \times (25/D)^{n}$$

where:

$PPV_{equipment}$ is the peak particle velocity in units of in/sec of the equipment adjusted for distance.

$PPV_{reference}$ is the reference vibration level in units of in/sec at 25 ft (see Table 7-4)

D is the distance from the equipment to the receiver, in ft.

n is the ground attenuation. Normal propagation conditions are an n=1.5 which is assumed for this assessment.

b. Annoyance Assessment – Calculate the vibration according to the method outlined below:

$Lv(D) = Lv(25\ ft) - 30Log_{10}(D/25) + correction$

where:

Lv(D) is the rms vibration velocity in logarithmic units of VdB re 10^{-6} in/sec of the equipment, adjusted for distance.

Lv(25 ft) is the reference vibration level in logarithmic units of VdB re 10^{-6} in/sec at 25 ft (see Table 7-4)

D is the distance from the equipment to the receiver, in ft.

Correction is to apply -7 dB for buildings four stories or greater.

Table 7-4 presents the FTA average vibration source levels in terms of velocity for various types of construction equipment measured under a wide variety of construction activities. The approximate rms vibration velocity levels were calculated from the PPV limits using a crest factor of 4, representing a PPV-rms difference of 12 dB. Note that although the table gives one level for each piece of equipment, there is considerable variation in reported ground vibration levels from construction activities. The data in Table 7-4 provide a reasonable estimate for a wide range of soil conditions.

TABLE 7-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Peak Vibration at 25 ft (peak particle velocity (PPV) in/sec)	Approximate Lv at 25 ft (RMS VdB re 10^{-6} in/sec)
Clam Shovel Drop (slurry wall)	0.202	94
Hydromill (slurry wall)	Soil 0.008 Rock 0.017	66 75
Excavator with Grapple Shears	0.076	86
Vibratory Roller Compactor	0.210	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Auger Drill Rig	0.089	87
Front Loaders	0.076	86
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: FTA, 2018.

7.4 PREDICTION RESULTS AND IMPACT ASSESSMENT (CHECK NUMBERING SCHEME)

7.4.1 DAMAGE RISK

Table 7-5 presents the distance beyond which the Project's vibration damage risk thresholds (see Table 7-1 and Table 7-2) would not be exceeded for the major vibration-generating pieces of equipment likely to be used. for the Project. All the construction equipment assumed for this assessment can be operated without risk of exceeding the Project's vibration threshold of 0.5 in/sec PPV and the FTA damage risk threshold of 0.3 in/sec PPV at distances of 12 feet or more from the affected structures. There is a potential risk of building damage at those structures closer than 12 feet to the construction sites.

TABLE 7-5: DISTANCE TO CONSTRUCTION VIBRATION IMPACT THRESHOLDS

Equipment	PPV Reference Level at 25 ft (in/sec)	Distance to Impact Threshold of 0.3 in/sec PPV[1] (feet)	Distance to Impact Threshold of 0.5 in/sec PPV[2] (feet)	Distance to Impact Threshold of 1.0 in/sec PPV[3] (feet)
Crawler Crane	0.089 in/sec	12	8 ft	5 ft
Excavator	0.076 in/sec	10	7.5 ft	4.5 ft
Haul Truck	0.076 in/sec	10	7.5 ft	4.5 ft
Drill Rig	0.089 in/sec	12	8 ft	5 ft

Notes:

1. FTA Building Category II for concrete and masonry buildings.
2. Contract alert threshold vibration level limits for buildings in good condition.
3. Contract upset limiting vibration level limits for buildings in good condition.

7.4.2 ANNOYANCE

Table 7-6 presents the distance beyond which the Project's annoyance thresholds (see Table 7-3) would not be exceeded for the major vibration-generating pieces of equipment likely to be used. for the Project. All the construction equipment assumed for this assessment can be operated without risk of exceeding the FTA sustained annoyance threshold of 80 VdB at distances of 23 to 25 feet from the affected structures. There is a potential risk of exceeding the FTA annoyance threshold at those buildings that are 23 feet or closer from the construction site.

TABLE 7-6: DISTANCE TO CONSTRUCTION VIBRATION ANNOYANCE THRESHOLD

Equipment	Reference Level at 25 ft (dBV)	Distance to FTA Annoyance Threshold of 80 VdB (feet)
Crawler Crane	87	25
Excavator	86	23
Haul Truck	86	23
Drill Rig	87	25

7.5 VIBRATION MONITORING

Vibration measurements will be conducted at those buildings closest to the construction sites during periods of construction activity when equipment that generates a substantial amount of groundborne vibration are in use. All vibration monitors used will be equipped with an "alarm" feature to provide notification that vibration damage risk and annoyance criteria have been approached or exceeded.

8. CONSTRUCTION VIBRATION MITIGATION METHODS

The calculation results indicated that vibration limits would not be exceeded at structures adjacent to the proposed construction sites. However, different ground conditions may exist that would result in higher than predicted vibration levels. If during vibration monitoring, there is an exceedance of the vibration thresholds the current construction activities shall be halted and mitigation measures shall be implemented by the contractor before those activities are resumed. These measures would include modifying the means and methods of construction near the affected structure. Other measures that should be followed by the contractor to avoid exceeding the vibration thresholds include:

- Notify occupants of the affected structures prior to major construction activities. If feasible, work shall be performed during times of minimal or reduced impacts.
- Adjacent to the affected structures avoid the use of hoe ram and utilize grapple shears instead. Any unnecessary ramming to a structure being demolished should be avoided.
- Vibration associated with auger drilling will be monitored to ensure the compliance.
- Avoid using pavement breakers, vibratory rollers or packers near residential or office areas when feasible.
- Minimize the use of impact devices, such as jackhammers, pavement breakers, and hoe rams. Where possible, use concrete crushers or pavement saws rather hoe rams for task such as concrete deck removal and retaining wall demolition.
- Non-impact demolition and construction methods, such as saw or torch cutting, and removal of off-site demolition, chemical splitting, and hydraulic jack splitting, shall be used instead of high impact methods near residential or office areas.
- Route heavily-loaded trucks away from residential land uses, if possible. Select streets with fewest residences if no alternatives are available.
- If possible, sequence construction activities that produce vibration such as demolition, excavation, earthmoving and ground impacting so that the vibration sources do not operate simultaneously.
- Operate earth-moving equipment on the construction site as far away from vibration sensitive locations as possible.
- Avoid night time vibration generating activities as people are more aware of vibration at night compared to daytime hours.

APPENDIX A: PROJECT SPECIFICATION SECTION 1B.1.4 NOISE CONTROL

In accordance with Specification Section 1B.1.4 Noise Control the Contractor shall:

a. Comply with all the requirements and regulations of the New York City Noise Control Code, Title 24 of the Administrative Code of the City of New York.

b. Submit a Noise Mitigation Plan for each work site to the Engineer, keep a copy on site, and conduct all work in compliance with the procedures set forth in said plan. All necessary special precautions and noise abatement measures shall be taken by the Contractor to reduce public exposure to noise generated by construction/demolition work on or around the work site.

c. Monitor and log sound levels for public exposure to noise due to construction/demolition work. Measurements shall be made at the closest point adjacent to the work site in normal use by the public while construction/demolition work is in progress. Sound levels shall not exceed 85 dB(A) at 50 feet from the source. All measurements shall be made on the "A" scale of a general purpose integrating sound level meter conforming to ANSI S1.4 for Type 2 meters. All measured levels shall be made with the meter on slow response, Lmax.

d. Provide equipment in good state of repair, provide sound-deadening devices and take such noise abatement measures necessary to control maximum noise levels due to construction/demolition work including, but not limited to:

1. Shields or other physical barriers to restrict the transmission of noise. Shields or barriers shall have a vertical physical surface measuring a minimum of 8' height form the street level, and continuing with a 3' surface inclines at 45 degrees toward the work area. Barriers shall completely enclose the work area with no gaps below or between shield surfaces. Any gates or portals on the perimeter of the work site shall utilize a similar sound absorbing material as the rest of the barriers.
   - For plywood construction use Control Acoustic CAQ 11 or approved equal.
   - For chain link fence construction use Control Acoustic LBC 14-2 or approved equal.

   If concrete "Jersey Barriers" are used as the base for the noise shield or barrier the height of the Jersey barrier shall be included in the total height and the sound absorbing material shall overlap the top of the Jersey barrier by minimum of six inches.
2. Soundproof housings or enclosures (noise tents). Noise-producing machinery shall be isolated using the same sound absorbing materials or equivalent as the barriers detailed above.
3. Silencers on air intakes of equipment.
4. Maximum sized intake and exhaust mufflers on internal combustion engines.
5. Gears on machinery designed to reduce noise to a minimum.
6. Hoppers and storage bins lined with sound deadening material.
7. Conducting the operation of dumping rock or other materials and carrying it away in trucks so that noise is kept to a minimum.
8. Positioning and routing of construction/demolition equipment and vehicles that will cause the least disturbance to residents and the public near the work site.
9. Noise control materials may be new or used. Used materials shall be sound and free of damage and defects and shall be of a quality and condition to perform their design function.

10. Noise curtain material shall be ¼ inch thick, 1.5 lbs./sq. ft. heavy vinyl with a noise absorptive quilt attached to one side.
11. Acoustical materials and curtains shall have a Sound Transmission Class (STC) rating of STC 30 or greater, based on sound transmission loss data according to ASTM test Method E90. The noise absorptive face of the curtains shall have a Noise Reduction Coefficient (NRC) rating of 0.85 or greater, based on sound absorption coefficient data taken according to ASTM Test method C423.

e. Document equipment used at the work site in the daily log and make specific notation any time a new piece of equipment is brought to the work site. Any new piece of equipment that is allowed to be incorporated into daily use shall adhere to the Noise Mitigation Plan on file.

f. The Contractor shall assign within 30 days of Notice of Award an Acoustical Engineer to the Project subject to the Engineer's approval:

1. The minimum requirements for the Acoustical Engineer shall be a Bachelor of Science Degree or higher degree, from a qualified program in engineering, physics, or architecture offered by an accredited university or college, and ten (10) years' experience (or as approved by the Engineer) in noise control engineering and construction noise analysis, or current enrollment as a full Member or Board Certified Member in the Institute of Noise Control Engineering. In addition to the basic requirements shown above, the Acoustical Engineer must demonstrate substantial and responsible experience in preparing and implementing construction noise control and monitoring plans on construction projects conducted in an urban setting, and designing and overseeing the implementation of construction noise and vibration control measures.
2. The Acoustical Engineer shall oversee all requirements of this Section. This includes noise prediction and assessment, preparation and implementation of the Noise Control, Monitoring and Mitigation Plan, equipment noise verification, and complaint response noise monitoring and reporting. In consultation with the Authority, the Acoustical Engineer shall:
    - Continuously evaluate construction noise impacts Project-wide in accordance with Table 4-1;
    - Define operational and/or equipment restrictions;
    - Submit noise control and monitoring plan (s); collection of background and compliance noise data;
    - Submit equipment noise certification and design of noise mitigation measures, as needed;
    - Prepare and submit performance reports;
    - Perform noise compliance monitoring;
    - Document contractor noise compliance;
    - Present specific construction operations and noise mitigation strategies to city officials and to the public at community meetings (when requested by the Authority).

g. Sound levels for public exposure to noise shall comply with noise level thresholds found in Table 4-1.

h. Test equipment and demonstrate compliance with noise limits specified herein whenever evidence of non-compliance is apparent.

i. Submit a Noise Control, Monitoring and Mitigation Plan for each work site to the Engineer with the following requirements:

1. The Plan shall be prepared by an Acoustical Engineer and submitted to the Engineer. Noise generating equipment shall not be operated at the construction site until the Noise Control, Monitoring, and Mitigation Plan has been submitted and approved by the Engineer.
2. The Contractor shall update and resubmit the Noise Control, Monitoring and Mitigation Plan every (6) months after the initial Plan's acceptance date. The Contractor shall also update and re-submit the Noise Control, Monitoring, and Mitigation Plan upon any major change in type of work and/ or schedule, construction method, or equipment operation not included in the most recent Plan. The Contractor shall re-establish background noise levels as required by the Engineer.
3. Describe the noise monitoring and reporting procedure to be used during construction. Noise generating equipment shall not be operated at the construction site until the Plan has been submitted and approved by the Engineer.
4. A scaled drawing of the construction site(s) indicating Contract name and number with legend of symbols and direction of North.
5. A description of the anticipated construction activities including construction equipment locations.
6. An inventory of construction equipment and associated noise levels.
7. Noise level calculations for all applicable noise monitoring locations. Where necessary include for the effect of any mitigation.
8. Noise level calculations during applicable daytime, evening, and nighttime periods for all applicable noise monitoring locations.
9. Noise monitoring locations including 24-hour noise monitoring stations and other locations and times designated by the Engineer.
10. Type of noise measurement devices that shall be used.
11. Noise monitoring methods and procedures that shall be used.
12. Data reporting method that shall be used.
13. Background noise measurement methodology and results performed along with the corresponding lot-line noise criteria limits in Table 1 at the end of this Section.
14. A noise mitigation section of the Plan shall include a description of noise mitigation and noise reduction strategies, methods, procedures and technology, and locations and types of noise reduction measures that may be required.
15. Complaint response procedures.

j. The Contractor shall create and provide a noise mitigation training program for all fieldworker supervisory personnel, including subcontractor supervisors. Supervisors shall field-train all field workers to minimize construction noise.

k. Noise Monitoring Methods:

1. The sound level meter and the acoustic calibrator shall be calibrated and certified annually by the manufacturer or another independent certified acoustical laboratory. The sound level meter shall be field calibrated using an acoustic calibrator, per the manufacturer's specifications, prior to and after each measurement.

2. All measurements shall be made on the "A" scale of a general-purpose sound level meter conforming to ANSI S1.4 for Type 2 meters. All measured levels shall be made with the meter on slow response.
1. The measurement microphone shall be fitted with an appropriate windscreen, shall be located five (5) feet above the ground, and shall be at least five (5) feet away from the nearest acoustically-reflective surface.
2. Noise monitoring shall not be performed during precipitation or when wind speeds are greater than 15 mph, unless the microphone is protected in such a manner as to negate the acoustic effects of rain and high winds.
3. All noise measurements shall be performed with an instrument that is in compliance with the criteria for a Type 1 (Precision) or Type 2 (General Purpose) Sound Level Meter as defined in the current revision of ANSI Standard S1.4.
4. The sound level meter shall be capable of measuring dBA noise levels and operating on the "slow" response setting.
5. Sound level meters shall be capable of measuring and displaying Lmax, Leq and L10 over 20 minute intervals in the field without the need for post-processing of data.

l. Background Noise Monitoring:

1. Background noise measurements (in dBA, slow) shall be collected for at least 24 hours over two (2) non-consecutive days Monday through Saturday and one Sunday at noise monitoring receptor locations identified in the Noise Control, Monitoring and Mitigation Plan, prior to the start of construction.
2. Background noise measurements should be performed in the absence of any contributing construction noise. Background noise level data shall be reported for each one hour period and include Lmax, Leq and L10 values. Background noise L10 levels shall be logarithmic averaged into single L10 levels defining the background noise for daytime (7 AM - 6 PM), evening (6 PM - 10 PM), and nighttime (10 PM – 7 AM) time frames, respectively. The Contractor shall notify the Engineer of the schedule to conduct the background measurements.

m. Construction Noise Monitoring:

1. Noise level measurements, with hand held noise meters, and shall be taken at designated noise-sensitive locations during ongoing construction activities during the applicable daytime, evening, and night time.
2. Monitoring should measure sound levels for public exposure to noise due to construction and deconstruction at the closest point adjacent to the site of the project in normal use by public while work is in progress, but no less than fifty (50) feet away from noise generating activities on the site. Measurements shall include L_{10} and Lmax. Lmax noise level limits are the maximum noise level that occurs over 20- minute intervals.
3. Sound levels shall not exceed 85 dB(A) at fifty (50) feet from the source.
4. In situations where construction activities are within fifty (50) feet of the nearest affected building or point of public exposure, the measurement shall be taken from a point along the building lot-line or public area (e.g. walkway) such that a minimum fifty (50) feet distance is maintained between the sound level meter and the construction activity being monitored.

5. Construction noise measurements shall coincide with daytime, evening, and nighttime periods of maximum noise-generating construction activity, and shall be performed during the construction phase or activity that has the greatest potential to exceed noise level limitations as specified in Table 1 of this Section. Compliance noise measurements for the noise limits in Table 1 shall be performed at a sensitive-noise receptor, identified in the Noise Control, Monitoring and Mitigation Plan, which is the closest to the construction activity. These monitors shall can record the Lmax, Leq and L10 values in 20-minute intervals over 24-hour periods.
6. The Contractor shall notify the Engineer daily of any noise exceeding the requirements of the Contract.

n. Weekly Noise Monitoring Reports shall include:

1. A sketch or diagram for the exact location of the noise measurement. Include the location and distance of the noise measurement in relationship to the noise monitoring location.
2. Identification of the location of construction equipment operating during the monitoring on a site location plan. The location plan shall include the distance between the noise measurement location and the construction equipment.
3. All activities occurring while performing noise measurements shall be noted. For example, “augers banging on ground to clean soil from threads” or “heavy traffic passing near the sound level meter.” In addition, any noise level of 85 dbas or greater requires an explanation.
4. Daily field logs, noise measurement summary tables, and complaint responses.
5. List of noise reduction measures implemented, those to be implemented, the effectiveness of implemented reduction measures.
6. A schedule of upcoming week’s activities.

Attachment 5
L Project Public Outreach Summary
April 3, 2019

MTA NYCT has been conducting ongoing public outreach related to the new construction means and method of the Canarsie Tunnel work and changes to the proposed alternative service plan. In conducting this outreach, MTA NYCT followed its normal procedures that also align with the best practices of the New York Metropolitan Transportation Council's (NYMTC) Public Involvement Plan (PIP) revised in 2012. As outlined in Appendix G: Overall Public Participation Procedures of the PIP, MTA NYCT met the standards of distribution and availability of information, provisions for gathering public input, and public meetings.

Distribution and Availability of Public Information

MTA NYCT has been providing service plan and project details to stakeholders during meetings, via newsletters and other correspondence. This was accompanied by briefings held for elected officials on February 13, 2019 and for community boards and advocacy groups on February 14, 2019. All materials presented were made publicly available on the dedicated project website for the L Project (https://new.mta.info/l-project).

Provisions for Gathering Public Input

MTA NYCT continues to solicit feedback from the public and stakeholders at all meetings, briefings, and events. Recommendations provided have the opportunity to be incorporated into the proposed plan where feasible. The opportunity to provide feedback will be available throughout the length of the project. The current plan is to hold approximately four Open Houses, whereby, the public will have the ability to see each element of the project and provide comments or ask questions. Briefings will additionally be offered to the 11 community boards within the service area of the L.

Feedback can also be submitted through the comment section of the L Project Website, the Contact Us link on the main MTA.info page, or physically written in letters and comment cards.

Public Meetings

Notice of the Open Houses was provided to the public two weeks in advance of the first meeting through postings on the website, station signage, and an email to all those subscribed to receive information on the project. All facilities which host these meetings are ADA compliant and within proximity to public transportation services. At the open houses, written comment cards will be offered and collected at the closing of each event.

Outside of the NYMTC PIP best practices, MTA NYCT has an established plan with outreach.

NYCT OUTREACH PLAN:

NYCT's L Project outreach plan entails briefings at 2 Broadway of elected officials, community board representatives and transit advocacy groups; presentations at community board meetings, and public open houses.

I. Briefings with Elected Officials, Community Board Representatives, and Transit Advocates

NYCT, MTA Capital Construction (CC), and NYC Department of Transportation (DOT) briefed elected officials and their staff at 2 Broadway on February 13, 2019. Community Board representatives and transit advocacy groups were subsequently briefed in separate meetings via conference calls on February 14, 2019.

During these meetings, senior MTA and DOT leadership, along with experts from NYCT Operations Planning and MTA CC fielded questions from elected officials, Community Board representatives, and advocacy groups concerning the project and service plan.

Briefing Comments and Feedback

The main comments received at both the elected officials and Community Board briefings were:

- When one of community board members expressed concern over how customer will travel between Brooklyn and Manhattan they were informed that the L would still be traveling through the tunnel but the other options include the J/M across the Williamsburg Bridge or E/M/7 connect to the G.

- Requests to increase the mobility of M14 either through busway or SBS and the process involved in establishing one of these options were met with the response that the MTA would try to advance the plans to get a busway for 14th St. Options for what the busway may look like would be provided so that the public could provide input but this would occur as a separate project with potential secondary benefits to the single-track closure.

- During the elected officials briefing, the recurring concern over the surface construction work on 14th St between 1st Ave. and Ave B were presented. MTA NYCT responded by stating which surface level activities would continue to occur and during what times of the day.

All of these questions were either answered directly on the spot or demonstrated through a presentation. There are plans to continue to meet with these stakeholders throughout the project as it develops.

II. Current Schedule of Community Board Presentations

Date, Time	Community Board	Address
Wednesday, February 20, 6:30-8:30 PM	MN CB4 - Transportation Committee	500 W. 41st Street, 8th Floor, New York, NY
Tuesday, February 26, 7:30-9:00 PM	QN CB5 Transportation Committee Meeting	CB5 Office, 61-23 Myrtle Avenue, Glendale, NY 11385
Monday, March 4, 7-9 PM	MN CB6 - Transportation Committee	NYU School of Dentistry, 433 1st Avenue, Room 210, New York, NY
Tuesday, March 12, 6-8 PM	BK CB1 - Full Board	Swinging Sixties Senior Citizen Center, 211 Ainslie Street, Brooklyn, NY 11211
Tuesday, March 12, 6:30-8:30 PM	MN CB3 - Transportation Committee	Grand Street Settlement, 80 Pitt Street, New York, NY

Date, Time	Community Board	Address
Monday, March 18, 6-8PM	BK CB5 - Transportation Committee	404 Pine St, 3rd Floor, Brooklyn, NY
Wednesday, March 20, 6-8PM	BK CB4 - Full Board	Hope Gardens Senior Citizen Center, 195 Linden Street, Brooklyn, NY
Wednesday, March 20, 7-9 PM	BK CB18 - Full Board	1097 Bergen Avenue, Brooklyn, NY
Monday, March 25, 6-9 PM	MN CB5 - Transportation Committee	Bryant Park Corporation, 1065 Avenue of the Americas, Suite #2400, New York, NY
Tuesday, March 26, 6-9 PM	BK 16 - Full Board	CB 16-- 1st floor, 444 Thomas Boyland Street, Brooklyn, NY
Thursday, April 4, 6:30 – 8:30 PM	MN CB2 Transportation Committee	NYU Silver Building, 32 Waverly Pl., Room 520

Community Board Presentation Comments and Feedback

- At the Manhattan Community Board 4 Transportation Committee briefing, one community member expressed concerns about adequate signage for train arrivals and which platform to wait on during the single-track movement of trains. MTA NYCT is working on how signage will be placed but placement will vary in each station this will most likely be paired with announcements on train arrivals.
- A member of the 14th Street Coalition requested reassurance that previously planned ADA improvements would still be occurring. MTA NYCT will be making ADA improvements at 1st, 3rd, 6th, and Ave A in Manhattan as well as Bedford Ave in Brooklyn.

III. L Project Open Houses

NYCT scheduled four Open Houses—two in Manhattan and two in Brooklyn.

Date, Time	Venue	Address
Thursday March 7, 6 – 8pm	Shrine of Our Lady of Guadalupe	328 W14th St (btw 8th & 9th Aves), New York, NY
Wednesday March 13, 6 – 8pm	Williamsburg Northside School	299 N 7th St (at Meeker Ave), Brooklyn, NY
Tuesday March 19, 6 – 8pm	Grand Street Campus High School	850 Grand St (btw Bushwick Ave & Waterbury St), Brooklyn, NY
Monday April 8, 6 – 8pm	14th St Y	344 E 14th St (btw 1st & 2nd Aves), New York, NY

Marketing of the Open Houses

The Open House schedule was first publicly announced on February 21, 2019 via email to all affected elected officials' offices and community boards followed by a press release on February 22, 2019. Additional marketing on our website at MTA.info, and on station posters in multiple languages (including English, Spanish, Polish, Chinese).

Open House Format:

The open houses are broken down into sections:

- Section one: "The Project" focuses on the construction elements of the project; provides context (reiterating the damage caused by Sandy in 2012); explains project scope, and covers resiliency and environmental monitoring concerns around dust.
- Section two: "The Service Plan" focuses on the alternative service plan and trip planning options.
- Section three: focuses on street treatments and other content provided by DOT
- Sections four and five: focus on advising customers on how to stay informed and what to expect in terms of next steps.

Each of these sections features large posters of relevant content, such as maps and project details. Each section is staffed by area experts who can speak to the content and field questions. Open House staff includes representatives from NYCT's Government Relations and Operations Planning, as well as MTA Capital Construction, and the NYC DOT. There was also a table set up for customers to fill out comments cards, L project surveys, and submit their comments online through the use of iPads.

At the first Open House on March 7th, each representative assigned to a poster relayed the types of questions received or help they provided to the customers they engaged with, as well as the amount of interest in the topic they were covering. The total number of participants at the event was 170, which included customers, elected officials, and members of the press. As expected, a lot of the questions were centered around how customers would get from point A to point B. The Open House setting provided the opportunity for customers to get tailored route ideas that met their needs.

Open House Comments and Feedback

Construction and Environmental – Approximately 12 people engaged

- Will the new plan have the same life cycle as the original plan?
- Why wasn't this methodology considered before?
- What are we doing to mitigate dust?

Bus Planning – Approximately 40 people engaged

- Positive and negative responses to the current busway on 14th Street along with requests for an M14SBS.
- Customers like the idea of two bus loops in Williamsburg and some requested bus lanes to support the loops.
- Why are there no longer interborough buses?

Subway Planning – Approximately 50 people engaged

- Can the L shutdown start later on Friday evenings?
- Some customers in support of the M running up to 96th Street on the weekends.
- Frustration with the perceived level of crowding on the L under the new proposed plan and possibly having to divert from the L.

Communications

- How should comments be submitted to ensure someone is going to listen?
- How fast does the MYmta App update with real-time information?

Outside of the topics involved with the Proposed Plan, the ancillary elements that would go under their own review process—but were included in the Approved Plan—were included as information boards at the Open House. This included the M14 SBS Route, NYCDOT improvements of bike lanes, pedestrianization, and turn restrictions.

Options for SBS Route – Approximately 30 people engaged

- Strong reactions both for and against the busway.
- Complaints from seniors on the displacement of an M14 bus stop.
- Desire to maintain the existing M14 stops around Union Square.

NYC DOT Elements – Approximately 20 people engaged

- Left-turn restrictions on 14th Street.
- Questions surrounding 14th Street road markings – busway vs. standard bus lanes vs. prior conditions.
- Comments on the 12th & 13th Street bike lanes.

These questions and comments were used as the basis for the Frequently Asked Questions (FAQs) page that will be made available on the project website. Once the website is established, everyone who submitted a comment will be notified via email on where they can find their answers.

IV. Construction and Silica Concerns

Given the public nature of the construction dust and silica concerns, MTA NYCT has put forth an effort to reassure the public of their safety on the platforms and passage through the tunnel on the train. At each Open House, there is a board set up to explain the efforts MTA NYCT is making to suppress the amount of dust created during construction in the tunnel. These points are also available in PowerPoint presentation of the overall project on the website. Questions surrounding the work trains, silica dust collection and dust suppression were brought up at almost all the interactions with the public.

As a result, a dust control and monitoring plan was established to be in place whenever construction occurs. This plan is being accompanied by air monitoring and public reporting of results. Please refer to the FAQs page for additional information.

V. Comment Cards and Online Customer Feedback

As comment cards and online feedback is received, the comments are read and categorized to highlight major areas of concern. Through the online submission, customers are required to provide an email contact, so they can find out where the answers to their questions can be found. On the comment cards,

providing a contact is not necessary, but the comments are still reviewed. The current plan being presented is proposed and through the comments received, MTA NYCT looks to modify the plans to meet the needs of the customers, where feasible. Most customers will be able to find the answers to their comments on the L Project website as we continue to provide updates.

Summary of Comments Received

Following the first Open House, we have received approximately 115 comments from customers both through online submissions and comment cards. Most of the comments were collected on comment cards at the first Open House. Online submissions accounted for about a fourth of the total.

- A similar number in requests both for and against bus priority on 14th Street
- Customers want to either return to the original plan for the shutdown or understand why it was given up on
- Support to keep the bike lanes on 12th and 13th Street

Ongoing outreach will continue throughout the project covering implementation and potential changes to the project following the start date. As with all changes, the mta.info website will be updated as they are established.

Attachment 6: Alternative Noise Mitigation Plan

Prepared for:

JUDLAU OHL GROUP TC ELECTRIC JOINT VENTURE

Project:

MTA CONTRACT P-36437

"SANDY" REPAIR AND CORE CAPACITY IMPROVEMENT CANARSIE TUNNEL REHAB AND CAPACITY IMPROVEMENT IN THE BOROUGHS OF MANHATTAN AND BROOKLYN

SECTION 1B.1.4 – NOISE CONTROL ALTERNATE NOISE MITIGATION PLAN MANHATTAN

REV. 6

September 28, 2018

Prepared by:

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Abbreviations & Acronyms

ANSI: American National Standards Institute

dBA: A-weighted decibels; widely used for environmental/quality of life noise measurements

EL: Used in noise calculations and represents the noise generated from a given piece of equipment at a reference distance.

FHWA: Federal Highway Administration

G: Used in noise calculations and represents the constant based upon ground conditions.

L_{eq}: Equivalent sound level at a given noise receptor from operation of noise-generating construction equipment over a given time period

L_{10}: The noise level exceeded for 10% of the time of the measurement duration.

L_{max}: Maximum noise level occurring over a specified time interval

NIST: Na*tional Institute of Standards and Technology*

RCNM: Roadway Construction Noise Model developed by FHWA

SLM: Sound Level Meter

NM: Sound Level Meter

SPL: Sound pressure level

UF: Used in noise calculations and represents the usage factor of the piece of equipment over the given monitoring period

1. Introduction

Wang Technology (Wang) has been retained by Judlau OHL Group TC Electric Joint Venture (GC) to serve as the designated Noise Specialist for this project. Part of the Wang responsibilities for the project include the preparation of this Noise Mitigation Plan (the Plan), which has been prepared in general accordance with Specification Section 1B.1.4 for MTA Contract P-36437 "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab and Capacity Improvement in the Boroughs of Manhattan and Brooklyn.

This Plan has been prepared specifically for the Manhattan portion of the project.

As outlined in the Specification this Plan will cover the following items.

- Describe the noise monitoring and reporting procedure to be used during construction.
- A scaled drawing of the construction site(s) indicating Contract name and number.
- A description of the anticipated construction activities including construction equipment locations.
- An inventory of construction equipment and associated noise levels.
- Noise monitoring locations.
- Noise level calculations during applicable daytime, evening, and nighttime periods.
- Type of noise measurement devices that will be used.
- Noise monitoring methods and procedures that will be used.
- Data reporting method that will be used.
- Background noise measurement methodology and results.
- Noise mitigation and noise reduction strategies, methods, procedures and technology.
- Complaint response procedures.

For the noise we have relied upon the information provided by the GC concerning upcoming tasks and the equipment to be used for these tasks. This Plan will be updated as additional tasks are added and the equipment to be used changes.

The DEP Alternative Noise Mitigation Plan Application Form has been included as Appendix E of this plan. Wang strongly recommend that the GC follow all of NYCDEP's recommendations for mitigating noise.

2. General Description of Construction Activities

The work to be performed by the GC in Manhattan is summarized below.

- Construction of new First Avenue station entrance and revenue control area at the construction access shaft on north side of East 14th Street near Avenue A including two street stairs and one elevator to the new fare collection area.
- Modification of existing traffic island for the North Avenue A entrance.
- Construction of new First Avenue station entrance and revenue control area on south side of East 14th Street near Avenue A including two street stairs and one elevator to the new fare collection area.
- Construct a new underground avenue b substation adjacent to new emergency exit 171.
- Install two rectifier transformers, two rectifiers and two ac high tension switchgear assembles.
- Install dc switchgear and disconnect switches and all necessary ancillary items
- Furnish and install plc-based supervisory control and data acquisition cabinet.
- Install new telephone, fire alarm and intrusion system, smoke detectors and fire extinguisher.
- Provide an exhaust fan ventilation system to the remove heat from the substation power equipment room and to ventilate the facility.
- Provide plumbing systems for the substation including, drainage, sanitary lines, domestic water line, sewage pumps and associated plumbing fixtures.

This revision of the plan adds installation of sheet piles during night shift. The location of this construction activity is shown in the Noise Monitoring Plan included in Appendix A.

3. Sensitive Receptors

A number of buildings exist in the vicinity of the construction activities. These buildings are all classified for residential land use as summarized in Table 1 below.

Receptor No.	Block / Lot	Location/Address	Land Use
1	972/1	Stuyvesant Town @ Avenue A West	Residential
2	972/1	Associated Supermarket	Commercial
3	441/29	223 Avenue A	Commercial
4	441/23	432 East 14th Street	Residential
5	441/20	426-430 East 14th Street	Residential
6	441/19	424 East 14th Street	Residential
7	441/18	422 East 14th Street	Residential
8	441/17	420 East 14th Street	Residential
9	441/16	418 East 14th Street	Residential
10	972/1	Stuyvesant Town @ Avenue B	Residential
11	407/29	232 Avenue B	Residential
12	407/28	540 East 14th Street	Residential
13	407/27	538 East 14th Street	Residential
14	407/26	536 East 14th Street	Residential
15	407/25	534 East 14th Street	Residential
16	407/22	522-532 East 14th Street	Residential
17	972/1	Stuyvesant Town @ Avenue A East	Residential
18	407/18	520 East 14th Street	Residential
19	407/8	502-518 East 14th Street	Residential

Table 1. Summary of Sensitive Receptor Buildings

The location of these sensitive receptors is shown on the Noise Plan in Appendix A.

4. Baseline Noise Monitoring

Table 2 shows a summary of the background readings determined in Revision 0 of this Plan. The noise levels were recorded at 20 minute intervals for L_{eq} and L_{10}.

Noise Meter	Weekday Day		Weekday Evening		Weekday Night		Saturday		Sunday	
	L_{eq}	L_{10}	L_{eq}	L_{10}	L_{eq}	L_{10}	L_{eq}	L_{10}	L_{eq}	L_{10}
NM-FAVE-01	78.3	80.9	76.4	73.9	70.8	70.6	74.0	73.6	73.4	71.8
NM-FAVE-02	81.4	84.3	77.1	75.4	74.5	73.3	75.3	75.1	75.2	73.8
NM-AVEB-01	78.0	78.6	76.9	76.0	70.3	71.0	75.1	75.6	72.5	72.0
NM-AVEB-02	74.9	74.9	74.7	74.3	70.2	70.9	73.9	73.1	72.5	73.0

Table 2. Summary of Background Readings in dBA

The time intervals designating Day, Evening, Night, Saturday and Sunday followed those defined in the specification.

At the request of the GC Wang has calculated background readings specifically for the swing shift. These swing shift baselines were based on data obtained in November and December 2017. Please refer to a letter regarding this issue

submitted to the GC on January 5, 2018. The swing shift baseline readings relevant for this plan are summarized in Table 2A below.

Noise Meter	Weekday Swing Shift		Saturday Swing Shift	
	L_{eq}	L_{10}	L_{eq}	L_{10}
NM-FAVE-01	74.9	73.6	73.6	73.8
NM-FAVE-02	66.7	66.2	65.5	65.7
NM-AVEB-01	65.7	65.5	64.9	64.2
NM-AVEB-02	72.3	72.4	71.4	73.5

Table 2A. Summary of Swing Shift Background Readings in dBA

5. Noise Level Limits

Specification Section 1B.1.4 defines the noise level limits to be established as defined based on background noise levels as shown in Table 3 below.

Land Uses	Noise Level – L_{10} (dBA) (whichever is greater)	L_{max} Level (dBA, slow)
DAYTIME (7 AM TO 6 PM Weekdays)		15 dBA above Background noise L_{eq} noise level
Residences, theaters, churches, schools, hospitals	75 or Background + 5	
Commercial Areas	80 or Background + 5	
Industrial Areas	80 or Background + 5	
EVENING (6 PM TO 11 PM Weekdays)		
Residences, theaters, churches, schools, hospitals	65 or Background + 5	
Commercial Areas	80 or Background + 5	
Industrial Areas	80 or Background + 5	
NIGHT-TIME (11 PM TO 7 AM Weekdays)		
Residences, theaters, churches, schools, hospitals	60 or Background + 5	
Commercial Areas	80 or Background + 5	
Industrial Areas	80 or Background + 5	
WEEKEND (Sat. 7AM to 6 PM)		
Residences, theaters, churches, schools, hospitals	65 or Background + 5	
Commercial Areas	80 or Background + 5	
Industrial Areas	80 or Background + 5	
WEEKEND (Sat. 6PM through Sunday to 7AM Monday)		
Residences, theaters, churches, schools, hospitals	55 or Background + 5	
Commercial Areas	80 or Background + 5	
Industrial Areas	80 or Background + 5	

Table 3. Noise Level Limits from Specification

Combining the information contained in Tables 1 through 3 the receptor noise limits can be given as shown in Table 4.

Receptor	Weekday Day		Weekday Evening		Weekday Night		Saturday		Sunday	
	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}
1	85.9	93.3	78.9	91.4	75.6	85.8	78.6	89.0	76.8	88.4
2	85.9	93.3	80.0	91.4	80.0	85.8	80.0	89.0	80.0	88.4
3	89.3	96.4	80.4	92.1	80.0	89.5	80.1	90.3	80.0	90.2
4	89.3	96.4	80.4	92.1	78.3	89.5	80.1	90.3	78.8	90.2
5	89.3	96.4	80.4	92.1	78.3	89.5	80.1	90.3	78.8	90.2
6	89.3	96.4	80.4	92.1	78.3	89.5	80.1	90.3	78.8	90.2
7	89.3	96.4	80.4	92.1	78.3	89.5	80.1	90.3	78.8	90.2
8	89.3	96.4	80.4	92.1	78.3	89.5	80.1	90.3	78.8	90.2
9	89.3	96.4	80.4	92.1	78.3	89.5	80.1	90.3	78.8	90.2
10	83.6	93.0	81.0	91.9	76.0	85.3	80.6	90.1	77.0	87.5
11	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
12	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
13	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
14	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
15	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
16	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
17	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
18	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5
19	79.9	89.9	79.3	89.7	75.9	85.2	78.1	88.9	78.0	87.5

Table 4. Receptor Noise Limits

6. Predicted Noise for Construction Equipment

Predicted noise levels for the work activity listed above at the sensitive receptor locations will be calculated using the Federal Highway Administration Roadway Construction Noise Model (RCNM). For these analyses the GC has provided a list of construction equipment to be used for the work as shown in Table 5 below. This table also contains the Lmax at 50 feet used for the specific equipment for the RCNM analyses.

ID	Location	Equip Type	Manufacturer	Lmax @ 50ft	
				Specification	Specification
1	Avenue B	Compressor	Kaeser	80 dBA	77.7 dBA
2	Avenue B	Drill Rig	HD Engineering	84 dBA	81.4 dBA
3	Avenue B	Compressor	Sullair	80 dBA	77.7 dBA
4	Avenue B	Excavator/Grap	Caterpillar	85 dBA	80.5 dBA
5	Avenue B	Generator	Multiquip Whisper	82 dBA	80.6 dBA
6	Avenue B	Metax Pump/Plant	Metax Pump	77 dBA	80.9 dBA
7	Avenue B	Hydraulic Pump/Power Pak	John Deere	77 dBA	80.9 dBA
8	Ave A South	Light Tower	Wacker Nelson	82 dBA	80.6 dBA
9	Avenue A North	Water Pump	Godwin	77 dBA	80.9 dBA
10	Avenue B	Water Pump	Water Pump	77 dBA	80.9 dBA
11	Avenue A	Excavator	Caterpillar	85 dBA	80.5 dBA
12	Avenue B	Excavator	Caterpillar	85 dBA	80.5 dBA
13	Avenue B	Excavator	Caterpillar	85 dBA	80.5 dBA
14	Avenue B	Excavator	Caterpillar	85 dBA	80.5 dBA

ID	Location	Equip Type	Manufacturer	Lmax @ 50ft	
				Specification	Specification
15	Avenue B	Drill Rig	Comacchio	84 dBA	81.4 dBA
16	Avenue B	Drill Rig	Casagrande	84 dBA	81.4 dBA
17	Avenue A North	Compressor	Kubota	80 dBA	77.7 dBA
18	Avenue A North	Hydraulic Pump//Power Pak	Hydra Tech	77 dBA	80.9 dBA
19	Avenue A North	Excavator	Caterpillar	85 dBA	80.5 dBA
20	Avenue A North	Hydraulic Pump/Power Pak	Hydra Tech	77 dBA	80.9 dBA
21	Avenue A North	Generator	Atlas Copco	82 dBA	80.6 dBA
22	Avenue A North	Electric Pump	Hevvy Pump	77 dBA	80.9 dBA
23	Avenue A South	Bypass Pump	Hydra Tech	77 dBA	80.9 dBA
24	Avenue B	Portable Silo	Penndrill	77 dBA	80.9 dBA
25	Avenue B	Horizontal Cement Pig	Cement Pig Rentals	77 dBA	80.9 dBA
26	Avenue A North	Portable Silo	Penndrill	77 dBA	80.9 dBA
27	Avenue B	Agitation Tank	Cuoghi	77 dBA	80.9 dBA
28	Avenue A North	Agitation Tank	Cuoghi	77 dBA	80.9 dBA

Table 5. Construction Equipment

Table 5 shows both specification values and measured values for Lmax as provided in the RCNM user guide. For the RCNM analyses to be performed for this plan the measured values will be used by default.

The ID number shown in Table 5 corresponds to the equipment number shown on the Instrument Location Plans provided in Appendix A.

The work referenced for Weekend in this plan will be performed on Saturday day and swing shifts. There is no Saturday night or Sunday work planned.

Distances from the sensitive receptors to the various construction equipment are shown in Tables 6.A. through 6.S. These table also shows the shielding applied for each case in the RCNM analyses.

Instrument ID	Distances in Feet	Shielding in dBA
8	120	5
9	50	5
11	65	5
17	45	5
18	25	5
19	20	5
20	50	5
21	45	5
22	25	5
23	130	5
26	60	5
28	55	5

Table 6.A. Sensitive Receptor #1. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	120	5
9	120	5
11	30	5

17	175	5
18	95	5
19	120	5
20	50	5
21	160	5
22	35	5
23	100	5
26	70	5
28	65	5

Table 6.B. Sensitive Receptor #2. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	70	5
9	70	5
11	195	5
17	70	5
18	100	5
19	100	5
20	130	5
21	70	5
22	120	5
23	195	5
26	70	5
28	70	5

Table 6.C. Sensitive Receptor #3. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	5	5
9	70	5
11	195	5
17	90	5
18	100	5
19	100	5
20	70	5
21	80	5
22	100	5
23	90	5
26	70	5
28	70	5

Table 6.D. Sensitive Receptor #4. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	15	5
9	115	5
11	90	5
17	175	5
18	125	5
19	145	5
20	85	5
21	155	5

22	100	5
23	25	5
26	100	5
28	140	5

Table 6.E. Sensitive Receptor #5. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	90	5
9	185	5
11	90	5
17	245	5
18	185	5
19	205	5
20	70	5
21	225	5
22	130	5
23	15	5
26	160	5
28	205	5

Table 6.F. Sensitive Receptor #6. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	110	5
9	205	5
11	90	5
17	270	5
18	205	5
19	225	5
20	100	5
21	250	5
22	150	5
23	15	5
26	185	5
28	230	5

Table 6.G. Sensitive Receptor #7 Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	140	5
9	230	5
11	100	5
17	290	5
18	225	5
19	250	5
20	120	5
21	275	5
22	170	5
23	25	5
26	210	5
28	255	5

Table 6.H. Sensitive Receptor #8 Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
8	160	5
9	250	5
11	110	5
17	315	5
18	240	5
19	275	5
20	140	5
21	300	5
22	190	5
23	40	5
26	230	5
28	280	5

Table 6.I. Sensitive Receptor #9 Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	25	5
2	45	5
3	25	5
4	25	5
7	40	5
13	30	5
14	30	5
15	40	5
16	50	5

Table 6.J. Sensitive Receptor #10. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	95	5
2	155	5
3	170	5
4	90	5
7	100	5
13	100	5
14	130	5
15	100	5
16	75	5

Table 6.K. Sensitive Receptor #11. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	90	5
2	125	5
3	140	5
4	95	5
7	95	5
13	120	5
14	110	5
15	85	5
16	70	5

Table 6.L. Sensitive Receptor #12. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	95	5
2	105	5
3	125	5
4	105	5
7	95	5
13	135	5
14	95	5
15	80	5
16	70	5

Table 6.M. Sensitive Receptor #13. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	100	5
2	90	5
3	110	5
4	120	5
7	95	5
13	155	5
14	90	5
15	80	5
16	75	5

Table 6.N. Sensitive Receptor #14. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	110	5
2	80	5
3	100	5
4	135	5
7	100	5
13	170	5
14	90	5
15	80	5
16	85	5

Table 6.O. Sensitive Receptor #15. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
1	130	5
2	75	5
3	95	5
4	160	5
7	110	5
13	195	5
14	85	5
15	85	5
16	105	5

Table 6.P. Sensitive Receptor #16. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
5	35	5
6	30	5

10	30	5
12	20	5
24	24	5
25	70	5
27	55	5

Table 6.Q. Sensitive Receptor #17. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
5	100	5
6	150	5
10	120	5
12	210	5
24	175	5
25	70	5
27	90	5

Table 6.R. Sensitive Receptor #18. Distance to Construction Equipment and Applied Shielding

Instrument ID	Distances in Feet	Shielding in dBA
5	85	5
6	85	5
10	85	5
12	95	5
24	85	5
25	60	5
27	85	5

Table 6.S. Sensitive Receptor #19. Distance to Construction Equipment and Applied Shielding

The details of the RCNM analyses are included in Appendix D. The results of the analyses are summarized in Table 7.

Receptor No.	Predicted Noise Levels		Predicted Noise Level Exceedances					
			Weekday Day		Weekday Swing		Weekend	
	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}
1	88.6	83.7	2.7	None	9.7	None	10.0	None
2	84.6	80.1	None	None	4.6	None	4.6	None
3	81.8	73.0	None	None	1.4	None	1.4	None
4	95.8	95.6	6.5	None	15.4	3.5	15.7	5.3
5	88.0	86.1	None	None	7.6	None	7.9	None
6	87.0	86.4	None	None	6.6	None	6.9	None
7	86.8	86.4	None	None	6.4	None	6.7	None
8	82.7	81.9	None	None	2.3	None	2.6	None
9	79.4	77.8	None	None	None	None	None	None
10	87.0	81.7	3.4	None	6.0	None	6.4	None
11	76.5	70.6	None	None	None	None	None	None
12	76.7	71.2	None	None	None	None	None	None
13	76.8	71.2	None	None	None	None	None	None
14	76.7	70.6	None	None	None	None	None	None
15	76.4	70.6	None	None	None	None	None	None
16	76.0	71.1	None	None	None	None	None	None
17	88.4	83.7	8.5	None	9.1	None	10.3	None

Receptor No.	Predicted Noise Levels		Predicted Noise Level Exceedances					
			Weekday Day		Weekday Swing		Weekend	
	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}	L_{10}	L_{max}
18	77.6	73.0	None	None	None	None	None	None
19	80.1	74.3	0.2	None	0.8	None	2.0	None

Table 7. Predicted Noise Levels in dBA

As can be seen in Table 7 the work to be performed will cause some significant exceedances. The response to and mitigation of these exceedances will be covered in the next section.

7. Noise Exceedance Response, Attenuation and Mitigation

As shown in Table 6 the RCNM analyses were performed using a shielding value of 5 dBA. This amount of shielding can be achieved using noise curtains around the work zones as shown in Appendix C.

Per the analyses the most serious exceedance occurs in vicinity of Receptor 1 with predicted daytime L10 noise exceedances of 2.7 dBA, Receptor 4 with predicted daytime L10 noise exceedances of 6.5 dBA as well as Receptor 10 with predicted daytime L10 noise exceedance of 3.4 dBA and Receptor 17 with predicted daytime L10 noise exceedance of 8.5 dBA. These exceedances will occur as a result of the close proximity of these receptors to the work. These exceedances likely cannot be avoided. The exceedances at Receptors 1 and 4 are much more severe if this work is performed during swing shift (9.7 dBA/15.4 dBA) or in the weekend (10.0 dBA/15.7 dBA). Wang recommends to that the CG only work in close vicinity to Receptors 1 and 4 during day shift. The potential swing shift and Saturday exceedances at Receptors 2, 3 and 5 through 8 range from 1.4 dBA to 7.6 dBA. These receptors will not experience any exceedances at day shift. Receptor 19 will experience very minor exceedances from this work while Receptors 9, 11 through 16 and 18 will not experience any noise exceedances from this work.

The GC shall implement the general options for noise attenuation listed below to limit noise exceedances as much as possible.

Regardless of whether the monitored noise levels meet the criteria set forth above, all feasible noise reduction techniques shall be implemented in order to minimize noise exposure to the public. In the event that monitored sound levels exceed the criteria set forth above, the RE will assess the site conditions and evaluate whether more aggressive noise reduction techniques should be adopted, e.g., higher and wider noise barriers, additional noise blankets, etc.

Possible noise source control measures include:

- Use broad band backup warning devices instead of pure tone for all mobile equipment during nighttime construction activities.
- Line hoppers, storage bins and dump truck beds with sound absorbing material.
- Use exhaust mufflers, certified by the manufacturer, on all internal combustion engines. Fit air powered equipment with pneumatic exhaust silencers. Ensure air compressors meet EPA noise emission standards.
- Ensure that on-site construction equipment is the necessary size and power for the activity. Do not use equipment that is oversized for the work as determined by the RE.
- Restrict idling engine-powered vehicles or equipment to three (3) minutes.
- Eliminate use of truck tailgates to remove materials from the truck bed.
- Use solar powered Arrow Boards and Variable Message Signs (VMS).
- For overnight operations, use wire saws rather than air or gasoline-powered saws, as directed by RE.

The following additional options shall be considered for general noise attenuation:

- Avoid working during the night. To the extent that working during the night is unavoidable, minimize the number of pieces of equipment that are being operated simultaneously.
- Orient all stationary machines so all exhaust emissions are directed towards the center of the site and away from the site boundaries.
- Position and route all equipment and vehicles to minimize disturbance to residents and the general public.
- Use equipment that has sufficient noise attenuation devices. Examples include larger mufflers and sound-absorbing materials placed around drills and impact hammers.
- Keep equipment well-maintained in order to minimize any extra noise generation. Test and refine all noise attenuation methods and or materials for the length of the Project. Ensure that all equipment purchased for the Project is the most efficient in terms of noise attenuation. If possible, use new equipment that produces less noise than older or used equipment.
- The housing doors of internal combustion engines should be kept closed.
- Portable compressors, generators, pumps and other such devices should be covered with noise-insulating fabric to the maximum extent possible that does not interfere with the manufacturer's guidelines for engine operation or exhaust. Further noise reductions can be achieved by operating the device at lower engine speeds.
- Vehicle engine idling on-site should be limited to three consecutive minutes for delivery and dump trucks.
- A skilled hoe ram operator can significantly affect the amount of noise produced during work. The GC should ensure that its personnel are trained on the proper angle when the hoe ram chisel is placed against the work in order to minimize noise.
- Silencers should be used on air intake and exhaust sides of blower. Heavy duty silencers include those made by Universal, Industrial Acoustics, McGill and Burgess-Manning.
- Use the smallest size dump truck that adequately does the job. Avoid slamming a tail gate.
- When using cranes, use the smallest, newest and most modern cranes as possible. Position the crane carefully in order to minimize the need to constantly relocate the crane throughout the site.
- Impact equipment, such as pile drivers, jackhammers and hoe rams, shall be the quietest available and shall be equipped with a muffler.

Recommendations on Noise Control Materials:

- Noise Control Materials may be new or used. Used materials shall be sound and free of damage and defects and shall be of a quality and condition to perform their design function. All equipment and materials specified in this part will remain the property of the GC or the GC's subcontractors, vendors, and suppliers, as applicable.
- All construction equipment shall incorporate the latest noise attenuation features available to the manufacturer.
- Acoustical materials and curtains shall have a Sound Transmission Class (STC) rating of STC 30 or greater, based on sound transmission loss data according to ASTM E90 (Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements). The noise absorptive face of the curtains shall have a Noise Reduction Coefficient (NRC) rating of 0.85 or greater, based on sound absorption coefficient data taken according to ASTM C423 (Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method).
- Noise curtain material should be 1/4-inch thick, 2 lbs/ft^2 heavy vinyl with a noise absorptive quilt attached to one side. The noise curtain design will be submitted reflecting the manufacturer's recommended methods of fastening and support including overlapping and connections at abutting curtains and other transitions, such as corners.

In the event of a complaint from the community regarding construction noise, the GC will promptly take the following actions:

- Immediately notify the RE of such complaint;
- Perform noise measurements at the complainant's location during the construction activities causing the noise complaint;
- Submit such noise measurements to the RE; and
- If the measured noise levels exceed the Project limits or clearly results in a community nuisance the GC will adopt mitigation methods to reduce noise levels.

In the event that noise monitoring determines that the Project's noise limits are being exceeded, the GC will adopt noise mitigation methods to reduce noise levels. In the event that the noise limits remain above the Project limits, then RE can suspend activity contributing to the elevated noise levels and consult with the GC regarding the adoption of additional response actions.

Once the RE and the GC have agreed upon an appropriate response/noise mitigation method and have implemented such mitigation method, then the suspended construction activity may resume, with additional monitoring to determine the efficacy of such noise mitigation method

8. Noise Monitoring Equipment

Wang will perform baseline noise monitoring for this project at the locations shown on the Noise Monitoring Plan in Appendix A and will continue to perform construction noise monitoring for the duration of this project.

All noise measurements has been and will continue to be taken with a Center 322 Data Logger Sound Level Meter (Noise Meter or NM). The specifications for this instrument are as follows:

- Standard applied: IEC651 Type 2 and ANSI S1.4 Type 2.
- Frequency range: 31.5 Hz – 8 K Hz
- Measuring level range: 30 – 130 dB
- Frequency weighting: A or C
- Microphone: ½ inch electric condenser microphone
- Display: LCD
- Digital display: 4 digits, Resolution: 0.1 dB, Display Update: 0.5 second
- Analogue display: 50 segments bar-graph, Resolution: 1 dB, Display update: 50 ms.
- Time weighting: FAST (125 ms), SLOW (1 sec)
- DC output: 10 mV/dB, output impedance approx. 100 ohms

The noise meters, microphones and calibrators are calibrated using standards traceable to the NIST. The calibrator used will undergo certified laboratory calibration conformance testing annually. All noise meters for use under this contract were subject to calibration which was performed before being deployed to the site. Catalog cut sheet for the sound level meter, microphone calibrator certificate of calibrations, and NM Calibrations are attached hereto as Appendix B.

Each noise meter is housed in a ruggedized fiberglass box. The box is mounted onto a light or utility pole with metal bands. The NM microphone tip, protected by manufacturer provided windscreen protrudes below the box through a circular cut-out, and is shielded from the elements with a slotted capsule.

All measurements are performed using A-weighting network and the "SLOW" response of the NM. The measurement microphone is fitted with an appropriate windscreen and each location is at least six feet above ground and ten feet away from the nearest acoustically-reflective surface.

9. Data Collection and Reporting

All measurements using the noise meter will be performed using A-weighting network and the "SLOW" response of the noise meter. The noise meter will record the instantaneous sound pressure level (SPL) in dBA every second. The noise level will be report in L_{10} (20 minutes) and L_{max} (20 minutes). Noise will be downloaded and posted on a client accessible website every hour. Recorded data will be collected and uploaded to our web based monitoring software Argus. Upon request, raw data can easily be transferred to a spreadsheet format and submitted to the RE for post processing, plotting and analysis.

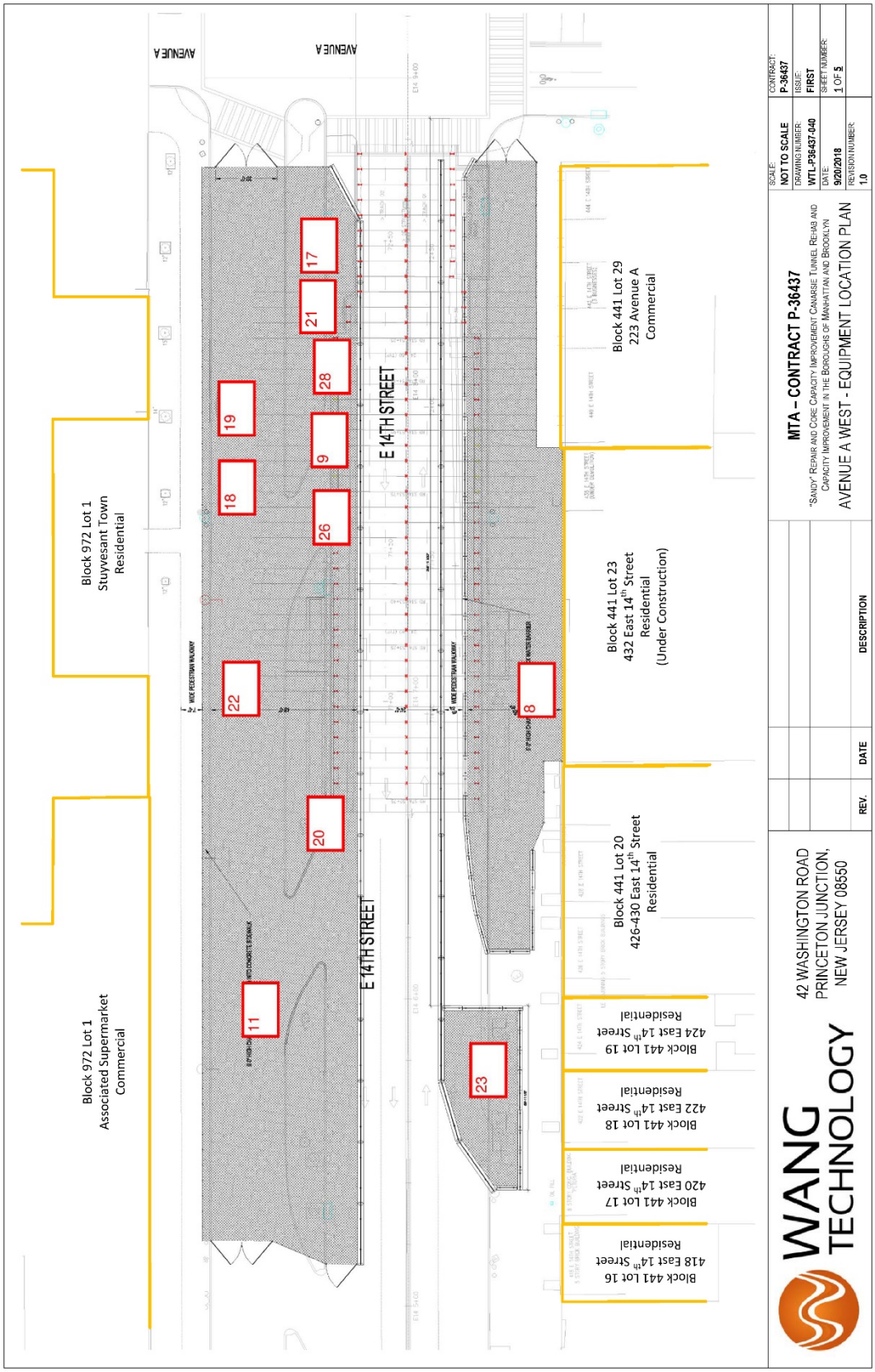
As per the requirements in the specification Wang will provide monitoring reports on a weekly basis.

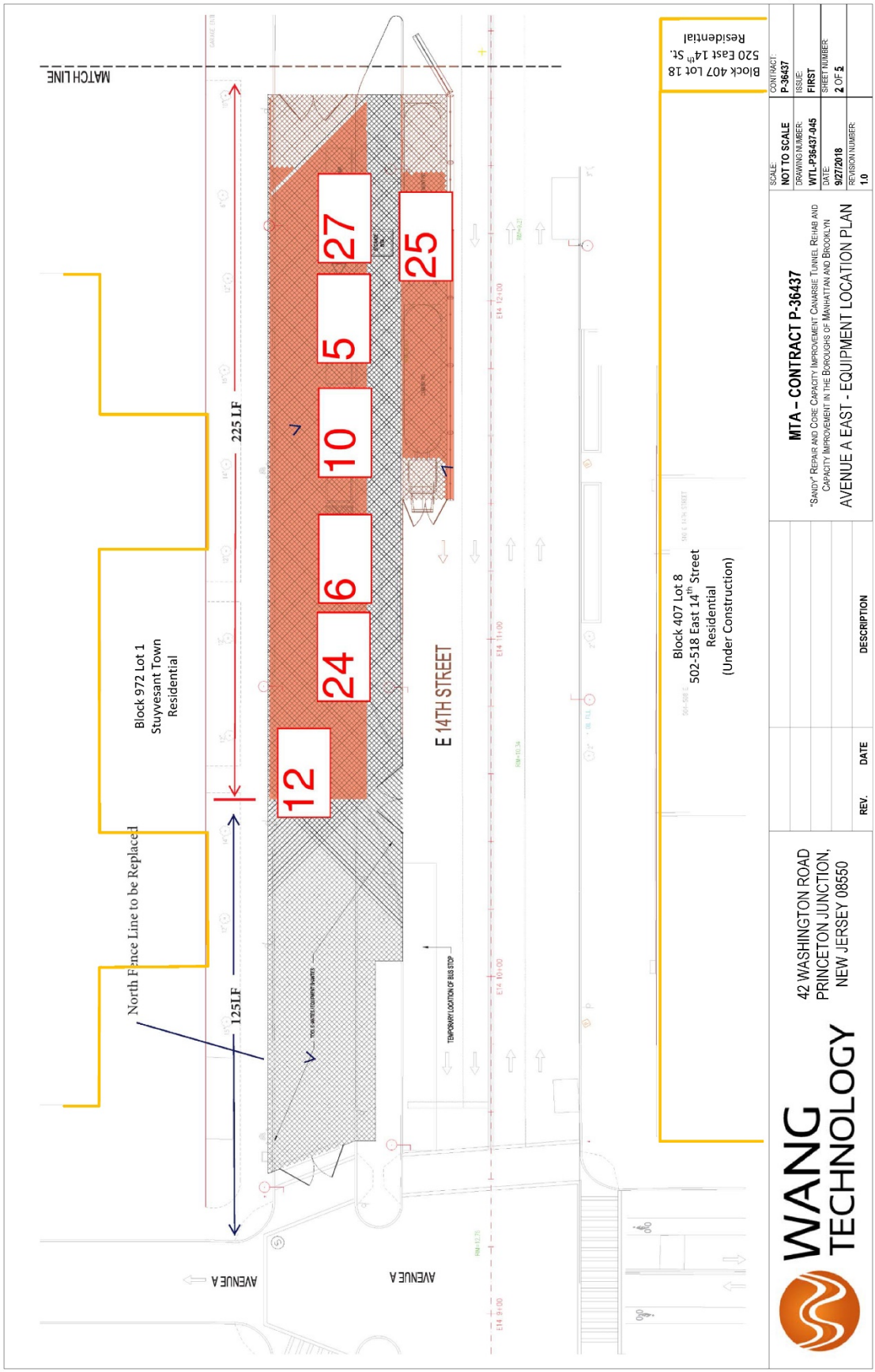
10. Conclusion & Recommendations

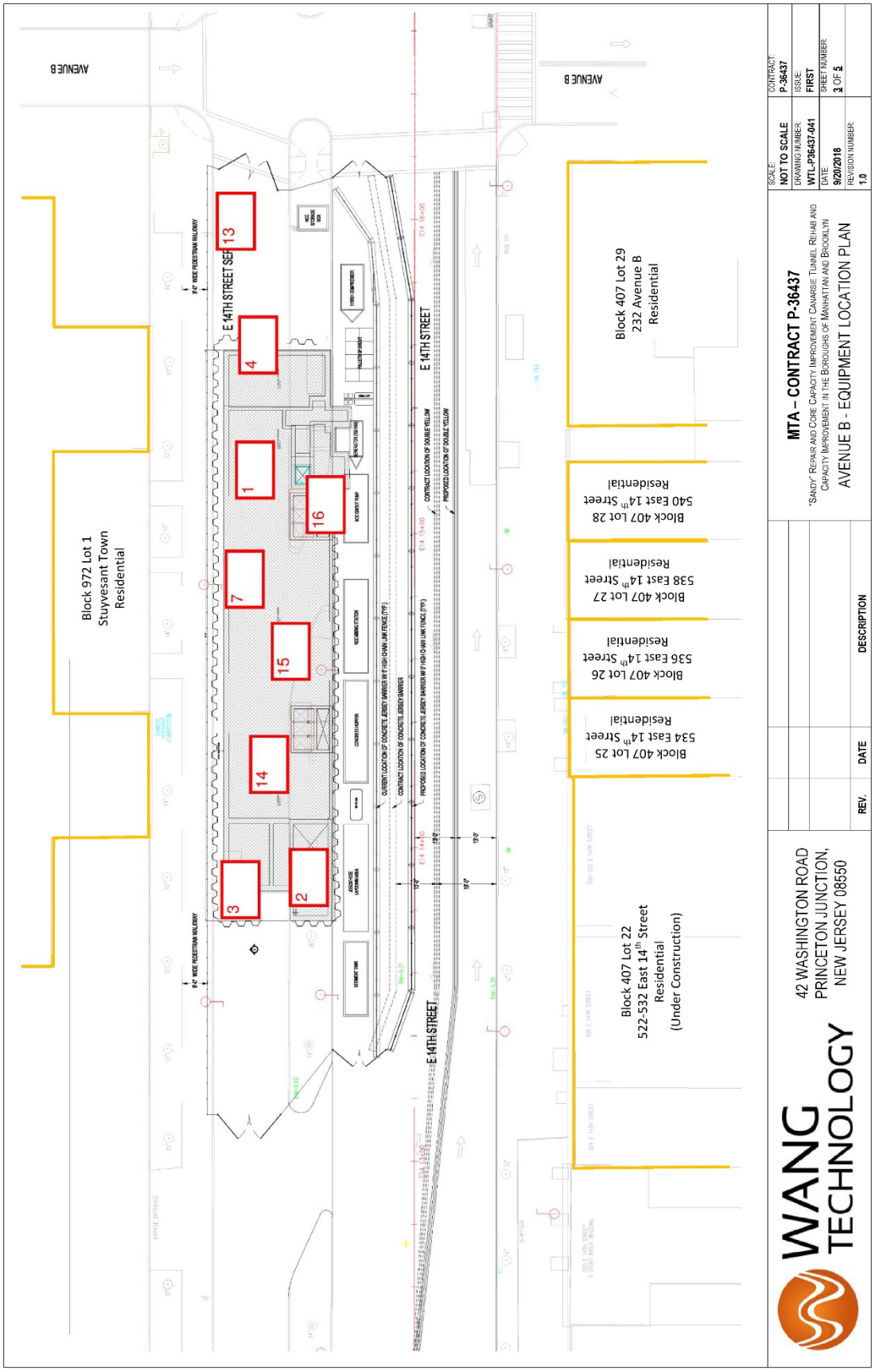
As described in Section 6 Wang performed RCNM analyses for the 19 sensitive receptor locations. These analyses were based on the activities outlined in Section 2, the proximity of these activities to the sensitive locations and the list of equipment provided to us by the GC for these activities.

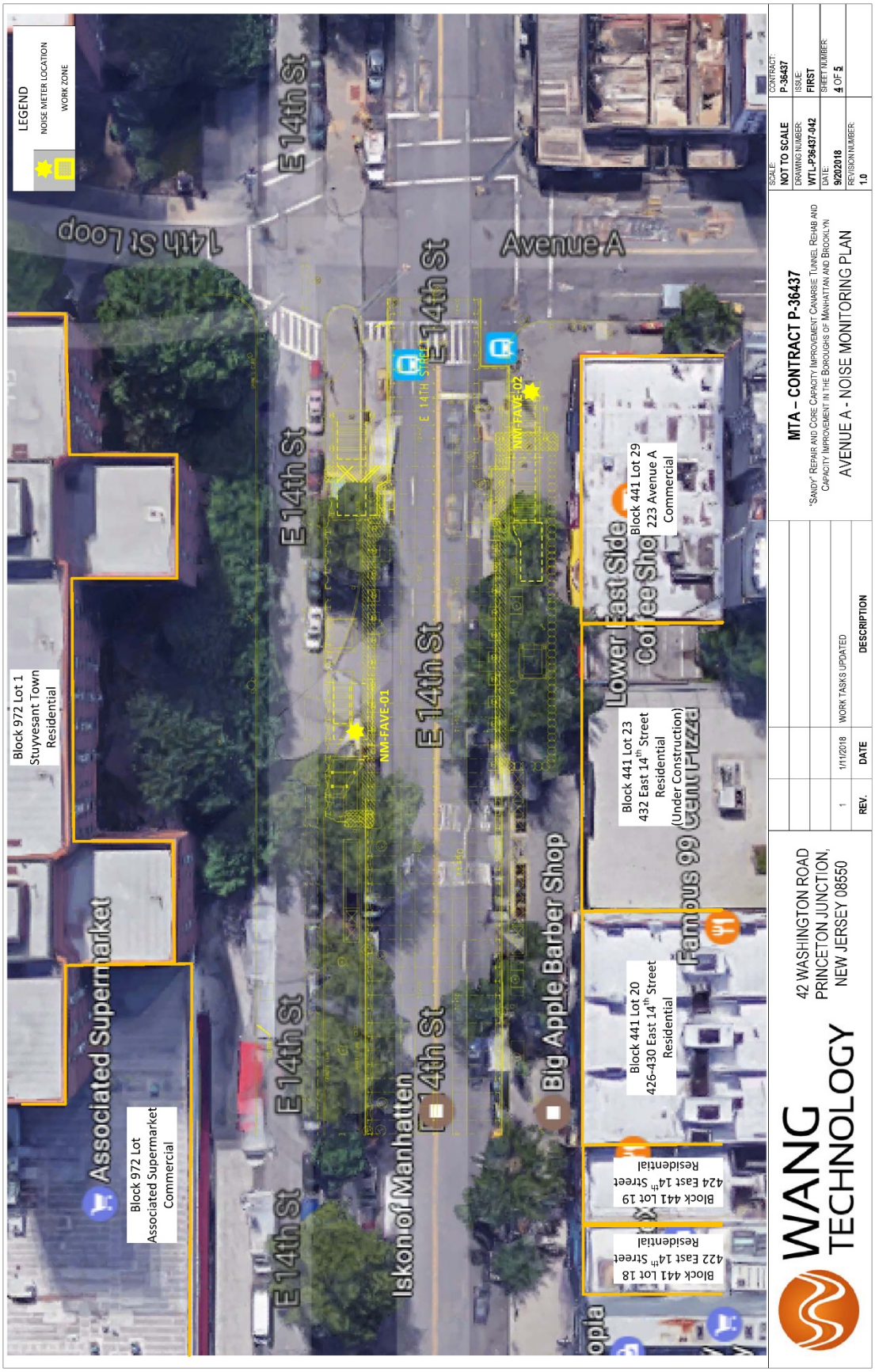
Per the analyses some noise exceedances are to be expected during the performance of this work. These expected exceedances should be mitigated as described in Section 7.

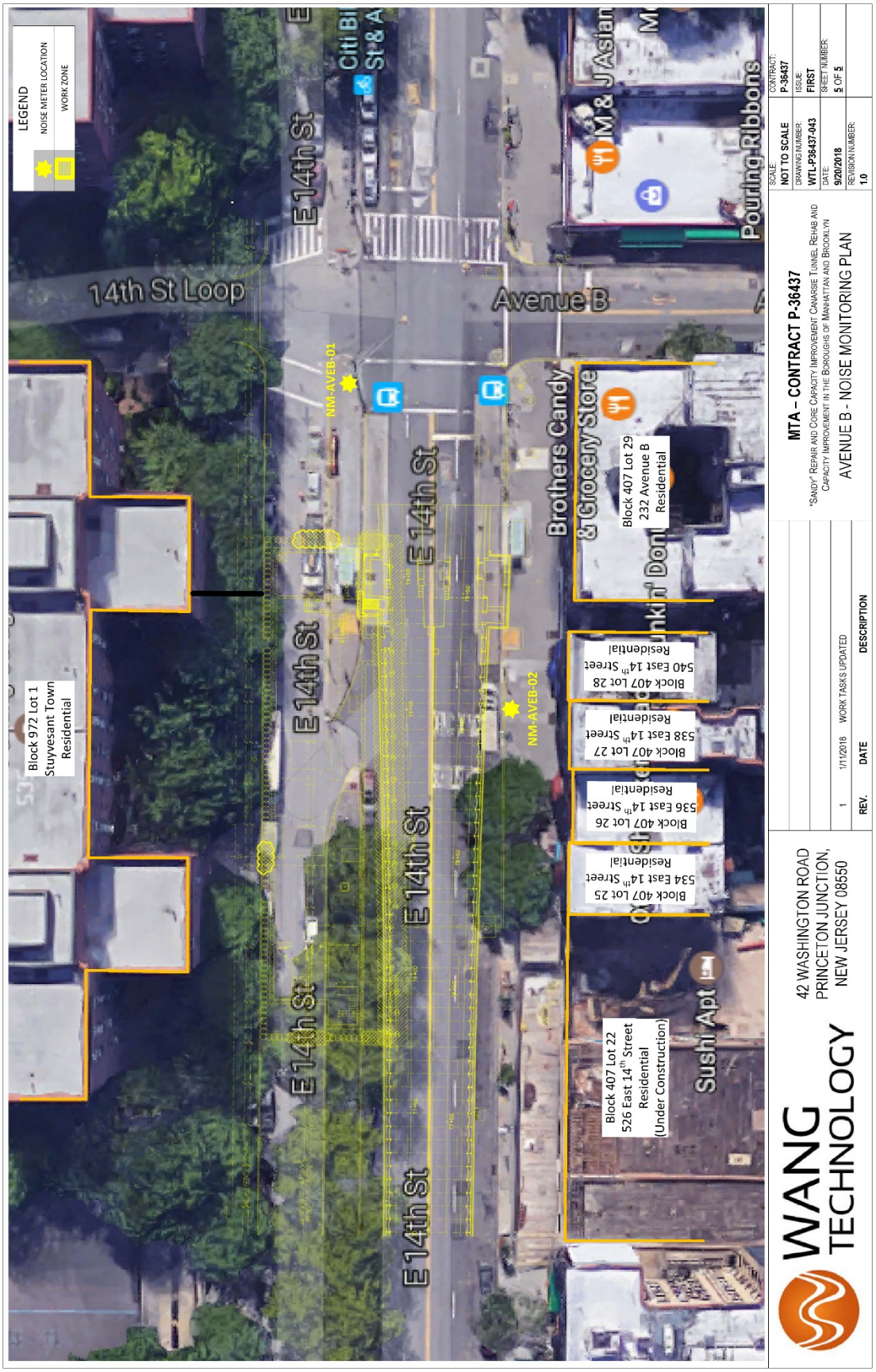
Appendix A: Equipment Location Plans & Noise Monitoring Plans




MATCH LINE
225 LF
125LF
Block 972 Lot 1
Stuyvesant Town
Residential
North Fence Line to be Replaced
E 14TH STREET
Block 407 Lot 8
502-518 East 14th Street
Residential
(Under Construction)
Block 407 Lot 18
520 East 14th St.
Residential
AVENUE A
AVENUE A
TEMPORARY LOCATION OF BUS STOP
12
24
6
10
5
27
25
MTA – CONTRACT P-36437
"SANDY" REPAIR AND CORE CAPACITY IMPROVEMENT CANARSIE TUNNEL REHAB AND CAPACITY IMPROVEMENT IN THE BOROUGHS OF MANHATTAN AND BROOKLYN
AVENUE A EAST - EQUIPMENT LOCATION PLAN
SCALE: NOT TO SCALE
DRAWING NUMBER: WTL-P36437-045
DATE: 9/27/2018
REVISION NUMBER: 1.0
CONTRACT: P-36437
ISSUE: FIRST
SHEET NUMBER: 2 OF 5
REV. DATE DESCRIPTION
WANG TECHNOLOGY
42 WASHINGTON ROAD
PRINCETON JUNCTION,
NEW JERSEY 08550


AVENUE B
E 14TH STREET
Block 972 Lot 1
Stuyvesant Town
Residential
Block 407 Lot 29
232 Avenue B
Residential
Block 407 Lot 28
540 East 14th Street
Residential
Block 407 Lot 27
538 East 14th Street
Residential
Block 407 Lot 26
536 East 14th Street
Residential
Block 407 Lot 25
534 East 14th Street
Residential
Block 407 Lot 22
522-532 East 14th Street
Residential
(Under Construction)
1
2
3
4
7
13
14
15
16
MTA – CONTRACT P-36437
"SANDY" REPAIR AND CORE CAPACITY IMPROVEMENT CANARSIE TUNNEL REHAB AND CAPACITY IMPROVEMENT IN THE BOROUGHS OF MANHATTAN AND BROOKLYN
AVENUE B - EQUIPMENT LOCATION PLAN
SCALE: NOT TO SCALE
DRAWING NUMBER: WTL-P36437-041
DATE: 9/20/2018
REVISION NUMBER: 1.0
CONTRACT: P-36437
ISSUE: FIRST
SHEET NUMBER: 3 OF 5
REV. DATE DESCRIPTION
WANG TECHNOLOGY
42 WASHINGTON ROAD
PRINCETON JUNCTION,
NEW JERSEY 08550


LEGEND
NOISE METER LOCATION
WORK ZONE
E 14th St
14th St Loop
Avenue A
NM-FAVE-01
NM-FAVE-02
Block 972 Lot 1
Stuyvesant Town
Residential
Associated Supermarket
Block 972 Lot
Associated Supermarket
Commercial
Iskon of Manhatten
Big Apple Barber Shop
Block 441 Lot 23
432 East 14th Street
Residential
(Under Construction)
Block 441 Lot 20
426-430 East 14th Street
Residential
Block 441 Lot 19
424 East 14th Street
Residential
Block 441 Lot 18
422 East 14th Street
Residential
Block 441 Lot 29
223 Avenue A
Commercial
WANG
TECHNOLOGY
42 WASHINGTON ROAD
PRINCETON JUNCTION,
NEW JERSEY 08550
REV.
DATE
DESCRIPTION
1
1/11/2018
WORK TASKS UPDATED
MTA – CONTRACT P-36437
"SANDY" REPAIR AND CORE CAPACITY IMPROVEMENT CANARSIE TUNNEL REHAB AND CAPACITY IMPROVEMENT IN THE BOROUGHS OF MANHATTAN AND BROOKLYN
AVENUE A - NOISE MONITORING PLAN
SCALE:
NOT TO SCALE
DRAWING NUMBER:
WTL-P36437-042
DATE:
9/20/2018
REVISION NUMBER:
1.0
CONTRACT:
P-36437
ISSUE:
FIRST
SHEET NUMBER:
4 OF 5


LEGEND
NOISE METER LOCATION
WORK ZONE
14th St Loop
Avenue B
E 14th St
NM-AVEB-01
NM-AVEB-02
Block 972 Lot 1
Stuyvesant Town
Residential
Block 407 Lot 29
232 Avenue B
Residential
Brothers Candy
& Grocery Store
Block 407 Lot 28
540 East 14th Street
Residential
Block 407 Lot 27
538 East 14th Street
Residential
Block 407 Lot 26
536 East 14th Street
Residential
Block 407 Lot 25
534 East 14th Street
Residential
Block 407 Lot 22
526 East 14th Street
Residential
(Under Construction)
Sushi Apt
Pouring Ribbons
M & J Asian
Citi Bi
St & A
WANG TECHNOLOGY
42 WASHINGTON ROAD
PRINCETON JUNCTION,
NEW JERSEY 08550
REV. DATE DESCRIPTION
1 1/11/2018 WORK TASKS UPDATED
MTA – CONTRACT P-36437
"SANDY" REPAIR AND CORE CAPACITY IMPROVEMENT CANARSIE TUNNEL REHAB AND CAPACITY IMPROVEMENT IN THE BOROUGHS OF MANHATTAN AND BROOKLYN
AVENUE B - NOISE MONITORING PLAN
SCALE: NOT TO SCALE
DRAWING NUMBER: WTL-P36437-043
DATE: 9/20/2018
REVISION NUMBER: 1.0
CONTRACT: P-36437
ISSUE: FIRST
SHEET NUMBER: 5 OF 5

Appendix B: Catalog Cut Sheets

AUTOMATED SOUND LEVEL METER SYSTEM -ASLMS 1

AUTOMATED SOUND LEVEL METER SYSTEM -ASLMS

AUTOMATED SOUND LEVEL METER SYSTEM

PRODUCT DATA

Designed primarily for the construction industry, our Automated Sound Level Meter System provides continuous and automated noise monitoring, delivering real time alerts from exceedance, audio playback for investigation and comprehensive reporting to show ongoing compliance with legislation.

The Automated Sound Level Meter System takes care of the hassle associated with monitoring compliance including instrument provision, installation, operation, data capture, records management, calibration and fault rectification. The data can be accessed from anywhere, over the internet, 24/7, freeing you to operate more effectively.

The Automated Sound Level Meter System is based on modular hardware and software solutions and subscription services for long term outdoor unattended monitoring.

The system has all the capabilities of IEC651 Type 2 and ANSI s1.4 Type 2 Sound Level Meters, over and above all the additional features like automated data-logging and remote access.

APPLICATIONS

Temporary and permanent noise monitoring for

- Construction Noise
- Environmental Noise
- Industrial Noise
- Noise in Mines & quarries
- Noise in Ports & harbors
- Noise in Power Stations
- Road Noise
- City Noise
- Quality of Life Noise surveys

ADVANTAGES

- 24/7 Remote system access and maintenance
- Modular system, can be configured per requirements and adapted to specific sites
- NIST traceable standards
- Zero removal footprint
- Ruggedized enclosure for all-weather operation

CENTER 322 SOUND LEVEL METER

POWER OPTIONS

Battery Pack

7-Ah 12 VDC battery; Manual data retrieval

Battery Pack w/ Solar Panel

Wang Technology LLC | 42 Washington Road | Princeton Junction, NJ 08536 | ☎(609) 750-8860 | 🖷(609) 750-8870 | 🖳www.wangtechnology.com

AUTOMATED SOUND LEVEL METER SYSTEM -ASLMS 2

7 to 18-Ah 12 VDC battery with 200W Industrial Solar Panel; Manual or Automated

Battery Pack w/ continuous AC power

7 Ah 12 VDC battery with charging regulator connected to AC source; Continuous and automated with remote access

ASLMS FEATURES

- Automated measurement of noise
- Continuous unattended operation
- Automatic compliance reporting
- Real time control to reduce impact
- Alerts on exceedance so you can take immediate action to reduce impact
- Automatic notification via Email or SMS
- Remote access from anywhere over the Internet
- Solar power and mobile communications for standalone operation
- Annual calibration of monitors

ASLMS deployed at a construction site, for 24/7 remote monitoring with automated alerts and alarm notifications

DATA LOGGER FEATURES

The data logger will provide automated and continuous measurement and reporting of the following parameters in real time:

- SPL – the instantaneous sound pressure level
- Max and Min SPL
- L_{eq} (1 min to 1 hr) – Equivalent Continuous Noise Level that would produce the same energy as the fluctuating sound level (SPL)

The Center 322 is an easy to use and accurate hand held sound level meter with Data Logging. It records in dBA and dBC scales and the data can be downloaded to a PC for analysis. While not an integrating Dosimeter, the Center 322 can give a good indication of exposure to sound over an extended period. The bar graph indicator gives operator feedback on the trends of the readings.

- Standards: IEC651 Type 2 and ANSI S1.4 Type 2
- Range: 30-130 Db
  - Lo=30~80dB ; Med=50~100dB ; Hi=80~130dB
- Accuracy: ±1.5dB (ref 94dB@1KHz)
- Frequency Weighting: A / C
- Time Weighting: Fast, Slow
- Dynamic Range: 50dB
- Frequency Range: 31.5Hz to 8KHz
- Microphone: Electret condenser microphone
- Auxiliary Outputs: AC/DC Output; DC output (10mV/dB)
- Battery: 9V battery
- Dimensions: 275x64x30 mm
- Weight: Approx.280g

C322 SOUND LEVEL METER SPECIFICATIONS

Wang Technology LLC | 42 Washington Road | Princeton Junction, NJ 08536 | ☎(609) 750-8860 | 🖷(609) 750-8870 | 💻www.wangtechnology.com

3M Personal Safety Division

3M Oconomowoc
1060 Corporate Center Drive
Oconomowoc, WI 53066-4828
www.3M.com/detection
800 245 0779

An ISO 9001 Registered Company

3M

Certificate of Calibration

Certificate No: 5136037QOD110010

Submitted By: WANG TECHNOLOGY, LLC
42 WASHINGTON ROAD
PRINCETON JUNCTION, NJ 08550

Serial Number: QOD110010
Customer ID:
Model: QC-20 CALIBRATOR

Date Received: 10/5/2017
Date Issued: 10/7/2017
Valid Until: 10/7/2018

Test Conditions:

Temperature: 18°C to 29°C
Humidity: 20% to 80%
Barometric Pressure: 890 mbar to 1050 mbar

Model Conditions:

As Found: IN TOLERANCE
As Left: IN TOLERANCE

SubAssemblies:

Description: **Serial Number:**

Calibrated per Procedure: 56V982

Reference Standard(s):

I.D. Number	Device	Last Calibration	Date Calibration Due
ET0000556	B&K ENSEMBLE	10/19/2016	10/19/2017
T00230	FLUKE 45 MULTIMETER	2/4/2016	2/4/2018

Measurement Uncertainty:

+/- 1.1% ACOUSTIC (0.1DB) +/- 1.4% VAC +/- 0.012% HZ
Estimated at 95% Confidence Level (k=2)

Calibrated By: BETHANY JOHNSON **Service Technician** 10/7/2017

This report certifies that all calibration equipment used in the test is traceable to NIST, and applies only to the unit identified under equipment above. This report must not be reproduced except in its entirety without the written approval of 3M Detection Solutions.

098-393 Rev. B

Professional Equipment

Sound Level Meter Datalogger (Calibrated to NIST Standards)
Item #: Q1322
Manufacturer: Center Technology Corp.
Manufacturer Item #: 322
Product Type: Digital Sound Level Meters

The Sound Level Meter Datalogger has a wide decibel level range!

Monitor sound levels for noise assessments with ease and accuracy. This quality datalogger can store up to 32,000 records. The easy-to-read digital display, with bargraph indicator also performs MAX/MIN function, auto ranging and fast/slow weghting.

Features & Applications:

Features:

- Calibrated to NIST Standards
- 32,000 Records Datalogger
- Bargraph Indication
- MAX/MIN Function
- Auto Ranging (30 ~ 130dB)
- Resolution 0.1dB
- Clock Display
- Level Range Display
- RS-232 Interface and Windows™ Software
- 9 V. battery included
- Microphone windscreen and carrying case included

Spec Summary:

Level Range:	Lo=30 ~ 80dB; Med=50 ~ 100dB; Hi=80 ~ 130dB
Accuracy:	±1.5dB (ref 94dB @ 1KHz)
Frequency Weighting:	A/C
Time Weighting:	Fast, Slow
Dynamic Range:	50dB
Frequency Range:	31.5Hz to 8KHz
Microphone:	Electret condenser microphone
Auxiliary Outputs:	AC/DC Output
Battery:	9V battery
Dimensions:	10 3/4 x 2 1/2 x 1"
Weight:	.75 lbs

Appendix C: Noise Control Material

all noise control

datasheets

Industrial & Commercial Noise Control Solutions

your success is ours.

ANC-AB1-112 Outdoor Short Term Sound Curtains

All Noise Control ANC-AB1-112 offers the benefits of both a noise barrier and a sound absorber for outdoor applications. This product consists of a two-inch thick vinyl-coated-fiberglass-cloth faced quilted fiberglass that is bonded to a one-pound per sq. ft. reinforced loaded vinyl noise barrier. Sound Curtain panels are constructed with grommets across the top and **bottom, and exterior grade** Velcro seals along the vertical edges. The product is also available in roll form with edges bound or unbound.

- Class A (or 1) flammability rated per ASTM E- 84
- For Indoor or Outdoor Applications
- Available facing colors on quilt: gray, tan, black or off-white
- Available barrier colors: gray, tan, blue or olive drab

Applications:
With its 3-5 year life span* in the harshest environments, this product is typically used as a **temporary noise barrier on outdoor applications such as construction site noise mitigation projects**. Also available with a two-pound psf noise barrier or a one-inch thick quilted fiberglass sound absorber.

Product Data:

Description	Vinyl coated fiberglass cloth facing on 2" quilted fiberglass/ 1 lb-psf reinforced loaded vinyl noise barrier
Flammability	Flame Spread: 23.0 Smoke density: 30.0
Nominal thickness	2.0 inches
Temperature range	-20° to +180° F
Standard roll size	54" wide x 25' long
Weight	1.45 lb psf

Acoustical Performance:

Sound Transmission Loss

	OCTAVE BAND FREQUENCIES (Hz)						
Product	**125**	**250**	**500**	**1000**	**2000**	**4000**	**STC**
ANC-AB1-112	13	20	29	40	50	55	32

ASTM E-90 & E 413

Sound Absorption Data

	OCTAVE BAND FREQUENCIES (Hz)						
Product	**125**	**250**	**500**	**1000**	**2000**	**4000**	**NRC**
ANC-AB1-112	.07	.27	.96	1.13	1.08	.99	.85

ASTM C 423

Appendix D: Roadway Construction Noise Model (RCNM) Analyses

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
1	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	88.6	88.6	88.6

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	120	5
2	1	Pumps	No	50	77.0	80.9	50	5
3	1	Excavator	No	40	85.0	80.7	65	5
4	1	Compressor (air)	No	40	80.0	77.7	45	5
5	1	Pumps	No	50	77.0	80.9	25	5
6	1	Excavator	No	40	85.0	80.7	20	5
7	1	Pumps	No	50	77.0	80.9	50	5
8	1	Generator	No	50	82.0	80.6	45	5
9	1	Pumps	No	50	77.0	80.9	25	5
10	1	Pumps	No	50	77.0	80.9	130	5
11	1	Pumps	No	50	77.0	80.9	60	5
12	1	Pumps	No	50	77.0	80.9	55	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
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29							50	0
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34							50	0
35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	83.7	88.6	93.3	85.9	91.4	78.9	85.8	75.6	None	2.7	None	9.7	None	13
1	Generator	68.0	68.0	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	None
2	Pumps	75.9	75.9	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	0.3
3	Excavator	73.4	72.4	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	None
4	Compressor (air)	73.6	72.6	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	None
5	Pumps	81.9	81.9	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	3	None	6.3
6	Excavator	83.7	82.7	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	3.8	None	7.1
7	Pumps	75.9	75.9	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	0.3
8	Generator	76.5	76.5	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	0.9
9	Pumps	81.9	81.9	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	3	None	6.3
10	Pumps	67.6	67.6	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	None
11	Pumps	74.3	74.3	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	None
12	Pumps	75.1	75.1	93.3	85.9	91.4	78.9	85.8	75.6	None	None	None	None	None	None
13															
14															
15															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
1	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	88.6	88.6	88.6

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	120	5
2	1	Pumps	No	50	77.0	80.9	50	5
3	1	Excavator	No	40	85.0	80.7	65	5
4	1	Compressor (air)	No	40	80.0	77.7	45	5
5	1	Pumps	No	50	77.0	80.9	25	5
6	1	Excavator	No	40	85.0	80.7	20	5
7	1	Pumps	No	50	77.0	80.9	50	5
8	1	Generator	No	50	82.0	80.6	45	5
9	1	Pumps	No	50	77.0	80.9	25	5
10	1	Pumps	No	50	77.0	80.9	130	5
11	1	Pumps	No	50	77.0	80.9	60	5
12	1	Pumps	No	50	77.0	80.9	55	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
28							50	0
29							50	0
30							50	0
31							50	0
32							50	0
33							50	0
34							50	0
35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	83.7	88.6	89	78.6	89	78.6	89	78.6	None	10.0	None	10	None	10
1	Generator	68.0	68.0	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
2	Pumps	75.9	75.9	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
3	Excavator	73.4	72.4	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
4	Compressor (air)	73.6	72.6	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
5	Pumps	81.9	81.9	89	78.6	89	78.6	89	78.6	None	3.3	None	3.3	None	3.3
6	Excavator	83.7	82.7	89	78.6	89	78.6	89	78.6	None	4.1	None	4.1	None	4.1
7	Pumps	75.9	75.9	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
8	Generator	76.5	76.5	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
9	Pumps	81.9	81.9	89	78.6	89	78.6	89	78.6	None	3.3	None	3.3	None	3.3
10	Pumps	67.6	67.6	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
11	Pumps	74.3	74.3	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
12	Pumps	75.1	75.1	89	78.6	89	78.6	89	78.6	None	None	None	None	None	None
13															
14															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
2	Commercial	Commercial

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	84.6	84.6	84.6

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	80.1	84.6	93.3	85.9	91.4	80	85.8	80	None	None	None	4.6	None	4.6
1	1	Generator	No	50	82.0	80.6	120	5	1	Generator	68.0	68.0	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	120	5	2	Pumps	68.3	68.3	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	30	5	3	Excavator	80.1	79.1	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	175	5	4	Compressor (air)	61.8	60.8	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	95	5	5	Pumps	70.3	70.3	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	120	5	6	Excavator	68.1	67.1	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	50	5	7	Pumps	75.9	75.9	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	160	5	8	Generator	65.5	65.5	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	35	5	9	Pumps	79.0	79.0	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	100	5	10	Pumps	69.9	69.9	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
11	1	Pumps	No	50	77.0	80.9	70	5	11	Pumps	73.0	73.0	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	65	5	12	Pumps	73.6	73.6	93.3	85.9	91.4	80	85.8	80	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
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50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
2	Commercial	Commercial

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	84.6	84.6	84.6

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	120	5
2	1	Pumps	No	50	77.0	80.9	120	5
3	1	Excavator	No	40	85.0	80.7	30	5
4	1	Compressor (air)	No	40	80.0	77.7	175	5
5	1	Pumps	No	50	77.0	80.9	95	5
6	1	Excavator	No	40	85.0	80.7	120	5
7	1	Pumps	No	50	77.0	80.9	50	5
8	1	Generator	No	50	82.0	80.6	160	5
9	1	Pumps	No	50	77.0	80.9	35	5
10	1	Pumps	No	50	77.0	80.9	100	5
11	1	Pumps	No	50	77.0	80.9	70	5
12	1	Pumps	No	50	77.0	80.9	65	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
28							50	0
29							50	0
30							50	0
31							50	0
32							50	0
33							50	0
34							50	0
35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	80.1	84.6	89	80	89	80	89	80	None	4.6	None	4.6	None	4.6
1	Generator	68.0	68.0	89	80	89	80	89	80	None	None	None	None	None	None
2	Pumps	68.3	68.3	89	80	89	80	89	80	None	None	None	None	None	None
3	Excavator	80.1	79.1	89	80	89	80	89	80	None	None	None	None	None	None
4	Compressor (air)	61.8	60.8	89	80	89	80	89	80	None	None	None	None	None	None
5	Pumps	70.3	70.3	89	80	89	80	89	80	None	None	None	None	None	None
6	Excavator	68.1	67.1	89	80	89	80	89	80	None	None	None	None	None	None
7	Pumps	75.9	75.9	89	80	89	80	89	80	None	None	None	None	None	None
8	Generator	65.5	65.5	89	80	89	80	89	80	None	None	None	None	None	None
9	Pumps	79.0	79.0	89	80	89	80	89	80	None	None	None	None	None	None
10	Pumps	69.9	69.9	89	80	89	80	89	80	None	None	None	None	None	None
11	Pumps	73.0	73.0	89	80	89	80	89	80	None	None	None	None	None	None
12	Pumps	73.6	73.6	89	80	89	80	89	80	None	None	None	None	None	None
13															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
3	Commercial	Commercial

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	81.8	81.8	81.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	73.0	81.8	96.4	83.9	92.1	80.4	89.5	80	None	None	None	1.4	None	1.8
1	1	Generator	No	50	82.0	80.6	70	5	1	Generator	72.7	72.7	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	70	5	2	Pumps	73.0	73.0	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	195	5	3	Excavator	63.9	62.9	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	70	5	4	Compressor (air)	69.8	68.8	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	100	5	5	Pumps	69.9	69.9	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	100	5	6	Excavator	69.7	68.7	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	130	5	7	Pumps	67.6	67.6	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	70	5	8	Generator	72.7	72.7	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	120	5	9	Pumps	68.3	68.3	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	195	5	10	Pumps	64.1	64.1	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
11	1	Pumps	No	50	77.0	80.9	70	5	11	Pumps	73.0	73.0	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	70	5	12	Pumps	73.0	73.0	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
13	1	Pumps	No	50	77.0	80.9	85	5	13	Pumps	71.3	71.3	96.4	83.9	92.1	80.4	89.5	80	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
3	Commercial	Commercial

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	81.4	81.4	81.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	73.0	81.4	90.3	80	90.3	80	90.3	80	None	1.4	None	1.4	None	1.4
1	1	Generator	No	50	82.0	80.6	70	5	1	Generator	72.7	72.7	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	70	5	2	Pumps	73.0	73.0	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	195	5	3	Excavator	63.9	62.9	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	70	5	4	Compressor (air)	69.8	68.8	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	100	5	5	Pumps	69.9	69.9	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	100	5	6	Excavator	69.7	68.7	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	130	5	7	Pumps	67.6	67.6	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	70	5	8	Generator	72.7	72.7	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	120	5	9	Pumps	68.3	68.3	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	195	5	10	Pumps	64.1	64.1	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
11	1	Pumps	No	50	77.0	80.9	70	5	11	Pumps	73.0	73.0	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	70	5	12	Pumps	73.0	73.0	90.3	80	90.3	80	90.3	80	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
4	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	95.8	95.8	95.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	95.6	95.8	96.4	89.3	92.1	80.4	89.5	78.3	None	6.5	3.5	15.4	6.1	17.5
1	1	Generator	No	50	82.0	80.6	5	5	1	Generator	95.6	95.6	96.4	89.3	92.1	80.4	89.5	78.3	None	6.3	3.5	15.2	6.1	17.3
2	1	Pumps	No	50	77.0	80.9	70	5	2	Pumps	73.0	73.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	195	5	3	Excavator	63.9	62.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	90	5	4	Compressor (air)	67.6	66.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	100	5	5	Pumps	69.9	69.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	100	5	6	Excavator	69.7	68.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	70	5	7	Pumps	73.0	73.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	80	5	8	Generator	71.5	71.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	100	5	9	Pumps	69.9	69.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	90	5	10	Pumps	70.8	70.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
11	1	Pumps	No	50	77.0	80.9	70	5	11	Pumps	73.0	73.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	70	5	12	Pumps	73.0	73.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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47							50	0	47															
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49							50	0	49															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend Analysis: L10

Receptor		
No	Description	Land Use
4	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	95.8	95.8	95.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	5	5
2	1	Pumps	No	50	77.0	80.9	70	5
3	1	Excavator	No	40	85.0	80.7	195	5
4	1	Compressor (air)	No	40	80.0	77.7	90	5
5	1	Pumps	No	50	77.0	80.9	100	5
6	1	Excavator	No	40	85.0	80.7	100	5
7	1	Pumps	No	50	77.0	80.9	70	5
8	1	Generator	No	50	82.0	80.6	80	5
9	1	Pumps	No	50	77.0	80.9	100	5
10	1	Pumps	No	50	77.0	80.9	90	5
11	1	Pumps	No	50	77.0	80.9	70	5
12	1	Pumps	No	50	77.0	80.9	70	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
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34							50	0
35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	95.6	95.8	90.3	80.1	90.3	80.1	90.3	80.1	5.3	15.7	5.3	15.7	5.3	15.7
1	Generator	95.6	95.6	90.3	80.1	90.3	80.1	90.3	80.1	5.3	15.5	5.3	15.5	5.3	15.5
2	Pumps	73.0	73.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
3	Excavator	63.9	62.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
4	Compressor (air)	67.6	66.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
5	Pumps	69.9	69.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
6	Excavator	69.7	68.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
7	Pumps	73.0	73.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
8	Generator	71.5	71.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
9	Pumps	69.9	69.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
10	Pumps	70.8	70.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
11	Pumps	73.0	73.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
12	Pumps	73.0	73.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
13															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
5	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	88.0	88.0	88.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	15	5
2	1	Pumps	No	50	77.0	80.9	115	5
3	1	Excavator	No	40	85.0	80.7	90	5
4	1	Compressor (air)	No	40	80.0	77.7	175	5
5	1	Pumps	No	50	77.0	80.9	125	5
6	1	Excavator	No	40	85.0	80.7	145	5
7	1	Pumps	No	50	77.0	80.9	85	5
8	1	Generator	No	50	82.0	80.6	155	5
9	1	Pumps	No	50	77.0	80.9	100	5
10	1	Pumps	No	50	77.0	80.9	25	5
11	1	Pumps	No	50	77.0	80.9	100	5
12	1	Pumps	No	50	77.0	80.9	140	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
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35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	86.1	88.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	7.6	None	9.7
1	Generator	86.1	86.1	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	5.7	None	7.8
2	Pumps	68.7	68.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
3	Excavator	70.6	69.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
4	Compressor (air)	61.8	60.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
5	Pumps	67.9	67.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
6	Excavator	66.5	65.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
7	Pumps	71.3	71.3	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
8	Generator	65.8	65.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
9	Pumps	69.9	69.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
10	Pumps	81.9	81.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	1.5	None	3.6
11	Pumps	69.9	69.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
12	Pumps	67.0	67.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
13															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
5	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	88.0	88.0	88.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	86.1	88.0	90.3	80.1	90.3	80.1	90.3	80.1	None	7.9	None	7.9	None	7.9
1	1	Generator	No	50	82.0	80.6	15	5	1	Generator	86.1	86.1	90.3	80.1	90.3	80.1	90.3	80.1	None	6	None	6	None	6
2	1	Pumps	No	50	77.0	80.9	115	5	2	Pumps	68.7	68.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	90	5	3	Excavator	70.6	69.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	175	5	4	Compressor (air)	61.8	60.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	125	5	5	Pumps	67.9	67.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	145	5	6	Excavator	66.5	65.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	85	5	7	Pumps	71.3	71.3	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	155	5	8	Generator	65.8	65.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	100	5	9	Pumps	69.9	69.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	25	5	10	Pumps	81.9	81.9	90.3	80.1	90.3	80.1	90.3	80.1	None	1.8	None	1.8	None	1.8
11	1	Pumps	No	50	77.0	80.9	100	5	11	Pumps	69.9	69.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	140	5	12	Pumps	67.0	67.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
6	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	87.0	87.0	87.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	86.4	87.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	6.6	None	8.7
1	1	Generator	No	50	82.0	80.6	90	5	1	Generator	70.5	70.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	185	5	2	Pumps	64.5	64.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	90	5	3	Excavator	70.6	69.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	245	5	4	Compressor (air)	58.9	57.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	185	5	5	Pumps	64.5	64.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	205	5	6	Excavator	63.4	62.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	70	5	7	Pumps	73.0	73.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	225	5	8	Generator	62.5	62.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	130	5	9	Pumps	67.6	67.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	15	5	10	Pumps	86.4	86.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	6	None	8.1
11	1	Pumps	No	50	77.0	80.9	160	5	11	Pumps	65.8	65.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	205	5	12	Pumps	63.6	63.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
6	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	87.0	87.0	87.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	90	5
2	1	Pumps	No	50	77.0	80.9	185	5
3	1	Excavator	No	40	85.0	80.7	90	5
4	1	Compressor (air)	No	40	80.0	77.7	245	5
5	1	Pumps	No	50	77.0	80.9	185	5
6	1	Excavator	No	40	85.0	80.7	205	5
7	1	Pumps	No	50	77.0	80.9	70	5
8	1	Generator	No	50	82.0	80.6	225	5
9	1	Pumps	No	50	77.0	80.9	130	5
10	1	Pumps	No	50	77.0	80.9	15	5
11	1	Pumps	No	50	77.0	80.9	160	5
12	1	Pumps	No	50	77.0	80.9	205	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
28							50	0
29							50	0
30							50	0
31							50	0
32							50	0
33							50	0
34							50	0
35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	86.4	87.0	90.3	80.1	90.3	80.1	90.3	80.1	None	6.9	None	6.9	None	6.9
1	Generator	70.5	70.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
2	Pumps	64.5	64.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
3	Excavator	70.6	69.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
4	Compressor (air)	58.9	57.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
5	Pumps	64.5	64.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
6	Excavator	63.4	62.4	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
7	Pumps	73.0	73.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
8	Generator	62.5	62.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
9	Pumps	67.6	67.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
10	Pumps	86.4	86.4	90.3	80.1	90.3	80.1	90.3	80.1	None	6.3	None	6.3	None	6.3
11	Pumps	65.8	65.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
12	Pumps	63.6	63.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
13															
14															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
7	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	86.8	86.8	86.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	86.4	86.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	6.4	None	8.5
1	1	Generator	No	50	82.0	80.6	110	5	1	Generator	68.8	68.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	205	5	2	Pumps	63.6	63.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	90	5	3	Excavator	70.6	69.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	270	5	4	Compressor (air)	58.1	57.1	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	205	5	5	Pumps	63.6	63.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	225	5	6	Excavator	62.6	61.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	100	5	7	Pumps	69.9	69.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	250	5	8	Generator	61.6	61.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	150	5	9	Pumps	66.4	66.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	15	5	10	Pumps	86.4	86.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	6	None	8.1
11	1	Pumps	No	50	77.0	80.9	185	5	11	Pumps	64.5	64.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	230	5	12	Pumps	62.6	62.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
7	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	86.8	86.8	86.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	86.4	86.8	90.3	80.1	90.3	80.1	90.3	80.1	None	6.7	None	6.7	None	6.7
1	1	Generator	No	50	82.0	80.6	110	5	1	Generator	68.8	68.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	205	5	2	Pumps	63.6	63.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	90	5	3	Excavator	70.6	69.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	270	5	4	Compressor (air)	58.1	57.1	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	205	5	5	Pumps	63.6	63.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	225	5	6	Excavator	62.6	61.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	100	5	7	Pumps	69.9	69.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	250	5	8	Generator	61.6	61.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	150	5	9	Pumps	66.4	66.4	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	15	5	10	Pumps	86.4	86.4	90.3	80.1	90.3	80.1	90.3	80.1	None	6.3	None	6.3	None	6.3
11	1	Pumps	No	50	77.0	80.9	185	5	11	Pumps	64.5	64.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	230	5	12	Pumps	62.6	62.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
8	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	82.7	82.7	82.7

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	81.9	82.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	2.3	None	4.4
1	1	Generator	No	50	82.0	80.6	140	5	1	Generator	66.7	66.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	230	5	2	Pumps	62.6	62.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	100	5	3	Excavator	69.7	68.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	290	5	4	Compressor (air)	57.4	56.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	225	5	5	Pumps	62.8	62.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	250	5	6	Excavator	61.7	60.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	120	5	7	Pumps	68.3	68.3	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	275	5	8	Generator	60.8	60.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	170	5	9	Pumps	65.3	65.3	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	25	5	10	Pumps	81.9	81.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	1.5	None	3.6
11	1	Pumps	No	50	77.0	80.9	210	5	11	Pumps	63.4	63.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	255	5	12	Pumps	61.7	61.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
8	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	82.7	82.7	82.7

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	140	5
2	1	Pumps	No	50	77.0	80.9	230	5
3	1	Excavator	No	40	85.0	80.7	100	5
4	1	Compressor (air)	No	40	80.0	77.7	290	5
5	1	Pumps	No	50	77.0	80.9	225	5
6	1	Excavator	No	40	85.0	80.7	250	5
7	1	Pumps	No	50	77.0	80.9	120	5
8	1	Generator	No	50	82.0	80.6	275	5
9	1	Pumps	No	50	77.0	80.9	170	5
10	1	Pumps	No	50	77.0	80.9	25	5
11	1	Pumps	No	50	77.0	80.9	210	5
12	1	Pumps	No	50	77.0	80.9	255	5
13							85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
28							50	0
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35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	81.9	82.7	90.3	80.1	90.3	80.1	90.3	80.1	None	2.6	None	2.6	None	2.6
1	Generator	66.7	66.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
2	Pumps	62.6	62.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
3	Excavator	69.7	68.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
4	Compressor (air)	57.4	56.4	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
5	Pumps	62.8	62.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
6	Excavator	61.7	60.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
7	Pumps	68.3	68.3	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
8	Generator	60.8	60.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
9	Pumps	65.3	65.3	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
10	Pumps	81.9	81.9	90.3	80.1	90.3	80.1	90.3	80.1	None	1.8	None	1.8	None	1.8
11	Pumps	63.4	63.4	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
12	Pumps	61.7	61.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
13															
14															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
9	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	79.4	79.4	79.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	77.8	79.4	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	1.1
1	1	Generator	No	50	82.0	80.6	160	5	1	Generator	65.5	65.5	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	250	5	2	Pumps	61.9	61.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	110	5	3	Excavator	68.9	67.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	315	5	4	Compressor (air)	56.7	55.7	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	240	5	5	Pumps	62.3	62.3	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	275	5	6	Excavator	60.9	59.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	140	5	7	Pumps	67.0	67.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	300	5	8	Generator	60.0	60.0	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	190	5	9	Pumps	64.3	64.3	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	40	5	10	Pumps	77.8	77.8	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
11	1	Pumps	No	50	77.0	80.9	230	5	11	Pumps	62.6	62.6	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	280	5	12	Pumps	60.9	60.9	96.4	89.3	92.1	80.4	89.5	78.3	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
9	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	79.4	79.4	79.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	77.8	79.4	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
1	1	Generator	No	50	82.0	80.6	160	5	1	Generator	65.5	65.5	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	250	5	2	Pumps	61.9	61.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
3	1	Excavator	No	40	85.0	80.7	110	5	3	Excavator	68.9	67.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
4	1	Compressor (air)	No	40	80.0	77.7	315	5	4	Compressor (air)	56.7	55.7	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	240	5	5	Pumps	62.3	62.3	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
6	1	Excavator	No	40	85.0	80.7	275	5	6	Excavator	60.9	59.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	140	5	7	Pumps	67.0	67.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
8	1	Generator	No	50	82.0	80.6	300	5	8	Generator	60.0	60.0	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
9	1	Pumps	No	50	77.0	80.9	190	5	9	Pumps	64.3	64.3	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
10	1	Pumps	No	50	77.0	80.9	40	5	10	Pumps	77.8	77.8	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
11	1	Pumps	No	50	77.0	80.9	230	5	11	Pumps	62.6	62.6	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
12	1	Pumps	No	50	77.0	80.9	280	5	12	Pumps	60.9	60.9	90.3	80.1	90.3	80.1	90.3	80.1	None	None	None	None	None	None
13							85	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
10	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	87.0	87.0	87.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Compressor (air)	No	40	80.0	77.7	25	5
2	1	Drill Rig Truck	No	20	84.0	79.1	45	5
3	1	Compressor (air)	No	40	80.0	77.7	25	5
4	1	Excavator	No	40	85.0	80.7	25	5
5	0	Generator	No	50	82.0	80.6	200	5
6	0	Pumps	No	50	77.0	80.9	200	5
7	1	Pumps	No	50	77.0	80.9	40	5
8	0	Pumps	No	50	77.0	80.9	200	5
9	0	Excavator	No	40	85.0	80.7	200	5
10	1	Excavator	No	40	85.0	80.7	30	5
11	1	Excavator	No	40	85.0	80.7	30	5
12	1	Drill Rig Truck	No	20	84.0	79.1	40	5
13	1	Drill Rig Truck	No	20	84.0	79.1	50	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
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38							50	0
39							50	0
40							50	0
41							50	0
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44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	81.7	87.0	93	83.6	91.9	81	85.3	76	None	3.4	None	6	None	11
1	Compressor (air)	78.7	77.7	93	83.6	91.9	81	85.3	76	None	None	None	None	None	1.7
2	Drill Rig Truck	75.0	71.0	93	83.6	91.9	81	85.3	76	None	None	None	None	None	None
3	Compressor (air)	78.7	77.7	93	83.6	91.9	81	85.3	76	None	None	None	None	None	1.7
4	Excavator	81.7	80.7	93	83.6	91.9	81	85.3	76	None	None	None	None	None	4.7
5				93	83.6	91.9	81	85.3	76						
6				93	83.6	91.9	81	85.3	76						
7	Pumps	77.8	77.8	93	83.6	91.9	81	85.3	76	None	None	None	None	None	1.8
8				93	83.6	91.9	81	85.3	76						
9				93	83.6	91.9	81	85.3	76						
10	Excavator	80.1	79.1	93	83.6	91.9	81	85.3	76	None	None	None	None	None	3.1
11	Excavator	80.1	79.1	93	83.6	91.9	81	85.3	76	None	None	None	None	None	3.1
12	Drill Rig Truck	76.0	72.0	93	83.6	91.9	81	85.3	76	None	None	None	None	None	None
13	Drill Rig Truck	74.1	70.1	93	83.6	91.9	81	85.3	76	None	None	None	None	None	None
14															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
10	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	87.0	87.0	87.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	81.7	87.0	90.1	80.6	90.1	80.6	90.1	80.6	None	6.4	None	6.4	None	6.4
1	1	Compressor (air)	No	40	80.0	77.7	25	5	1	Compressor (air)	78.7	77.7	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	45	5	2	Drill Rig Truck	75.0	71.0	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	25	5	3	Compressor (air)	78.7	77.7	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	25	5	4	Excavator	81.7	80.7	90.1	80.6	90.1	80.6	90.1	80.6	None	0.1	None	0.1	None	0.1
5	0	Generator	No	50	82.0	80.6	200	5	5				90.1	80.6	90.1	80.6	90.1	80.6						
6	0	Pumps	No	50	77.0	80.9	200	5	6				90.1	80.6	90.1	80.6	90.1	80.6						
7	1	Pumps	No	50	77.0	80.9	40	5	7	Pumps	77.8	77.8	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	200	5	8				90.1	80.6	90.1	80.6	90.1	80.6						
9	0	Excavator	No	40	85.0	80.7	200	5	9				90.1	80.6	90.1	80.6	90.1	80.6						
10	1	Excavator	No	40	85.0	80.7	30	5	10	Excavator	80.1	79.1	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	30	5	11	Excavator	80.1	79.1	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	40	5	12	Drill Rig Truck	76.0	72.0	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	50	5	13	Drill Rig Truck	74.1	70.1	90.1	80.6	90.1	80.6	90.1	80.6	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
11	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	76.5	76.5	76.5

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	70.6	76.5	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	0.6
1	1	Compressor (air)	No	40	80.0	77.7	95	5	1	Compressor (air)	67.1	66.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	155	5	2	Drill Rig Truck	64.3	60.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	170	5	3	Compressor (air)	62.1	61.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	90	5	4	Excavator	70.6	69.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	200	5	5				89.9	79.9	89.7	79.3	85.2	75.9						
6	0	Pumps	No	50	77.0	80.9	200	5	6				89.9	79.9	89.7	79.3	85.2	75.9						
7	1	Pumps	No	50	77.0	80.9	100	5	7	Pumps	69.9	69.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	200	5	8				89.9	79.9	89.7	79.3	85.2	75.9						
9	0	Excavator	No	40	85.0	80.7	200	5	9				89.9	79.9	89.7	79.3	85.2	75.9						
10	1	Excavator	No	40	85.0	80.7	100	5	10	Excavator	69.7	68.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	130	5	11	Excavator	67.4	66.4	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	100	5	12	Drill Rig Truck	68.1	64.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	75	5	13	Drill Rig Truck	70.6	66.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
11	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.5	76.5	76.5

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	70.6	76.5	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	1	Compressor (air)	No	40	80.0	77.7	95	5	1	Compressor (air)	67.1	66.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	155	5	2	Drill Rig Truck	64.3	60.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	170	5	3	Compressor (air)	62.1	61.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	90	5	4	Excavator	70.6	69.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	200	5	5				88.9	78.1	88.9	78.1	88.9	78.1						
6	0	Pumps	No	50	77.0	80.9	200	5	6				88.9	78.1	88.9	78.1	88.9	78.1						
7	1	Pumps	No	50	77.0	80.9	100	5	7	Pumps	69.9	69.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	200	5	8				88.9	78.1	88.9	78.1	88.9	78.1						
9	0	Excavator	No	40	85.0	80.7	200	5	9				88.9	78.1	88.9	78.1	88.9	78.1						
10	1	Excavator	No	40	85.0	80.7	100	5	10	Excavator	69.7	68.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	130	5	11	Excavator	67.4	66.4	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	100	5	12	Drill Rig Truck	68.1	64.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	75	5	13	Drill Rig Truck	70.6	66.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
12	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.7	76.7	76.7

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	71.2	76.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	0.8
1	1	Compressor (air)	No	40	80.0	77.7	90	5	1	Compressor (air)	67.6	66.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	125	5	2	Drill Rig Truck	66.1	62.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	140	5	3	Compressor (air)	63.8	62.8	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	95	5	4	Excavator	70.1	69.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	200	5	5				89.9	79.9	89.7	79.3	85.2	75.9						
6	0	Pumps	No	50	77.0	80.9	200	5	6				89.9	79.9	89.7	79.3	85.2	75.9						
7	1	Pumps	No	50	77.0	80.9	95	5	7	Pumps	70.3	70.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	200	5	8				89.9	79.9	89.7	79.3	85.2	75.9						
9	0	Excavator	No	40	85.0	80.7	200	5	9				89.9	79.9	89.7	79.3	85.2	75.9						
10	1	Excavator	No	40	85.0	80.7	120	5	10	Excavator	68.1	67.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	110	5	11	Excavator	68.9	67.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	85	5	12	Drill Rig Truck	69.5	65.5	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	70	5	13	Drill Rig Truck	71.2	67.2	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
12	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.7	76.7	76.7

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	71.2	76.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	1	Compressor (air)	No	40	80.0	77.7	90	5	1	Compressor (air)	67.6	66.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	125	5	2	Drill Rig Truck	66.1	62.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	140	5	3	Compressor (air)	63.8	62.8	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	95	5	4	Excavator	70.1	69.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	200	5	5				88.9	78.1	88.9	78.1	88.9	78.1						
6	0	Pumps	No	50	77.0	80.9	200	5	6				88.9	78.1	88.9	78.1	88.9	78.1						
7	1	Pumps	No	50	77.0	80.9	95	5	7	Pumps	70.3	70.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	200	5	8				88.9	78.1	88.9	78.1	88.9	78.1						
9	0	Excavator	No	40	85.0	80.7	200	5	9				88.9	78.1	88.9	78.1	88.9	78.1						
10	1	Excavator	No	40	85.0	80.7	120	5	10	Excavator	68.1	67.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	110	5	11	Excavator	68.9	67.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	85	5	12	Drill Rig Truck	69.5	65.5	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	70	5	13	Drill Rig Truck	71.2	67.2	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
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47							50	0	47															
48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
13	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	76.8	76.8	76.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	71.2	76.8	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	0.9
1	1	Compressor (air)	No	40	80.0	77.7	95	5	1	Compressor (air)	67.1	66.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	105	5	2	Drill Rig Truck	67.7	63.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	125	5	3	Compressor (air)	64.7	63.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	105	5	4	Excavator	69.3	68.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	65	5	5				89.9	79.9	89.7	79.3	85.2	75.9						
6	0	Pumps	No	50	77.0	80.9	65	5	6				89.9	79.9	89.7	79.3	85.2	75.9						
7	1	Pumps	No	50	77.0	80.9	95	5	7	Pumps	70.3	70.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	60	5	8				89.9	79.9	89.7	79.3	85.2	75.9						
9	0	Excavator	No	40	85.0	80.7	150	5	9				89.9	79.9	89.7	79.3	85.2	75.9						
10	1	Excavator	No	40	85.0	80.7	135	5	10	Excavator	67.1	66.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	95	5	11	Excavator	70.1	69.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	80	5	12	Drill Rig Truck	70.0	66.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	70	5	13	Drill Rig Truck	71.2	67.2	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
20							50	0	20															
21							50	0	21															
22							50	0	22															
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48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
13	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	76.8	76.8	76.8

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	71.2	76.8	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	1	Compressor (air)	No	40	80.0	77.7	95	5	1	Compressor (air)	67.1	66.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	105	5	2	Drill Rig Truck	67.7	63.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	125	5	3	Compressor (air)	64.7	63.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	105	5	4	Excavator	69.3	68.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	65	5	5				88.9	78.1	88.9	78.1	88.9	78.1						
6	0	Pumps	No	50	77.0	80.9	65	5	6				88.9	78.1	88.9	78.1	88.9	78.1						
7	1	Pumps	No	50	77.0	80.9	95	5	7	Pumps	70.3	70.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	60	5	8				88.9	78.1	88.9	78.1	88.9	78.1						
9	0	Excavator	No	40	85.0	80.7	150	5	9				88.9	78.1	88.9	78.1	88.9	78.1						
10	1	Excavator	No	40	85.0	80.7	135	5	10	Excavator	67.1	66.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	95	5	11	Excavator	70.1	69.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	80	5	12	Drill Rig Truck	70.0	66.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	70	5	13	Drill Rig Truck	71.2	67.2	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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47							50	0	47															
48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
14	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.7	76.7	76.7

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	70.6	76.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	0.8
1	1	Compressor (air)	No	40	80.0	77.7	100	5	1	Compressor (air)	66.7	65.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	90	5	2	Drill Rig Truck	69.0	65.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	110	5	3	Compressor (air)	65.9	64.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	120	5	4	Excavator	68.1	67.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	80	5	5				89.9	79.9	89.7	79.3	85.2	75.9						
6	0	Pumps	No	50	77.0	80.9	60	5	6				89.9	79.9	89.7	79.3	85.2	75.9						
7	1	Pumps	No	50	77.0	80.9	95	5	7	Pumps	70.3	70.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	70	5	8				89.9	79.9	89.7	79.3	85.2	75.9						
9	0	Excavator	No	40	85.0	80.7	135	5	9				89.9	79.9	89.7	79.3	85.2	75.9						
10	1	Excavator	No	40	85.0	80.7	155	5	10	Excavator	65.9	64.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	90	5	11	Excavator	70.6	69.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	80	5	12	Drill Rig Truck	70.0	66.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	75	5	13	Drill Rig Truck	70.6	66.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
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48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
14	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.7	76.7	76.7

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	70.6	76.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	1	Compressor (air)	No	40	80.0	77.7	100	5	1	Compressor (air)	66.7	65.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	90	5	2	Drill Rig Truck	69.0	65.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	110	5	3	Compressor (air)	65.9	64.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	120	5	4	Excavator	68.1	67.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	80	5	5				88.9	78.1	88.9	78.1	88.9	78.1						
6	0	Pumps	No	50	77.0	80.9	60	5	6				88.9	78.1	88.9	78.1	88.9	78.1						
7	1	Pumps	No	50	77.0	80.9	95	5	7	Pumps	70.3	70.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	70	5	8				88.9	78.1	88.9	78.1	88.9	78.1						
9	0	Excavator	No	40	85.0	80.7	135	5	9				88.9	78.1	88.9	78.1	88.9	78.1						
10	1	Excavator	No	40	85.0	80.7	155	5	10	Excavator	65.9	64.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	90	5	11	Excavator	70.6	69.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	80	5	12	Drill Rig Truck	70.0	66.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	75	5	13	Drill Rig Truck	70.6	66.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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47							50	0	47															
48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
15	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.4	76.4	76.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	70.6	76.4	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	0.5
1	1	Compressor (air)	No	40	80.0	77.7	110	5	1	Compressor (air)	65.9	64.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	80	5	2	Drill Rig Truck	70.0	66.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	100	5	3	Compressor (air)	66.7	65.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	135	5	4	Excavator	67.1	66.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	95	5	5				89.9	79.9	89.7	79.3	85.2	75.9						
6	0	Pumps	No	50	77.0	80.9	60	5	6				89.9	79.9	89.7	79.3	85.2	75.9						
7	1	Pumps	No	50	77.0	80.9	100	5	7	Pumps	69.9	69.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	80	5	8				89.9	79.9	89.7	79.3	85.2	75.9						
9	0	Excavator	No	40	85.0	80.7	115	5	9				89.9	79.9	89.7	79.3	85.2	75.9						
10	1	Excavator	No	40	85.0	80.7	170	5	10	Excavator	65.1	64.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	90	5	11	Excavator	70.6	69.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	80	5	12	Drill Rig Truck	70.0	66.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	85	5	13	Drill Rig Truck	69.5	65.5	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
20							50	0	20															
21							50	0	21															
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45							50	0	45															
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49							50	0	49															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
15	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	76.4	76.4	76.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Compressor (air)	No	40	80.0	77.7	110	5
2	1	Drill Rig Truck	No	20	84.0	79.1	80	5
3	1	Compressor (air)	No	40	80.0	77.7	100	5
4	1	Excavator	No	40	85.0	80.7	135	5
5	0	Generator	No	50	82.0	80.6	95	5
6	0	Pumps	No	50	77.0	80.9	60	5
7	1	Pumps	No	50	77.0	80.9	100	5
8	0	Pumps	No	50	77.0	80.9	80	5
9	0	Excavator	No	40	85.0	80.7	115	5
10	1	Excavator	No	40	85.0	80.7	170	5
11	1	Excavator	No	40	85.0	80.7	90	5
12	1	Drill Rig Truck	No	20	84.0	79.1	80	5
13	1	Drill Rig Truck	No	20	84.0	79.1	85	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
28							50	0
29							50	0
30							50	0
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33							50	0
34							50	0
35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	70.6	76.4	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	Compressor (air)	65.9	64.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	Drill Rig Truck	70.0	66.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	Compressor (air)	66.7	65.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	Excavator	67.1	66.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5				88.9	78.1	88.9	78.1	88.9	78.1						
6				88.9	78.1	88.9	78.1	88.9	78.1						
7	Pumps	69.9	69.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8				88.9	78.1	88.9	78.1	88.9	78.1						
9				88.9	78.1	88.9	78.1	88.9	78.1						
10	Excavator	65.1	64.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
11	Excavator	70.6	69.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
12	Drill Rig Truck	70.0	66.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
13	Drill Rig Truck	69.5	65.5	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
14															
15															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
16	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	76.0	76.0	76.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	71.1	76.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	0.1
1	1	Compressor (air)	No	40	80.0	77.7	130	5	1	Compressor (air)	64.4	63.4	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	75	5	2	Drill Rig Truck	70.6	66.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	95	5	3	Compressor (air)	67.1	66.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	160	5	4	Excavator	65.6	64.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	115	5	5				89.9	79.9	89.7	79.3	85.2	75.9						
6	0	Pumps	No	50	77.0	80.9	60	5	6				89.9	79.9	89.7	79.3	85.2	75.9						
7	1	Pumps	No	50	77.0	80.9	110	5	7	Pumps	69.1	69.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	100	5	8				89.9	79.9	89.7	79.3	85.2	75.9						
9	0	Excavator	No	40	85.0	80.7	90	5	9				89.9	79.9	89.7	79.3	85.2	75.9						
10	1	Excavator	No	40	85.0	80.7	195	5	10	Excavator	63.9	62.9	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	85	5	11	Excavator	71.1	70.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	85	5	12	Drill Rig Truck	69.5	65.5	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	105	5	13	Drill Rig Truck	67.7	63.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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45							50	0	45															
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48							50	0	48															
49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
16	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	76.0	76.0	76.0

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	71.1	76.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	1	Compressor (air)	No	40	80.0	77.7	130	5	1	Compressor (air)	64.4	63.4	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	1	Drill Rig Truck	No	20	84.0	79.1	75	5	2	Drill Rig Truck	70.6	66.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	1	Compressor (air)	No	40	80.0	77.7	95	5	3	Compressor (air)	67.1	66.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	160	5	4	Excavator	65.6	64.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	0	Generator	No	50	82.0	80.6	115	5	5				88.9	78.1	88.9	78.1	88.9	78.1						
6	0	Pumps	No	50	77.0	80.9	60	5	6				88.9	78.1	88.9	78.1	88.9	78.1						
7	1	Pumps	No	50	77.0	80.9	110	5	7	Pumps	69.1	69.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8	0	Pumps	No	50	77.0	80.9	100	5	8				88.9	78.1	88.9	78.1	88.9	78.1						
9	0	Excavator	No	40	85.0	80.7	90	5	9				88.9	78.1	88.9	78.1	88.9	78.1						
10	1	Excavator	No	40	85.0	80.7	195	5	10	Excavator	63.9	62.9	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
11	1	Excavator	No	40	85.0	80.7	85	5	11	Excavator	71.1	70.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
12	1	Drill Rig Truck	No	20	84.0	79.1	85	5	12	Drill Rig Truck	69.5	65.5	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
13	1	Drill Rig Truck	No	20	84.0	79.1	105	5	13	Drill Rig Truck	67.7	63.7	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
14							105	5	14															
15							125	5	15															
16							50	0	16															
17							50	0	17															
18							50	0	18															
19							50	0	19															
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49							50	0	49															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
17	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	88.4	88.4	88.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	35	5
2	1	Pumps	No	50	77.0	80.9	30	5
3	1	Pumps	No	50	77.0	80.9	30	5
4	1	Excavator	No	40	85.0	80.7	20	5
5	1	Pumps	No	50	77.0	80.9	24	5
6	1	Pumps	No	50	77.0	80.9	70	5
7	1	Pumps	No	50	77.0	80.9	55	5
8							100	5
9							90	5
10							195	5
11							85	5
12							85	5
13							130	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
24							50	0
25							50	0
26							50	0
27							50	0
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35							50	0
36							50	0
37							50	0
38							50	0
39							50	0
40							50	0
41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	83.7	88.4	89.9	79.9	89.7	79.3	85.2	75.9	None	8.5	None	9.1	None	12.5
1	Generator	78.7	78.7	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	2.8
2	Pumps	80.3	80.3	89.9	79.9	89.7	79.3	85.2	75.9	None	0.4	None	1	None	4.4
3	Pumps	80.3	80.3	89.9	79.9	89.7	79.3	85.2	75.9	None	0.4	None	1	None	4.4
4	Excavator	83.7	82.7	89.9	79.9	89.7	79.3	85.2	75.9	None	2.8	None	3.4	None	6.8
5	Pumps	82.3	82.3	89.9	79.9	89.7	79.3	85.2	75.9	None	2.4	None	3	None	6.4
6	Pumps	73.0	73.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
7	Pumps	75.1	75.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
17	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	88.4	88.4	88.4

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	35	5
2	1	Pumps	No	50	77.0	80.9	30	5
3	1	Pumps	No	50	77.0	80.9	30	5
4	1	Excavator	No	40	85.0	80.7	20	5
5	1	Pumps	No	50	77.0	80.9	24	5
6	1	Pumps	No	50	77.0	80.9	70	5
7	1	Pumps	No	50	77.0	80.9	55	5
8							100	5
9							90	5
10							195	5
11							85	5
12							85	5
13							130	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
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41							50	0
42							50	0
43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	83.7	88.4	88.9	78.1	88.9	78.1	88.9	78.1	None	10.3	None	10.3	None	10.3
1	Generator	78.7	78.7	88.9	78.1	88.9	78.1	88.9	78.1	None	0.6	None	0.6	None	0.6
2	Pumps	80.3	80.3	88.9	78.1	88.9	78.1	88.9	78.1	None	2.2	None	2.2	None	2.2
3	Pumps	80.3	80.3	88.9	78.1	88.9	78.1	88.9	78.1	None	2.2	None	2.2	None	2.2
4	Excavator	83.7	82.7	88.9	78.1	88.9	78.1	88.9	78.1	None	4.6	None	4.6	None	4.6
5	Pumps	82.3	82.3	88.9	78.1	88.9	78.1	88.9	78.1	None	4.2	None	4.2	None	4.2
6	Pumps	73.0	73.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
7	Pumps	75.1	75.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8															
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WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
18	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	77.6	77.6	77.6

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	73.0	77.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	1.7
1	1	Generator	No	50	82.0	80.6	100	5	1	Generator	69.6	69.6	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	150	5	2	Pumps	66.4	66.4	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Pumps	No	50	77.0	80.9	120	5	3	Pumps	68.3	68.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	210	5	4	Excavator	63.2	62.2	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	175	5	5	Pumps	65.0	65.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
6	1	Pumps	No	50	77.0	80.9	70	5	6	Pumps	73.0	73.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	90	5	7	Pumps	70.8	70.8	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8							100	5	8															
9							90	5	9															
10							195	5	10															
11							85	5	11															
12							85	5	12															
13							130	5	13															
14							105	5	14															
15							125	5	15															
16							50	0	16															
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49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
18	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	77.6	77.6	77.6

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	73.0	77.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
1	1	Generator	No	50	82.0	80.6	100	5	1	Generator	69.6	69.6	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	150	5	2	Pumps	66.4	66.4	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	1	Pumps	No	50	77.0	80.9	120	5	3	Pumps	68.3	68.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	210	5	4	Excavator	63.2	62.2	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	175	5	5	Pumps	65.0	65.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
6	1	Pumps	No	50	77.0	80.9	70	5	6	Pumps	73.0	73.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	90	5	7	Pumps	70.8	70.8	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8							100	5	8															
9							90	5	9															
10							195	5	10															
11							85	5	11															
12							85	5	12															
13							130	5	13															
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50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 1 - Weekday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekday Analysis: L10

Receptor		
No	Description	Land Use
19	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	80.1	80.1	80.1

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)	Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
										Total	74.3	80.1	89.9	79.9	89.7	79.3	85.2	75.9	None	0.2	None	0.8	None	4.2
1	1	Generator	No	50	82.0	80.6	85	5	1	Generator	71.0	71.0	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
2	1	Pumps	No	50	77.0	80.9	85	5	2	Pumps	71.3	71.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
3	1	Pumps	No	50	77.0	80.9	85	5	3	Pumps	71.3	71.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
4	1	Excavator	No	40	85.0	80.7	95	5	4	Excavator	70.1	69.1	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
5	1	Pumps	No	50	77.0	80.9	85	5	5	Pumps	71.3	71.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
6	1	Pumps	No	50	77.0	80.9	60	5	6	Pumps	74.3	74.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
7	1	Pumps	No	50	77.0	80.9	85	5	7	Pumps	71.3	71.3	89.9	79.9	89.7	79.3	85.2	75.9	None	None	None	None	None	None
8							100	5	8															
9							90	5	9															
10							195	5	10															
11							85	5	11															
12							85	5	12															
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15							125	5	15															
16							50	0	16															
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49							50	0	49															
50							50	0	50															

WANG TECHNOLOGY

Wang RCNM Analyses Program Version 1.3
Adapted from the FHWA Roadway Construction Noise Model, Version 1.1

Created by: Niels Jensen
Date: 9/22/2017

Project: "Sandy" Repair and Core Capacity Improvement Canarsie Tunnel Rehab
Case: Case 2 - Saturday
Date: 9/28/2018
Processed by: Niels Jensen
Time: Weekend
Analysis: L10

Receptor		
No	Description	Land Use
19	Residential	Residential

Baseline (dBA)		
Day	Evening	Night
NA	NA	NA

Combined Differential		
Day	Evening	Night
0	0	0

Combined Total L10 with Baseline	Day	Evening	Night
	80.1	80.1	80.1

Use Combined L10: 0

Num	Active	Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Distance to Receptor (feet)	Estimated Shielding (dBA)
1	1	Generator	No	50	82.0	80.6	85	5
2	1	Pumps	No	50	77.0	80.9	85	5
3	1	Pumps	No	50	77.0	80.9	85	5
4	1	Excavator	No	40	85.0	80.7	95	5
5	1	Pumps	No	50	77.0	80.9	85	5
6	1	Pumps	No	50	77.0	80.9	60	5
7	1	Pumps	No	50	77.0	80.9	85	5
8							100	5
9							90	5
10							195	5
11							85	5
12							85	5
13							130	5
14							105	5
15							125	5
16							50	0
17							50	0
18							50	0
19							50	0
20							50	0
21							50	0
22							50	0
23							50	0
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39							50	0
40							50	0
41							50	0
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43							50	0
44							50	0
45							50	0
46							50	0
47							50	0
48							50	0
49							50	0
50							50	0

Num	Equipment	Calculated Lmax	Calculated L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedances (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
	Total	74.3	80.1	88.9	78.1	88.9	78.1	88.9	78.1	None	2.0	None	2	None	2
1	Generator	71.0	71.0	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
2	Pumps	71.3	71.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
3	Pumps	71.3	71.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
4	Excavator	70.1	69.1	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
5	Pumps	71.3	71.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
6	Pumps	74.3	74.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
7	Pumps	71.3	71.3	88.9	78.1	88.9	78.1	88.9	78.1	None	None	None	None	None	None
8															
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Appendix E: DEP Alternative Noise Mitigation Plan Application Form

PRINT EMAIL TO DEP

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Environmental Compliance
59-17 Junction Boulevard, 9th Floor, Flushing, New York 11373
Records Control (718) 595–3855

ALTERNATIVE NOISE MITIGATION PLAN APPLICATION

TO BE USED FOR ***MANHATTAN*** *ONLY*

IT IS NECESSARY TO FILE THIS DOCUMENT WITH DEP
THE APPROVED PLAN MUST BE ACCESSIBLE TO INSPECTORS

In accordance with Section 24-221 of the New York City Administrative Code, any individual or entity performing construction work in the city, shall adopt and implement an alternative noise mitigation plan for each construction site when any device or activity deviates from strict compliance with the noise mitigation rules as defined in Section 24-219. The attached sample form of an alternative noise mitigation plan is intended to inform the user of the required plan elements that a responsible party shall include when the listed devices are being used on site and the mitigation strategies and best management practices defined in Title 15 Rules of the City of New York - RCNY Section 28-102 cannot be strictly complied with. The responsible party shall be liable for the accuracy of this document and compliance with all applicable rules in Title 15 RCNY Chapter 28.

I. CONTACT INFORMATION

NAME OF RESPONSIBLE PARTY *(As defined in Title 15 RCNY §28-109)*	PHONE NUMBER:	EMAIL:

WORK SITE LOCATION ADDRESS:	ZIP:	BOROUGH:	BLOCK:	LOT:
		Manhattan		

HAVE YOU SUBMITTED A NOISE MITIGATION PLAN? *(You must submit a Noise Mitigation Plan before submitting this alternative plan)*	NYCDOT PERMIT NUMBER(s)	NYCDOB PERMIT NUMBER(s)
☒ YES ☐ NO		

II. CONSTRUCTION INFORMATION

Please list all **DEVICES** and/or **ACTIVITIES** that cannot comply with Title 15 RCNY Section 28-102.

1.
2.
3.
4.
5.

III. NOISE MITIGATION INFORMATION

Please describe in detail all **DEVICES** and/or **ACTIVITIES** listed in Section II working as proposed Noise Mitigation Methods. Attached diagrams or additional documentation if necessary.

1.
2.
3.
4.
5.

DEP USE ONLY

Allowable decibel level at 50 feet _____ Day Time _____ After Hours

☐ APPROVED		☐ DISAPPROVED	
Signature of the Agency Head or Designated Representative	Date:	Signature of the Agency Head or Designated Representative	Date:

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Environmental Compliance
59-17 Junction Boulevard, 9th Floor, Flushing, New York 11373
Records Control (718) 595–3855

CONSTRUCTION NOISE MITIGATION PLAN

TO BE USED FOR MANHATTAN ONLY

IF THIS DOCUMENT IS NOT POSTED ON SITE, CONTACT SHEET MUST BE POSTED

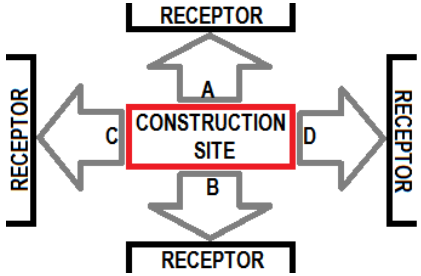
The responsible party shall be liable for the accuracy of the document and compliance with all applicable rules in Title 15 Rules of the City of New York - RCNY Chapter 28.

CONTACT INFORMATION

Name of Responsible Party as defined in Title 15 RCNY §28-109:	Phone Number	Email:			
Work Site Address		Zip	Borough: Manhattan	Block	Lot

CONSTRUCTION INFORMATION

Approximate Distance to Closest Receptor
(defined in Title 15 RCNY §28-109)



A. _____ feet
B. _____ feet
C. _____ feet
D. _____ feet

NORMAL WORK HOURS (AS DEFINED IN NYC ADMINISTRATIVE CODE §24-222).
Do you anticipate having to work at any time other than 7am to 6pm Monday to Friday? ❑YES ❑NO
If YES, what phase[s] do you anticipate needing an After Hours Variance:
❑Demolition ❑Excavation ❑Foundation ❑Superstructure ❑Finishing ❑Other_____

NYC Department of Transportation Permit number(s):	NYC Department of Buildings Permit number(s):
DOB Permit #:	DEP Registration #:

CONSTRUCTION PHASE

PHASES AND DURATION DATES		
Demolition	From	To
Excavation	From	To
Foundation	From	To
Superstructure	From	To
Finishing	From	To
Other	From	To

Estimated Depth of Excavation:
SOIL _____ FEET + BEDROCK _____ FEET = TOTAL _____0_____ FEET

Pumping Operation: ❑YES ❑NO
If YES, NUMBER OF INDIVIDUAL TRUCKS _____ PER HOUR

Number of Floors / Stories:
Describe How Flooring Will Be Laid:
❑ CONCRETE PUMP ❑ PREFAB ❑ OTHER: _____

☒ COMPLETED EXTERIOR BEFORE BEGINNING INTERIOR WORK
☒ INTERIOR WORK BEFORE EXTERIOR WALLS / WINDOWS ARE IN.

Explain:

CONSTRUCTION DEVICES

List of §102 construction devices to be used at the site. When the additional devices listed below each category are utilized, the use of barriers as set forth in section IV herein is not required unless the NYC Department of Environmental Protection receives complaints as set forth in §28-102(C) of Title 15 of the RCNY for each device. If however, the specific devices listed below each main category of devices are not checked, and you are using any of the main devices listed below, then the use of barriers set forth in Section IV herein shall be utilized. However, if you specified "other" in a category, you shall be required to utilize barriers as set forth in Section IV herein.

DEVICE	PILE DRIVERS	JACKHAMMERS	HOE RAMS	BLASTING	VACUUM EXCAVATORS	DUMP TRUCKS	CRANES	CONCRETE SAWS	SANDBLASTING EQUIPMENT	AUGER DRILL RIGS	OTHER:
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
PHASE USED FOR:	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):	☐ Demolition ☐ Excavation ☐ Foundation ☐ Superstructure ☐ Finishing ☐ Other (Explain):
MAKE (s)											
DETAIL	☐ Vibratory Pile Driver or Hydraulic Impact Pile Driver as defined in 102(a)(1)(B)(ii) ☐ Noise Bellows as defined in 102(a)(1)(B)(viii) ☐ Other (Explain):	☐ Quieter makes and models as defined in 102(a)(2)(B)(i) ☐ Other (Explain):	☐ Quieter makes and models as defined in 102(a)(3)(B)(i) ☐ Noise Shroud as defined in 102(a)(3)(B)(iii) ☐ Other (Explain):	☐ Blast Mats	☐ Smaller Capacity vac-truck as defined in 102(b)(1)(B)(i) ☐ Silencer as defined in 102(b)(1)(B)(iii) ☐ Other (Explain):	☐ US Made European Environmental Label equipment or equivalent as defined in 102(c)(1)(B)(iii) ☐ Other (Explain):	☐ Modern Hydraulic Crane as defined in 102(d)(1)(B)(ii) ☐ US Made European Environmental Label equipment or equivalent as defined in 102(d)(B)(1)(iii) ☐ Other (Explain):				
FUEL TYPE											
MAXIMUM NUMBER OF UNIT TO BE USED AT THE SAME TIME:											

ADDITIONAL CONSTRUCTION DEVICES

List of additional applicable construction devices to be used at the site:

☐ **GENERATORS** ☐ **COMPRESSORS** ☐ **STREET PLATES** ☐ **BACKUP ALARMS** ☐ **PUMPS** ☐ **HOIST**

NOISE MITIGATION

Noise Mitigation Barriers Utilized: If required as set forth in §28-101(g) of Title 15 of the RCNY.

Required to use Perimeter barrier /DOB construction fence or temporary/moveable barrier:

☐**YES** ☐**NO**

PILE DRIVERS	JACKHAMMERS	HOE RAMS	BLASTING	VACUUM EXCAVATORS	DUMP TRUCKS	CRANES	CONCRETE SAWS	STREET PLATES	AUGER DRILL RIGS	BACKUP ALARMS
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier	☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

CHECK ALL THAT APPLY

Please check all equipment that will be used on site. Review Rules for Citywide Construction Noise Mitigation Section 28-109. Certify that equipment has been sound tested and complies with Spec 721.560 Lmax @50 ft.

☑	Label ID	Equipment Description
	A	All Other Equipment > 5 HP
	B	Auger Drill Rig
	C	Backhoe
	D	Bar Bender
	E	Blasting
	F	Boring Jack Power Unit
	G	Chain Saw
	H	Clam Shovel (dropping)
	I	Compactor (ground)
	J	Compressor (air)
	K	Concrete Batch Plant
	L	Concrete Mixer Truck
	M	Concrete Pump Truck
	N	Concrete Saw
	O	Crane
	P	Dozer
	Q	Drill Rig Truck
	R	Drum Mixer
	S	Dump Truck

☑	Label ID	Equipment Description
	T	Excavator
	U	Flat Bed Truck
	V	Front End Loader
	W	Generator
	X	Generator (<25KVA, VMS signs)
	Y	Gradall
	Z	Grader
	AA	Grapple (on backhoe)
	AB	Horizontal Boring Hydr. Jack
	AC	Hydra Break Ram
	AD	Impact Pile Driver
	AE	Jackhammer
	AF	Man Lift
	AG	Mounted Impact Hammer (hoe ram)
	AH	Pavement Scarafier
	AI	Paver
	AJ	Pickup Truck
	AK	Pneumatic Tools
	AL	Pumps

☑	Label ID	Equipment Description
	AM	Refrigerator Unit
	AN	Rivet Buster / Chipping Gun
	AO	Rock Drill
	AP	Roller
	AQ	Sand Blasting
	AR	Scrapper
	AS	Shears (on backhoe)
	AT	Slurry Plant
	AU	Slurry Trenching Machine
	AV	Soil Mix Drill Rig
	AW	Tractor
	AX	Vacuum Excavator (Vac-truck)
	AY	Vacuum Street Sweeper
	AZ	Ventilation Fan
	BA	Vibrating Hopper
	BB	Vibratory Concrete Mixer
	BC	Vibratory Pile Driver
	BD	Warning Horn
	BE	Water Jet Deleading
	BF	Welder / Torch

Note: DEP will utilize the Federal Highway Administration Roadway Construction Model as a means of identifying equipment either in Section II or III, that may be the cause of a noise complaint, see §28-101(a) of Title 15 of the RCNY for compliance options.

I hereby certify that the information contained in this form is true and accurate.

_____ of _____

Name of Responsible Party Company

_____ _____

Signature Date

Notary Public

PRINT EMAIL TO DEP

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Environmental Compliance
59-17 Junction Boulevard, 9th Floor, Flushing, New York 11373
Records Control (718) 595–3855

Alternative Noise Mitigation Plan Application

IT IS NECESSARY TO FILE THIS DOCUMENT WITH DEP
THE APPROVED PLAN MUST BE ACCESSIBLE TO INSPECTORS

In accordance with Section 24-221 of the New York City Administrative Code, any individual or entity performing construction work in the city, shall adopt and implement an alternative noise mitigation plan for each construction site when any device or activity deviates from strict compliance with the noise mitigation rules as defined in Section 24-219. The attached sample form of an alternative noise mitigation plan is intended to inform the user of the required plan elements that a responsible party shall include when the listed devices are being used on site and the mitigation strategies and best management practices defined in Title 15 Rules of the City of New York - RCNY Section 28-102 cannot be strictly complied with. The responsible party shall be liable for the accuracy of this document and compliance with all applicable rules in Title 15 RCNY Chapter 28.

Contact Information

Name of Responsible Party as defined in Title 15 RCNY §28-109: Judlau-TC Electric JV

Work Site Location: 440 E 14th St (approximate) (Address) 10003 (Zip) Manhattan (Borough) (Block) (Lot)

Contact Phone Number of Responsible Party: 718-554-2621

Approximate Distance To Closest Receptor (defined in Title 15 RCNY §28-109 of) 15 feet.

Demolition Construction Work is Taking Place from: ____ / ____ To ____ / ____
(Month / Year To Month / Year)

Excavation Construction Work is Taking Place from: SEP / 2018 To AUG / 2019
(Month / Year To Month / Year)

Foundation Construction Work is Taking Place from: ____ / ____ To ____ / ____
(Month / Year To Month / Year)

Superstructure Construction Work is Taking Place from: ____ / ____ To ____ / ____
(Month / Year To Month / Year)

Finishing Construction Work is Taking Place from: ____ / ____ To ____ / ____
(Month / Year To Month / Year)

Other Construction Work is Taking Place from: ____ / ____ To ____ / ____
(Month / Year To Month / Year)

Normal Work Hours (as defined in NYC Administrative Code §24-222) Requesting Mon-Fri 7am-7am (continuous)/Sat 7am-11pm/Sun 9am-6pm

NYC Department of Transportation Permit number(s) see attached

NYC Department of Buildings Permit number(s) n/a

Construction Devices Being Used *See 15 RCNY §28102*

1. see attached
2.
3.
4.
5.

Describe in Detail Noise Mitigation Methods Proposed *(Attach diagrams or additional documentation if necessary)*:

1. ANC-AB1-112 Sound Curtains attached to construction fence surrounding each work zone as shown in Alternate Noise Mitigation Plan
2. Acoustiblok All Weather Sound Panels surrounding various equipmemt as needed.
3.
4.
5.
6.

DEP USE ONLY

☒ APPROVED Nina Favuzzi October 1, 2018
Signature of the Agency Head or Designated Representative — Date

☐ DISAPPROVED

Signature of the Agency Head or Designated Representative — Date

* Renewal based on Conditions of the Alternative Plan signed on February 1918.

EQUIP MANUFACTURER	EQUIPMENT MODEL	EQUIP TYPE
Kaeser	M57	Compressor
HD Engineering	HP205	Drill Rig
Sullair	C15	Compressor
CATERPILLAR	CAT311F	Excavator/Grap
Multiquip Whisper	DB-1651J2	Generator
Metax Pump	MP7 HP720T	Metax Pump/Plant
John Deere	HT60DJVFF	Hydraulic Pump/Power Pak
Wacker Nelson	LTN 4K-V	Light Tower
Godwin	HL80	Water Pump (red)
Water Pump	John Deere	Water Pump (red)
Caterpillar	M316F	Excavator
Caterpillar	CAT325F	Excavator
Caterpillar	M316F	Excavator
Caterpillar	M316F	Excavator
Comacchio	MC15	Drill Rig
Casagrande	C12	Drill Rig
Kubota	D1105-BG-ET01	Compressor
Hydra Tech	HT60DJVFF	Hydraulic Pump//Power Pak
CATERPILLAR	CAT308	EXCAVATOR
TAKEUCHI	Tb135	EXCAVATOR
Hydra Tech	HT60DJVFF	Hydraulic Pump/Power Pak
Atlas Copco	601715	Generator
HEVVY PUMP	DP-20	Electric Pump
HYDRA TECH	4" HYDRAULIC SILENT	Bypass Pump

PERMIT #		OLD PERMIT #	DOT TRACKING #	PERMIT TYPE	ON STREET	FROM STREET	TO STREET	TYPE	DESCRIPTION	DATE ISSUED	DATE EXPIRED
M02-2018257-A00		M02-2018169-A04	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	203	PLACE CRANE OR SHOVEL ON STREET	9/27/2018	12/25/2018
M02-2018257-A01		M02-2018169-A02	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	203	PLACE CRANE OR SHOVEL ON STREET	9/27/2018	12/25/2018
M02-2018257-A02		M02-2018169-A03	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	211	OCCUPANCY OF ROADWAY AS STIPULATED	9/27/2018	12/25/2018
M02-2018257-A03		M02-2018169-A05	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	211	OCCUPANCY OF ROADWAY AS STIPULATED	9/27/2018	12/25/2018
M02-2018257-A04		M02-2018169-A06	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	211	OCCUPANCY OF ROADWAY AS STIPULATED	9/27/2018	12/25/2018
M02-2018257-A05		M02-2018166-C41	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A06		M02-2018166-C43	2018090500387730	BUILDING OPERATION	E 14TH	AVE B	AVE C	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A07	`	M02-2018166-C45	2018090500387730	BUILDING OPERATION	E 14TH	AVE B	AVE C	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A08		M02-2018166-C47	2018090500387730	BUILDING OPERATION	E 14TH	AVE B	AVE C	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A09		M02-2018166-C49	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	211	OCCUPANCY OF ROADWAY AS STIPULATED	9/28/2018	12/26/2018
M02-2018257-A10		M02-2018166-C51	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	211	OCCUPANCY OF ROADWAY AS STIPULATED	9/28/2018	12/26/2018
M02-2018257-A11		M02-2018166-C53	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	215	OCCUPANCY OF ROADWAY AS STIPULATED	9/28/2018	12/26/2018
M02-2018257-A12		M02-2018166-C54	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	215	OCCUPANCY OF ROADWAY AS STIPULATED	9/28/2018	12/26/2018
M02-2018257-A13		M02-2018166-C55	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	221	TEMP. CONSTANT . SIGNS/MARKINGS	9/28/2018	12/26/2018
M02-2018257-A14		M02-2018166-C56	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	221	TEMP. CONSTANT . SIGNS/MARKINGS	9/28/2018	12/26/2018
M02-2018257-A15		M02-2018166-C57	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A16		M02-2018166-C58	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A17		M02-2018166-C59	2018090500387730	BUILDING OPERATION	E 14TH	1ST AVE	AVE A	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A18		M02-2018166-C60	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018
M02-2018257-A19		M02-2018166-C61	2018090500387730	BUILDING OPERATION	E 14TH	AVE A	AVE B	204	PLACE EQUIPMENT OTHER CRANE OR SHOV	9/28/2018	12/26/2018

Attachment 7: Construction Noise Re-evaluation Memo

TO: Angelo Elmi, New York City Transit Authority

FROM: Steven Wolf, WSP USA

SUBJECT: **Canarsie Tunnel Project, Construction Noise Reevaluation**

DATE: **April 5, 2019**

This memo presents a reevaluation of the construction noise for the Canarsie Tunnel Project at the following construction sites for activities occurring during March 2019:

- First Avenue Station (Ave A)
- Avenue B Substation
- Bedford Avenue Station
- Maspeth Substation

The construction noise levels monitored at these sites are compared with the Federal Transit Administration (FTA) Detailed Construction Criteria to determine if any exceedances of the FTA criteria occurred during March 2019. The monitored construction noise levels are measured using the L_{10} noise descriptor the level that occurs 10 percent of the time. The noise metric used by FTA is the equivalent sound level (Leq). The L_{10} is approximately 3 dB higher than Leq. The measured L_{10} noise levels are reduced by 3 dB to convert to Leq.

Excavation, concrete, and debris removal were the major activities at each of the four construction sites during March 2019.

FTA Construction Noise Criteria

The detailed construction noise criteria in the September 2018 FTA Noise Guidance Manual assess the potential for impact over an eight-hour period (Table 1). It consists of a threshold for daytime and nighttime periods. FTA defines daytime as the hours of 7 am to 10 pm and nighttime 10 pm to 7 am).

TABLE 1 DETAILED ANALYSIS CONSTRUCTION NOISE CRITERIA

Land Use	8-hr Leq, dBA	
	Daytime (7 am to 10 pm)	Nighttime (10 pm to 7 am)
Residential	80	70
Commercial	85	85
Industrial	90	90

CONSTRUCTION NOISE MONITORING DATA

The March 2019 monitored noise levels for the eight-hour period of 8 am to 4 pm is compared to the FTA residential construction noise criteria of Leq=80 dBA for weekdays and Saturdays.

FIRST AVENUE STATION (AVENUE A)

There are two monitors at this site, NM-FAVE-01 at the Avenue A service road on the west side of 14th Street, and NM-FAVE-02 at the Avenue A service road on the east side of 14th Street (Figure 1). The monitors sample the noise for a 20-minute period. Plots of the 20-minute L_{10} nose levels are presented on Figure 5 and Figure 6. A summary of the eight-hour Leq construction noise is presented in Table 2. The eight-hour Leq construction noise levels during the construction period of 8 am to 4 pm does not exceed the FTA residential noise criteria of Leq=80 dBA.

TABLE 2: FIRST AVENUE STATION (AVENUE A) MONITORED NOISE LEVELS – EIGHT-HOUR LEQ (MARCH 2019)

DATE	MEASURED CONSTRUCTION NOISE, 8-HR L_{EQ} (dBA)	
	NM-FAVE-01	NM-FAVE-02
3/4/2019	66	66
3/5/2019	66	64
3/6/2019	68	68
3/7/2019	67	67
3/8/2019	66	64
3/9/2019	64	61
3/11/2019	66	68
3/12/2019	66	64
3/13/2019	66	62
3/14/2019	65	65
3/15/2019	66	65
3/16/2019	65	64
3/18/2019	69	65
3/19/2019	68	67
3/20/2019	68	65
3/21/2019	67	64
3/22/2019	68	66
3/23/2019	69	65
3/25/2019	66	62
3/26/2019	67	62
3/27/2019	67	62
3/28/2019	69	67
3/29/2019	69	64
3/30/2019	63	61
FTA Residential Construction Noise Criteria		**80**

AVENUE B SUBSTATION

There are two monitors at this site, NM-AVEB-01, Avenue B and 14th Street north, and NM-AVEB-02 Avenue B and 14th Street south (Figure 2). The monitors sample the noise for a 20-minute period. Plots of the 20-minute L_{10} nose levels are presented on Figure 7 and Figure 8. A summary of the eight-hour Leq construction noise is presented in Table 3. The eight-hour Leq construction noise levels during the construction period of 8 am to 4 pm does not exceed the FTA residential noise criteria of Leq=80 dBA.

TABLE 3: AVENUE B SUBSTATION MONITORED NOISE LEVELS – EIGHT-HOUR LEQ (MARCH 2019)

DATE	MEASURED CONSTRUCTION NOISE, 8-HR L_{EQ} (dBA)	
	NM-AVEB-01	NM-AVEB-02
3/4/2019	66	68
3/5/2019	63	71
3/6/2019	64	70
3/7/2019	64	70
3/8/2019	63	71
3/9/2019	63	69
3/11/2019	63	70
3/12/2019	64	71
3/13/2019	61	70
3/14/2019	65	71
3/15/2019	63	71
3/16/2019	60	69
3/18/2019	64	71
3/19/2019	61	70
3/20/2019	63	71
3/21/2019	66	69
3/22/2019	64	71
3/23/2019	60	68
3/25/2019	64	79
3/26/2019	59	69
3/27/2019	62	68
3/28/2019	71	72
3/29/2019	63	72
3/30/2019	60	68
FTA Residential Construction Noise Criteria		**80 dBA**

BEDFORD AVENUE STATION

There are four monitors at this site (Figure 3):

- NM-BEDF-01 – Bedford Avenue at N. 7th Street south
- NM-BEDF-02– Bedford Avenue at N. 7th Street north

- NM-DRIG-01 – Driggs Avenue at N. 7th Street south
- NM-DRIG-02 – Driggs Avenue at N. 7th Street north

The monitors sample the noise for a 20-minute period. Plots of the 20-minute L_{10} nose levels are presented on Figure 9, Figure 10, Figure 11, and Figure 12. A summary of the eight-hour Leq construction noise is presented in Table 4. The eight-hour Leq construction noise levels during the construction period of 8 am to 4 pm does not exceed the FTA residential noise criteria of Leq=80 dBA.

TABLE 4: BEDFORD AVENUE STATION MONITORED NOISE LEVELS – EIGHT-HOUR LEQ (MARCH 2019)

DATE	MEASURED CONSTRUCTION NOISE, 8-HR L_{EQ} (dBA)			
	NM-BEDF-01	NM-BEDF-02	NM-DRIG-01	NM-DRIG-02
3/4/2019	68	67	69	69
3/5/2019	68	70	69	68
3/6/2019	68	70	70	69
3/7/2019	69	67	69	68
3/8/2019	69	67	72	68
3/9/2019	67	69	69	66
3/11/2019	68	70	67	68
3/12/2019	68	68	67	73
3/13/2019	68	70	67	74
3/14/2019	69	70	67	72
3/15/2019	69	68	69	72
3/16/2019	67	68	68	66
3/18/2019	66	68	65	70
3/19/2019	67	67	75	74
3/20/2019	67	69	70	73
3/21/2019	68	68	68	71
3/22/2019	74	72	66	75
3/23/2019	68	68	62	68
3/25/2019	68	66	65	72
3/26/2019	66	66	68	70
3/27/2019	70	69	68	73
3/28/2019	70	70	67	78
3/29/2019	67	68	68	72
3/30/2019	68	71	No Data	64
FTA Residential Construction Noise Criteria			**80 dBA**	

No Data – NM-DRIG-01 did not measure any data on 3/30/2019.

MASPETH SUBSTATION

There are no continuous noise monitors at this site. Hand held noise measurements were conducted for 30-minute sampling periods during March 2019 at four residential receivers along Maspeth Avenue between Humboldt Street and Woodpoint Road (Figure 4). The measured noise levels did not exceed the FTA residential construction criteria of 80 dBA at any of the four measurement sites during March 2019 (Table 5).

TABLE 5: 30-MINUTE SAMPLING NOISE MEASUREMENTS AT MASPETH CONSTRUCTION SITE – LEQ(DBA)

Date	1 Maspeth Ave.	3A Maspeth Ave.	3 Maspeth Ave.	5 Maspeth Ave.
3/4/2019	69	68	68	67
3/5/2019	72	71	70	69
3/6/2019	72	71	71	71
3/7/2019	69	66	67	64
3/8/2019	62	65	67	61
3/9/2019	63	62	62	60
3/11/2019	71	71	69	66
3/12/2019	66	64	65	60
3/13/2019	68	68	67	65
3/14/2019	68	66	65	68
3/15/2019	71	70	71	68
3/16/2019	67	64	64	61
3/18/2019	65	65	65	61
3/19/2019	67	65	67	64
3/20/2019	77	71	74	68
3/21/2019	74	75	71	70
3/22/2019	65	62	62	61
3/23/2019	64	63	59	61
3/25/2019	64	66	66	64
3/26/2019	70	70	71	68
3/27/2019	72	70	69	68
FTA Residential Construction Noise Criteria			**80 dBA**	

FIGURE 1: 14TH STREET NOISE MONITOR LOCATIONS

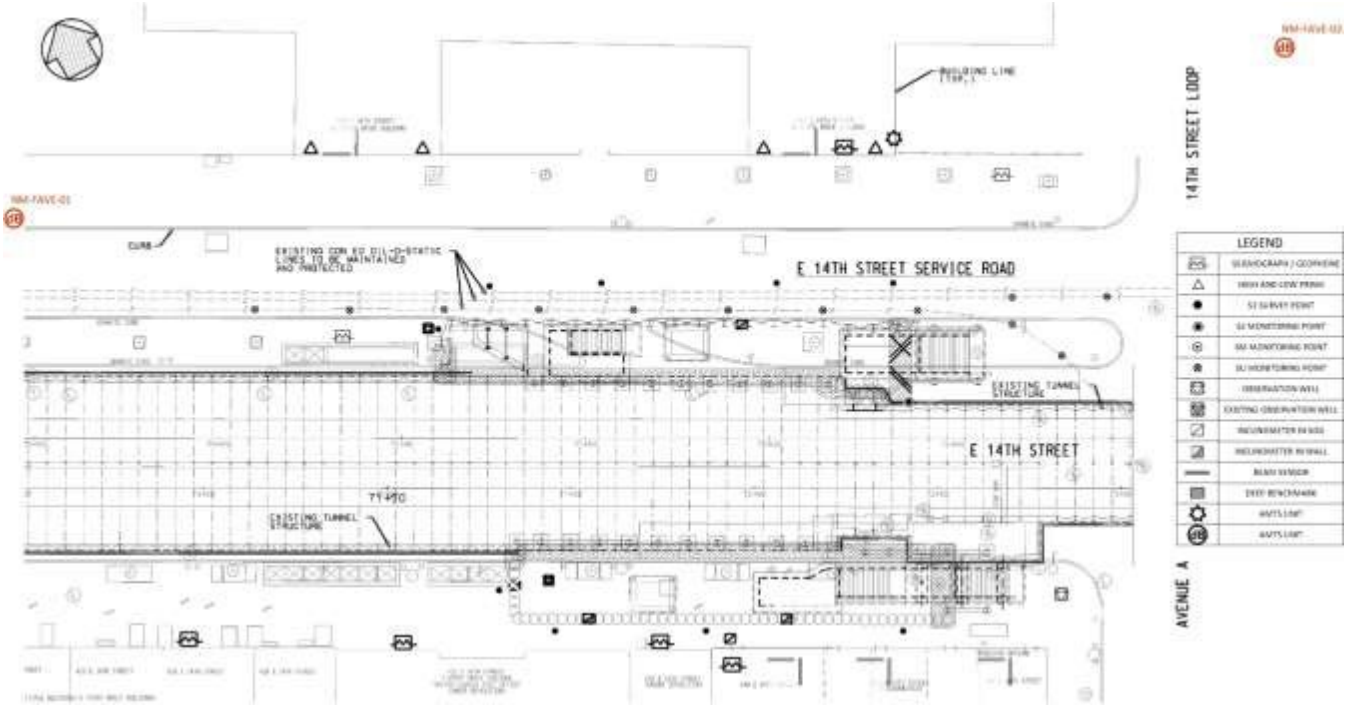


FIGURE 2: AVENUE B NOISE MONITOR LOCATIONS

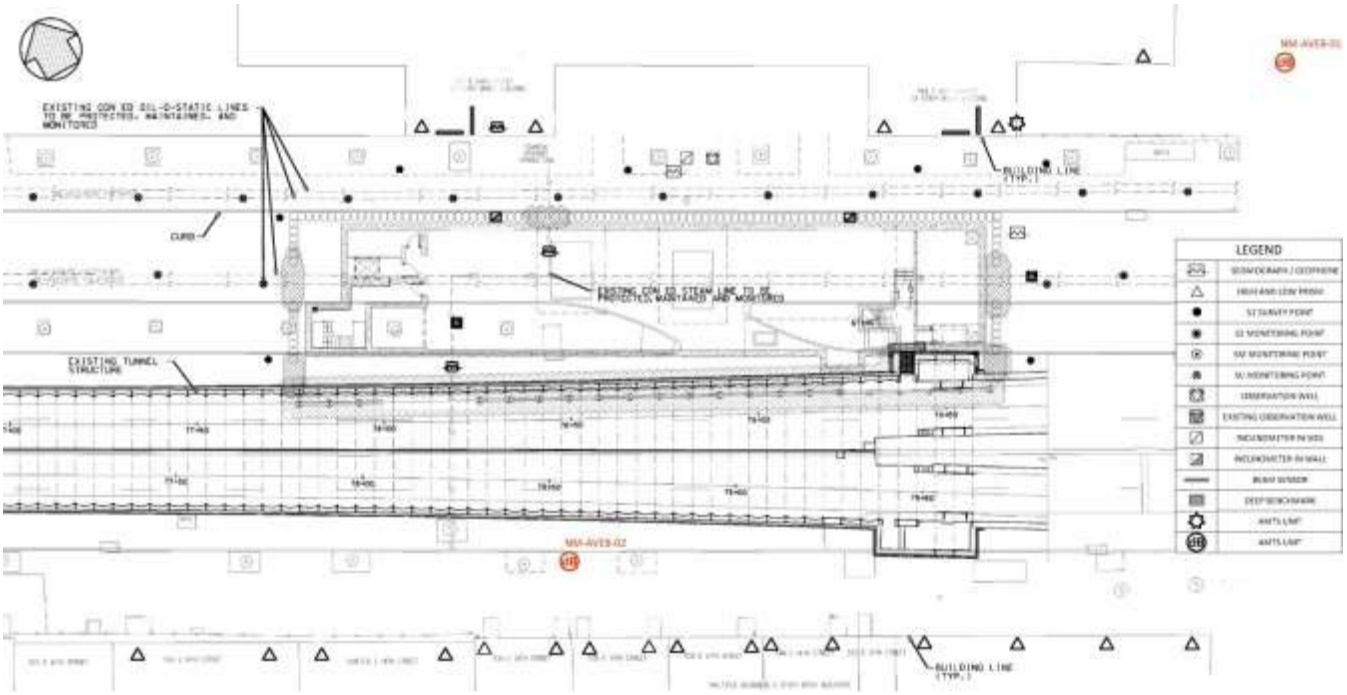
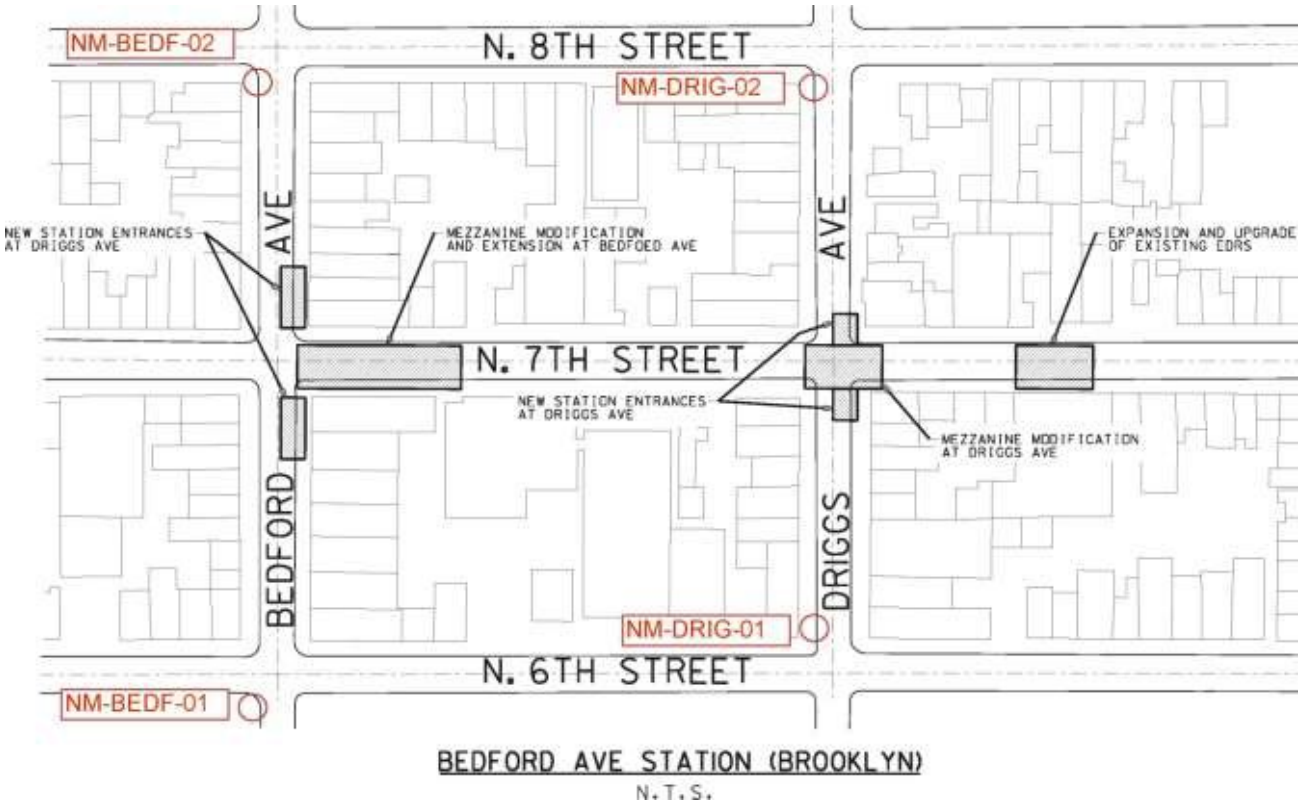


FIGURE 3: BEDFORD AVENUE STATION NOISE MONITOR LOCATIONS



BEDFORD AVE STATION (BROOKLYN)
N.T.S.

FIGURE 4: MASPETH SUBSTATION SAMPLING NOISE MEASUREMENT LOCATIONS

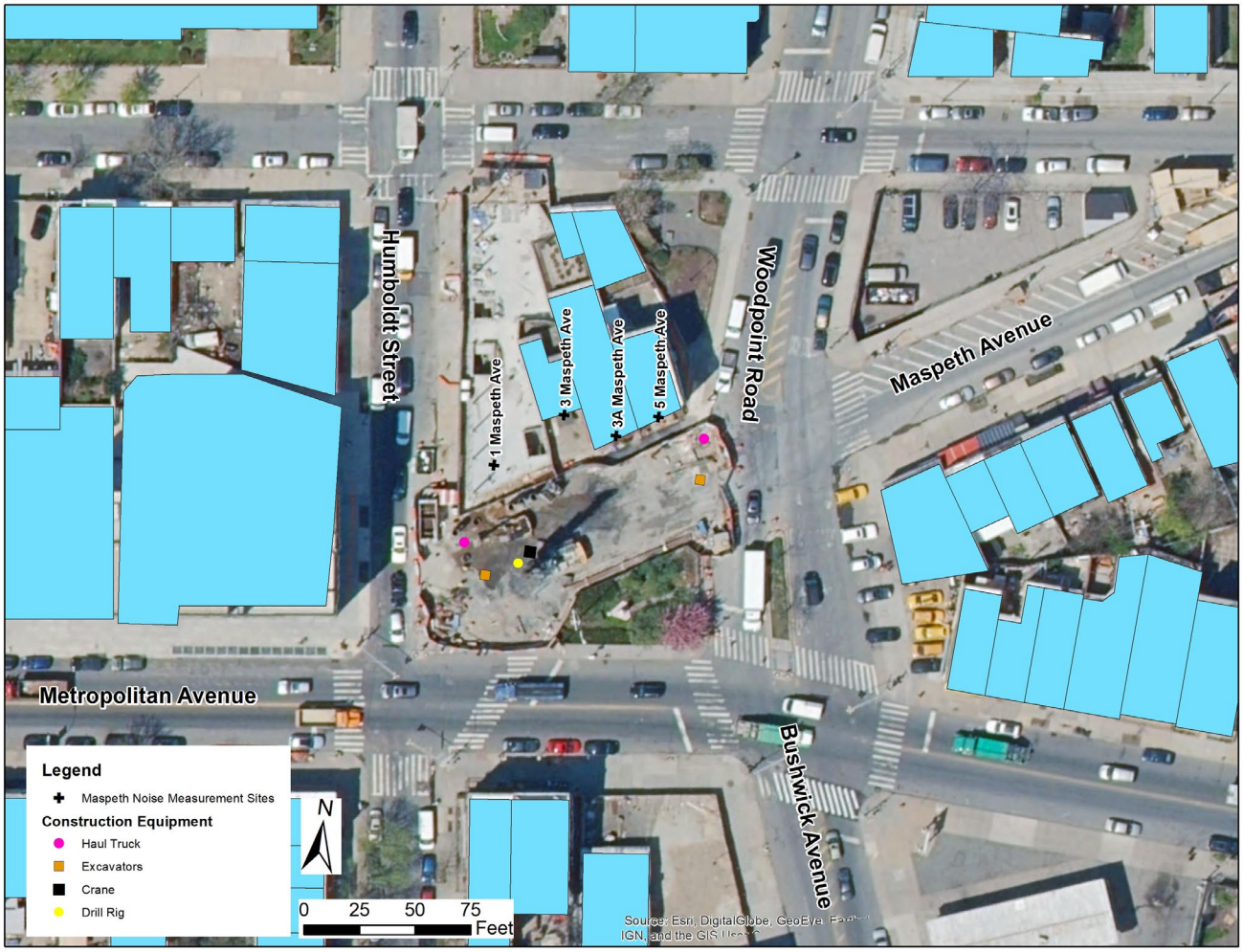


FIGURE 5: NM-FAVE-01 MARCH 2019 MONITORED NOISE LEVELS - L10 (DBA)

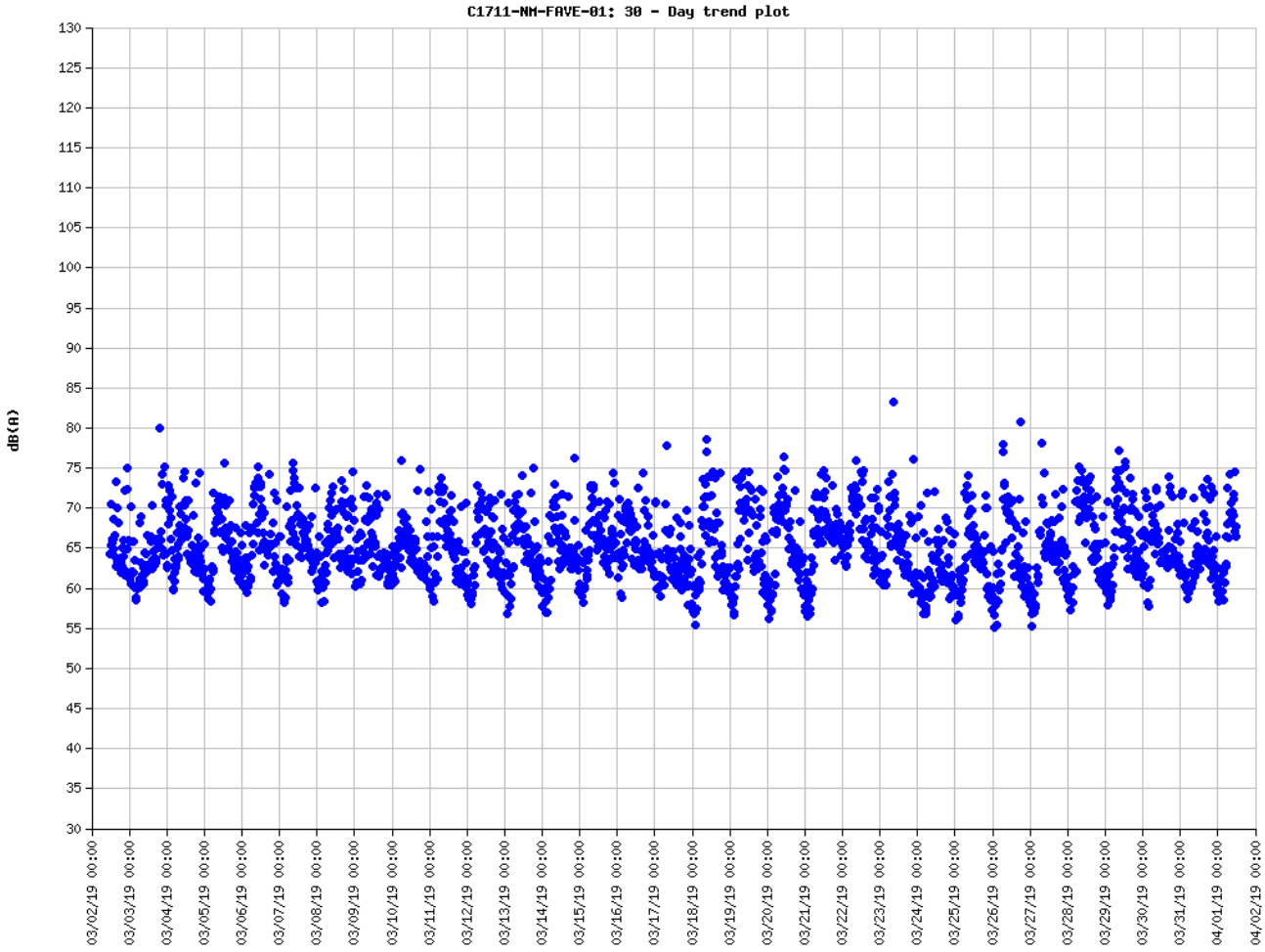


FIGURE 6: NM-FAVE-02 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)

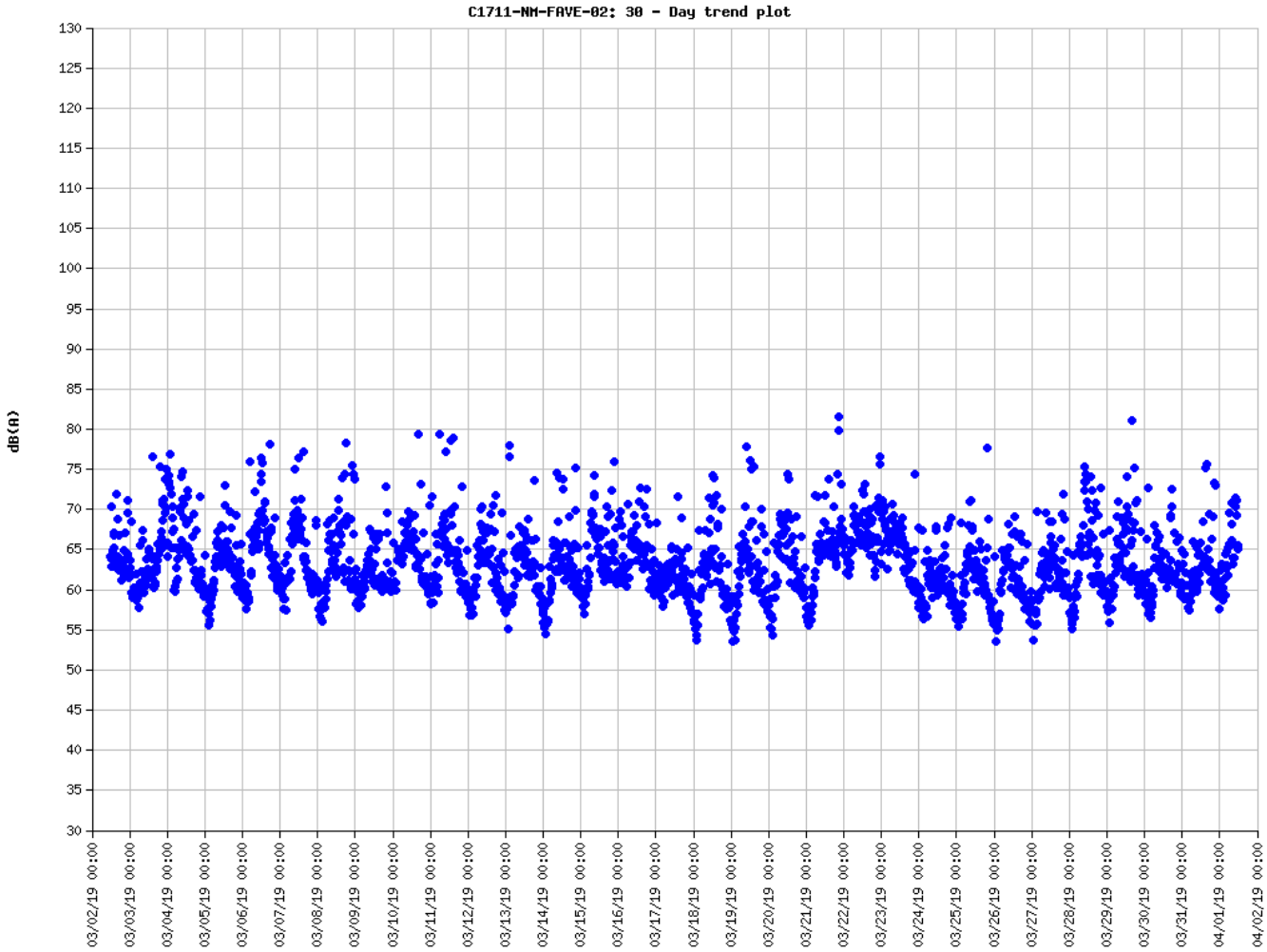


FIGURE 7: NM-AVEB-01 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)

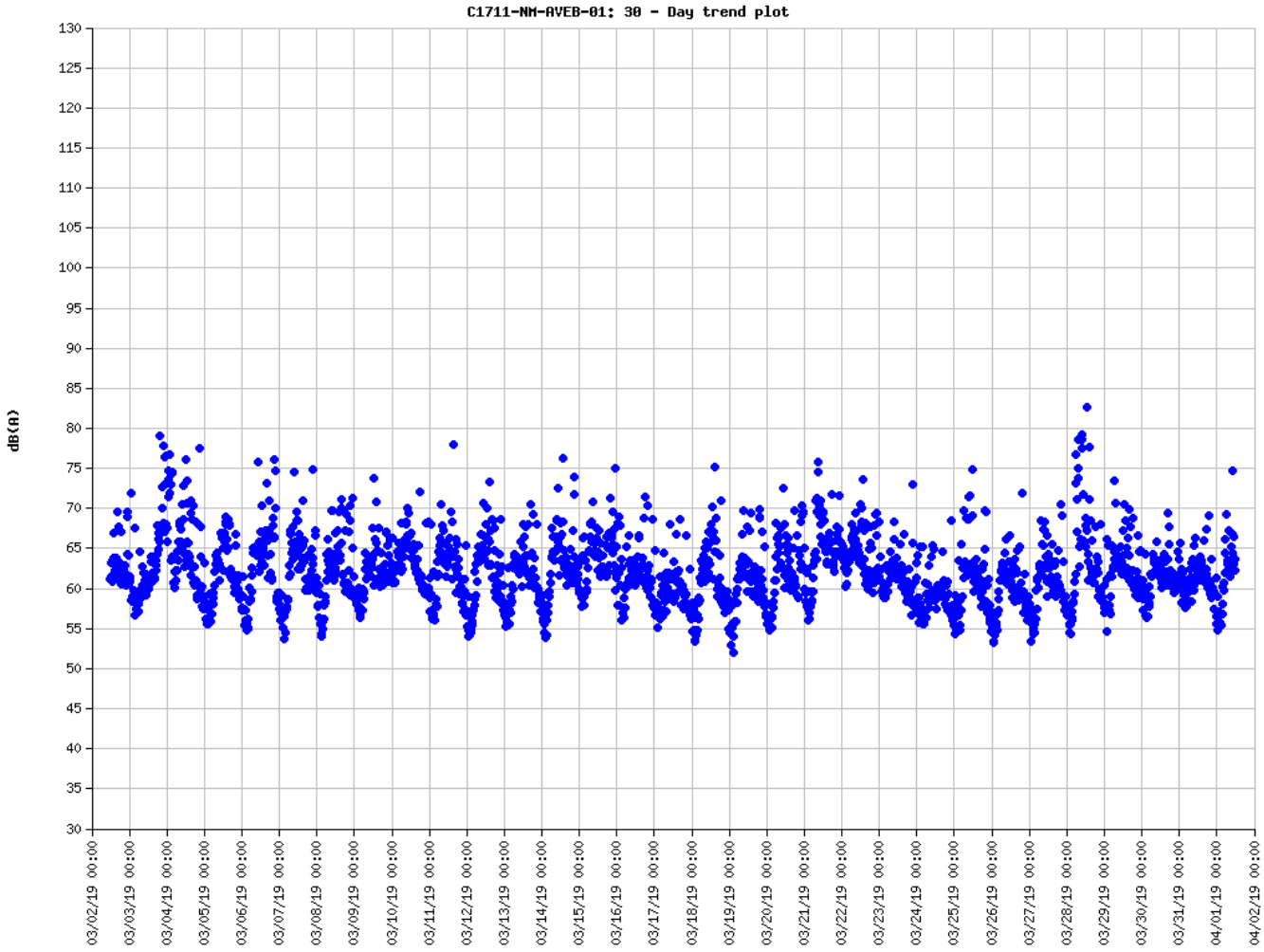


FIGURE 8: NM-AVEB-02 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)

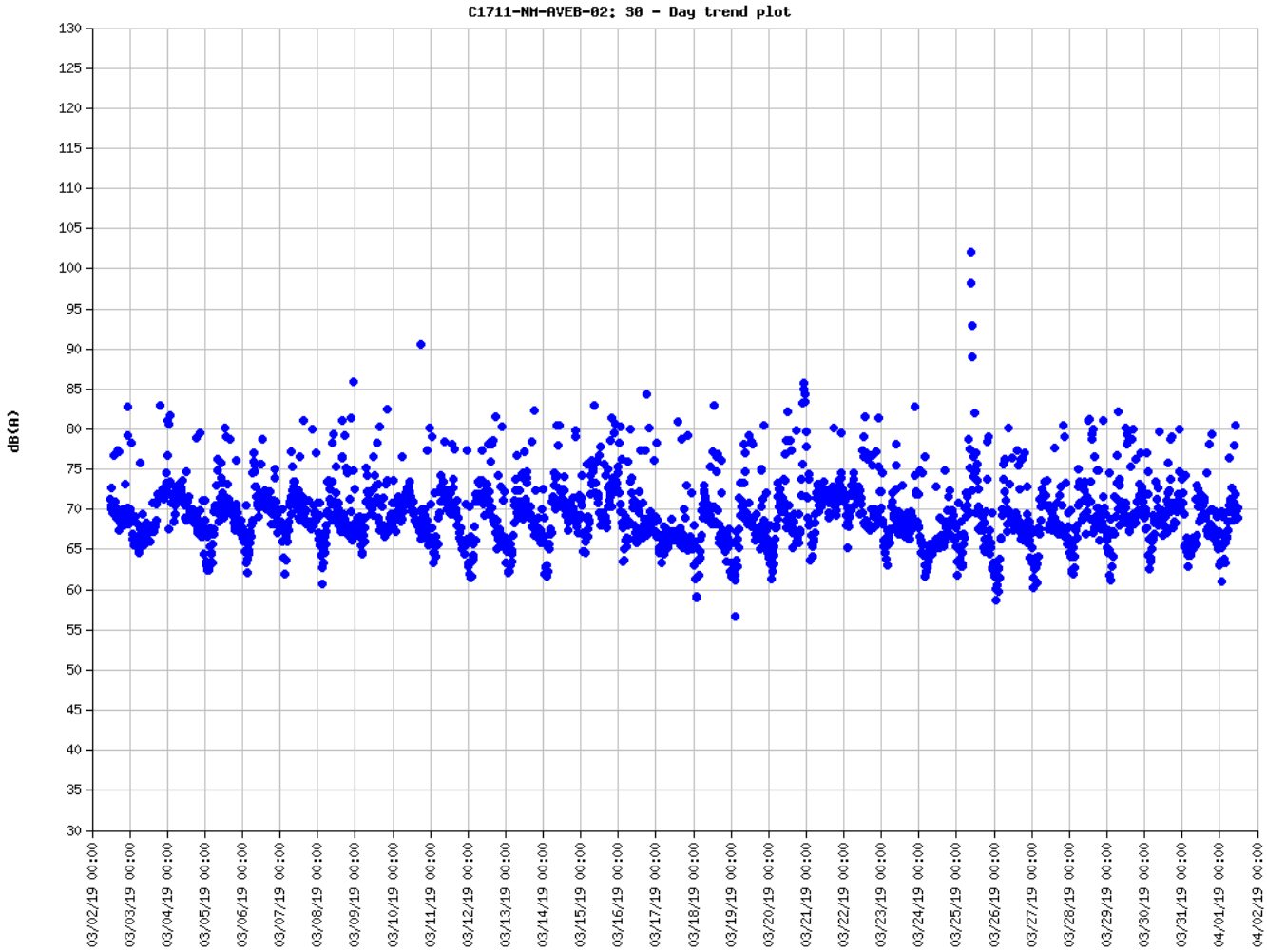


FIGURE 9: NM-BEDF-01 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)

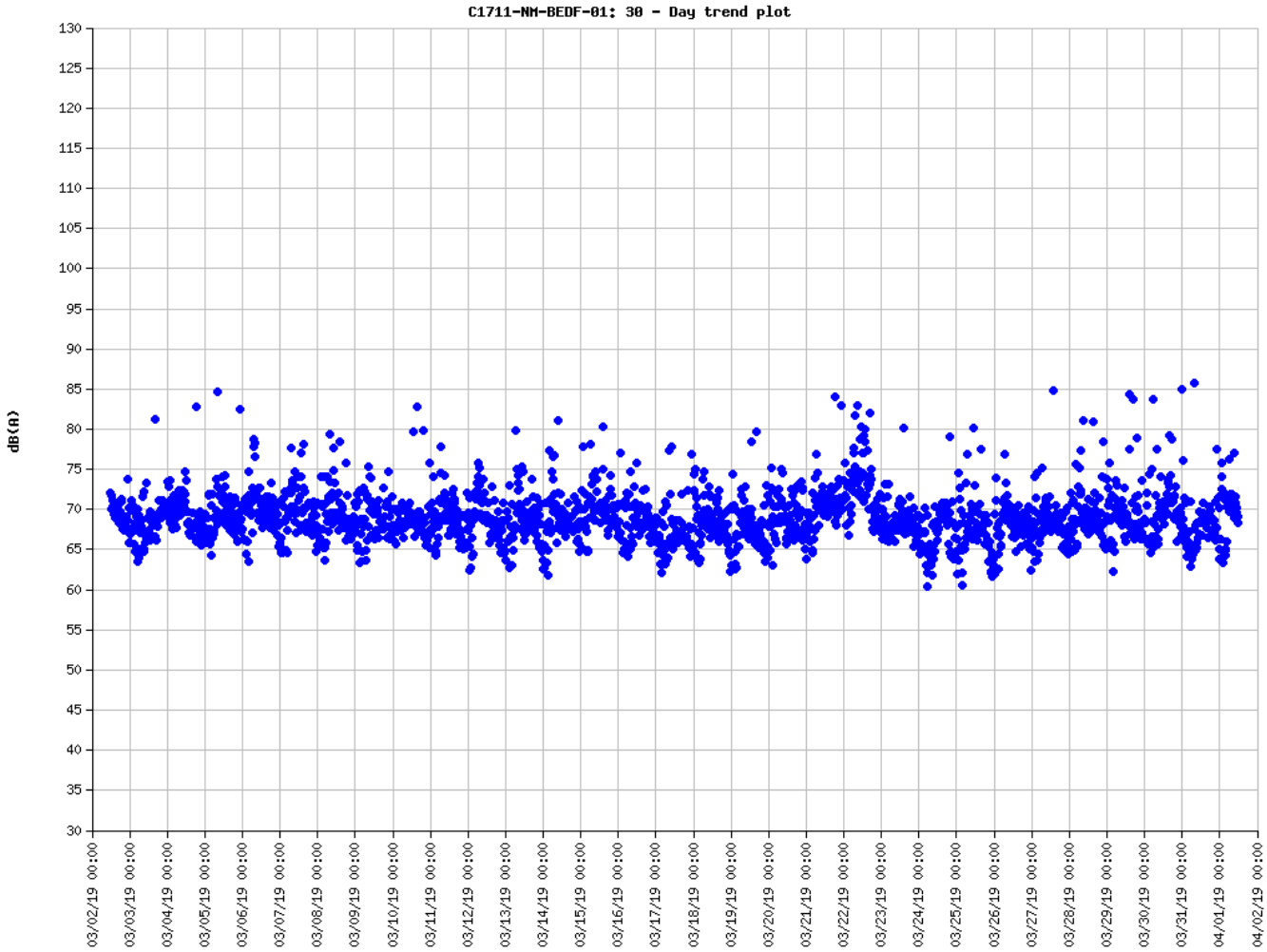


FIGURE 10: NM-BEDF-02 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)

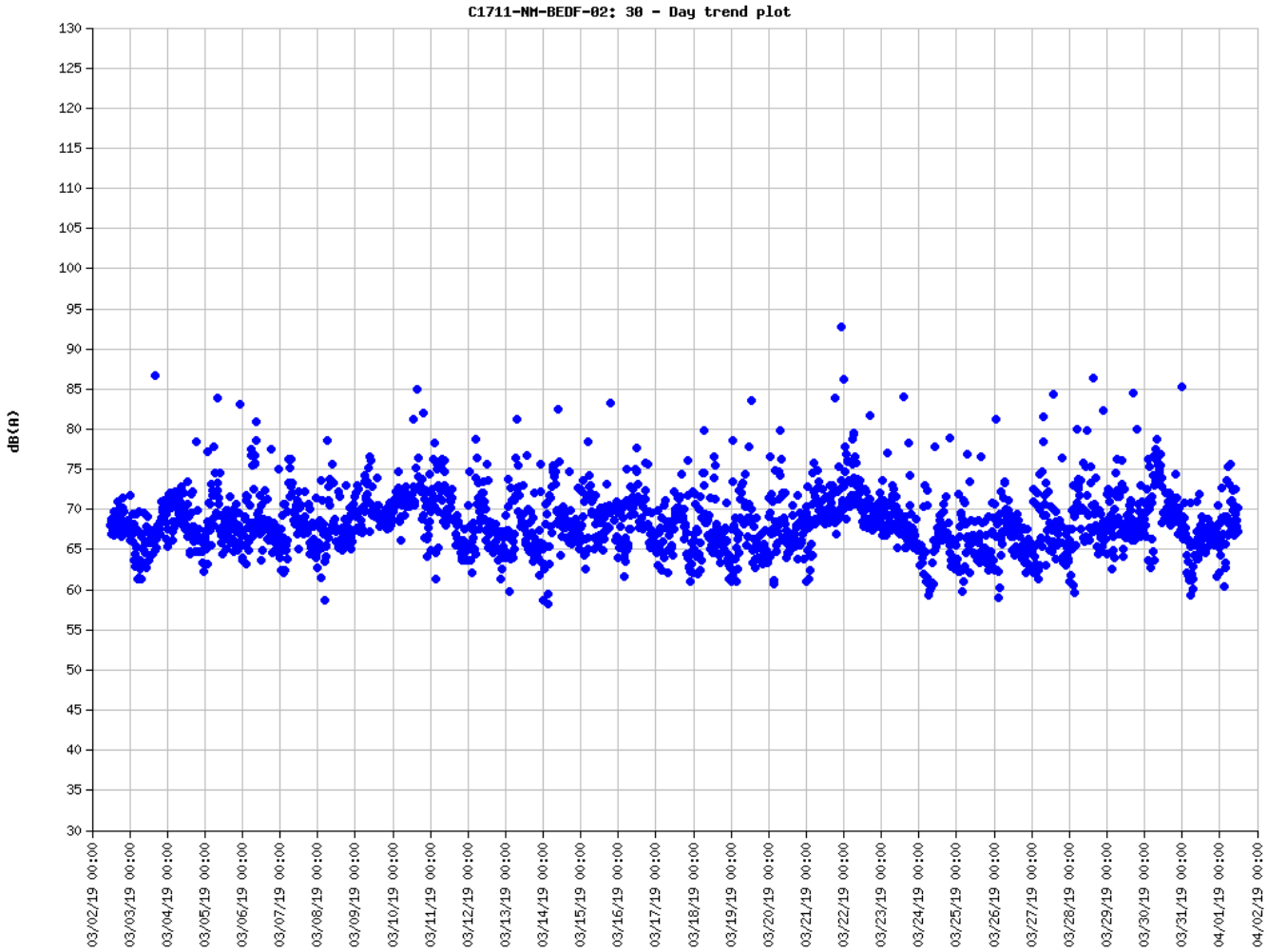


FIGURE 11: NM-DRIG-01 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)

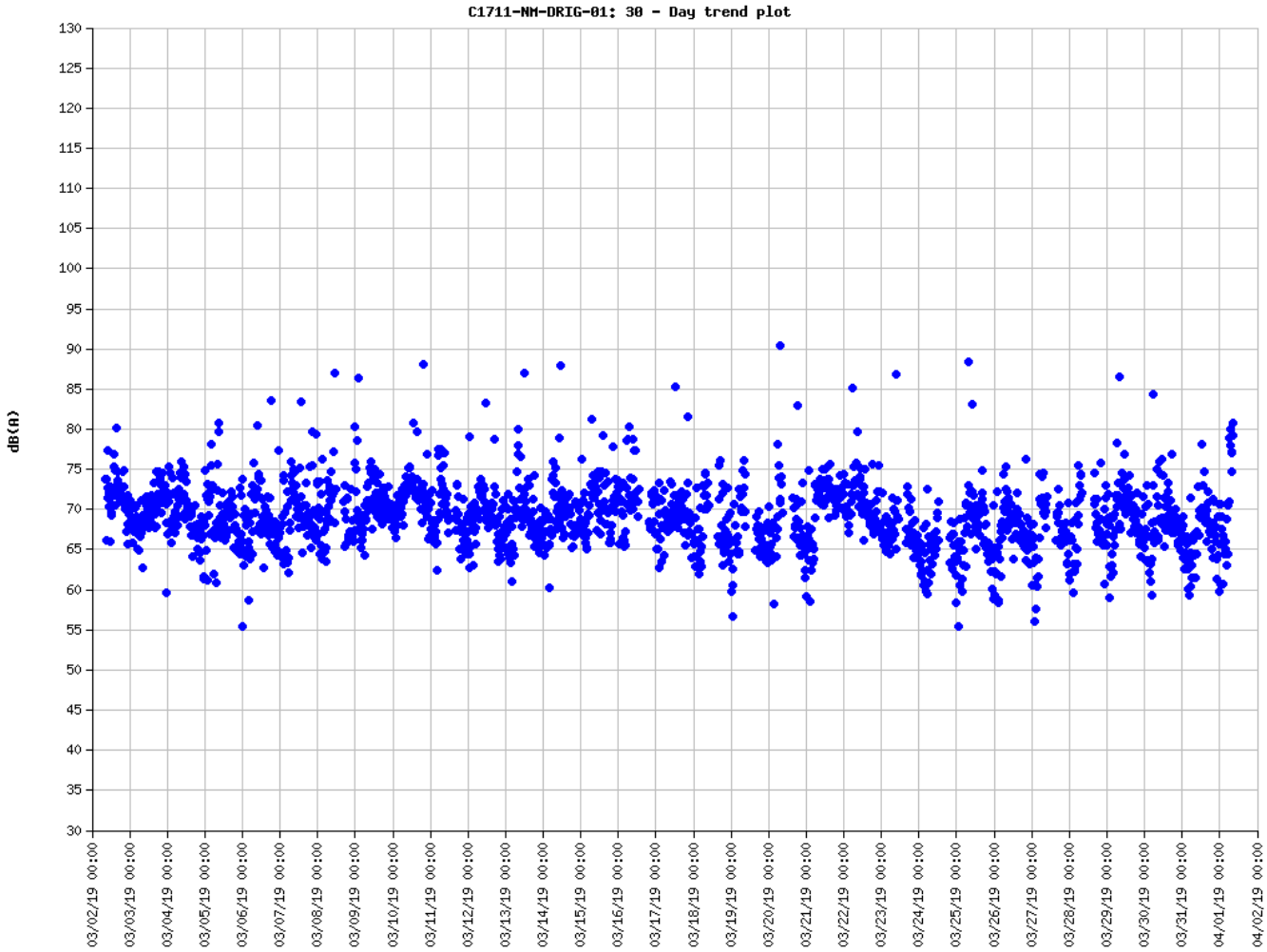


FIGURE 12: NM-DRIG-02 MARCH 2019 MONITORED NOISE LEVELS - L10 (dBA)