Construction & Development

NEWYORK CITY TRANSIT NOISE REDUCTION REPORT

Prepared Pursuant to the Rapid Transit Noise Code and Public Authorities Law 1204-a

Abstract

This report shall include, but not be limited to an itemized summary of all monies spent, bids requested and received, contracts let, and actual work done on noise abatement programs during the previous period. Any and all subway noise measurements made during the previous period shall be included, with, whenever possible, analyses of such measurements. Such annual reports shall include a detailed analysis of all future noise abatement activities planned for the upcoming twelve months. Following the first twelve-month interval these reports shall also include comprehensive statements of progress made on all planned noise abatement activities included in the previous annual report.

Introduction

MTA New York City Transit (NYCT) has investigated noise issues that may affect the health, safety, or quality of life of our customers and employees and the communities we serve, and has expedited any necessary mitigation actions, for many decades. Noise abatement efforts have been undertaken by technical experts from the Departments of Subways, Stations, Buses, Office of System Safety and MTA Construction & Development (C&D). Beginning in 2015, annual noise reduction reports have been posted on the MTA website and this effort has been continued by MTA C&D since then.

This annual report, prepared pursuant to the requirements of Public Authorities Law 1204-a, provides an update for the previous year on capital investments and improved maintenance that contribute most to reducing subway system noise. All subway noise measurements made during the previous period shall be included, with, whenever possible, analyses of such measurements. The annual report shall also include a detailed analysis of all future noise abatement activities planned for the next twelve months.

Noise Abatement Program

MTA NYCT's ongoing noise abatement program was begun in 1974. It calls for noise related improvements where appropriate as part of other important capital and operating programs. This has included such major programs as track reconstruction (welded rail and resilient rail fastener installation), station reconstruction (station acoustic treatments), car overhauls (traction motor retrofit, air conditioning retrofit/overhaul) and Scheduled Maintenance System work (ring damped wheels and wheel truing machines). This policy was adopted, and continues to be favorably implemented, because it is most efficient to undertake treatments which contribute to noise reduction in concert with other activities. By including noise abatement activities as integral parts of other vital NYCT programs, such as track replacement, they will not take a back seat to other high priority projects which may otherwise fail to contribute to noise abatement efforts.

There have been several MTA NYCT programs which were designed to exclusively address noise abatement. Many projects have also provided noise abatement benefits indirectly. Examples of the abatement treatments have included traction motor noise reduction (5-7 dBA noise reduction), resilient rail fastener installation on steel elevated structures (3-5 dBA noise reduction), ring damped wheel installation (15-20dBA screech noise reduction). Programs which provide benefits in addition to noise abatement have included new car purchases, rail welding (9-10 dBA noise reduction, while at the same time decreasing the wear on wheels and rails, and providing a smoother ride), car air conditioning and rail lubrication (reduces wheel and rail wear on curved track).

MTA NYCT's noise abatement programs are summarized below. These initiatives are organized by the four specific categories in which noise occurs. They are: 1) in-car, 2) elevated structures, 3) curve and brake screech and 4) stations. These represent the areas which are most significantly affected by a particular treatment, although many treatments provide benefits which overlap environments.

In-Car Environment

By purchasing new subway cars and overhauling older cars, MTA NYCT has provided significant reductions to in-car noise, while reducing the amount of noise which emanates from cars. MTA NYCT's existing fleet consists of two Divisions, namely Division A and Division B. The lines that are represented in Division A include all the numbered lines as well as the Times Square Shuttle; Division B consists of all the lettered lines as well as the Rockaway and Franklin Avenue Shuttles.

For each of these Divisions, new cars are being introduced into the fleet for each line. For Division A, older R62 and R62A models were replaced by R142 and R142A. With this changeover, one could see a measurable reduction in noise. A 2010 systemwide noise study indicated that the R62 model, manufactured in 1983-85, had an average sound level of 73.2 dBA. This is in comparison to the newer model R142A that had an average sound level of 69.7 dBA. This satisfies the suggested goal of 80 decibels for new cars cited in the Rapid Transit Noise Code. The results of Division B were even clearer that MTA NYCT is continually improving its fleet when it comes to noise reduction in passenger cars. For instance, the average sound level was found to be 80 dBA for a R32A versus 63.9 dBA for a newer R160B; this is a 16.1 dBA reduction in interior noise level.

Many older cars also meet the 80dBA noise level goal, including over 1,000 cars purchased in the 1970's. Currently, the newer R211 subway car models are being phased in and will replace all R44 cars on the Staten Island Railway and all R46 subway cars.

Other improvements have been made which reduce in-car noise. The use of controllers that more closely synchronize acceleration and deceleration of individual cars in a train reduces the incidence of locked wheels, thereby reducing a major cause of flat wheels. The use of improved door and window components provides better seals to insulate the car interior from outside noise. Some cars also have noise abating material installed under the floor.

The installation of welded rail and resilient rail fasteners has had a significant impact on in-car noise levels. Resilient rail fasteners are installed on reconstructed tangent (straight) track and unguarded (gentle) curves on subway concrete track (Type II) and elevated track (Type III). Welded rail is installed only on tangent track and unguarded curves in the subway, open-cut and at-grade sections of the track system.

Elevated Structure Environment

There are several treatments which can contribute to noise abatement on elevated structures. These treatments include the installation of resilient rail fasteners, wheel dampeners, wheel truing and the use of rail lubricants to reduce curve screech. Resilient rail fasteners with improved noise reducing characteristics now replace steel tie plates placed between the rail and the ties during elevated structure track replacement. Prefabricated track panels are constructed with resilient rail fasteners in place. NYCT installs resilient rail fasteners in Type III track installations at all tangent track and unguarded curve locations.

The occurrence of flat wheels can significantly contribute to an increase in the noise level of a train. In some cases, the increase can be as great as 10 dBA. Flat wheels generally occur because of poor

controller operation, which causes unsynchronized acceleration and deceleration from car to car within the train. This in turn results in wheels dragging rather than rolling evenly on the rails. There are two related strategies for reducing flat wheels. One is to prevent them before they occur. Car controllers replaced as part of the completed car overhaul program have significantly reduced the incidence of flat wheels. The improvements made in controller maintenance and increased track testing of cars are also factors in assuring that controllers do not contribute to wheels flattening. The second strategy is to true wheels after they become flat. Wheel truing, a procedure in which the surface of the wheel is ground to correct flats, is an important part of MTA NYCT operations. Wheel truing also eliminates other imperfections created by irregular wheel wear which may cause them to generate excessive noise.

Curve and Brake Screech

Screech noise is generated by friction between wheels and rails, usually on tight curves. It can also be caused by friction from braking. The primary ways to reduce screech noise are through ring damped wheels, rail lubrication and composition brake shoes. Resilient rail fasteners may also reduce rail screech to some extent, but their effectiveness on reducing noise is better addressed in the sections covering elevated structures, stations, and in-car environments.

Ring damped wheels have shown to be an effective means to reduce wheel screech on curves. Rail lubrication of curves is used by MTA NYCT to reduce curve screech. All guarded curves with a radius of less than 1500 feet are equipped with lubricators with Maintenance of Way (MOW) personnel working year-round to keep the lubricators operational and in a good state of repair.

Old cast iron brake shoes have been replaced by new composition brake shoes that lower the screech associated with braking. Composition brake shoes provide a more constant level of friction and, to some extent, sound damping.

Station Environment

The station environment benefits from almost all noise treatments. This includes station acoustical treatments such as noise absorbing barriers installed between tracks and acoustic material installed over and under subway platforms and on ceilings over tracks. The other noise abatement treatments which lower noise in stations are the installation of welded rail with resilient rail fasteners, running trains with quieter traction motors and equipping cars with composition brake shoes and ring damped wheels. In addition, if the station is adjacent to a curve, rail lubrication of that curve will decrease screech noise as trains enter or leave the station.

The Station Reconstruction and Rehabilitation Programs such as the Enhanced Station Initiative are designed to reconstruct or refurbish all elements of a station. Noise reduction is one of the many types of improvements these programs produce. MTA NYCT has instituted a policy to include station acoustical treatments where appropriate as part of these programs.

2023 Noise Abatement Program Progress

Resilient Rail Fasteners. Resilient rail fasteners reduce noise by absorbing vibration from wheel-rail interaction and is the best method to reduce vibration and vibration-generated noise in supporting structures. Resilient fasteners can reduce noise by 3 to 5 dBA underground and 6 to 8 dBA on elevated tracks. NYCT installed 24,062 regular resilient rail fasteners in 2023, plus 12,792 super resilient rail fasteners in 2023. In 2024, 31,604 regular resilient rail fasteners are planned for installation, and 9,464 super resilient rail fasteners are planned.

New Low Vibration Track (LVT). A new type of LVT is being installed throughout the NYCT System to determine its cost effectiveness. Several locations have been completed and preliminary results show a marked improvement in vibration-generated noise. The Culver Viaduct LVT installation, which ended in 2013, was for 18,000 track-feet. The #7 Line Extension LVT track installation, completed in 2014, was for 13,600 track-feet. In 2016, 23,006 track-feet LVT was added when the 2nd Avenue Subway Line opened for business. In 2017, 13,629 track-feet LVT was added, in 2018, 656 track-feet LVT was added throughout the System, 2019, 2020 and 2021 did not include any LVT. A total of 41,649 track-feet of regular track was replaced in 2019, none was replaced in 2020 but a total of 33,739 track-feet was replaced in 2021. In 2022 and 2023, zero track-feet of low vibration track was added, and none is projected for 2024.

Continuous Welded Rail (CWR). A proven noise reduction technique, welded rail continues to be installed with approximately 28,319 track-feet added throughout the system in 2020 which is approximately 56,638 feet of CWR. This includes continuous welded rail where rails are welded together to form one uninterrupted rail that may be several miles long. Because there are few joints, this form of track is very strong, gives a smooth ride, and needs less maintenance; trains can travel on it at higher speeds and with less friction. This technique can result in up to 8 to 10 dBA of noise reduction when used with resilient fasteners. CWR is installed on tracks underground and at-grade, but not on elevated track due to thermal expansion issues and need to modify structure and rail fixation. In 2023, 26,906 feet of CWR were installed and 12,231 feet of CWR installation is planned for 2024.

Top of Rail Friction Modifiers: This is a technique that lubricates contact surfaces of the rail to reduce squeal, which can be very effective under certain circumstances: 12 units of top-of-rail friction modifiers were added in 2023 and 16 is planned for installation in 2024.

Ring-Damped Wheels: All NYCT revenue subway car wheels continue to be outfitted with ring-damped wheels, which reduces bell-like ringing of wheels. Ring-Damped Wheels are economical and achieve between 15 to 20dBA screech noise reduction (both level and duration).

Wheel Truing. Flat wheels sometimes develop over time and can cause extreme noise conditions, in addition to potentially causing damage to rail and or the subway car itself. When it is ascertained through inspection that flat wheels exist the wheels are removed from the truck of the subway car and sent for wheel truing. Wheel truing machines are located in 8 of our 15 Maintenance shops (239th Street, Corona, 207th Street, Jamaica, Concourse, East NY, Coney Island Overhaul Shop, 207th Street Overhaul Shop) and 1850 cars wheels were trued in 2022; 2,273 cars wheels were trued in 2023.

Fan Plants and Electric Substations: In addition to incorporating noise reduction techniques for new fan plants and substations, MTA NYCT has added silencers and vibration isolators to a number of existing above-ground fan plants to reduce emergency ventilation fan noise and ground-borne vibration to

adjacent structures. In addition, in September 2022 a noise study was conducted at Maspeth Substation in Brooklyn to better ascertain noise levels in underground stations and what mitigation measures can be taken to minimize noise impacts for future installations. No noise complaints originating from operation of fan plants and electric substations were made in 2023.

Buses: All recent, current, and future bus purchases require sustainable design incorporating the latest noise reduction methods available, such as through the use of state-of-the-art mufflers, to reduce the noise level exposure of passengers and bus operators as well as adjacent pedestrians, vehicles, housing, and businesses. Future studies may be performed to ascertain the effectiveness of current operations in regard to noise mitigation.

Annual and Projected Noise Abatement Financials

Noise Abatement Financials 2023			
Regular Resilient Rail Fasteners (feet)	24,062 Each/Total	2023 Construction Cost	$4,258,974.00
Super Resilient Rail Fasteners (feet)	12,792 Each/Total	2023 Construction Cost	$3274,752.00
Track-feet of LVT installed (feet)	0 Feet/Total	2023 Construction Cost	$0.00
Track Feet replaced (feet)	2,783 Feet/Total	2023 Construction Cost	$24,267,493.34
Feet of Welded rail installed	26,906 Feet/Total	2023 Construction Cost	$856,165.90
Number top-of-rail friction modifiers	12 Each/Total	2023 Lubrication Cost	$192,000.00
2023 Material Cost			**$32,849,385.24**
2023 Labor Cost			**$124,800,000.00**
Noise Abatement Projected Financials 2024			
Regular Resilient Rail Fasteners (feet)	31,605 Each/Total	2024 Construction Cost	$5,594,085.00
Super Resilient Rail Fasteners (feet)	9464 Each/Total	2024 Construction Cost	$6,170,528.00
Track-feet of LVT installed (feet)	0 Feet/Total	2024 Construction Cost	$0.00
Track Feet replaced	37,116 Feet/Total	2024 Construction Cost	$20,375,570.52
Feet of Welded rail installed	12,231 Feet/Total	2024 Construction Cost	$492,677.00

Number top-of-rail friction modifiers	16 Each/Total	2024 Lubrication Cost	$249,600.00
2024 Projected Material Cost			**$32,882,460.52**
2024 Projected Labor Cost			**$162,240,000.00**

Response to Noise Complaints

MTA C&D measures and quantifies noise on transit equipment/structures for maintenance and troubleshooting purposes, but also in residences impacted by the operation of the subway system, critical infrastructure, and construction activity from NYCT capital projects. In 2023, Environmental Services responded to 14 noise and vibration complaints from residents located throughout Brooklyn and Queens. Many of these projects continued into 2024 and will involve significant follow up measurements and testing. Memorandums sent to various NYCT departments are included in the appendix of this report.

Conclusion

MTA NYCT has continued to make substantial progress in abating noise in the system. Transit's fleet is now entirely composed of new and overhauled cars, and new subway cars that are in the process of being phased in, such as the new R211 trains on the A line. Based on noise studies conducted by the MTA, it has been established that the noise exposure of the riding public is substantially less than the maximum acceptable dose established by OSHA for 8 hours continuous exposure (85 dBA, 8-hour time weighted average).

In the area of track MTA NYCT continues its capital program to improve its inventory of mainline track. Through the installation of welded rail, resilient rail fasteners and rail lubricators, substantial progress has been made in reducing noise. Rail welding and the installation of resilient rail fasteners is continuing in the next program as part of the normal replacement track program. Car equipment maintenance is also being undertaken to ensure that noise emissions are minimal by means of ring damped wheels and wheel truing. A total cost of $32,849,385.24 was spent on materials and $124,800,000.00 was spent on labor for noise mitigation efforts; a projected material cost of $32,882,460.52 and a projected labor cost of $162,240,000.00 is expected for 2024.

APPENDIX

2 Broadway, 8th Fl.
New York, NY 10004-2207

Memorandum

Construction & Development

Date: **August 11, 2023**
To: **Robert Sarno, Assistant Chief Track Officer, Elevated Maintenance, MoW**
From: **Stavroula Konstantellis, Project Administrator, Environmental Services, C&D**
Re: **Noise Measurements, Coney Island W. 8th Street NY Aquarium**

In response to noise complaints from residents at Brightwater Towers Condominium, on August 2, 2023, Environmental Services collected noise measurements of passing subway trains on the elevated structures for the F and Q lines. Field engineers decided the most effective location to collect noise measurements (marked by "X" in the photo) was at street level, at the wye, where the F and Q lines diverge past the W 8th Street NY Aquarium Station. This location provided the highest readings for the F & Q trains. The Jamaica-179th Street bound F trains were identified as producing the loudest noise by residents because some of the apartments are directly facing that track, and screeching noises occur when the trains make their way around the curve while approaching and leaving West 8th Street Station

The average L_{EQ} for the F trains on the Jamaica-179th street bound track measured at the "X" on the above map is 85.1 dB(A), with an average L_{MAX} of 94.6 dB(A). The highest L_{EQ} measured was 87.8 dB(A) and the highest L_{MAX} measured was 97.1 dB(A). The F train produces elevated peaks on the 400 Hz, 500 Hz, 2kHz, and 6.3kHz bands during screeching.

For the Manhattan Bound Q line, the average L_{EQ} was 82.1 dB(A) and the average L_{MAX} was 88.2 dB(A); the highest L_{EQ} was measured at 85.6 dB(A) and the highest L_{MAX} was measured at 88.3 dB(A).

For reference, the background L_{EQ} was measured at 56.3 dB(A) for a three-and-a-half-minute lull between train arrivals.

If any further information is needed, please contact Gideon Dunkley of my staff at 646-316-9224.

cc: G. Dunkley
K. Schnur
J. Pajarito

2 Broadway, 8th Fl.
New York, NY 10004-2207

Memorandum

Construction & Development

Date: **January 18, 2024**

To: **Andrew Inglesby, Assistant Director, Government & Community Relations**

From: **Stavroula Konstantellis, Director, Environmental Services, MTA C&D**

Re: **Noise Measurements, Manhattan Bridge, DUMBO**

On June 9, 2022, Environmental Services was contacted by Michael Dawson (Superintendent in Track Engineering, RS & MoW) requesting noise measurements be conducted in the DUMBO Section of Brooklyn, specifically at the Manhattan Bridge near the Brooklyn anchorage. This request was initiated due to a suggestion/request from Warren Barlowe, a resident at 301 Fifth Street in East Northport, New York to remediate noise from trains on the Manhattan Bridge. In this correspondence, Warren Barlowe suggests modifying the joints between the rails to eliminate the impact sounds that creates loud noises at receiving properties below the bridge. This correspondence was sent to the MTA Customer Service team and routed to the Maintenance of Way (MoW) division in the Department of Subways. It was received by Aquaina Murrell (Superintendent, Special Projects & Chief Officer in Track/Infrastructure) and sent to, among others, Robert Hermel (Acting Assistant chief Officer, Subway Track Maintenance).

After discussion in emails between Aquaina Murrell, Robert Hermel and Antonio Cabrera (Assistant Chief Officer, Track Engineering, RS & MoW, presently retired) on June 8'th and June 9'th, 2022 it was determined that Warren Barlowe's suggestion was infeasible, yet nevertheless corrective actions to alleviate the noise was still needed. Based on internal deliberations it was decided that another group within MoW would be better suited to handle the noise remediation strategy, and thus Mike Dawson was contacted by William Martin (P.E., Administrative Engineer, NYCT Track Engineering) who requested support from his department. Mike Dawson then contacted the Testing and Measurements group in Environmental Services with a request for noise measurements to be taken at the anchorage.

Noise measurements were scheduled to be performed on June 10, 2022, and subsequently a memorandum with the results of the measurements was sent to Mike Dawson the same day [attached]. After the measurements were completed, Environmental Services was contacted by phone by Pierre Syldor (then acting ACO of Track Engineering, Design & Specification in the Department of Subways) requesting further clarification on the noise levels measured; an email dated June 14, 2022, was sent to Pierre Syldor with additional information from the FTA with reference noise levels from transit sources, which he acknowledged in email dated June 14, 2022. Thereafter, no further correspondence was conducted.

On August 16, 2023, Will Schwartz and Andrew Inglesby of Government and Community Relations were contacted by Jo Anne Simon, Member of Assembly, AD 52 regarding the noise levels produced from trains on the Manhattan Bridge; this communication was initiated subsequent to a transmittal by Jo Anne Simon dated August 16, 2023 addressed to Janno Lieber, Chairman and CEO of the MTA.

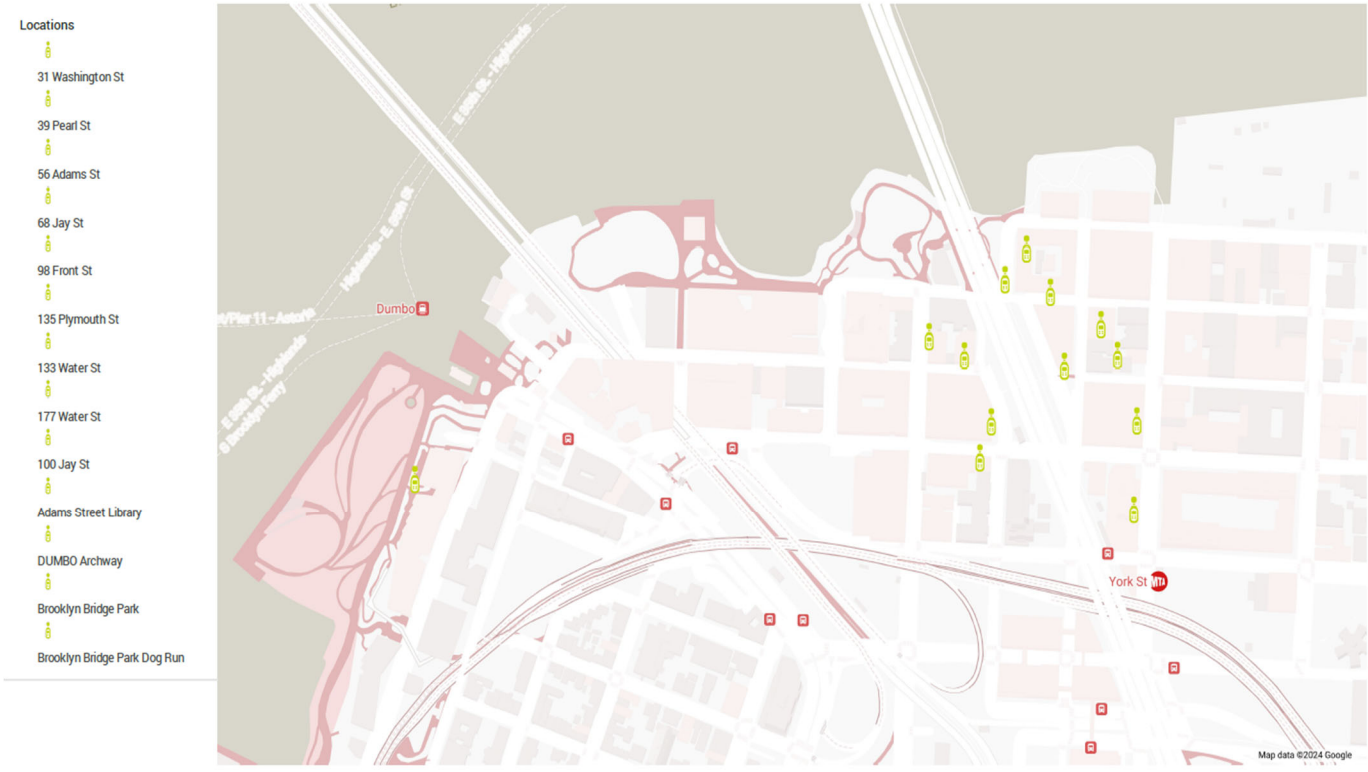
This letter addresses concerns about excessive noise caused by N, Q, B, and D trains passing over the Manhattan Bridge, negatively affecting the well-being and quality of life of residents in the DUMBO area of Brooklyn. The letter indicates Miss Simon's office has been in contact with the MTA New York City

Transit (NYCT) since 2022 regarding this issue, but progress has been limited. The letter requests a noise abatement study to be conducted in the DUMBO area due to alleged disruptions from noise caused by trains on the Manhattan Bridge; the letter details the severity of the train noise, the impacts it has been having on residents, and requests further dialogue to discuss noise mitigation efforts.

The letter was then forwarded to Thomas Abdallah, P.E., VP of Design Services & Chief Environmental Engineer at MTA C&D to begin discussion on next steps.

In November and December 2023, Environmental Services began scheduling noise measurements to be taken in DUMBO at a variety of locations, liaising with Government and Community Relations and Neal Modi of 100 Jay Street who provided a list of DUMBO residents that were willing to have noise monitoring done at their residence.

The following map shows the locations where the measurements were taken:



The following table summarizes the results of the noise measurements:

Address	Average L_{EQ}	Average L_{max}	Max L_{Max}	Baseline	Total Duration (hh:mm:ss)	Total Number of Trains Measured
31 Washington Street	54.54 dB(A)	59.34 dB(A)	75.7 dB(A)	43.1 dB(A)	8:16:40	423
39 Pearl Street	57.35 dB(A)	61.31 dB(A)	71.88 dB(A)	34.1 dB(A)	7:03:15	537
56 Adams Street	70.25 dB(A)	70.25 dB(A)	94.66 dB(A)	46.4 dB(A)	11:00:3	520
68 Jay Street	56.87 dB(A)	56.87 dB(A)	90.37 dB(A)	38.6 dB(A)	14:37:12	503
98 Front Street	46.57 dB(A)	51.72 dB(A)	83.93 dB(A)	32.8 dB(A)	5:04:06	323
135 Plymouth Street	53.42 dB(A)	58.68 dB(A)	94.76 dB(A)	44.5 dB(A)	9:04:16	357
133 Water Street	56.00 dB(A)	58.84 dB(A)	80.36 dB(A)	31.8 dB(A)	4:12:40	472
177 Water Street	51.96 dB(A)	54.63 dB(A)	75.71 dB(A)	33.5 dB(A)	3:27:37	389
100 Jay Street	50.21 dB(A)	56.72 dB(A)	78.27 dB(A)	33.4 dB(A)	18:38:00	292
Adams Street Library (Public)	84.65 dB(A)	-	98.1 dB(A)	48.1 dB(A)	00:18:56	9
Dumbo Archway (Public)	81.33 dB(A)	-	91.8 dB(A)	68.9 dB(A)	0:25:35	18
Brooklyn Bridge Dog Run (Public)	87.50 dB(A)	-	98.9 dB(A)	65.0 dB(A)	0:37:45	26

Measurements were attempted at Brooklyn Bridge Park, but the large distance between the bridge and the presence of background construction activity made train noise inaudible at this location. On average, the difference between the baseline and the peak sound level is 43 dB(A).

cc: T. Abdallah
M. Dawson
G. Dunkley
R. Hermel
A. Murrell
J. Pajarito
S. Pierre
K. Schnur
W. Schwartz

2 Broadway, 8th Fl.
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Memorandum

MTA Construction & Development

Date: **June 10, 2022**

To: **Michael Dawson, Superintendent, MOW Engineering, DOS**

From: **Stavroula Konstantellis, Project Administrator, Environmental Services, C & D**

Re: **Noise Measurements, Front St & Pine St, Manhattan Bridge Anchorage, Brooklyn**

Environmental Services conducted noise measurements underneath the Brooklyn side of the Manhattan Bridge at the intersection of Front Street & Pine Street on June 10, 2022. Measurements were collected for a 30-minute period at street level with the sound level meter set to fast response for impulsive sound measurements, due to indications that the noise impact is caused by sudden impact with a track element. The highest sound level produced by passing trains on the Manhattan bridge was 94.4 dB(A) against a background sound level of 68.2 dB(A).

If any further information is needed, please contact Gideon Dunkley of my staff at 646-316-9224.

cc: G. Dunkley

2 Broadway, 8th Fl.
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Memorandum

Construction & Development

Date: **December 27, 2023**

To: **Mike Dawson, Superintendent, Track Engineering, RS & MoW**

From: **Stacy Konstantellis, Director, Environmental Services, DSO, C&D**

Re: **Noise Measurements, Queensboro Plaza South, 7 Line**

In response to complaints from residents about screeching noise at Queensboro Plaza station on the 7-line, Environmental Services took measurements in the vicinity, particularly on the south side of the station and further east near the curve at 23rd Street. Due to construction activity on the north side of the station, it was determined to conduct all noise measurements on the south side, furthest away from the activity due to potential interference with noise monitoring.

Measurements collected for one hour approximately twenty feet away from the station entrance, adjacent to mixed use commercial/real estate, produced a max sound level of 88.1 dB(A) and an average sound level of 83.9 dB(A) when trains pass. This location experiences a background sound level of 72.2 dB(A) between arriving and departing trains (this includes noise due to vehicular traffic and construction activity in the area).

Measurements were also collected for one hour near the curve at 23rd street, outside of a residential property at 23-98 Queens Plaza South; the highest sound level measured due to passing trains on the elevated structure was 100.67 dB(A) with an average of 94.98 dB(A).

cc: G. Dunkley
J. Pajarito
K. Schnur