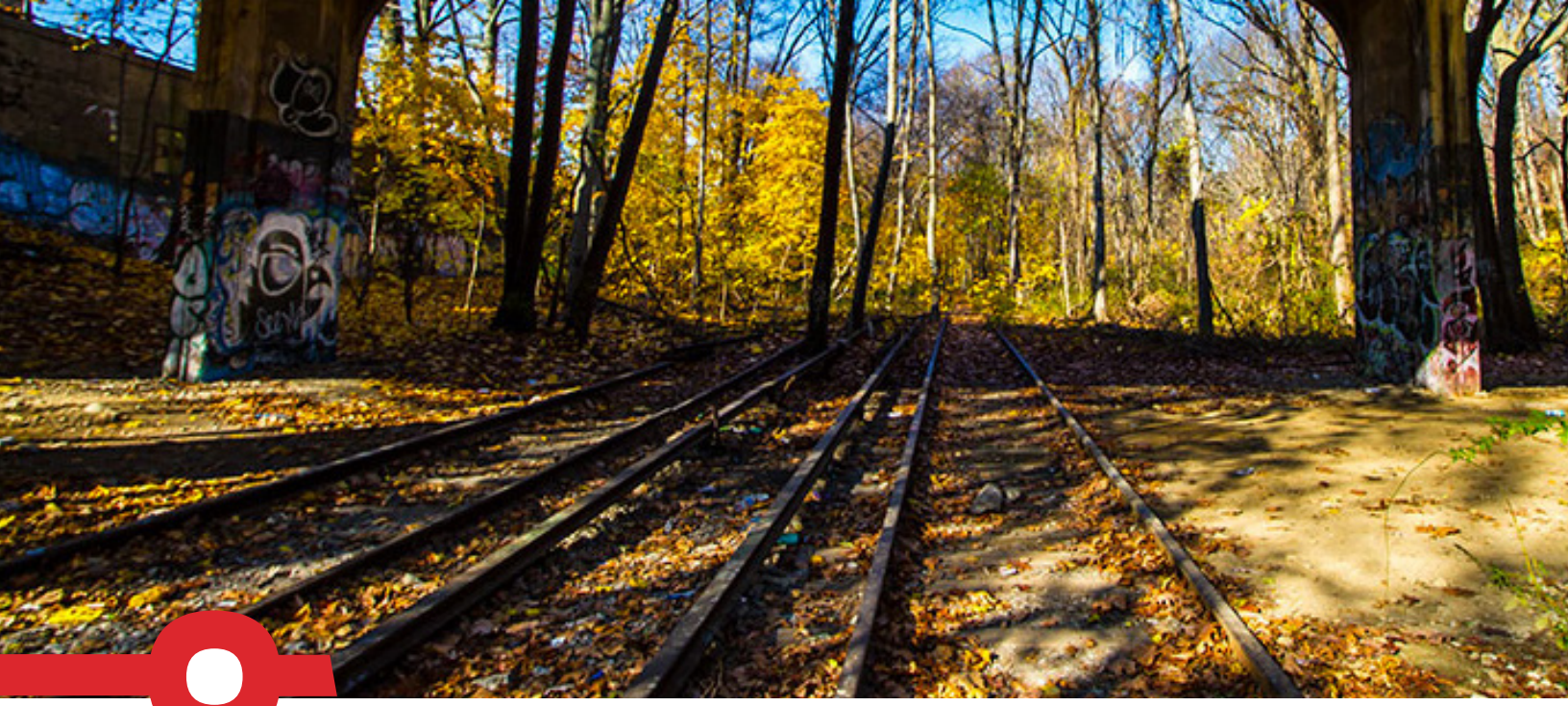

MTA Long Island Rail Road

PHASE ONE: ROCKAWAY BEACH BRANCH SKETCH ASSESSMENT FINAL WHITE PAPER

LIRR CONTRACT 6168C-10-09, RELEASE "A"

Submitted by:

SYSTRA

520 Eighth Avenue, Suite 2100

New York, NY 10018

September 21, 2018

In Association With:

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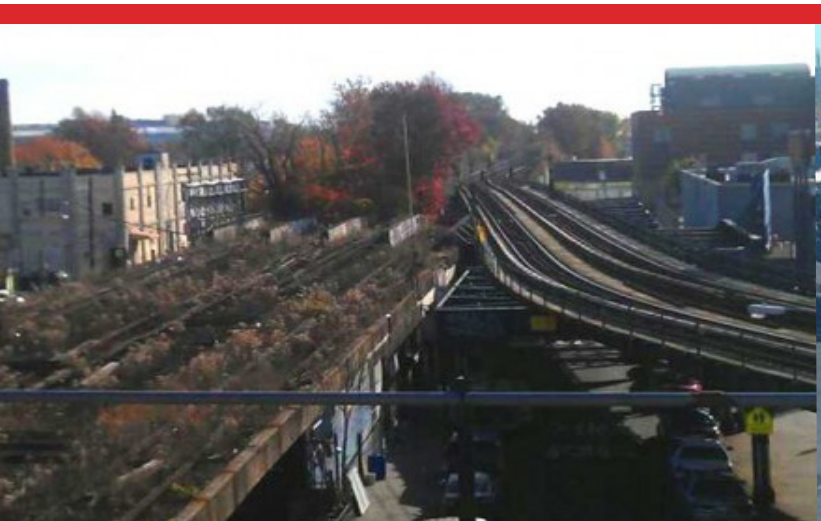

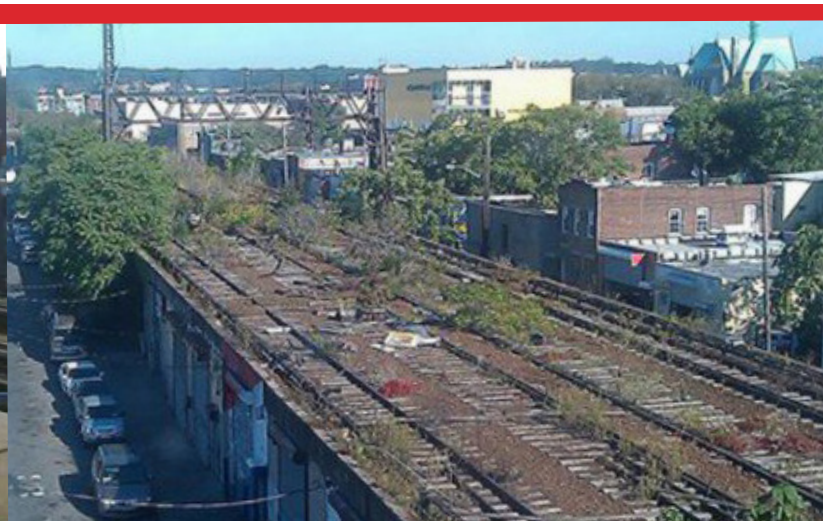

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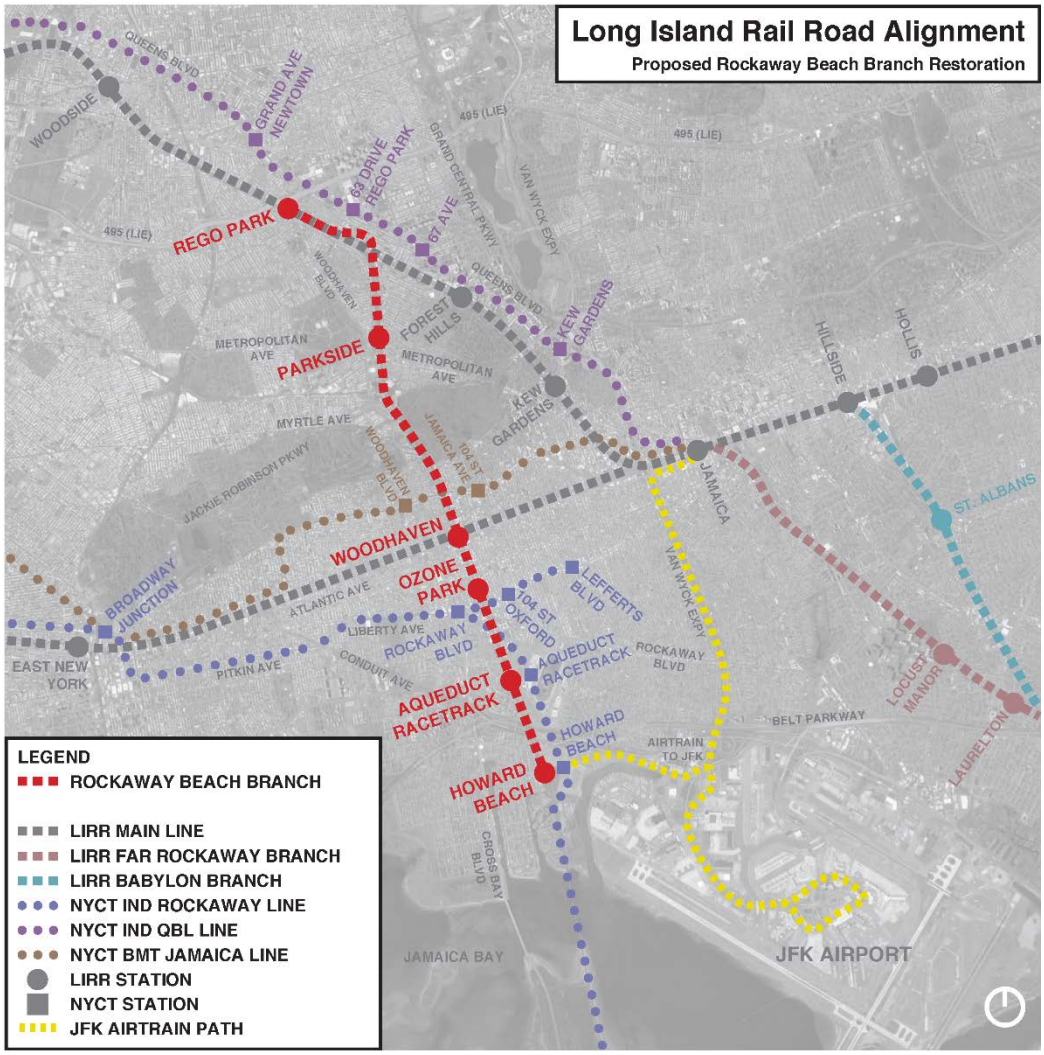
EXECUTIVE SUMMARY

The objective of this study is to assess, at a sketch planning level, the physical engineering and operational feasibility and order-of-magnitude costs of reactivating the Rockaway Beach Branch (RBB) for Long Island Rail Road (LIRR) or New York City Transit (NYCT) subway use between Queens and Midtown Manhattan using the LIRR Main Line or the NYCT Queens Boulevard Line (QBL). As part of the study potential intermediate stations throughout Central Queens were assessed under either LIRR or NYCT service. The SYSTRA Team (the Team) examined the option to revitalize the RBB as either a LIRR or NYCT subway alternative.

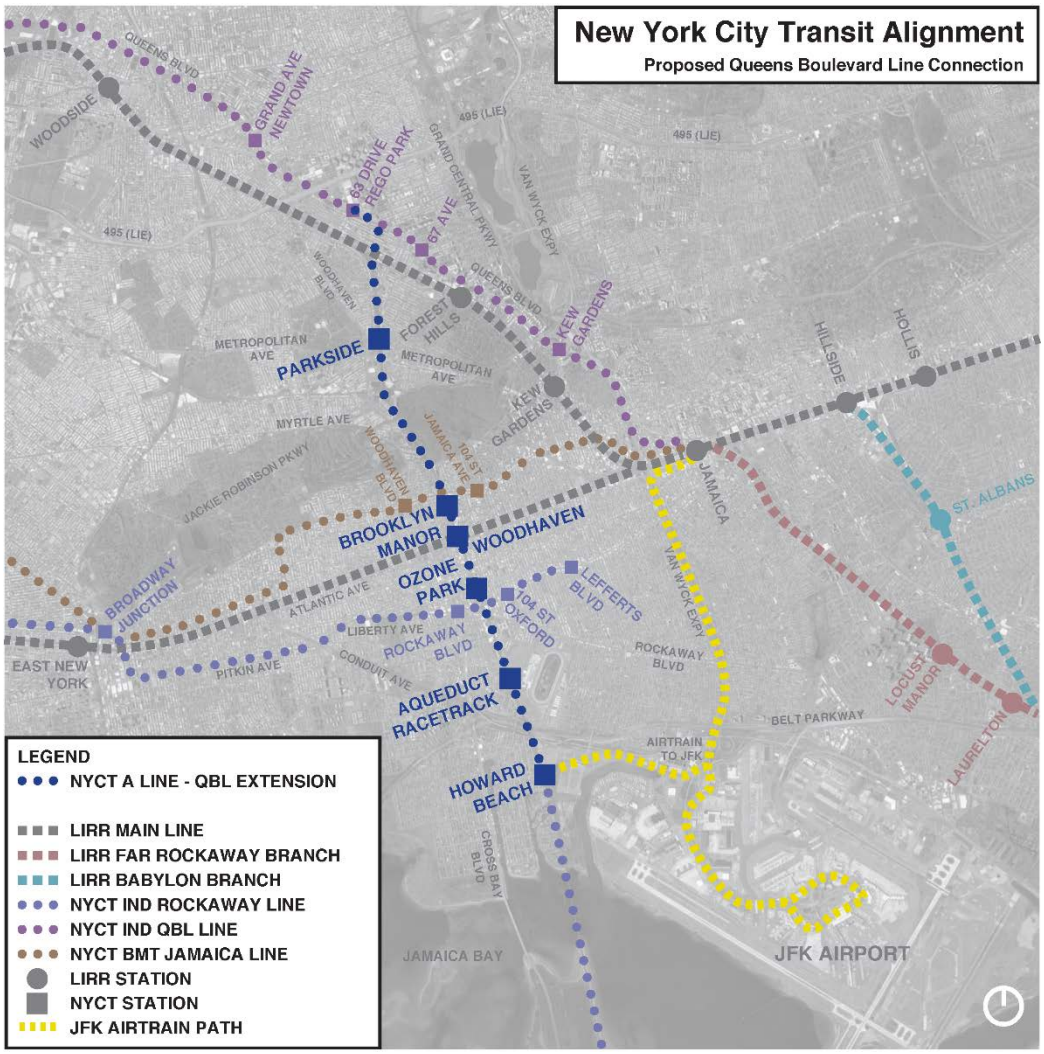
Throughout this initial phase of the study, the SYSTRA Team has held various working sessions and progress meetings with LIRR, NYCT, and MTA which has informed the direction of this project. The assumption of this analysis is based on the current capacity of both LIRR commuter and NYCT subway services. LIRR capacity assumes East Side Access opening day and service operation to both Penn Station (PSNY) and Grand Central Terminal (GCT).



ES Figure 1

For LIRR, the new alignment would connect to the Main Line and continue south along the abandoned RBB alignment to Howard Beach Station. The area south of Liberty Avenue would create a shared corridor with both LIRR and NYCT operating through this area. It is assumed that up to a 30-foot separation would be required by Federal Railroad Administration (FRA)

between LIRR and NYCT unless a crash barrier is constructed between the tracks. One new storage yard would be required for LIRR trains in the vicinity of Howard Beach Station. Two potential sites have been identified, which would provide a place for train storage, minor servicing and a train crew employee facility. As discussed further, the Team has determined not to extend the LIRR option across Jamaica Bay, as it once did in the past, due to considerable environmental and land use challenges. See *Figure ES1* for LIRR alignment map. A detailed description of the LIRR alignment can be found in Sections 2.1 of the report.



ES Figure 2

The NYCT option involves a connection to the Queens Boulevard Line (QBL) using an eastbound and westbound track (via a new tunnel) to the existing RBB corridor, which would then continue south and merge with the existing "A" service south of Liberty Avenue to Far Rockaway. The NYCT extension of the RBB line to the NYCT QBL would require the construction of a new tunnel for a direct underground connection to the existing QBL Station at 64th Street. It is anticipated that this option's proposed tunnel alignment and profile may have impacts to residential buildings, subject to future detailed engineering. See *Figure ES2* for the NYCT alignment map. A detailed description of the alignment can be found in Sections 2.2 of the report.

In general, the abandoned RBB right-of-way is overgrown with vegetation and is impassable on foot. Several undergrade (UG) bridges and viaduct sections will require full replacement due deteriorated conditions. Reactivation will require the laying of new track as well as the installation of new train signals and 3rd rail traction power substations. An Engineering Feasibility discussion is presented in Section 3.0 and a detailed Structures discussion can be found in Section 3.4.

Both options include six possible new stations which are at or adjacent to where LIRR stations were previously located. For the LIRR option, a possible combined station at Aqueduct Racetrack can be constructed eliminating the existing Aqueduct Racetrack and North Conduit stations. All stations would follow current LIRR or NYCT stations design guidelines including requirements for Americans with Disability Act (ADA) access. For the LIRR, the station design will include an automatic snow and ice melt system. A detailed description of the existing conditions and proposed concept for each LIRR and NYCT station are described in Section 3.3 of the report.

Section 3.9 of the report includes a discussion of environmental features along the alignments to identify potential environmental conditions that can inform future, more detailed environmental studies. There were no field assessments, or any testing performed as part of this study.

In order to assess the impacts and obstacles for both the proposed LIRR and NYCT alignment options, the Team separated the alignment into three sections: LIRR Main Line/QBL to Fleet Street; Fleet Street to Liberty Avenue; and South of Liberty Avenue. As these sections of the alignment each have varied issues, ranging from condition of the ROW, constructability, and environmental concerns; examining each alternative by section provides a more comparative and thorough assessment. The assessment is shown in a table format in Section 4.0.

The Team performed a Constructability Analysis as part of the study to identify any major obstacles with each alignment. In terms of construction feasibility, there is no single "fatal flaw" that would disqualify either of the LIRR or NYCT alternatives from being constructed and operated. However, both options have a number of impacts associated with reactivating the proposed services. Some notable items include:

- Impacts to scheduled trains during construction could include slow orders along sections under construction with associated impacts to customers.
- South of Liberty Avenue, the current ROW may need to be widened for sufficient clearance for the operation of both the NYCT and LIRR services.
- Reactivation of the alignment (using the existing alignment) may have impacts to properties that appear to be on or near the right-of-way.
- Tunnel Boring Machine (TBM) and Sequence Excavation Method (SEM) tunneling under the NYCT option may require underpinning existing buildings between the north side of the LIRR Main Line and the connection at Queens Boulevard with the existing QBL subway.
- Buildings founded on steel piles may require demolition to remove the piles, subject to future detailed engineering. Currently no information on building foundations is available, but multi-story residential buildings potentially will have steel pile foundations based upon the age of the buildings.
- Buildings not constructed on piles may be subjected to settlement during the NYCT Option due to TBM operations; as a result, the construction may require grouting programs to prevent or minimize settlement to the structures.
- Tunneling under the LIRR Main Line tracks at White Pot Junction is anticipated to require ground stabilization and monitoring. Existing track will need to be monitored and re-ballasted as needed as a result of any settlement during the tunneling and immediately after.

A service and operating plan was modeled by the SYSTRA Team for service between PSNY or GCT and Howard Beach for the LIRR Option. The Rockaway Beach Branch service plan assumes 15, 20, and 30 minute headways during peak hours which are comparable to other LIRR branch services. For initial planning and engineering purposes, four trains, eight cars in length, will be stored on the four tracks available in the proposed yard and crew base east of Howard Beach station. The run time from Howard Beach to PSNY or GCT is 25 minutes; train turnaround at the terminals is assumed to be 15 minute revenue to non-revenue and 20 minute revenue to revenue train cycle times, which includes the crew changing ends and mandated inspections. Both PSNY and GCT were examined, as well as a split service between both terminals.

Per the NYCT Trip Planner, the approximate travel time for each route between 63rd Drive – Rego Park and 34th Street/Herald Square is 30 minutes. Combined with the above TPC runs, an overall travel time from Howard Beach to 34th Street/Herald

Square of approximately 45 minutes is derived. Based on the combined headway of 5 or 10 minutes along Queens Boulevard, it is proposed that a new service (MX) operate along the local tracks. The service should consist of three former "M" and three former "R" trains that operate along both the 6th Avenue and 7th Avenue-Broadway lines in Midtown. The new service would provide 10 minute headway along the RBB to Howard Beach. A lower frequency 15 minute headway, which would only eliminate two trains from each of the existing service, has also been tested and is provided for analysis of the impact of train frequency on NYCT passenger ridership.

The Team also modeled travel demand forecasts for each option. For the LIRR alternative, the RBB was modeled with 15, 20, and 30 minute headways in both directions in the 4-hour AM peak period. Tables ES-1 through ES-3 demonstrate the year 2025 forecasted station level ons and offs for the RBB for the AM peak period. Using an AM peak period to a daily factor of 2.678 for LIRR ridership, the branch level daily ridership is forecasted to range from 11,200 riders to 10,800 riders, respectively, per average weekday dependent on headway.

Table ES-1: Forecasted Year 2025 LIRR RBB AM Peak Period Ridership by Station with 15 Minute Headways

Station	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	209	0	0	83
Aqueduct	97	0	0	32
Ozone Park	269	0	0	139
Woodhaven	389	1	1	136
Parkside	300	2	2	112
Rego Park	952	12	14	314
Woodside	918	70	75	218
Manhattan (PSNY or GCT)	0	3,050	942	0

Table ES-2: Forecasted Year 2025 LIRR RBB AM Peak Period Ridership by Station with 20 Minute Headways

Station	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	198	0	0	82
Aqueduct	73	0	0	25
Ozone Park	228	0	0	106
Woodhaven	372	1	1	128
Parkside	285	1	1	93
Rego Park	929	10	9	288
Woodside	1,027	68	58	215
Manhattan (PSNY or GCT)	0	3,033	867	0

Table ES-3: Forecasted Year 2025 LIRR RBB AM Peak Period Ridership by Station with 30 Minute Headways

	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	170	0	0	70
Aqueduct	64	0	0	22
Ozone Park	197	0	0	85
Woodhaven	331	1	1	111
Parkside	256	1	1	81
Rego Park	795	7	7	240
Woodside	762	58	47	162
Manhattan (PSNY or GCT)	0	2,507	715	0

For the NYCT alternative, the RBB was modeled with 10 minute headways in both directions in the 4-hour AM peak period. Table ES-4 demonstrates the year 2025 station level ons and offs for the RBB for the 4-hour AM peak period. Using an AM peak period to a daily factor of 2.91 for NYCT ridership, has the project stations of Howard Beach to Parkside generating approximately 47,000 riders per day.

Table ES-4: Forecasted Year 2025 NYCT RBB AM Peak Period Ridership by Station

	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	9,063	0	0	4,616
Aqueduct	871	0	0	709
Ozone Park	4,015	317	118	2,857
Woodhaven	1,278	215	170	763
Brooklyn Manor	2,537	781	499	1,276
Parkside	837	512	446	426
63rd Drive-Rego Park	852	2,492	1,720	262

The capital cost estimates (Table ES-5) were prepared for both the LIRR and NYCT alternatives. All costs were developed on an order of magnitude basis and do not include costs for any possible land acquisition.

Table ES-5: Capital Cost Estimate

Alternative	Capital Cost Estimate
Long Island Rail Road	$6,774,400,000
New York City Transit	$8,102,400,000

The NYCT option was estimated at a cost that is approximately 20 percent higher mainly due to the cost associated with construction of a tunnel connecting the RBB right of way with the NYCT QBL.

While the local TOD potential around RBB station areas is limited, with established residential neighborhoods and little opportunity/space to dramatically increase population density, the region would experience economic growth through increased property values, desirability/quality of life benefits, accessibility, and mobility options through leveraging the improved travel times to Midtown Manhattan for the study area's primarily middle class residents.

Overall, the middle class established neighborhoods prevalent along the RBB do not lend themselves well to TOD potential. However, there are some pockets of opportunity. These pockets of opportunity include:

- Parkside Station: limited potential low rise commercial uses including possible structured parking for RBB passengers
- Woodhaven Station: limited potential upzoning and parcel assemblage on either side of the LIRR ROW and 100th Street south of Atlantic Avenue
- Ozone Park Station: limited potential upzoning east of station area in currently industrial/manufacturing area surrounded by residential areas
- Aqueduct Station: potential mixed-use mid-rise TOD and larger scale commercial/recreational development

Next Steps:

In consideration of advancing this project, an environmental review and conceptual engineering would be a required next step. The environmental review will follow NEPA (Federal Process) or SEQRA (State Process). The available funding source for the project will determine whether NEPA is required in addition to SEQRA. If federal funding were utilized to construct rail service on the RBB, the FTA would likely be the funding agency. In this case, the NEPA process would be followed. The FTA would likely be the federal sponsor leading the EIS process following the National Environmental Policy Act (NEPA) statutes in accordance with FTA Environmental Impact and Related Procedures (23 C.F.R 771). Further, if no federal funds were utilized, the SEQRA would be followed; the New York State Environmental Quality Review Act (SEQRA) review process would require a state-level EIS for the project. Since the project may impact both parkland and existing historic resources, a federal Section 4(f) evaluation may also be required.

It should be noted that typically when a State Authority such as the MTA is the local lead entity, the state environmental process is used; however, the RBB right-of-way is a City owned and controlled property. It may be necessary to examine their role as at least a participating reviewing agency. NYC CEQR compliance is necessary if the project requires: discretionary approvals or permits from any city agency; city funding, or the project is being directly undertaken by a city agency. In any case, it may be necessary to examine their role as at least a participating reviewing agency.

INTRODUCTION

The reactivation of the partially abandoned 10-mile Rockaway Beach Branch Line, located in Queens, New York, presents an opportunity for the borough's transportation network. As an existing right-of-way that previously supported passenger rail transportation, the proposal to reactivate the line is an option. This new connection has benefits including service to Midtown Manhattan's Central Business District, access to and from the Rockaway Peninsula, and the opportunity to link communities in "Central" Queens that have historically been underserved by rail transit.

1.1 PROJECT GOALS AND OBJECTIVES

The objective of this study is to assess, at a sketch planning level, the physical subway and operational feasibility and order-of-magnitude costs of reactivating the Rockaway Beach Branch (RBB) for LIRR or NYCT subway use between Queens and Midtown Manhattan using the LIRR Main Line or the NYCT Queens Boulevard Line (QBL), including service at potential intermediate stations throughout Central Queens (Table 1).

Throughout this study, the SYSTRA Team has held various working sessions and progress meetings with LIRR, NYCT, and MTA which has informed the direction of this project. The assumption of this analysis is based on the current capacity of both LIRR commuter and NYCT subway service. LIRR capacity assumes East Side Access opening day and operation to both Penn Station and GCT. Pursuant to discussions with the Client Team, system wide capacity will not be added for this study and we have been directed to proceed with options based on current capacity constraints.

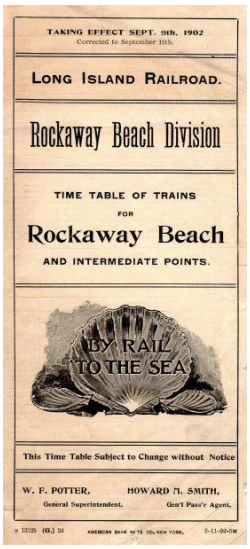
Table 1: Goals and Respective Objectives of This Study

Goal	Objective
Assess Mobility and Provide Access to Transit	• Assess the physical and operational feasibility of reactivating the RBB using a variety of evaluation criteria • Improve transit access for transit-dependent and transit-reliant communities throughout Queens, NY • Reduce travel time for Manhattan-bound trips • Reduce increasing roadway congestion by offering a viable option to automobile users • Prepare a sketch operating plan and travel demand analysis for future service on the RBB • Assess the order of magnitude costs for reactivating the RBB
Preservation of Open Space and the Environment	• Analyze impacts to the community and environment • Identify potential impacts on residential areas, businesses and the built environment • Identify potential impacts on the natural environment from reactivation of the RBB • Identify possible parkland impacts

1.2 A BRIEF HISTORY OF THE ROCKAWAY BEACH BRANCH

Service on the Rockaway Beach Branch of the Long Island Rail Road was initiated during the late 1880s. Diverging from the LIRR Main Line at White Pot Junction in Rego Park, Queens and running south to the Rockaway Peninsula, this 10-mile branch served the communities of Forest Hills, Glendale, Richmond Hill, Ozone Park and, of course, the Rockaways. Although the line was frequented by day-trippers looking for a respite at the beach, the line also provided connections for freight train service to the Montauk Branch near Glendale (today, operating as freight), the Atlantic Branch near Woodhaven (passenger and freight), and the Far Rockaway Branch at Hammels, which continued through Nassau County before rejoining the Main Line in Jamaica, Queens.

Figure 1: Map of original LIRR RBB Line – courtesy of www.lirrhistory.org


TAKING EFFECT SEPT. 9th, 1902
Corrected to September 11th.

LONG ISLAND RAILROAD.

Rockaway Beach Division

TIME TABLE OF TRAINS
FOR
Rockaway Beach
AND INTERMEDIATE POINTS.

BY RAIL TO THE SEA

This Time Table Subject to Change without Notice

W. F. POTTER, General Superintendent.
HOWARD M. SMITH, Gen'l Pass'r Agent.

Figure 2: Rockaway Beach Division Timetable, 1902. Archive: Brad Phillips

A variety of factors contributed to the decline of the Rockaway Beach Branch. In 1950, a fire on a wooden trestle across Jamaica Bay halted service on the southern portion of the line. At the time, LIRR was bankrupt and unable to justify the large cost to repair this integral structure, especially given the line's low ridership numbers. LIRR increasingly perceived this service south of Ozone Park as a very expensive liability and sought to either sell or abandon the line. Fortunately, the City of New York understood the viability and utility of this portion of the line (south of Liberty Avenue) and purchased the entire Rockaway Beach Branch from LIRR in 1953. Eventually, IND subway service was extended to Far Rockaway, which would become present-day NYCT A train service. Pursuant to an agreement with the City of New York, LIRR would continue to operate service on the northern portion of the RBB between the Main Line and Ozone Park through 1962. When their lease expired, LIRR chose to cease operation and the property reverted to the City of New York.[1]

During its peak operation, the LIRR provided service to as many as nineteen RBB stations; however, only five remained in operation into the 1960s. Remnants of some stations and bridges are still present and have become an attraction for urban explorers, particularly for those with a strong interest in rail history and abandoned infrastructure throughout New York City. It is important to note the RBB ROW was originally constructed without any at grade crossings.

Subsequently, a large segment of the abandoned line has been partially encroached upon by residential and commercial development. These encroachments are further detailed in later sections. Additional information concerning the existing conditions of the proposed LIRR and NYCT alignments are discussed in Sections 2.1 and 2.2 of this report.

[1] Linder, Bernard. "Rockaway Line." *New York Division Bulletin*. Electric Railroader's Association. Vol. 49, No. 2, 3-4, February 2006.

Figure 3: Brooklyn Manor Station, LIRR Rockaway Beach Branch

Figure 4: Former Brooklyn Manor Station Site (LIRR) underneath Jamaica Avenue NYCT Line (J Train)

2. DEFINITION OF OPERATIONAL ALIGNMENTS

The SYSTRA Team (the Team) examined the option to revitalize the RBB as either a LIRR or NYCT subway alternative. For LIRR, the new alignment would connect to the Main Line and continue south along the abandoned RBB alignment to Howard Beach Station, see *Figure 5*. As discussed further, the Team has determined to not extend the LIRR option across Jamaica Bay due to considerable environmental and land use challenges. The NYCT option involves a connection to the Queens Boulevard Line (QBL) using an eastbound and westbound track (via a new tunnel) to the existing RBB corridor, which would then continue south and merge with the existing "A" service south of Liberty Avenue to Far Rockaway.

2.1 LONG ISLAND RAIL ROAD

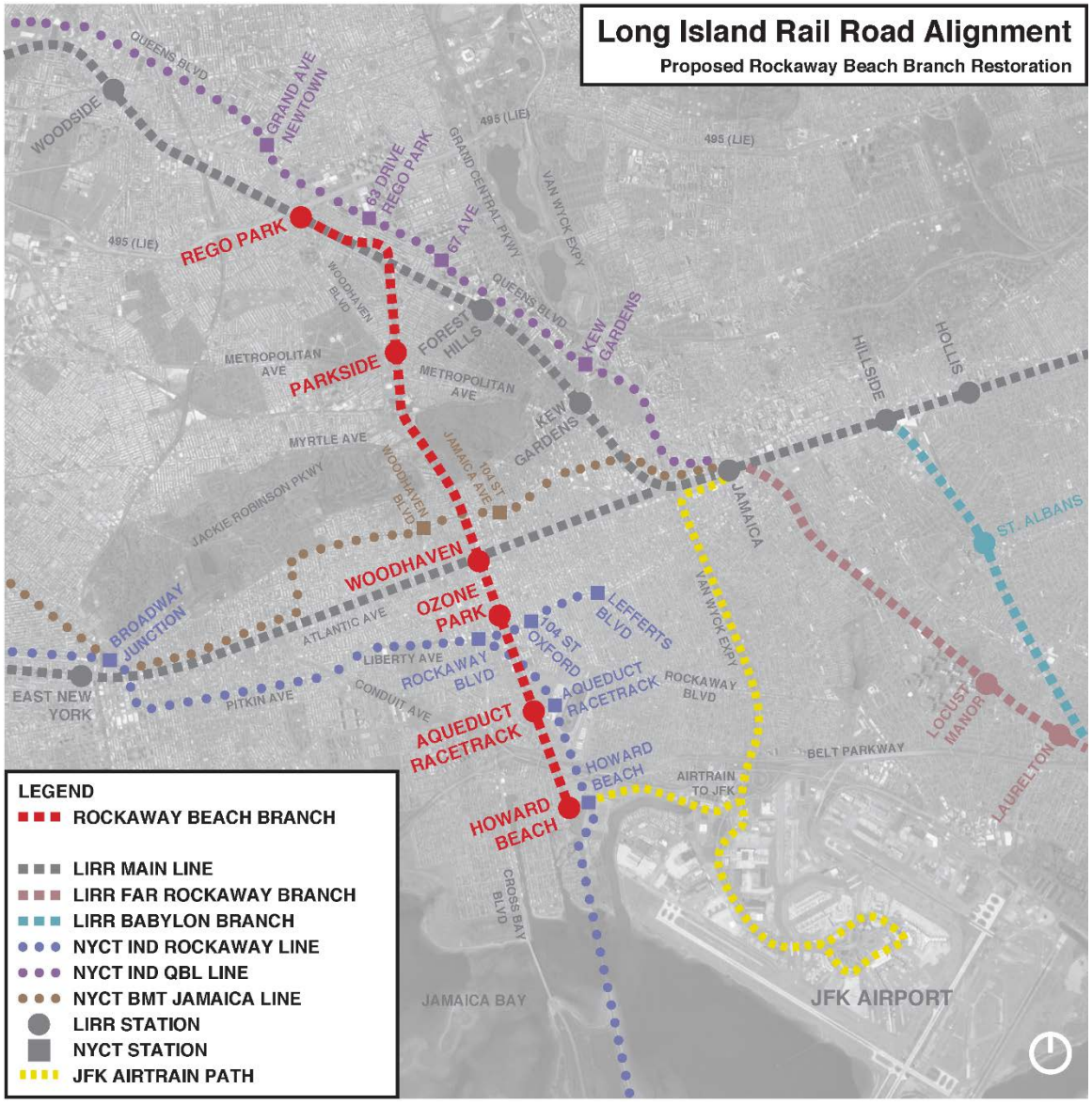


Figure 5: LIRR Alignment – Restoration of the Rockaway Beach Branch

2.1.1 Woodside to White Pot Junction (Grade Section – Station 100+00 to 182+00)

The LIRR Main Line between Jamaica and Woodside is a four-track railroad that is utilized by all branches, other than the Port Washington Branch. The proposed connection to the LIRR Main Line will require two additional tracks to be added to the active corridor, one north off Main Line 3 and one south of the existing Main Line 4. The existence of the prior Main Line connection (abandoned) to the RBB makes this alignment easily accomplished. The location of these tracks will follow the historic alignment that was in place while the RBB was operational. Prior to the RBB abandonment in 1962, the Main Line between Rego Park and Woodside had six tracks, with two of these tracks used exclusively by the RBB.

The restored RBB alignment will begin at Mile Post 4.5 on the LIRR's Main Line diverging off Main Line 4 and Main Line 3, which is approximately 8800 feet west of White Pot Junction. The tracks will be spaced at 13-foot on center from Main Line track 3 and 13-foot 6-inches from Main Line 4. A No. 20 turnout will be added to the existing Main Line tracks 3 and 4 approximately 1,300 feet west of the Grand Avenue overhead roadway crossing. The maximum diverging speeds through

these turnouts will be 45 miles per hour. The RBB tracks will parallel the Main Line for approximately two miles. This will allow the trains using the RBB to adjust to and from Main Line track speed to minimize scheduling impacts to Main Line operations. This track length is needed to mitigate the speed restriction caused by the curves at White Pot Junction.

There are five major UG bridges in this segment. The UG bridges along this corridor have vacant track bays that are currently not in use but can accommodate the proposed RBB tracks. It is assumed that the overhead bridges, overpasses or signal bridges in this segment can also accommodate the required LIRR MW-2000 vertical and horizontal offset clearances required to restore the RBB tracks, but confirmation of this will require field verification.

A possible Rego Park Station could be located just east of Woodhaven Boulevard at approximate Station 152+00 to Station 159+00. The eastbound and westbound platforms would be side platforms and would provide access to RBB service only.

2.1.2 White Pot Junction (Cut and Embankment – Station 182+00 to 210+00)

The possible RBB tracks will match the abandoned alignment at this location. Because of the prior railroad operation, the alignment can be achieved by utilizing the existing White Pot Junction rail tunnel that crosses under the LIRR Main Line tracks. To cross under the Main Line and connect to the abandoned RBB ROW south of White Pot Junction, the westbound alignment traverses a 7°15'00" curve followed by short tangent and a reverse 4°00'00" curve. This set of curves has a maximum authorized speed of 30 mph. The track grade profile for the westbound track will be approximately 2.00 percent to climb the 25 feet between the top of rail in the White Pot Junction tunnel and the top of rail elevation on the 63rd Drive Bridge. To diverge from the south side Main Line track and connect to the eastbound RBB requires a 3°00'00" curve. This curve has a maximum speed of 45 mph. The track grade profile for the eastbound track will be approximately 1.50 percent to descend and meet the RBB ROW on the south side of White Pot Junction.

2.1.3 White Pot Junction to Atlantic Avenue (Cut, Embankment, Bridges – Station 210+00 to 336+00)

This segment of the alignment will follow the abandoned RBB ROW. Despite not being operational for 55 years, this ROW has been reasonably well preserved. Most of the track alignment in this segment is tangent, with three areas of curvatures. The speed limiting area for this segment is the set of reverse curves near Union Turnpike. The maximum authorized speed for train operation through this curved segment of the alignment will be 45 mph. All other areas on this portion of the alignment can be traversed at 50 mph plus. The profile grades will match the abandoned RBB alignment. This segment of the ROW begins in a cut section with the track grade being below the surrounding property elevation. As the ROW continues south, it becomes an embankment section with the track grade being equal to or above the surrounding property elevation. This section of ROW can be readily restored by removing the overgrowth and addressing the cut and embankment slopes in specific areas. Where the ROW intersects roadways, UG bridges are used in conjunction with varying road profiles to maintain a dedicated corridor. All UG bridges in this segment are assumed to require a full replacement, due to deteriorated conditions. It is assumed that the overhead bridges in this segment can also accommodate the required vertical and horizontal offset clearances required to restore the RBB tracks, but confirmation of this will require field verification.

The possible Parkside Station would be located at approximate Station 238+25 to Station 245+25 just south of Metropolitan Avenue. The eastbound and westbound platforms would be side platforms and would provide access to RBB service only.

The possible Woodhaven Station would be located at approximate Station 323+25 to Station 330+25 centered over Atlantic Avenue. The eastbound and westbound platforms would be side platforms and would provide access to RBB service as well as a restored station connection to LIRR Atlantic Branch service, whereby customers could transfer to LIRR service to Brooklyn or Jamaica. This would require improvements and re-opening of the LIRR's former Woodhaven Station on the Atlantic Branch. This former station, inside the tunnel, was closed in 1977.

As a result of the close proximity to the possible Woodhaven Station, the LIRR alignment does not incorporate the reconstruction of the possible Brooklyn Manor Station. In addition to likely being a challenge to build to today's standards, it has also been determined that the ability to transfer to proximate NYCT "J" train service is not considered significant enough to re-open the station at this location. The possible Woodhaven Station has been deemed the more critical of the proximate two stations due to its potential to provide a connection to LIRR Atlantic Branch service.

2.1.4 Atlantic Avenue to Liberty Avenue (Viaduct – Station 336+00 to 364+00)

This segment of the alignment will follow the abandoned RBB ROW. Because it is a grade separated viaduct structure this ROW has been kept intact. The track alignment in this segment is entirely tangent except for the very south end. The maximum authorized speed for train operation through this segment of the alignment will be 60 mph. The profile grades will match the abandoned RBB alignment.

This segment of the ROW begins south of Atlantic Avenue with a section of embankment and transitions into the viaduct structure at 97th Avenue. The viaduct is wide enough to accommodate four tracks. As the ROW continues south it continues as a viaduct and the track grade is elevated above the adjacent properties and street level. Where the ROW intersects roadways, UG bridges (part of the viaduct structure) are used to maintain a dedicated corridor. It is assumed that the entire viaduct in this segment will be replaced, see more on this in Section 3.4.1.

The possible RBB alignment will utilize the two eastern most tracks to simplify the interface with the NYCT "A" Line tracks south of Liberty Avenue.

The possible Ozone Park Station would be located at approximate Station 343+20 to Station 350+20 just south of 101st Avenue. The eastbound and westbound platforms would be side platforms and would provide access to RBB service only.

2.1.5 LIRR Atlantic Branch Connection (Station 234+50)

With the restoration of the RBB there is an option for an additional service connection to the LIRR Atlantic Branch. The Atlantic Branch currently originates from Valley Stream and runs through Brooklyn parallel (underneath or above) to, Atlantic Avenue and has its terminal station at Flatbush and Atlantic Avenues in Brooklyn. Future LIRR service from Jamaica, Queens to Atlantic Terminal, Brooklyn will be operated as a shuttle service as part of the East Side Access operating plan. The current LIRR Platform F Construction project in Jamaica is underway and will support this future shuttle service.

Immediately south of Atlantic Avenue there is an abandoned ROW connection into the LIRR Atlantic Branch tunnel. This connection was originally built and operated on the now abandoned RBB alignment. The infrastructure that allowed for this connection still exists. This infrastructure includes a retained embankment section, track subgrade, original portal openings in the Atlantic Tunnel and steel framing in the tunnel that allows the LIRR track connection. The tunnel portals were sealed in a manner that allows reuse. The embankment section has been filled but the original structures are still in place. The steel framing in the tunnel is in use today and if restoration is required it can be readily accessed.

To reactivate this connection, the portals need to be opened and excess fill needs to be excavated to track subgrade elevation. Structural repairs are anticipated for the retaining walls and portal openings. The steel frame in the tunnel will require minor modifications.

This track alignment for this connection would be single track that will join the eastbound RBB track through a No. 10 turnout. The connection will come off LIRR Atlantic Track 2. The required curve to match the historic alignment for this connection and structures is a 6°15'00 curve. A rail profile grade of two percent will be required to connect the tracks on the viaduct to the tracks in the tunnel that runs under Atlantic Avenue. All new subgrade and track structure will be required for the connection. New third rail and two new fully signaled interlockings are also required. Power for the third rail and signal systems needs to be added. Modifications to the LIRR Atlantic Branch systems are also needed to allow the connection to be merged into the LIRR operation.

2.1.6 Liberty Avenue to Belt Parkway (Viaduct, Retained Embankment, Bridges - Station 364+00 to 419+00)

This segment of the alignment will follow the RBB ROW that is currently being used by NYCT to provide A line train service to Far Rockaway and Rockaway Park. This ROW has been operated continuously and has been maintained. This segment of the ROW begins at the Liberty Avenue at the end of the viaduct and transitions into the retained embankment at Rockaway Blvd. As the ROW continues south, the track grade is elevated above the adjacent properties and street level.

To accommodate both LIRR RBB trains and NYCT "A" Line subway trains the alignment would locate the two LIRR tracks on the eastern side and the two NYCT tracks on the western side. The alignment assumes that the NYCT tracks would hold their current position where they enter the ROW to avoid encroachment on adjacent educational facilities and residences. The Linden Boulevard and Pitkin Avenue bridges will be replaced in their entirety and will accommodate the proposed track spacing.

The track alignment in this segment enters with a set of reverse curves to set the LIRR tracks east of NYCT to yield an up to 30-foot separation between the two closest track centers. The alignment continues tangent until Sutter Avenue and then continues south with a set of reverse curves to set the LIRR tracks to be at a maximum of 30-foot separation between the NYCT tracks. The alignment continues tangent until the Pitkin Avenue bridge. This portion of the alignment can be traversed at 60 mph. The track separation will cause the new retained embankment to encroach on the adjacent parallel roadway between Rockaway Boulevard and Sutter Avenue, see more on this issue in Section 3.4.1.

This viaduct and embankment segment can accommodate four tracks but only at standard track spacing using the same mode of transportation. It is assumed that an up to 30-foot separation would be required by Federal Railroad Administration (FRA) between LIRR and NYCT unless a crash barrier is constructed between the tracks. The outside tracks are currently used to provide A Train service to the stations at Aqueduct Racetrack, North Conduit/Aqueduct and Howard Beach. The center two tracks along different portions of this segment are used by NYCT for turnarounds, track maintenance and equipment storage.

This track layout would require reconfiguration of the NYCT stations at Aqueduct Racetrack and North Conduit/Aqueduct from side platforms to one combined station with center island platforms that will be located at the Racetrack and centered between the two existing stations. The existing stations would be demolished. The NYCT transit tracks will be shifted west to obtain the increased track spacing needed to accommodate a center island platform and the proposed LIRR tracks would be shifted east to accommodate a center island platform. This shift would also be needed to provide a minimum of 25-foot center to center track spacing between the LIRR and NYCT and for construction of a crash barrier. To accommodate this transition, the LIRR westbound track south of Pitkin Avenue will go through a series of reverse curves to shift alignment to the east to increase the track spacing of the LIRR tracks from 14' to 33'-2" to accommodate a 22-foot wide island platform to provide a possible LIRR Aqueduct Racetrack Transfer Station. A similar transition would occur on the NYCT eastbound track.

Also, north of Belt Parkway the westbound LIRR track goes through a series of reverse curves to shift the alignment to east to bring track spacing between the RBB tracks back down to single track section. This shift to the east is to accommodate the NYCT tracks utilizing the existing western two tracks at Howard Beach Station. A similar transition north of the Belt Parkway would occur on the NYCT eastbound track.

2.1.7 Belt Parkway to Howard Beach Station (Embankment, At Grade - Station 419+00 to 444+00)

After crossing over the Belt Parkway, the RBB alignment continues south using the existing shared ROW. The LIRR transitions to a single-track alignment that remains on the east side of the ROW. The track alignment through this segment is tangent and designed to obtain a speed of 60 mph. The NYCT tracks will utilize the two western most track positions through Howard Beach Station. This is done to avoid impacts to the eastbound Howard Beach platform and minimize impacts to the overhead bridge that connects the NYCT "A" line with AirTrain. The westbound platform at the NYCT Howard Beach Station will be utilized by LIRR and a new 15-foot 2-inch island platform will be in the space between the NYCT and LIRR tracks for NYCT westbound service use only. The existing westbound side platform at Howard Beach will be utilized by LIRR. The passenger connection between the NYCT Howard Beach Station and AirTrain will also require modification.

The profile through this segment will match the existing NYCT tracks. Maintaining this profile will be efficient for the new LIRR storage yard, the track shift, and the station modifications. The North Conduit Avenue and Belt Parkway bridges will undergo repairs as needed, see Section 3.4.1.

2.1.8 Storage Yard between Belt Parkway and Howard Beach Station (At Grade Station 419+50 to Station 434+00)

One new storage yard would be required for LIRR trains and two potential sites have been identified. Having a storage yard at a terminal station serves multiple purposes including a local or nearby location to store trains that start or end at the

terminal station, a place to perform inspections or minor service, a location to perform a brake test before entering into service, a place to store an out-of-service train, and a place for train crews to report. The first potential site could be built off the westbound LIRR track between the Belt Parkway and Howard Beach Station. The yard will be double ended and be accessed from No. 10 turnouts on either end. The yard will include two tracks that will provide for storage, light maintenance and vehicle cleaning of LIRR trains. The outside track is 600 feet long.

The other potential site, located east of the existing boundary, would require the acquisition of additional ROW in order to be constructed. The expanded ROW will occupy land currently used as a buffer between the ROW and airport roads and parking lots. Also, the yard facility must be accessible from the street to allow access by trucks and railroad personnel which will be provided via Aqueduct Road.

2.1.9 Terminal Storage Yard South of Howard Beach Station (At Grade Station 451+00 to End of Track)

A terminal storage yard could be built off the westbound LIRR track south of Howard Beach Station. The yard will be stub-ended and be accessed directly from the station track. The yard will include four tracks that will provide for storage, light maintenance and cleaning of LIRR trains. The tracks from west to east will all provide 700 feet of storage space.

Additional ROW must be acquired to the east of the existing boundary to accommodate this storage yard. The yard facility must be accessible from the street to allow access by trucks and railroad personnel. Access as well as the layout of the facility and any welfare support facilities will require further analysis.

2.1.10 Howard Beach to Rockaway Peninsula

The study also investigated an LIRR alignment continuing south past Howard Beach Station and across Jamaica Bay to a connection with the existing Rockaway Peninsula track currently operated under NYCT Far Rockaway "A" service and Rockaway Park "A" service. This track was originally operated by LIRR until the 1950 trestle fire noted above. Under this option, a two-track LIRR alignment would be required at Howard Beach as well as two adjacent tracks to the west for continued NYCT "A" service to keep parallel and separate operations. In order to fit four tracks and have separate eastbound and westbound platforms for both LIRR and NYCT, a major reconfiguration of the Howard Beach station would be required that would involve demolition of the existing structure/station. Two LIRR tracks would continue south across Jamaica Bay on a new trestle east of the existing NYCT trestle. New construction across the bay would require extensive environmental analysis. The LIRR tracks would tie into a reconfigured wye track on the peninsula and take over service to the various stations along the beach east to the terminal station at Mott Avenue. The NYCT "A" service would continue across Jamaica Bay and retain service southwest to Rockaway Park/Beach, 116 Street Station, as it does today. The third leg of the wye track on the peninsula connecting the east and west portions of the beach service would be removed to keep the LIRR service completely separated from the NYCT service. The existing track and associated stations and infrastructure would have to undergo modifications as needed to comply with current LIRR standards.

A potential connection that would be approximately 1,350 feet east from the Mott Avenue terminal station to the adjacent Far Rockaway terminal station on the LIRR Far Rockaway Branch was also reviewed. A horizontal connection appears possible with the demolition of an existing grocery store as well as acquisition of other properties between Mott Avenue and Nameoke Avenue. A connecting vertical alignment, however, may be problematic given that the Mott Avenue station is elevated, and the Far Rockway Station is at-grade and the alignment needs to cross Mott Avenue and Nameoke Avenue. This connection would allow for LIRR trains stored in the existing Far Rockaway Yard to be sent west and across Jamaica Bay. Further investigation of the existing track elevations, roadway elevations and clearances is required.

In addition, the New York City Council recently approved the rezoning plan for downtown Far Rockaway (in the vicinity of the Mott Ave. "A" train terminal) in September 2017. This multi-million dollar rezoning is expected to spend $126 million of city funds on a $288 million plan to revitalize a 23-block blighted area, with the remainder of the funding to come from the federal government and private groups.[2] The rezoning plan will also include a new park, library, sewer and sidewalk improvements, a pilot program to extend the shuttle bus to the newly opened Rockaway ferry landing as well as funding to acquire the Far

[2] Parry, Bill. "City Council approves rezoning plan for downtown Far Rockaway." *Times Ledger*, 15 Sep 2017.

Rockaway Shopping Center which has been abandoned for decades.[3] The progression of this alternative for Far Rockaway would involve considerable political, agency, community and stakeholder outreach given the high priority of these plans. The city agencies involved with this rezoning and redevelopment include New York City Department of City Planning (NYCECP), New York City Economic Development Corporation (NYCEDC), NYC Councilman Donovan Richards, New York City Department of Housing Preservation and Development (NYCHPD), NYC Department of Transportation (NYCDOT), New York City Department of Parks and Recreation (NYCDPR), NYC Department of Design and Construction (NYCDDC) and NYC Small Business Services (SBS).

The Team has determined that the provision of LIRR service past Howard Beach Station presents vast challenges. The following list includes a summary of aforementioned considerations of the extension of LIRR service into Far Rockaway:

- Extension of service past Howard Beach requires a major configuration of the existing Howard Beach Station, which would likely involve the demolition of the structure/station
- Construction of a new trestle across Jamaica Bay will bear a high cost
- New construction would require extensive environmental analysis and fortification against future extreme weather events (*See Section 3.9 for greater detail*)
- Existing NYCT Track and systems in Far Rockaway will have to undergo modifications as needed to comply with current LIRR standards
- Construction of a new alignment and station may conflict with recently approved Far Rockaway Rezoning – any development would involve considerable political, agency, community and stakeholder outreach
- "A" line stations between Mott Avenue and Beach 67 Street would experience much less frequent service (compared with the current NYCT frequency) due to LIRR infrastructure limitations.

[3] Honan, Katie. "Downtown Far Rockaway Rezoning Gets City Council Approval." *DNA Info*, 7 Sep 2017.

2.2 NEW YORK CITY TRANSIT

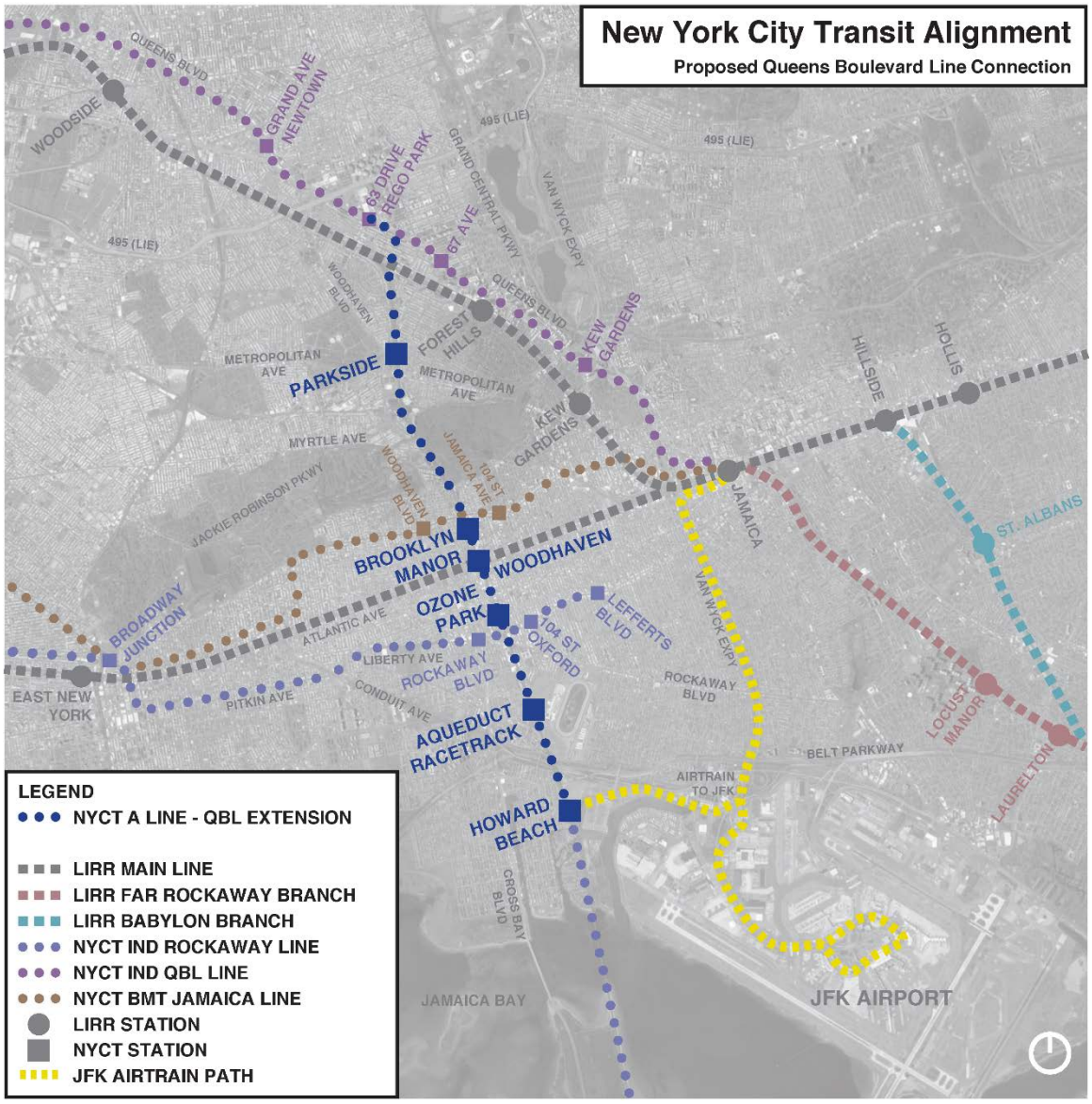


Figure 6: NYCT Subway Alignment – Restoration of the Rockaway Beach Branch

2.2.1 NYCT QBL Connection to Fleet Street (Tunnel Section – Station -1+21 to 43+00)

The proposed connection to the NYCT Queens Boulevard Line (QBL) would require an eastbound and westbound track to the proposed RBB corridor. An anticipated connection east of the 63rd Drive Rego Park Station was incorporated in the original 1930's construction as noted in the archived plan and profile drawings provided to the SYSTRA Team. The alignment shown in this study replicates the connections that were originally envisioned and are described in the sections that follow.

The westbound connection would diverge off the northern most QBL track and continue east parallel to the existing QBL alignment in a new cut and cover tunnel. The track would curve south through the 220-foot existing underpass between 65th Road and 66th Avenue on a 500-foot to 600-foot compound curve for 15 mph. operation. The track would continue under the east side of 66th Avenue for a short distance and then into a reverse curve under the LIRR Main Line. The alignment enters the abandoned RBB corridor south of the LIRR Main Line. The curved 30 mph alignment was set to avoid a large seven-story

residential building, just south of the LIRR Main Line, which is assumed to have deep pile foundations. This section of the alignment would be in a new bored tunnel which is discussed in greater detail in Section 3.4.2 of this report.

The eastbound connection would be in an existing tunnel flare section built just east of 65th Road. A 500 to 525-foot compound curve for 15 mph operation curves south to the west side of 66th Avenue and parallels the alignment described above for the westbound track.

2.2.2 Fleet Street to 97th Avenue (Embankment Section – Station 43+00 to 172+00)

Both tracks would portal north of Fleet Street and would traverse the old RBB ROW from a tunnel to an embankment section. New UG bridges would be installed at Fleet Street and Yellowstone Boulevard. The alignment will continue tangent through Metropolitan Avenue. A new NYCT subway "Parkside" Station would be located just south of Metropolitan Avenue. The station would include two side platforms for RBB service.

The alignment will continue south following the old RBB alignment on a 50 mph "S" curve over Union Turnpike and under the Jackie Robinson Parkway. The track would be constructed on a new embankment section at normal 14'-0" track centers. The track would be tangent from Jackie Robinson Parkway to Park Lane South. The tracks curve southwest to Jamaica Avenue on a 50-mph alignment. A new NYCT "Brooklyn Manor" Station would be located on tangent track just south of Jamaica Avenue. Two side platforms for RBB service are assumed.

A new NYCT subway "Woodhaven" Station will be centered over Atlantic Avenue with two side platforms for RBB service and potential customer transfer to LIRR Service on the Atlantic Branch below. The embankment in this section ends at 97th Avenue where the ROW transitions to a viaduct.

2.2.3 97th Avenue to Sutter Avenue (Viaduct Section – Station 172+00 to 211+00)

This viaduct section which has been out-of-service for many years is assumed to be replaced in its entirety with a new viaduct section. See Section 3.4.1 for more info. This section is on a tangent alignment from 97th Avenue through Liberty Avenue. A new NYCT subway "Ozone Park" Station would be located between 101st and 103rd Avenues, with two new side platforms for RBB service.

South of Liberty Avenue, a new interlocking configuration is required to tie the proposed RBB service in with existing "A" Line service. The configuration shown in this study shows the two RBB tracks tying into the westbound "A" Line track followed by a double crossover for routing to the eastbound "A" Line track. Similarly, the "A" Line tracks converge to the eastbound track and would follow normal operations from that point east. This interlocking layout allows trains to diverge either on the RBB or the "A" line, though there is a short section of single track on either connection. Alternative layouts at this location will be discussed further with NYCT. The service from Sutter Avenue south assumes existing NYCT "A" Line service as no additional infrastructure changes are planned.

3. ENGINEERING FEASIBILITY

3.1 TRACK

3.1.1 LIRR

The at-grade segments of the track bed and track structure of the RBB will follow the LIRR's track standards (MW-2000). The proposed track centers will be a minimum of 14 feet centerline to centerline. Concrete ties at 24" center to center will be used to support the track. Twelve inches of ballast and six inches of sub ballast will be used to support the rail and ties. The subgrade and sub ballast will be crowned from the center of the double track to outside of each of tracks with a minimum slope of two percent to provide proper drainage. A 2'-6" walkway will be provided on the outside of both tracks. A 10' wide access road will be provided where feasible along the alignment. A typical section for the proposed track section is shown as *Figure 7*.

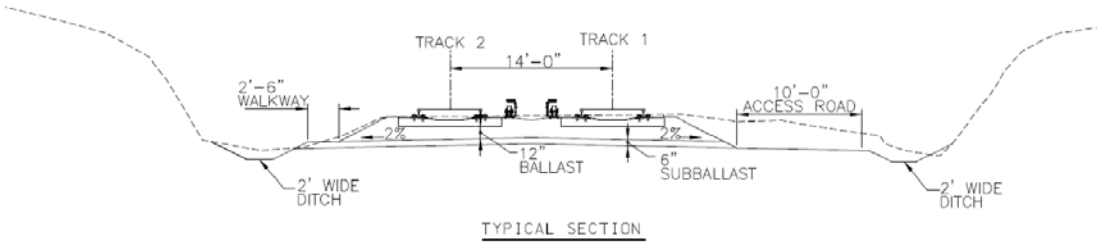


Figure 7: Typical Section of Proposed Track - LIRR

3.1.2 NYCT

The at-grade segments of the track bed and track structure of the RBB, will follow NYCT's track standards (MW-1), Type VI Track. The proposed track centers will be a minimum of 13'-6" centerline to centerline. Concrete ties at 24" center to center will be used to support the track. The rails and crossties will be set in a 14-inch ballast section with 12" shoulders. A geotextile layer will be placed on the level subgrade. A 3'-0" walkway will be provided on the outside of both tracks. A 10' wide access road will be provided where feasible along the alignment. A typical section for the proposed track section is shown as *Figure 8*.

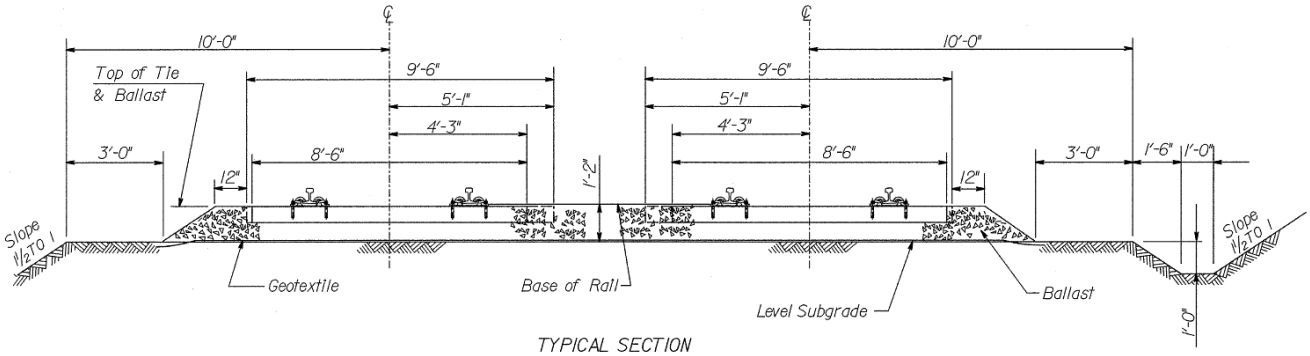


Figure 8: Typical Section of Proposed Track - NYCT

The below-grade or tunnel sections of the NYCT track structure will follow MW-1, Modified Type II Track. Type II LV Track would be an alternate track section. The proposed track centers will be a minimum of 13'-0" centerline to centerline. Wood ties in a concrete invert will be spaced at 22" center-to-center. A drainage trough will be provided in the gauge of the track. A typical section of the proposed track sections are shown as *Figure 9 and 10.*

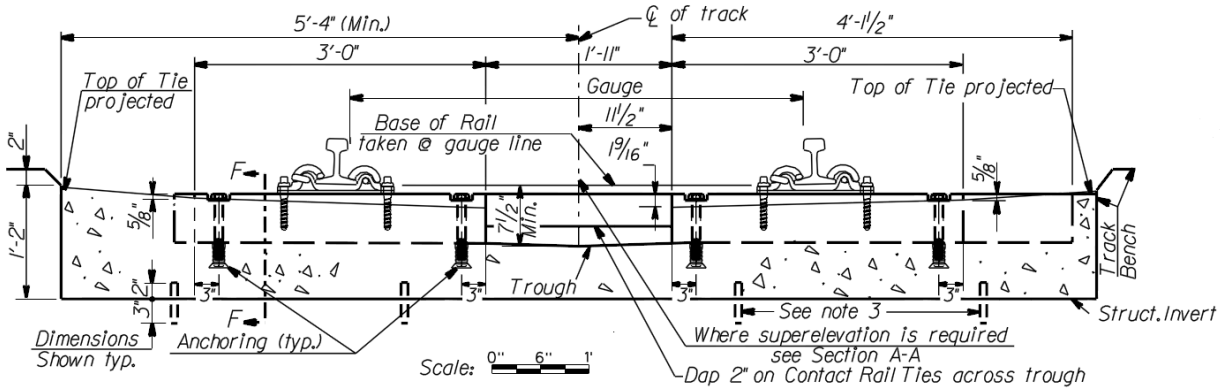


Figure 9: Modified Type II Track - NYCT

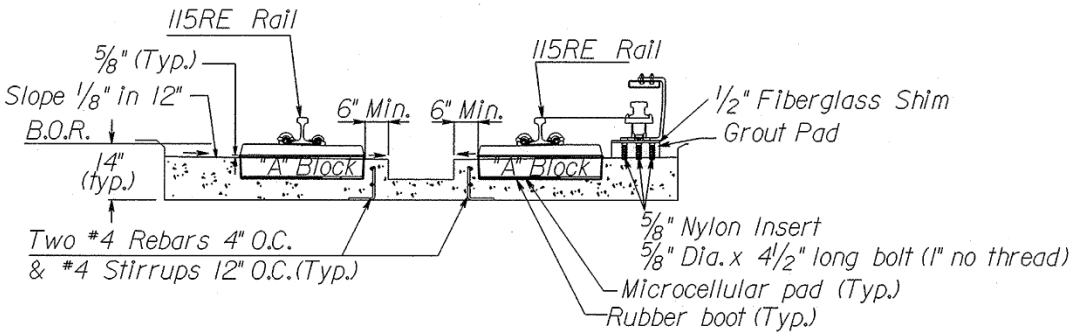


Figure 10: Type II LV - NYCT

3.1.3 Drainage

The proposed drainage for the RBB corridor will closely follow that of the abandoned alignment. Open ditches will be provided on the outside of both tracks to collect drainage from the track bed and surrounding embankments in cut sections. The water will be carried in these ditches along the track alignment to collector storm drains at roadway crossings. It should be noted that new building development since service stopped in 1962 along the RBB ROW has created additional drainage demands in the area. A formal drainage study must be undertaken to establish the existing drainage patterns and to establish the project drainage conditions to study if any modifications must be made to the existing storm drain infrastructure to accommodate restoration of the RBB line.

3.2 GEOTECHNICAL

Based on the limited geotechnical information available, the proposed NYCT tunnel alignment will fall within the soft ground. The anticipated subsurface geology at the site will consist of Fill and Organic silty Clay underlain by glacial deposits consisting of varied Silt, Clay and fine Sand, Glacial Outwash Sand and Glacial Till deposits extending to an approximate depth of 100 feet below the existing surface. This, in turn, is underlain by Raritan Clay and Lloyd Sand deposits extending to an approximate depth of 350 feet and 400 feet, respectively. Bedrock consisting of Gneiss and Schist occurs at an approximate depth of 400 feet below the existing surface. Groundwater is likely to be encountered at more shallow depths.

Based on a previous NYCT subway tunnel project in this area, tunneling through sand and gravel with occasional boulders (soft ground) will be challenging, but constructible. The general quality of ground can be described as granular, uncemented and medium dense to dense material. The anticipated tunneling problems are unstable ground (running ground/flowing ground), and face instability. At some locations, there may be a heavy inflow of groundwater and hence deep dewatering wells may be required.

The tunnel alignment will likely affect the foundation elements for some of the structures within the public ROW along 66th Street. Some multi-story buildings here may likely be founded on deep foundations. Buildings not founded on piles may be acceptable to remain in place, with a compensation grouting program to account and adjust for settlement during the Tunnel Boring Machine (TBM) drive.

To the south of the proposed alignment, more towards Rockaway Boulevard/Howard Beach, the thickness of soil layers generally increases as a result of the increase in the thickness of glacial till layer. It is likely that this layer will be underlain by glacial Gardiners clay and Jameco gravel deposits. The depth of bedrock increases to approximately 600 feet.

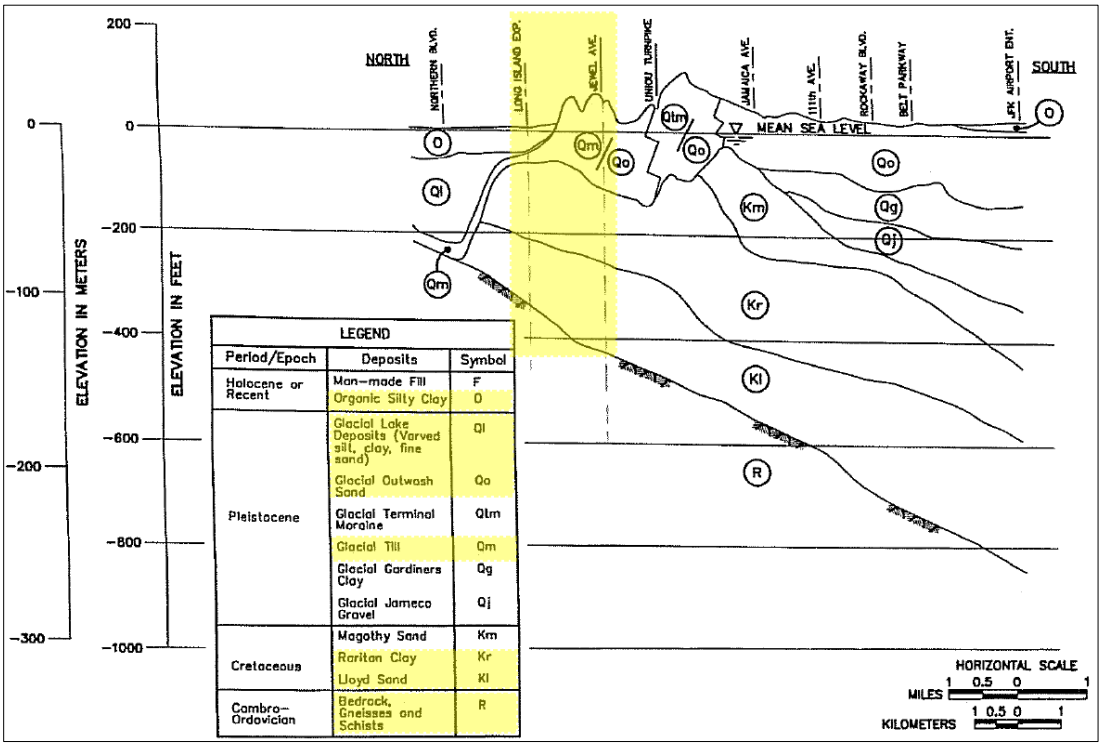


Figure 11: Geological Section of Queens

3.3 STATIONS

The following table provides a summary of existing conditions at selected stations.

Table 2: LIRR/NYCT Stations – Existing Conditions Matrix

	Station Name/ Description	Rego Park	Parkside	Brooklyn Manor	Woodhaven	Ozone Park	Aqueduct Racetrack	Howard Beach
	Potential LIRR Station	●	●		●	●	●	●
	Potential NYCT Station		●	●	●	●	●	●
	Current NYCT Station	●					●	●
EXISTING ELEMENTS	Existing/Historical Station				●	●	●	●
	Existing Platforms				●	●	●	●
	Track Elevation (0'-10')							●
	Track Elevation (10'-20')			●				
	Track Elevation (20'-30')	●	●		●		●	
	Track Elevation (30' +)					●		
	Two Track ROW		●	●	●			
	Four Track ROW	●				●	●	●
	Retaining Wall System	●	●	●	●			●
	Earth Berm	●	●	●	●			
	Viaduct Structure					●		
	Existing Access Stairs	●						
	Adjacent Residential	●		●	●	●		●
	Adjacent Commercial	●	●	●	●	●		●
	Adjacent Institutional		●					

	Station Name/ Description	Rego Park	Parkside	Brooklyn Manor	Woodhaven	Ozone Park	Aqueduct Racetrack	Howard Beach
	Adjacent Major Street Crossing	●	●	●	●			
	Adjacent Dead End Streets	●			●			●
	Adjacent Green Spaces		●					●
	Adjacent Parking Lots		●		●		●	●
	Passenger Overpass						●	●
	Passenger Underpass							

3.3.1 LIRR – Typical Station Components

Overall Station Intent

The LIRR Station is an open platform system. The possible stations are derived from historic station locations and are as detailed in the sections that follow.

A typical platform will have a minimum of two staircases on each platform, and an elevator on one end of each platform. Elevators shall be located on the platform end closest to the major cross street. Where space is available, additional staircases may be provided.

Station Platforms

Platform length is typically 700', to accommodate for eight standard M7/M9 train cars. Single track platforms shall be a minimum of 12' wide along the entire length of the platform. Center island type platforms shall maintain a minimum of 22' wide along the entire length of the platform. All LIRR station platforms should include an Automatic Snow and Ice Melting System (ASIMS). The stations will have Ticket Vending Machines (TVMs).

Wind Walls

The wind wall will be placed along the majority of the platform serving as a buffer (wind, noise and sight) between track and adjacent neighborhood fabric. A canopy structure above will be provided, along portions of the platforms, affixed to the wind wall, for shade and rain protection. On either end of the platforms, there shall be a conventional guard rail system in place, instead of the wind wall, for more clear sightlines when entering and exiting the platforms.

Connection between Platforms

It is assumed that a connection between platforms will be made by the existing street grade. Selected sidewalk work and curb cuts would provide an ADA path of travel. Where center island platforms are proposed, overpass structures will be provided to access the existing street grid to these center platforms.

3.3.2 LIRR - Rego Park Station

3.3.2.1 Existing Conditions

The extents of the existing site chosen for the new platforms have only limited remnants of an existing station or historical fabric. There is a maintenance access stair on the south side of the tracks on the southeast corner of Woodhaven Blvd. The tracks are elevated above street level at a minimum of 20' above the adjacent streetscape with naturally sloping berms on both sides down to grade. However, there is an exception on the north and south side of Woodhaven Blvd as well as a portion of the north side by 62nd Avenue where a retaining wall system exists.

The adjacent areas are mostly residential; predominantly 2-1/2 story attached row houses on the south side with 2-1/2 story single family detached houses on the north side. The elevated platforms will abut residential neighborhood backyards that are below in elevation. There are several high rise residential buildings and a single commercial building within the vicinity of this site. On the west side of the proposed platform, there is a major street intersection at Woodhaven Boulevard and Eliot Avenue. On the east side of the proposed platform, on both the north and south side, there is a two-way dead-end street.

3.3.2.2 Possible Concept

Restoration of this station would require the west side of the project site at both the north and south will contain the main entry for each platform. A stair (with canopy) and elevator will be proposed at this end of each platform. The east side of the project site contains the secondary entry. A stair (straight run with canopy) will be located at this area for each of these platforms. A platform size of 12' by 700' is indicated on the conceptual plan. On the north side of the tracks the platform will be required to extend past the 700' dimension in order to connect into the existing street grid. On the south side of the platform the length can be shortened to fit within the context of the street grid. A wind wall and canopy system shall be provided along both the north and south platforms.

The proposed platform will be constructed in the typical LIRR station design – concrete slabs resting on concrete round column footings. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevator will consist of a glass enclosure system.

3.3.3 LIRR – Parkside Station

3.3.3.1 Existing Conditions

The extents of the existing site chosen for the new platforms have no remnants of an existing station or historical fabric. There appears to be no access stair on either side of the tracks. The tracks are elevated above street level at a minimum of 20' above the adjacent streetscape with naturally sloping berms on both sides down to grade. There is a retaining wall at varying heights on the west side of the site.

The west side of the proposed platform is adjacent to single story commercial properties and parking lots. The east side of the proposed platform is adjacent to green space, parking lots, and the Queens Metropolitan High School. On the north side of the proposed platform, there is a major street intersection at Metropolitan Avenue. On the south side of the proposed platform is a parking lot to the west and a one-way street on the east.

3.3.3.2 Possible Concept

Restoration of this station would require the north side of the project site at both the west and east will contain the main entry for each platform. A stair (with canopy) and elevator will be proposed at each these platforms. The south side of the project site contains the secondary entry. A stair (straight run with canopy) will be located at this area for each of these platforms. A platform size of 12' by 700' is indicated on the conceptual plan that connects into the existing street grid. A wind wall and canopy system shall provide partial coverage along both the east and west platforms.

The proposed platforms will be constructed in the typical LIRR station design – concrete slabs resting on concrete round column footings. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly, and be roofed over. The proposed elevators will consist of a glass enclosure system. The station will have TVMs and the station platforms will have ASIMS.

Further Studies are needed:

- Dimensional constraints at elevators.
- Dimensional constraints at stairs to street.
- Pedestrian circulation paths to stairs not directly adjacent to the street grid.

3.3.4 LIRR – Woodhaven Station (Atlantic Avenue)

3.3.4.1 Existing Conditions

The extents of the existing site chosen for the new platforms have remnants of an existing station or historical fabric. Platforms and tracks exist. There appears to be no access stairs on either side of the tracks. The tracks are elevated above street level at a minimum of 20' above the adjacent streetscape with naturally sloping berms on both sides down to grade with a retaining wall at varying heights.

The west side of the proposed platform is adjacent to residential, 2-1/2 story single family detached houses and mixed use three story residential and commercial properties. On the west side at the south is mostly commercial buildings and a surface lot school bus depot. The east side of the proposed platform is mostly 2-1/2 story residential buildings with a mix of detached and attached housing units located to the north. On the east side to the south is mostly single story detached commercial property with some 2-1/2 story detached residential buildings at the very south side.

The elevated platforms will abut residential backyards that are below in elevation in some locations. Within the middle of the project site is a major street intersection, Atlantic Avenue. To the north there is no secondary street access on the west side platform. To the north, the east side platform does have street access to 93rd Street, a dead-end street that is perpendicular to the tracks. At the south side of the project site, there is no direct access to the west side platform. The east side platform on the south side does have a direct street connection at 100th Street that runs parallel to the tracks or at 95th Street that runs perpendicular.

3.3.4.2 Possible Concept

The restoration of this station would require the north side of the project site at both the west and east will contain a secondary entry for each platform. A stair (with canopy) will be proposed at each these platforms. On the west platform, this stair does not have any connection to an adjacent street grid. It is assumed that there will be a pedestrian path that will follow to Atlantic Avenue. On the east platform this stair has near direct access to 93rd Avenue. It is assumed that there will be a pedestrian path that will follow to this street.

Within the middle of the platform will be the main entry at both the west and east platforms. A stair (with canopy) and elevator will be proposed at each of these platforms.

The south side of the project site, at both the west and east, will contain another secondary entry for each platform. A stair (with canopy) will be proposed at each these platforms. On the west platform, this stair does not have any connection to an adjacent street grid. Further studies are needed to see where this pedestrian path terminates. On the east platform this stair has direct access to 100th Street. Further studies are needed as this street has dimensional constraints.

A platform size of 12’ by 700’ (as indicated on the conceptual plan) connects into the existing street grid. A wind wall and canopy system shall provide partial coverage along both the east and west platforms.

The proposed platform will be constructed in the typical LIRR station design – concrete slabs resting on concrete round column footings. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevator will consist of a glass enclosure system.

The station platforms will have TVMs and the station platforms will have ASIMS.

Further Studies are needed:

- Dimensional constraints at elevators.
- Dimensional constraints at stairs to street.
- Pedestrian circulation paths to stairs not directly adjacent to the street grid.
- Investments required at former Woodhaven Station (Atlantic Branch) which would be necessary to restore service to that station and provide a customer connection to/from the RBB.

3.3.5 LIRR – Ozone Park Station

3.3.5.1 Existing Conditions

The extents of the existing site chosen for the new platforms have remnants of an existing station and historical fabric. Platforms, tracks and overhead signal structures exist. There appears to be no access stairs on either side of the tracks. The tracks are elevated above street level at a minimum of 30’ above the adjacent streetscape cantilevering off from the viaduct structure. Below the viaduct are commercial businesses and warehouses.

To the west and east of the proposed platform, the adjacent areas are mostly commercial with some residential uses. The west side of the platforms, 99th Street, is predominately single story detached commercial businesses and three-story attached and detached residential buildings. The one-way street is wide with sidewalks on both sides. The east side of the platforms, at 100th Street, is comprised of single or two-story attached commercial buildings with a single 3-story residential building. The one-way street is narrow with a typical sized sidewalk on the east side only. The west side of 100th Street is a narrow, with an approximately one-foot wide concrete curb.

3.3.5.2 Possible Concept

Restoration of this station would require extensive reconstruction since the site is unable to accommodate vertical circulation elements. Both the north side and south side of the project site are equal in terms of space and focus. The west side of the project site has more space at street level over the east side. At the west side of the project site, a stair (with canopy) will be proposed from platform to street at both the north and south entries. Additionally, an elevator will be proposed on the west side, currently placed on the south side. Due to limited sidewalk availability, the east side of the project site currently has both stairs proposed to go through the cantilevered platform to street. This will affect current commercial properties at these locations. On the east side of the project, an elevator is currently located on the south side. All vertical circulation elements will need to be developed and studied further. Both platform sizes of 12' by 700' are indicated on the conceptual plan and connect into the existing street grid. A wind wall and canopy system shall provide partial coverage along both the east and west platforms.

The proposed platform will be constructed in the typical LIRR station design – concrete slabs resting on concrete round column footings that will be built atop a reconstructed viaduct structure. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevator will consist of a glass enclosure system. The station will have TVMs and the station platforms will have ASIMS.

Further Studies are needed:

- Dimensional constraints at elevator.
- Dimensional constraints at stairs to street

3.3.6 LIRR – Aqueduct Station

3.3.6.1 Existing Conditions

The NYCT "A" line is currently in service at this station. There are currently four tracks in existence at this location, one of which is fully removed from service. The easternmost track is being used to serve the casino and racetrack for westbound "A" line service, while the westernmost track is used for eastbound "A" line service. The middle track is active for train movements. All existing station elements must be demolished in order to reuse this station for dual LIRR/NYCT train service.

3.3.6.2 Possible Concept

Restoration of this station would require the reactivation of all four existing tracks: the two westernmost tracks to be used for NYCT "A" line service, and the two easternmost tracks to be used for LIRR service. Between each set of tracks (LIRR and NYCT) there will be a 700' long, 22' wide island type platform, each with a standing seam type, center column mounted canopy. Connecting each platform to the street level will be two separate overpass structures, one on the north end of the platforms, and one on the south end. The overpass structures would span across both platforms, providing stair and elevator access down to each platform. On the east side of the platforms the overpasses would be connected into an elevated walkway which provides direct access into Aqueduct Racetrack Casino. In addition, there would be street access stairways and ADA elevators on both the north and south ends of the overpass structures.

A platform size of 12' by 700' is indicated on the conceptual plan. A wind wall and canopy system shall be provided along both the east and west platforms.

The proposed platform will be constructed in the typical LIRR station design – concrete slabs resting on concrete round column footings sitting on the berm. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevators will consist of a glass enclosure system. The station platforms will have ASIMS (Automatic Snow and Ice Melting System).

3.3.7 LIRR – Howard Beach Station

3.3.7.1 Existing Conditions

The complex at the Howard Beach Station was rebuilt in late 2003 to incorporate access to JFK Airport via the AirTrain. Tracks servicing NYCT are on grade level with four tracks. The outer tracks are being used by NYCT for the "A" line. Only one of the middle tracks is currently functional, the other one has been removed from service. The southbound track has a wind wall that separates the residential and commercial properties from the station.

The northbound track that is currently adjacent to the existing parking lot services the AirTrain and NYCT commuters. The parking lot is accessed from Aqueduct Road. The current station's main entrance is on 159th Avenue with direct access to the ground level tracks.

3.3.7.2 Possible Concept

Restoration of this station would require the northbound track will be demolished, while the existing southbound track will remain. A stair (straight run with canopy) will be proposed at the platform. A platform size of 15' by 700' is indicated on the conceptual plan that connects into the existing parking area. The existing access from the station building will remain. The wind wall will be placed along the majority of the platform serving as a buffer (wind, noise and sight) between the track platform and the parking area. A canopy structure above will be provided affixed to the wind wall for shade and rain. At each end of the platform there will be a more conventional guardrail to allow clear visual sight lines when entering and exiting the platform.

The proposed platform will be constructed in the typical LIRR station design – concrete slabs resting on concrete round column footings. The stairs from street grade to platform level will be open, consisting of a metal tread and closed riser assembly and be roofed over.

The station will have TVMs and the station platforms will have ASIMS.

Further Studies are needed:

- Dimensional constraints at stairs to street.

3.3.8 NYCT – Typical Station Components

3.3.8.1 Overall Station Intent

The NYCT subway is a controlled platform system. Control areas consisting of turnstiles will be provided in order to access the platforms. High Exit Entrance Turnstiles (HEET) will be provided at secondary locations. All control areas will be, at a minimum, covered by a roof.

3.3.8.2 Station Platforms

Proposed platform length is to be approximately 700', in order to accommodate the 8-10 R46 or R68A train cars. Train car size is approximately 75 feet with the typical eight-car trains being around 600 feet in total length. Single track platforms are proposed to be a minimum of 12' wide and center island platforms to be proposed at a minimum of 15' wide.

3.3.8.3 Wind Walls

The wind wall will be placed along the majority of the platform serving as a buffer (wind, noise and sight) between the tracks and adjacent neighborhood fabric. A canopy structure above will be provided, affixed to the wind wall, for shade and rain protection. On either end of the platforms, there shall be a conventional guard rail system in place instead of the wind wall, for more clear sightlines when entering and exiting the platforms.

3.3.8.4 Connection between Platforms

It is assumed that connection between platforms will be made to the existing street grade. Where center island platforms are proposed, overpass structures will provide access to the existing street grid using these center platforms.

There is no proposed underground or below elevated track (mezzanine) connection at this time.

3.3.9 NYCT – Parkside Station

3.3.9.1 Existing Conditions

Refer to Section 3.3.3: LIRR - Parkside Station

3.3.9.2 Possible Concept

Restoration of this station would require the north side of the project site, at both the west and east, will contain the main entry for each platform. A stair (with canopy) and elevator will be proposed at each these platforms along with a control area with NYCT turnstiles and ticket vending machines. The south side of the project site contains the secondary entry. A stair (straight run with canopy) will be located at this area for each of these platforms along with a control area containing NYCT HEETs and ticket vending machines. A platform size of 12' by approximately 700' (as indicated on the conceptual plan) connects into the existing street grid.

The wind wall will be placed along the majority of the platform serving as a buffer (wind, noise and sight) between the track platform and the adjacent buildings. A canopy structure above will be provided affixed to the wind wall for shade and rain. At each end of the platforms there will be a more conventional guardrail to allow clear visual sight lines when entering and exiting the platform.

The proposed platform will be constructed of a concrete slab resting on concrete round column footings. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevator will consist of a glass enclosure system.

Further Studies are needed:

- Dimensional constraints at elevators.
- Dimensional constraints at stairs to street.
- Pedestrian circulation paths to stairs not directly adjacent to the street grid.

3.3.10 NYCT – Brooklyn Manor Station

3.3.10.1 Existing Conditions

The extent of the existing sites chosen for the new platforms have no remnants of an existing station or historical fabric. The tracks are elevated above street level at a minimum of 20' above the adjacent streetscape with naturally sloping berms on both sides down to grade with a retaining wall system exists at the north side of the site.

To the west and east of the proposed platform, the adjacent areas are mostly residential, predominantly 2-1/2 story single family detached houses on the west side and a mix of 2-1/2 story single family detached and attached row houses on the east side. At the north side are commercial buildings located on the east side. The elevated platforms will abut residential backyards that are below in elevation. The north side of the site at both the west and east platform includes a major street intersection at Jamaica Avenue. Additionally, there is another elevated overhead track system (minimum 40' above grade) for the J and Z line. The east platform side has two dead-end streets, 87th and 88th Streets. The west platform has no additional adjacent streets other than the primary entry point.

3.3.10.2 Possible Concept

Restoration of this station would require the north side of the project site at both the west and east will contain a primary entry for each platform. A stair (with canopy) and elevator will be proposed at each of these platforms along with a control area with NYCT turnstiles and fare vending machines.

The east platform can have a secondary entry at 88th Street. Currently a single stair (with canopy) will be proposed at this platform along with a control area with NYCT HEETs and fare vending machines. There is no secondary entry for the west platform proposed at this time.

A platform size of 12' by approximately 700' (as indicated on the conceptual plan) connects into the existing street grid. The proposed platform will be constructed of a concrete slab resting on concrete round column footings sitting on the berm. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevator will consist of a glass enclosure system.

Further Studies are needed:

- Dimensional constraints at elevators.
- Dimensional constraints at stairs to street.
- Pedestrian circulation paths to stairs not directly adjacent to the street grid on the west platform side.

3.3.11 NYCT – Woodhaven Station

3.3.11.1 Existing Conditions

Refer to Section 3.3.4: LIRR - Woodhaven Station (Atlantic Avenue)

3.3.11.2 Possible Concept

Restoration of this station would require the north side of the project site at both the west and east will contain a secondary entry for each platform. A stair (with canopy) will be proposed at each of these platforms along with a control area with NYCT turnstiles and fare vending machines. On the west platform this stair does not have any connection to an adjacent street grid. It is assumed that there will be a pedestrian path that will follow to Atlantic Avenue. On the east platform, this stair has near direct access to 93rd Avenue. It is assumed that there will be a pedestrian path that will follow to this street.

Within the middle of the platform will be the main entry at both the west and east platforms. A stair (with canopy) and elevator will be proposed at each of these platforms along with a control area with NYCT turnstiles and fare vending machine.

At the south side of the project site, at both the west and east sides, is a secondary entry for each platform. A stair (with canopy) will be proposed at each these platforms along with a control area with NYCT HEETs and fare vending machines. On the west platform, this stair does not have any connection to an adjacent street grid. Further studies are needed to see where this pedestrian path terminates. On the east platform this stair has direct access to 100th Street. Further studies are needed as this street has dimensional constraints.

A platform size of 12' by approximately 700' (as indicated on the conceptual plan) connects into the existing street grid.

The proposed platform will be constructed of a concrete slab resting on concrete round column footings sitting on the berm. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly, and be roofed over. The proposed elevator will consist of a glass enclosure system.

Further Studies are needed:

- Dimensional constraints at elevators.
- Dimensional constraints at stairs to street.
- Pedestrian circulation paths to stairs not directly adjacent to the street grid.

3.3.12 NYCT – Ozone Park Station

3.3.12.1 Existing Conditions

Refer to Section 3.3.5: LIRR – Ozone Park Station

3.3.12.2 Possible Concept

Overall the project site, as it currently exists at street level, is restricted in placement of vertical circulation elements. Both the north side and south side of the project site are equal in terms of space and focus. The west side of the project site has more space at street level over the east side. At the west side of the project site a stair (with canopy) will be proposed from platform to street at both the north and south entries along with a control area with NYCT turnstiles and fare vending machines. Additionally, an elevator will be proposed on the west side, currently placed on the south side. The east side of

the project site at street level, due to limited sidewalk, currently has both stairs proposed to go through the cantilevered platform to street. This will affect current commercial properties at these locations below. On the east side of the project, an elevator is currently located on the south side. All vertical circulation elements will need to be developed and studied further. Both platform sizes of 12' by approximately 700' are indicated on the conceptual plan and connect to the existing street grid.

The proposed platform will be constructed of a concrete slab resting on concrete round column footings that will be built atop a reconstructed viaduct structure. The stairs from street grade to platform will be open, consist of a metal tread and closed riser assembly and be roofed over. The proposed elevator will consist of a glass enclosure system.

Further Studies are needed:

- Dimensional constraints at elevator.
- Dimensional constraints at stairs to street.

3.3.13 NYCT – Aqueduct Racetrack Station

3.3.13.1 Existing Conditions

New York City Transit "A" line is currently in service at this station. There are currently four tracks in existence at this location, one of which is fully removed from service. The easternmost track is being used to serve the casino and racetrack for westbound "A" line service, while the westernmost track is used for eastbound "A" line service. The middle track is active for train movements.

3.3.13.2 Possible Concept

No significant modifications are required for RBB service.

3.3.14 NYCT – Howard Beach Station

Existing Conditions

The complex at Howard Beach Station was rebuilt in late 2003 to incorporate access to JFK Airport via the AirTrain. Tracks servicing NYCT are on grade level with four tracks. The outer tracks are being used by NYCT for the "A" line. Only one of the middle tracks is currently functional, as the other one has been removed from service. The southbound track has a wind wall that separates the residential and commercial properties from the station.

The northbound track that is currently adjacent to the existing parking lot services AirTrain and NYCT commuters. The parking lot is accessed from Aqueduct Road. The current station's main entrance is on 159th Avenue with direct access to the ground level tracks.

Possible Concept

No significant modifications are required for RBB service.

3.4 STRUCTURES

3.4.1 Bridges

The existing bridge structures along the alignment have been neglected for at least the last 55 years, with many of them either close to or past their useful life. We propose full replacement of the structures by removing the existing spans by crane and placing on flatbed trucks to be removed from the area. Abutments would be repaired and replaced as necessary to receive the new spans, which would be lifted into position from the street.

Between White Pot Junction and Atlantic Avenue, 9 bridge structures would be demolished, and 10 replacement structures would be constructed (the bridge over the LIRR Lower Montauk Branch had been previously demolished). Temporary impacts from the demolition and reconstruction of the bridges would include vehicle and pedestrian delays due to temporary traffic patterns, increased traffic due to construction equipment, and increased noise caused by the demolition and construction. Residential impacts will be primarily limited to neighborhood traffic congestion and noise.

Between Atlantic Avenue and Rockaway Boulevard, four additional bridge structures would be removed and reconstructed. South of Atlantic Avenue, the right-of-way supports a four-track alignment, but with reactivation, replacement structures need only to be a two track for NYCT operation.

The specific bridge structures and the required work are listed below:

3.4.1.1 Grand Avenue Bridge

This roadway bridge is over the LIRR Main Line tracks. The LIRR RBB connection requires adding two tracks along its north and south abutment areas. Since space is available for these additional tracks, there should not be any impact to this bridge. The existing bridge, however, can impose aerial constraint to construction but it is not anticipated to be a major issue. Construction access can be obtained from adjacent streets, if needed.

3.4.1.2 55th Avenue Pedestrian Bridge

This pedestrian bridge is over the LIRR Main Line tracks and appears to have sufficient space to fit the two additional tracks for the LIRR RBB connection. While it is an aerial obstruction to construction, it should not present a major issue or obstacle. Construction access can be obtained from adjacent streets, if needed.

3.4.1.3 57th Avenue Bridge

This bridge carries LIRR Main Line tracks over the roadway and has sufficient room to fit the two additional tracks for the LIRR RBB connection. The bridge appears to be in fair condition but requires repainting of its superstructure. This bridge imposes a non-standard vertical clearance to roadway underneath (12'-6" posted clearance – actual vertical clearance per inspection report 13'-11") and it was suggested in an internal engineering review document to raise the bridge to provide the 14' minimum vertical clearance. Raising this bridge can impact all of the Main Line tracks as well as increase costs significantly; therefore, it is not recommended. As this non-standard vertical clearance is an existing condition and the bridge does not need widening to fit the additional tracks, LIRR should not have any obligation to improve the vertical clearance. Lowering the roadway for additional vertical clearance could be an option but it would impact the driveway access of a few existing residential properties located in the northwest quadrant.

Maintenance and Protection of Traffic (MPT) is required to repaint the 57th Avenue Bridge. Construction access needs to be provided from LIRR Main Line ROW. If necessary, crane stationing on 57th Avenue is feasible with lane closures.

It is not clear at this point if this bridge meets the current seismic design requirements; however, since it carries the Main Line tracks, seismic retrofit is not recommended as part of this study.

3.4.1.4 I-495 Bridge

This bridge carries LIRR Main Line tracks over I-495, also known as the Long Island Expressway (LIE), and has sufficient room to fit the additional tracks for the connection. The bridge appears to be in fair condition but requires repainting of its superstructure and repairing of its pier and "tunnel" walls. The minimum vertical clearance under the bridge is 14'-5" per its recent inspection report provided by LIRR.

The necessary work on this bridge requires major MPT on LIE as well as travel lane closures. Construction access needs to be provided from LIRR Main Line ROW. If necessary, crane stationing on LIE is feasible with lane closures.

It is not clear at this point if this bridge meets the current seismic design requirements; however, since it carries the Main Line tracks, seismic retrofit is not recommended as part of this study.

3.4.1.5 Woodhaven Boulevard Bridge

This bridge carries LIRR Main Line tracks over Woodhaven Blvd and also has sufficient room to fit the additional tracks for the connection. The bridge appears to be in fair condition but requires repainting and repairing of its superstructure and pier columns. This bridge imposes a non-standard vertical clearance to roadway underneath (12'-9" posted clearance – actual vertical clearance per inspection report 13'-9"). However, as this non-standard vertical clearance is an existing condition and

the bridge does not require widening to fit the additional tracks, LIRR should not have any obligation to improve the vertical clearance.

The required work on this bridge requires substantial MPT on Woodhaven Boulevard and travel lane closures are most likely required. Construction access needs to be provided from LIRR Main Line ROW. If necessary, crane stationing on Woodhaven Boulevard is feasible with lane closures.

It is not clear at this point if this bridge meets the current seismic design requirements; however, since it carries the Main Line tracks, seismic retrofit is not recommended as part of this study.

3.4.1.6 63rd Drive Bridge

This bridge carries LIRR Main Line tracks over 63rd Drive and also has sufficient room to fit the additional tracks for the connection. The bridge appears to be in fair condition but requires repainting of its superstructure and repairing of its underdeck. This bridge imposes a non-standard vertical clearance to roadway underneath (12'-6" posted clearance – actual vertical clearance per inspection report 13'-6"). However, as this non-standard vertical clearance is an existing condition and the bridge does not need widening to fit the additional tracks, LIRR should not have any obligation to improve the vertical clearance.

The repainting and repairing work requires MPT on 63rd Drive, but it is not a significant effort. Construction access needs to be provided from LIRR Main Line ROW. If necessary, crane stationing on 63rd Drive is feasible with lane closures.

It is not clear at this point if this bridge meets the current seismic design requirements; however, since it carries the Main Line tracks, seismic retrofit is not recommended as part of this study.

3.4.1.7 Fleet Street (66th Avenue) Bridge

This bridge carries the abandoned RBB tracks over Fleet Street and continues to be used for the new LIRR RBB connection tracks. This bridge is older than 75 years and appears to have not been maintained after 1962. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life.

MPT on Fleet Street is required for the bridge work. Construction access is mainly from the RBB ROW.

3.4.1.8 Yellowstone Boulevard Bridge

This bridge carries the abandoned RBB tracks over Yellowstone Boulevard and continues to be used for the new LIRR RBB connection tracks. This bridge is older than 75 years and appears to have not been maintained after 1962. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life.

MPT on Yellowstone Boulevard is required for the bridge work. Construction access can be obtained from the RBB ROW and Yellowstone Blvd.

3.4.1.9 Metropolitan Avenue Bridge

This bridge carries the abandoned RBB tracks over Metropolitan Avenue and continues to be used for the new LIRR RBB connection tracks. This bridge is older than 75 years and appears to have not been maintained after 1962. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life.

MPT on Metropolitan Avenue is required for the bridge work. Construction access can be obtained from the RBB ROW.

3.4.1.10 Lower Montauk Bridge (*New*)

The reactivated RBB requires a new bridge to be built to carry the LIRR RBB tracks over the Lower Montauk Branch tracks. Reuse of any remnants of the former bridge would require a field investigation and structural inspection. This bridge situates at a confined location and construction access needs to be obtained through commercial and/or NYC Department of Parks and Recreation properties. Construction would need to be coordinated with New York and Atlantic Railway (NYAR) which operates freight train service on the Lower Montauk Branch.

3.4.1.11 Union Turnpike Bridge

This bridge carries the abandoned RBB tracks over Union Turnpike and will continue to be used for the new LIRR RBB connection tracks. This bridge is older than 75 years and appears it has not been maintained after 1962. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life. The existing pedestrian bridge crossing the RBB tracks at this site also requires replacement to provide adequate vertical clearance and be upgraded to current ADA standards. A more in depth field investigation is required to assess what those ADA improvements would consist of. The construction of this pedestrian bridge should not be an onerous effort.

MPT on Union Turnpike is required for the bridge work. However, this bridge is located within a confined area and construction access would need to be obtained via commercial and residential properties. Crane operation can be done from Union Turnpike with travel lane closures.

3.4.1.12 Jackie Robinson Parkway Bridge

The new LIRR RBB connection tracks run under this bridge. As evidenced within an internal engineering review document, there is sufficient clearance under the bridge to accommodate the track alignments. While there is no major issue with construction in this area, the existing bridge imposes overhead constraint to the construction activities. It is necessary to minimize impact to trees in this area.

3.4.1.13 Myrtle Avenue Bridge

The new LIRR RBB connection tracks run under this bridge. As evidenced within an internal engineering review document, there is sufficient clearance under the bridge to accommodate the track alignments. While there is no major issue with construction in this area, the existing bridge imposes overhead constraint to the construction activities. It is necessary to minimize impacts to trees in this area.

3.4.1.14 Forest Park Bridge

The new LIRR RBB connection tracks run under this bridge. As evidenced within an internal engineering review document, there is sufficient clearance under the bridge to accommodate the track alignments. While there is no major issue with construction in this area, the existing bridge imposes overhead constraint to the construction activities. It is necessary to minimize impacts to trees in this area.

3.4.1.15 Park Lane South Bridge

This bridge carries the abandoned RBB tracks over Park Lane South and continues to be used for the new LIRR RBB connection tracks. This bridge is older than 75 years and appears it has not been maintained after 1962. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life. The replacement can also allow for improvement to the existing non-standard vertical clearance (12’-8” posted vertical clearance) with slight raise in the new track grade.

MPT on Park Lane South is required for the bridge work and it is pretty straightforward. Construction access can be obtained from the RBB ROW and the adjacent local streets with construction ramps. Crane operation can be done from Park Lane with travel lane closures.

3.4.1.16 Jamaica Avenue Bridge

This bridge carries the abandoned RBB tracks over Jamaica Avenue and continues to be used for the new LIRR RBB connection tracks. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life. However, the existing NYCT overhead structure and its columns for the "J" & "Z" subway lines makes the replacement work extremely difficult. Special bridge type and construction techniques would need to be deployed.

MPT on Jamaica Avenue is required with some complexity due to the proximity of the existing columns of the NYCT structure as well as the need to utilize special construction techniques. Construction access from RBB ROW seems to be the only feasible method for the replacement of this bridge.

3.4.1.17 91st Avenue Bridge

This bridge carries the abandoned RBB tracks over 91st Avenue and continues to be used for the new LIRR RBB connection tracks. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life.

MPT on 91st Avenue is required for the bridge work. Construction access can be obtained from the RBB ROW. Crane operation can be done from 91st Avenue with travel lane closures. However, due to narrow roadway width, one-lane two-way MPT operation may be required.

3.4.1.18 Atlantic Avenue Bridge

This bridge carries the abandoned RBB tracks over Atlantic Avenue and continues to be used for the new LIRR RBB connection tracks. As a result, its original design most likely does not meet the current seismic requirements. Instead of performing rehabilitation, partial replacement, and seismic retrofit, a complete replacement of this bridge seems to be a better option, especially since its alignment is inactive. A new bridge would provide 75 years of service life.

MPT on Atlantic Avenue is required for the bridge work. Construction access can be obtained from the RBB ROW and Atlantic Avenue. Crane operation can be done from Atlantic Avenue with travel lane closures.

3.4.1.19 Ozone Park Viaduct

This viaduct carries the abandoned RBB tracks from 97th Avenue all the way down south to Rockaway Boulevard and will continue to be part of the reactivated RBB line. This viaduct requires a complete replacement. A typical MPT at 97th Avenue, 101st Avenue, and 103rd Avenue, is required for the viaduct work. However, MPT at Liberty Avenue is very complex due to the narrow roadway width and the proximity of the existing NYCT "A" line overhead structure. This NYCT overhead structure and its columns also make the viaduct replacement work extremely difficult. Special viaduct structure types and construction techniques are to be deployed. Longitudinal roll-in technique for pre-constructed viaduct segment may also be considered.

At Rockaway Boulevard, the existing viaduct structure also provides support to the NYCT "A" line structure at the roadway intersection area. This situation adds complexity to construction as well as the MPT since temporary support columns are required and will sit in the middle of the intersection. Partial traffic detours may be required.

Construction access for the entire viaduct work can be obtained from the RBB ROW and the adjacent local streets.

3.4.1.20 Linden Boulevard and Pitkin Avenue Bridges

These two bridges not only carry two abandoned RBB tracks but also carry two active NYCT tracks for the "A" line subway service. These two bridges have been well maintained by NYCT and do not appear to need any additional work. However, these two bridges are older than 75 years and their original design most likely does not meet the current seismic requirements. As the NYCT "A" line tracks on these two bridges also require relocation as part of the RBB reactivation, full replacement should be considered in order to meet the current seismic standards as well as gain another 75 years of service life. A full replacement can also address the non-standard vertical clearance at Linden Boulevard (12'-10" posted vertical

clearance). Replacing these two bridges will cause significant impact to NYCT operations. The feasibility of maintaining the existing bridges while constructing an independent bridge carrying a single track just south of the existing bridge, may be investigated.

For full replacement, typical MPT on both roadways is required. Construction access can be obtained from the RBB ROW. Crane operation can be done from local roadways with travel lane closures.

3.4.1.21 N. Conduit Avenue, Belt Parkway and Nassau Expressway Bridges

The realignment of the LIRR RBB tracks and NYCT "A" line tracks through these areas will not require replacement of these bridges. These bridges are in very good condition and their replacement will cause a significant impact not only to NYCT operations, but also to vehicular traffic on these major highways.

3.4.2 Tunnels

3.4.2.1 Scope

The NYCT extension of the RBB line to QBL provides a direct underground connection to the existing QBL Station at 64th Street. The underground tunneling section begins at-grade from Fleet Street, north within the NYCT ROW, beneath the LIRR Main Line, continuing north beneath 66th Street and connecting to the existing eastbound and westbound NYCT at Queens Boulevard Station at 64th Street. The tunneling structures will follow the proposed track alignment shown in *Figure 12* and section shown in *Figures 13* & *14*. Several tunneling methods are considered for this study including Tunnel Boring Machine (TBM) method using segmental precast concrete liner, Sequential Excavation Method (SEM) using cast in place liner, where special mining solutions may be appropriate, and Cut-and-Cover and Boat cast in place sections to complete the alignment. It is anticipated that this option may impact residential buildings for the proposed tunnel alignment and profile, subject to future detailed engineering.

Figure 12: Proposed Tunnel Alignment

3.4.2.2 Geotechnical Setting

The geotechnical regional geology is not well defined at this time. Based on reviewing geodetic surveys, it is anticipated that rock is several hundred feet deep below existing ground and overburden in the area of tunneling consists of fill, varied clay and silts, and sands with high phreatic groundwater and lower aquifer. Tunneling under these ground conditions will be challenging, but constructible. In addition, a subsurface soil exploration program of boring and testing, as well as LIRR track and adjacent structure monitoring, will be required to be successful. Controlled management of groundwater for TBM, SEM and cut-and-cover tunneling methods will be required.

3.4.2.3 Tunnel Design and Construction Consideration

Tunnel construction from the at-grade location begins at Fleet Street (Sta. 43+00) with a boat section, housing both trackways and continues into the section of cut-and-cover box and portal at Sta. 34+00. The section of cut-and-cover box will act as the temporary launch pit for the TBM. The TBM will launch through a head wall at the north face of the launch pit at Sta. 31+00. Location of the head wall to provide adequate ground cover for the TBM leaving the launch pit is critical. In addition to adequate ground cover, the width of the launch pit will include both trackways and adequate room to launch TBM's from the pit. The width of the launch pit will be 85 feet and a length of 300'; therefore, ROW for the proposed width will need to be evaluated. Based on preliminary studies, parameters of the TBM include 24 feet O.D. with the tunnel crown approximately 18.5 feet above the Top of Rail (T/R). The launch pit will be completed and covered as part of the finished tunnel.

The closed-face pressurized TBM will be driven from south to north from the launch pit head wall. One TBM will be used and each tunnel will be driven separately. The first TBM drive will be from the launch pit to the reception pit (discussed below), where the TBM will be disassembled, brought back to the launch pit and relaunched to the reception pit to complete the second tunnel alignment. Between the in-place liner reinforced first tunnel and second tunnel alignment, a minimum of one diameter pillar or wall of soil will provide support for the second "twin" tunnel. When the second drive is complete, the TBM will be dismantled and removed from the site. The area in the vicinity of the launch pit will provide construction staging facilities for TBM operations, including contractor storage, change houses, air compressor, TBM temporary substation power, handling muck, muck disposal, trucking operations, ground stabilization and grouting equipment and liner segment storages. The area required for construction staging is temporary and approximately three to four acres would be ample. Truck access is expected to be from Fleet Street with minor roadway construction and proximity to major routes. There should be no impact on surrounding residential or public use facilities along the existing ROW.

The twin TBM tunnel alignment will continue in a northerly direction clearing the existing seven-story residential building foundation south of the LIRR Main Line at approximate Sta. 26+00 along the alignment. The TBM tunnels will proceed beneath the LIRR Main Line tracks at approximate Sta. 24+00. It is anticipated that ground stabilization (grouting or ground freezing) will be required to ensure stability of the existing LIRR tracks during the TBM drive. The T/R is El. 17.45', existing grade at El. 73.0' (+/-) and tunnel crown at El. 36.0; leaving approximately 37.0' or 1.5 diameter of existing cover between TBM crown and tracks. The clearance allows for design capabilities of TBM's driven beneath the LIRR Main Line. The existing tracks will be monitored and re-ballasted, as required.

The tunnel alignment will proceed northerly through a 600' radius S-curve to align with public ROW along 66th Street. In order to meet the alignment, the TBM tunnels will drive beneath four buildings; one seven-story residential building, one three-story residential building and two single-story residential buildings. Foundation conditions are unknown at this time. The seven-story building may be founded on steel piles and may demolition and removal of piles, subject to future detailed engineering. Buildings not founded on piles may be acceptable to remain in place, with a compensation grouting program to account and adjust for settlement during the TBM drive.

TBM drive would continue northerly beneath 66th Street to the proposed reception pit located at Sta. 16+00. The reception pit, 85' wide by 50' long would be constructed using cut-and-cover construction methods. Based on past projects, adequate room is required to dismantle, remove and relocate the TBM back to the launch pit to drive the second tunnel. The reception pit will be completed and covered as part of the finished tunnel.

From the reception pit the twin tunnels will splay off skewed in each direction and variable track grades to meet the existing alignment and profile of the Queens Boulevard underground tunnel on the westbound track and the at-grade switch connection on the eastbound track alignment and profile.

The eastbound track and tunnel will continue from the reception pit at Sta. 16+50 as a single cut-and-cover tunnel constructed to approximately Sta. 14+00 where the tunnel alignment may interface with two existing residential apartment buildings and two smaller single-story buildings along Queen Boulevard, subject to future detailed engineering. The eastbound tunnel will continue as a cut-and-cover construction from the reception pit to grade and connect to the existing eastbound NYCT track line at approximately Sta. 8+85. The building site could be used for a tunnel ventilation fan structure, operations center or electric substation. If the structures cannot be taken by acquisition, direct underpinning and soil stabilization methods will be required. SEM tunneling methods would be used beneath the underpinned building foundations and continue as cut-and-cover to grade once clearing the existing foundations.

The westbound tunnel will continue as a single-track cut-and-cover structure north along 66th Street on a separate alignment and grade and interface with the existing residential apartment building as did the eastbound tunnel; however, the proposed westbound tunnel will connect with and utilize an existing single-track tunnel built early in the 1900s beneath the NYCT line from approximate Sta. 11+00 to Sta. 8+50. The existing tunnel below the NYCT tracks ends on the north side of the tracks where a new single-track cut-and-cover tunnel will continue westbound to the Queens Boulevard Station at 64th Street and connect to the existing bell mouth connection at Sta. 0+00.

Utilities, whether involving temporary or permanent relocations, are always a concern in urban tunneling construction and need to be addressed throughout the alignment in the boat, cut-and-cover and SEM tunneling areas. It is anticipated that the TBM will be below most all utilities, except where deep sewers may exist. Initial programs will review utility layouts for potential interface with tunneling requirements.

3.4.2.4 General Design Conditions

The proposed tunneling to connect with the existing Queens Boulevard Station at 64th Street will require the following additional tasks (but not limited to) during a Preliminary Engineering design to fully evaluate the design conditions along the alignment:

- Geotechnical subsurface exploration program and literature search of existing construction in the area, including foundations of any existing buildings that may possibly be impacted.
- Decisions regarding possible impacts to existing structures.
- Extensive utility review effort and possible discussion with third parties.
- ROW clearances and temporary construction easements.
- Evaluate existing station at connection locations.
- Evaluate the tunnel ventilation system of the existing station and impacts of the future tunnel connection and system, communications, and security connections. Tunnel ventilation may require fan structures to meet present code requirements.
- Establish Instrumentation and Monitoring Program system for adjacent buildings, LIRR Main Line and NYCT Line.
- There are no crossover caverns required in this section of tunneling. Crossovers would be a special SEM design if required.

3.4.2.5 Cross Passages

Tunnel cross passages will be provided at approximately 750’ spacing as emergency egresses from one tunnel to adjacent tunnel. Construction will consist of mined SEM tunneling cross passages between the two TBM’s, as shown in *Figure 14* (courtesy of previous LIRR analysis). It is anticipated that two cross passages will be required.

3.4.2.6 Tunnel Alignment Profile and Typical Tunnel Cross Sections

The following images demonstrate the typical tunnel cross sections.

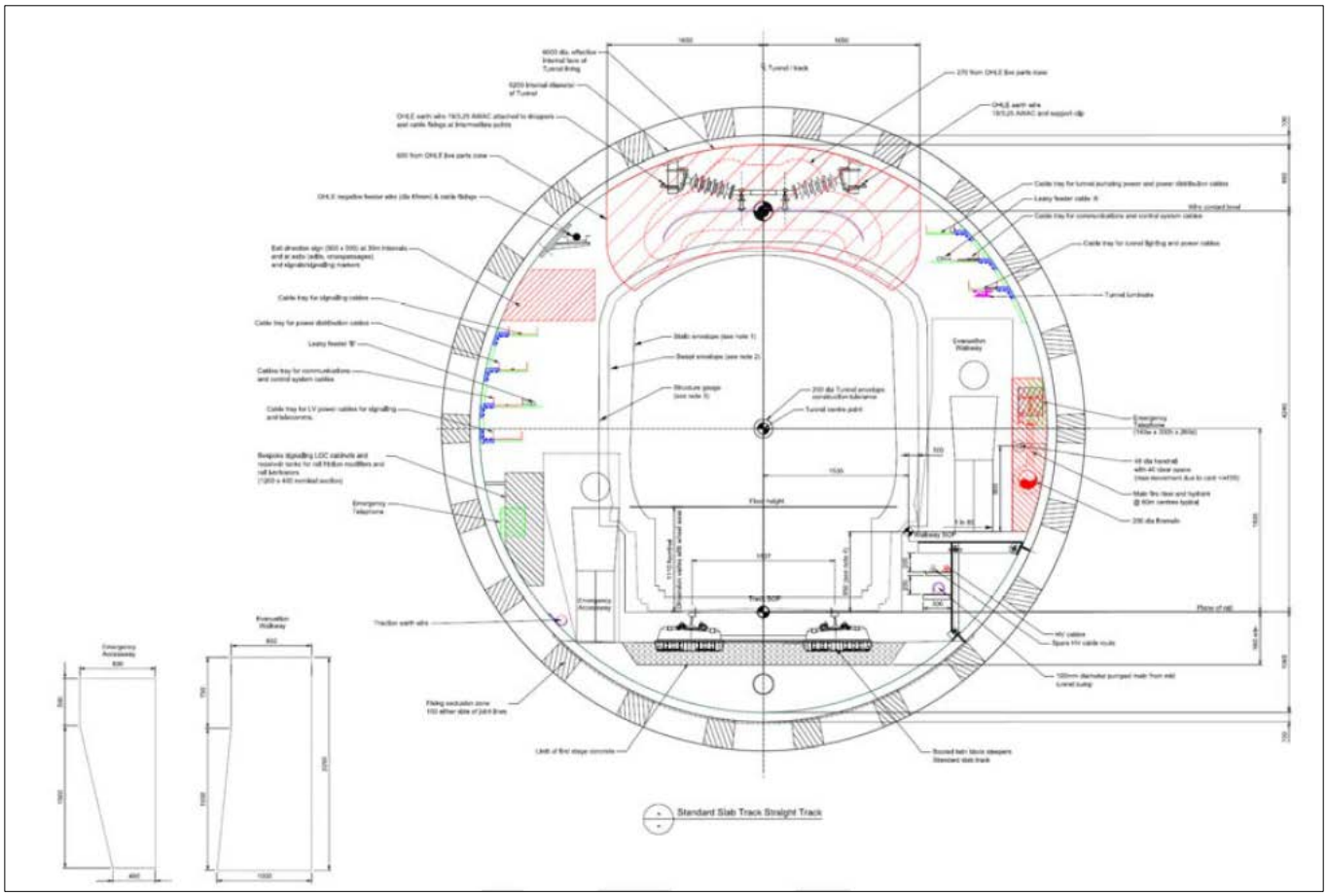


Figure 13: Typical TBM Tunnel (courtesy of LIRR)

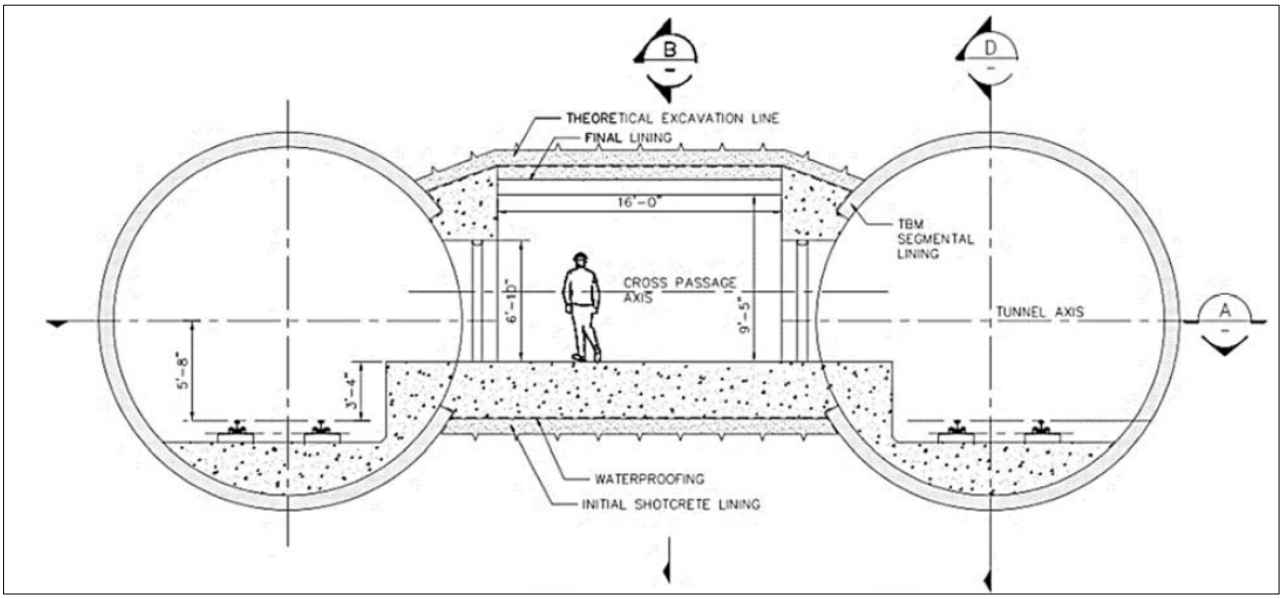


Figure 14: Typical Cross Passage (courtesy of LIRR)

3.5 POWER

New or rehabilitated traction power substations are required along the route at approximately every 1.5 miles. Separate NYCT and LIRR traction power substations are required where both services run on adjacent tracks. The reason for this is because they operate at different voltages (625VDC and 750VDC, respectively) and have separate organizational and maintenance requirements.

Land acquisition for new substations may be required where there is a need for a substation. In select areas, there may be abandoned substations that are situated on railroad property, but they would require a complete replacement. As new substations would need to be designed to the latest standards, including Con Edison requirements, the historical substation footprint may be insufficient to house new substation. A traction power load study should be performed to determine exact substation sizes and spacing. The traction power load study should also determine the quantities of positive and negative ductbanks.

Each substation will require incoming AC utility service and associated medium or high voltage switchgear, along with rectifier transformers to step down and convert the voltage to DC power. The output of the rectifier transformers will then be connected to DC switchgear where the DC circuit breakers connect to the track switches via 2000kcmil copper cable feeders. The negative cables will return through reactors at the substation.

The track-side power equipment includes a new third rail and protection board, which will have track switches to isolate power to the third rail from the tracks. Depending on the operational requirements, the contact rail switches can be load breaking and/or electrically operated. The switches' SCADA infrastructure will need to be added to tie the switches to the substation SCADA system.

Track-side equipment will also include third rail heaters for any yard areas, which may require control panels. Jumper cables are also required between sections of the third rail, and negative return cables back to the substations. These will all be routed in concrete encased duct banks.

In addition to the traction power equipment, there is house power required for the substations such as low voltage lighting and receptacles and DC traction power control equipment that would need to interface with the power command and rail control centers for each railroad.

3.6 SIGNALS and INTERLOCKINGS

3.6.1 LIRR

The alignment will support a fully signalized bi-directional train signal system with the required wayside signaling components and incorporation of the PTC application. The signal system will include a vital Microprocessor-based system that is compliant with Part 236 of Title 49 of the Code of Federal Regulations. The interlockings are:

- Two No. 20 switches located at White Pot Junction - Rego Park coming off LIRR Main Line Tracks 3 and 4 and connecting to the restored RBB alignment.
- One No. 10 turnout for a connection to the LIRR Atlantic Branch.
- Interlocking comprised of two No. 10 turnouts, one on each end for connecting to the new maintenance yard north of Howard Beach Station.
- Interlocking comprised of three No. 10 turnouts connecting to the four tracks “maintenance shop and inspection” facility south of Howard Beach Station.

Signal huts will have the ability for local control at both the interlocking and at the maintenance yard. The maintenance yard will be fully signalized for remote control of the two yard tracks. All track switches will be electrically driven and interlocked to meet FRA testing and inspection requirements.

The new signal system will be controlled from the Jamaica Central Control (JCC).

3.6.2 NYCT

The alignment will support a fully signalized bi-directional train signal system with the required wayside signaling components and incorporation of the CBTC ready application. The signal system will include a vital Microprocessor-based system that is compliant with NYCT 733 typical requirement and interfaces to the RCC (ISIM and TPMS systems). The interlockings are:

- One No. 6 and one No. 8 switch located east of the existing 63rd Drive-Rego Park Station coming off the QBL local tracks and connecting to the restored RBB alignment.
- South of Rockaway Boulevard where NYCT “A” line meets with RBB alignment - One No. 10 turnout connecting the RBB westbound track to the RBB eastbound track, one No. 10 turnout connecting the NYCT “A” line eastbound track to NYCT “A” line westbound track, one No. 10 double crossover between the eastbound and westbound tracks.

Signal huts will have the ability for local control at both the interlocking and at the maintenance yard. The maintenance yard will be fully signalized for remote control of the two yard tracks. All track switches will be electrically driven and interlocked to meet NYCT testing and inspection requirements. The switches will be electrically operated by a switch machine with the necessary heated elements to mitigate snow and ice buildup.

3.7 COMMUNICATIONS

LIRR’s systems for train and wayside communications will require new aerial lines and poles constructed along the ROW and will be connected to their fiber Sonnet backbone system for connectivity. It is assumed that all new pole lines will be installed. All stations will include public address systems as well as customer information signs that will also be connected to the control center in Jamaica. New signal power and fare vending machine systems will also need communications support. In addition, all facilities for security measures will include CCTV and card access readers at all access points.

3.8 EXAMINATION OF RIGHT-OF-WAY FOR POSSIBLE JOINT USE

There are competing neighborhood plans for the future of the RBB. Some want ROW transformed into a recreational use whereas others advocate for reactivated transit service. Although both plans seem to be in opposition to one another, there may be a possibility to combine elements of each plan to create a right-of-way to support both uses. The following are some options the Team has identified:

- Potential recreational trail possible under the rebuilt viaduct section between 97th Avenue and Liberty Avenue.
- Potential to build south of Fleet Street, parallel to the tracks on the eastside of the trail. This would require converting the existing embankment to retained fill walls at the mapped ROW edge of the alignment.
- Through Forest Park, a new elevated walkway could be constructed similar to the High Line Park in Manhattan.

3.9 ENVIRONMENTAL CONDITIONS

The following is an investigation of the current environmental conditions of the RBB. This preliminary documentation identifies environmental features from Woodside to Howard Beach, Queens. The purpose of this section is to identify environmental conditions that can be mitigated or avoided during the design phase of the project and, in addition, inform future more detailed environmental studies determined to be necessary.

3.9.1 Cultural Resources

Historic and cultural resources include archaeological (buried) resources and architectural (historic standing structure) resources. Nationally, the National Register of Historic Places, administered by the National Park Service, is part of a federal program to recognize the nation's historic and archeological resources. The New York State Historic Preservation Office (SHPO) administers programs authorized by both the National Historic Preservation Act of 1966 and the New York State Historic Preservation Act of 1980 (SHPA). These programs include the Statewide Historic Resources Survey and the New York State and National Registers of Historic Places.

Further Studies: The project will require coordination with the New York City Landmarks Preservation Commission (LPC) regarding potential historic sensitivity. Also, the project will require conformance with New York's SHPO, especially section 14.09 of the Parks, Recreation and Historic Preservation Law (PRHPL). Accordingly, the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) should also be consulted to determine if any affected buildings or structures are protected as important cultural resources.

3.9.2 Hazardous Materials and Waste

For hazardous materials, the goal for further environmental study is to determine whether the proposed project may increase the exposure of people or the environment to hazardous materials and, if so, whether this increased exposure would result in potential significant public health or environmental impacts. If significant impacts are identified, the impacts must be disclosed and mitigated or avoided to the greatest extent possible.

Further Studies: To determine potential impacts related to hazardous waste issues, a review of NEPAssist, NYSDEC database, and other federal and state databases and site-specific assessments are necessary to identify any toxic or radioactive substances on, adjacent to, or near the RBB. If the studies reveal any reason that there might be site contamination, a Phase II Environmental Site Assessment (ESA) should be prepared. In addition, all properties impacted by the project should be surveyed for asbestos in accordance with the NYS and NYC asbestos standards. Any materials that would be disturbed by project activities would require abatement according to those standards. Further, proposed activities may require removal of materials that include lead-based paint; all such activities must comply with applicable federal, state, and local laws and regulations regarding lead-based paint. Any remediation should be appropriately scheduled and coordinated with construction activities.

3.9.3 Natural Resources

Biological resources including wetlands within the RBB project area are protected by federal and state laws and policies, such as the Endangered Species Act, Clean Water Act and the Migratory Bird Treaty Act (MBTA). Under the Endangered Species Act, consultation with the United States Fish and Wildlife Service (USFWS) is required if there is potential for a federally threatened or endangered species to be affected by the project. The Clean Water Act is the primary federal law governing water pollution. Its objective is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by maintaining the integrity of wetlands.

Future Studies: A review request should be sent to the NYSDEC's Division of Fish, Wildlife & Marine Resources Natural Heritage Program (NHP) to determine if there are any records of rare species occurrence near the project site. The project will also require coordination with the Long Island Office of the U.S. Fish and Wildlife Service (USFWS). A NYSDEC Adjacent Area – Tidal Wetland Permit should be obtained prior to construction. Should the project impact the Jamaica Bay ecosystem, the Jamaica Bay Watershed Protection Plan Project Tracking Form will need to be submitted to NYC Department of Environmental Protection.

3.9.4 Parkland and Tree Preservation

The New York City Department of Parks & Recreation (NYCDPR) maintains jurisdiction over all public parkland and trees growing in the public ROW—including street and parkway trees—as well as those in parks, playgrounds and greenstreets. NYCDPR's goal is to preserve and protect these public assets.

Future Studies: A comprehensive tree survey will be required prior to construction. The tree survey should be completed by a certified arborist and include a scaled plan of the area, including the existing and proposed locations of all building structures and utilities; and the locations of all existing trees identified by common and/or botanical name, condition and diameter at breast height. The condition assessment must follow the method detailed in the International Society of Arboriculture's Guide for Plant Appraisal (Council of Tree & Landscape Appraisers, 9th edition, 2000, chapter 4). The site plan should clearly identify which trees are to be retained, which are to be transplanted, and which are to be removed.

3.9.5 Air, Noise and Vibration Considerations

Ambient air quality, or the quality of the surrounding air, may be affected by air pollutants produced by motor vehicles, referred to as "mobile sources"; by fixed facilities, usually referenced as "stationary sources"; or by a combination of both.

Potential Issues: The RBB is located in Queens County, which is within a non-attainment area for inhalable particulate matter (PM2.5), a marginal non-attainment area for the eight-hour ozone standard and considered an area source for hazardous air pollutants (HAPs) emissions.

Future Studies: The air quality studies for the proposed project should include both mobile and stationary source analyses. The mobile source air quality impact analysis will assess the potential for PM and CO from mobile-generated emissions. The stationary source air quality impact analysis should address the effects of emissions from combustion sources of emissions on pollutant levels. Based on an analysis of baseline conditions throughout the alignment, noise and vibration levels should be determined at each noise-sensitive receptor location within the applicable Federal Transit Administration (FTA) screening distance. FTA Transit Noise and Vibration Impact Assessment guidelines and methodologies should be employed. The predicted noise and vibration levels will be compared with the FTA's relative increase criteria to determine the potential for impacts.

3.9.6 Sole Source Aquifer and Coastal Zone Management

The Environmental Protection Agency (EPA) defines a sole or principal source aquifer (SSA) as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. EPA guidelines also stipulate that these areas can have no alternative drinking water source(s) which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. The SSA program is authorized by Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et. seq).

The New York State Coastal Management Program has established statewide boundaries in accordance with the requirements of the federal Coastal Zone Management Act of 1972, as amended, and its subsequently issued rules and regulations. The New York City Waterfront Revitalization Program (WRP) is the City's principal coastal zone management tool as it establishes the City's policies for development and use of the waterfront. All projects subject to local, state, or federal agency discretionary actions that are situated within New York City's designated Coastal Zone Boundary must be reviewed and assessed for their consistency with the WRP.

Future Studies: The project is required to undergo SSA review by Region 2 of the EPA. Further, the project is required to undergo state and local coastal consistency review. A request for a general consistency concurrence should be sent to the

NYS Department of State and the NYC Department of City Planning Waterfront and Open Space Division to determine whether the proposed project is consistent with applicable policies.

3.9.7 NEPA/SEQRA Compliance

The anticipated funding source for the project's construction will determine whether NEPA is required. If federal funding were utilized to construct rail service on the RBB, the FTA would likely be the funding agency. In this case, the NEPA process would be followed. The FTA would likely be the federal sponsor leading the EIS process following the National Environmental Policy Act (NEPA) statutes in accordance with FTA Environmental Impact and Related Procedures (23 C.F.R 771). Further, if no federal funds were utilized, then SEQRA would be followed, the New York State Environmental Quality Review Act (SEQRA) review process which would require a state-level EIS for the project. Since the project would impact both parkland and existing historic resources, a federal Section 4(f) evaluation would also be required.

3.9.8 Rockaway Peninsula Alignment - Considerations

Due to its geographic size and multitude of diverse ecosystems, Jamaica Bay serves as a very important ecological resource for the people of New York City as well as the plant and animal species living there. Consequently, Jamaica Bay is protected by numerous stakeholders including the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Park Service and the New York State Department of Environmental Conservation, to name a few.

The majority of Jamaica Bay is mapped by the federal government as Estuarine and Marine Deepwater and Estuarine and Marine Wetland. The placement of fill in these areas and surrounding navigable waters would require compliance with the Clean Water Act under the U.S. Army Corps of Engineers Section 404 permitting program. Permit decisions are made using environmental criteria developed by the EPA. Further, a New York State Protection of Waters Permit would be required for placement of fill in navigable waters.

The project area contains numerous protected plant and animal species and is a critical stopover area for migratory birds. The Endangered Species and Migratory Bird Treaty Acts require that federally-listed species and habitats not be adversely affected during any activity with federal involvement or subject to federal oversight. Therefore, construction of the project in Jamaica Bay would require consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, as well as New York State.

Most of Jamaica Bay proper and portions of the uplands and barrier beach are part of the Gateway National Recreation Area, administered by the National Park Service. Jamaica Bay is also situated within the 100-year floodplain, the Brooklyn Queens Sole Source Aquifer system, and is classified by the state as a "Significant Natural Community." In 1990, Jamaica Bay was also listed by Kings, Queens and Nassau counties as a Critical Environmental Area. As such, compliance with a myriad of environmental regulations would be necessary to construct a new rail alignment across Jamaica Bay.

3.10 POSSIBLE PROPERTY ENCROACHMENTS

The City of New York owns the RBB ROW, which extends from the LIRR Main Line in Rego Park south to Rockaway Boulevard, where it merges with "A" train service on the NYCT line (the City also owns the "A" train portion, so they would own the property that would be for joint use). The portion of the ROW north of Liberty Avenue has been abandoned since 1962. As a result, the ROW is in extreme disrepair in some parts and there have been various encroachments that would have to be dealt with legally if the ROW were to be reactivated for transit use.

4. IMPACTS AND OBSTACLES

In order to assess the impacts and obstacles for both the proposed LIRR and NYCT alignment options, the Team separated the alignment into three sections: LIRR Main Line/QBL to Fleet Street; Fleet Street to Liberty Avenue; and South of Liberty Avenue. As these sections of the alignment each have varied issues, ranging from condition of the ROW constructability, and environmental concerns; examining each alternative by section provides a more comparative and thorough assessment.

4.1 SECTION ONE: LIRR MAIN LINE/NYCT QBL TO FLEET STREET

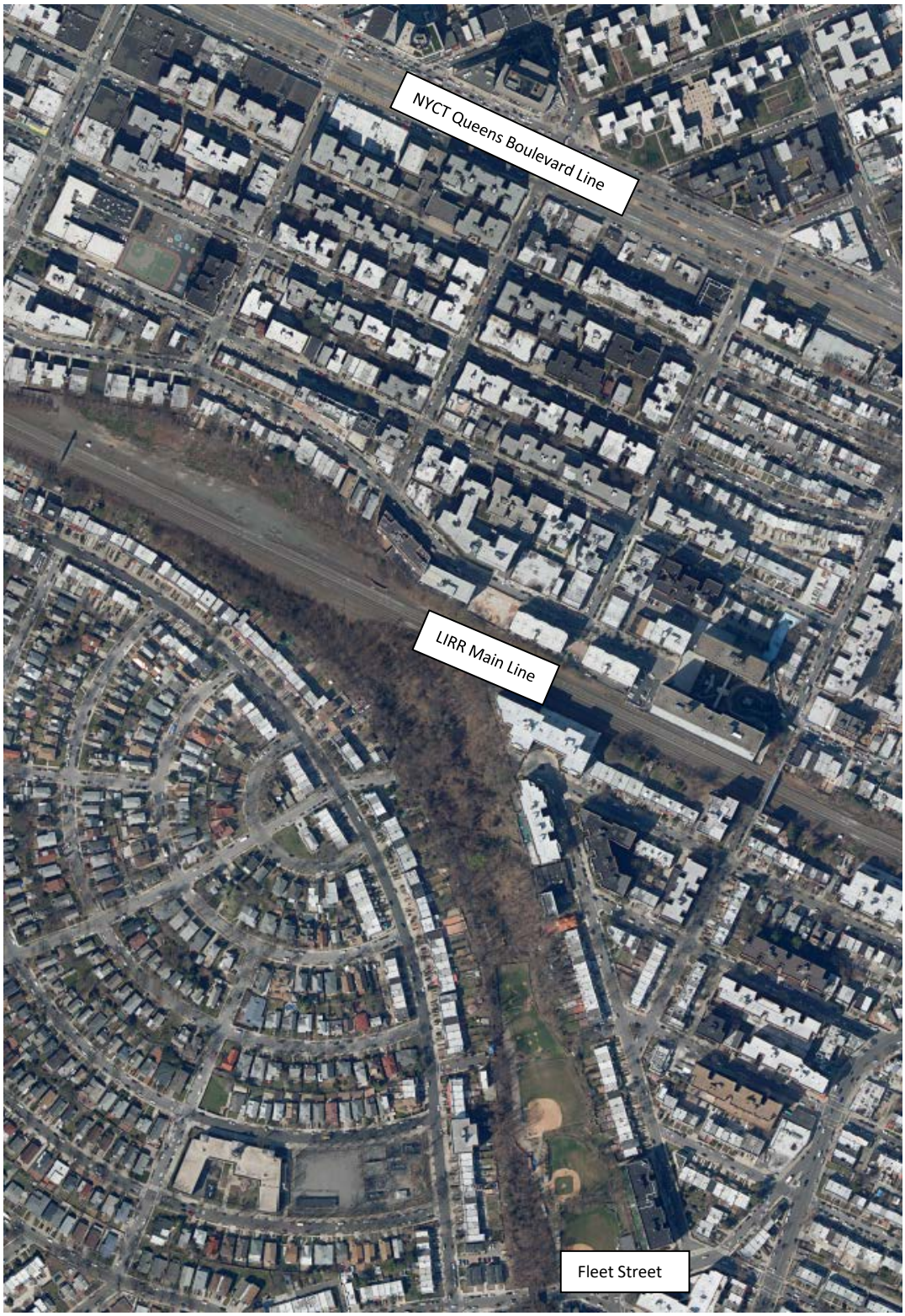


Figure 15: LIRR MAIN LINE/NYCT QBL TO FLEET STREET

Table 3: Segment One Summary of Findings

LIRR MAINLINE/NYCT QBL TO FLEET STREET	LIRR	NYCT
	Findings	**Findings**
Cost Effectiveness	• At-grade construction and minimum impact on residential housing; lower cost than underground construction.	• High cost of tunnel construction from QBL to RBB • High cost associated with possible real estate purchase
User Benefits	• Travel time savings and cost savings for work and non-work trips	• Travel time savings and cost savings for work and non-work trips
Ease of Implementation/Constructability	• Re-activating alignment that was once there -minimal constructability and implementation issues - switches and interlockings • Access to ROW • Temporary partial/full closure of streets • Access to identified laydown areas for equipment/construction staging • Temporary LIRR service impacts • Complex area access and egress for equipment/removal of material	• Complex construction methods including underpinning of residential and commercial properties • Possible impacts to properties • New tunnel construction from QBL to RBB – temporary impacts to residents, businesses, recreational facilities; local area traffic/noise • Property impacts: displacement of businesses, loss of access/reduced access, loss of parking • Access to ROW • Partial/full closure of streets • Access to identified laydown areas for equipment/construction staging • Temporary NYCT and LIRR service impacts • Complex area access and egress for equipment/removal of material • Utility Relocation Impacts • Impacts to existing QBL service – delays
Possible Ridership Demand	• 11,200 daily riders per average weekday*	• 47,000 daily riders per average weekday*
Origin and Destination Run Time Measurements	• From PSNY to Howard Beach, the run time for LIRR is 25 minutes	• From 34 St. Harold Square to Howard Beach, the run time for NYCT is 45 minutes
Condition of ROW/Structures	• ROW needs to be cleared – impassable by foot in some sections; complete removal and installation of new track and equipment • New Fleet Street bridge will be required	• ROW needs to be cleared – impassable by foot in some sections; complete removal and installation of new track and equipment • New Fleet Street bridge will be required
Alignment Concerns/ROW Encroachment	• Encroachments include retail and recreational areas	• Encroachments retail and recreational areas
Environmental Sensitivities	• New railroad use differs from existing nearby residential use • Loss of trees/vegetation	• Possible impact to buildings during tunnel construction (noise, vibration) • New railroad use differs from existing nearby residential use • Loss of trees/vegetation
Possible Parkland Impacts	• Possible impacts to recreational properties	• Possible impacts to recreational properties
Land Use Compatibility	• A transport use of the corridor differs from nearby use of land for residential	• A transport use of the corridor differs from nearby use of the land for residential

* Ridership demand driven by the assumption of a zone fare for LIRR and a flat fare for NYCT.

4.2 SECTION TWO: FLEET STREET TO LIBERTY AVENUE

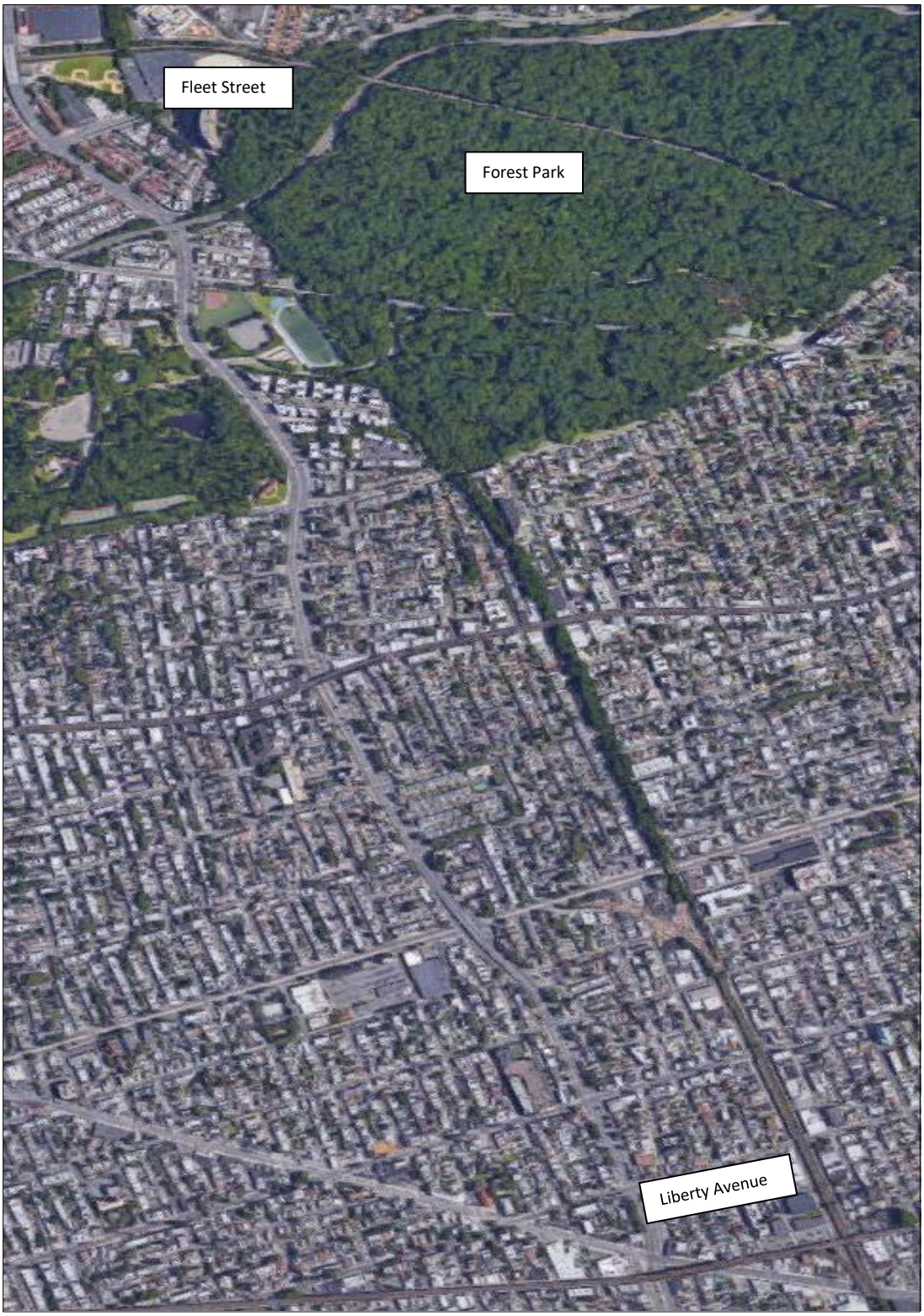


Figure 16: FLEET STREET TO LIBERTY AVENUE

Table 4: Segment Two Summary of Findings

FLEET STREET TO LIBERTY AVENUE	LIRR	NYCT
	Findings	**Findings**
Cost Effectiveness	• Costs will be similar for both options	• Costs will be similar for both options
User Benefits	• Travel time savings and cost savings for work and non-work trips to Manhattan • Improved access to downtown Brooklyn	• Travel time savings and cost savings for work and non-work trips to Manhattan • Improved access from Rockaway and Central Queens to the Queens Center Mall • Improved access to downtown Brooklyn
Ease of Implementation/Constructability	• Access to ROW • Temporary partial/full closure of streets • Access to identified laydown areas for equipment/construction staging • Temporary NYCT "J" service disruptions • Complex area access and egress for equipment/removal of material	• Access to ROW • Temporary partial/full closure of streets • Access to identified laydown areas for equipment/construction staging • Temporary NYCT "J" service disruptions • Complex area access and egress for equipment/removal of material
Condition of ROW/Structures	• ROW needs to be cleared – impassable by foot in some sections; complete removal and installation of new track and equipment • New bridges will be required	• ROW needs to be cleared – impassable by foot in some sections; complete removal and installation of new track and equipment • New bridges will be required
Alignment Concerns/ROW Encroachment	• Possible Encroachments include retail and recreational properties	• Possible Encroachments include retail and recreational properties
Environmental Sensitivities	• New railroad use differs from existing nearby residential use • Loss of trees/vegetation • Possible Impacts to recreational properties – during and after construction • Impacts to public schools – playground area, ball fields and courts	• New railroad use differs from existing nearby residential use • Loss of trees/vegetation • Possible Impacts to recreational properties – during and after construction • Impacts to public schools – playground area, ball fields and courts
Possible Parkland Impacts	• Temporary impacts to recreational properties during construction	• Temporary impacts to recreational properties during construction
Land Use Compatibility	• A transport use of the corridor differs from nearby use of land for residential	• A transport use of the corridor differs from nearby use of land for residential

4.3 SECTION THREE: SOUTH OF LIBERTY AVENUE

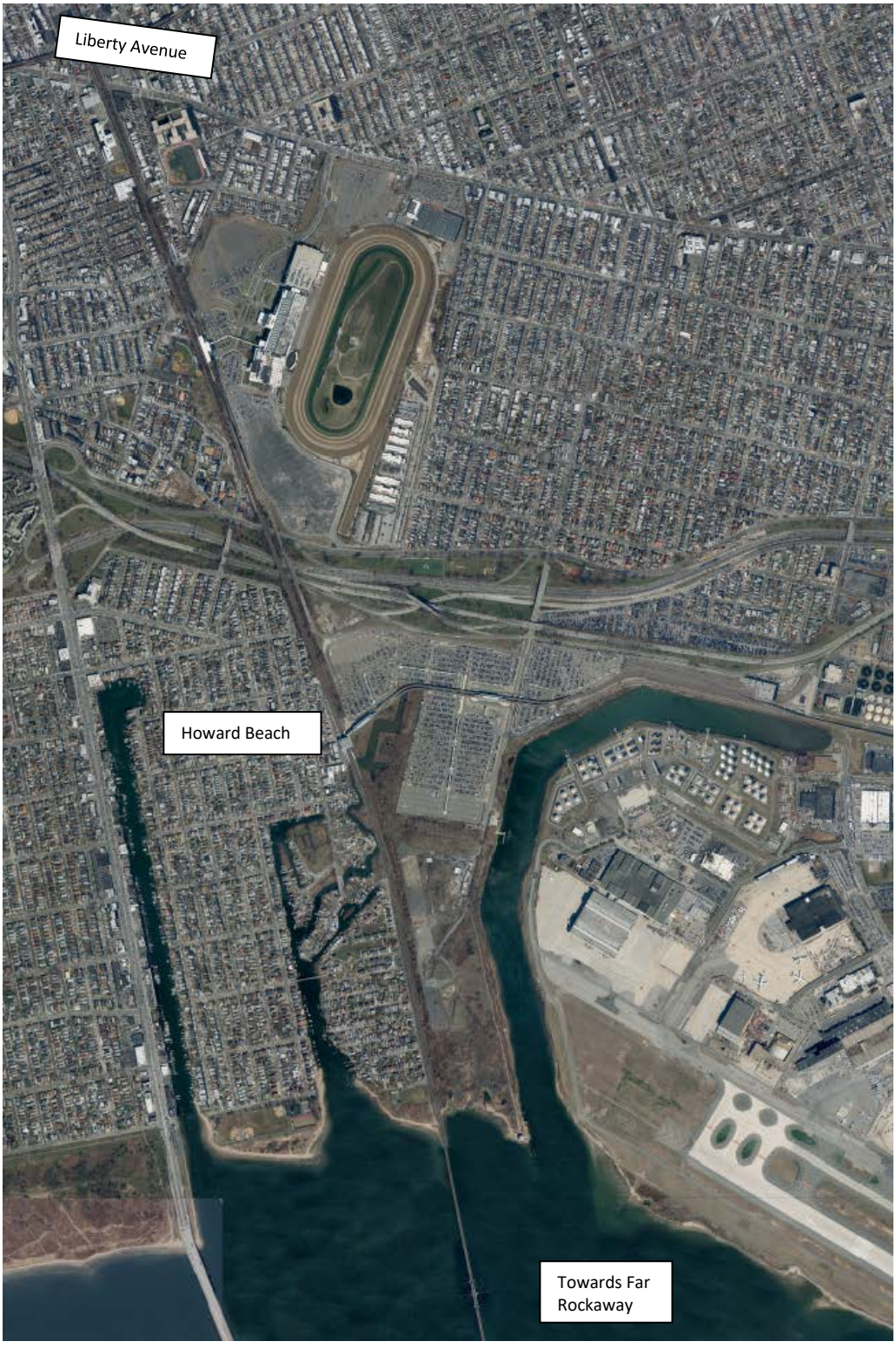


Figure 17: SOUTH OF LIBERTY AVENUE

Table 5: Section Three Summary of Findings

SOUTH OF LIBERTY AVENUE	LIRR	NYCT
	Findings	**Findings**
Cost Effectiveness	• Cost of construction of bridge across Jamaica Bay; new station in Far Rockaway	• No construction required
User Benefits	• Travel time savings and cost savings for work and non-work trips	• Travel time savings and cost savings for work and non-work trips
Ease of Implementation/Constructability	• Challenge to implement/construct due to environmental sensitivities (crossing Jamaica Bay) • Requires environmental analysis, including various approvals/permits, NEPA/SEQRA • Extension of service past Howard Beach requires a configuration of the existing Howard Beach Station, which would likely involve demolition • Construction over Belt Parkway – requires closures	• Access to ROW • Temporary partial/full closure of streets • Access to identified laydown areas for equipment/construction staging • Temporary service disruptions • Complex area access and egress for equipment/removal of material • Impacts to existing "A" service – delays
Condition of ROW/Structures	• Minimum clearance of ROW south of Liberty Avenue through Howard Beach • New bridges may be required	• Minimum clearance of ROW south of Liberty Avenue through Howard Beach • No change to bridges south of Linden Boulevard – Linden Bridge may be rebuilt
Alignment Concerns/ROW Encroachment	• Very little ROW • Property required to connect to LIRR Far Rockaway Beach	• Same as existing
Environmental Sensitivities	• New railroad use differs from existing nearby residential use • Possible residential impacts to Howard Beach community	• Same as existing
Possible Parkland Impacts	• Recreational Parks	• Same as existing
Land Use Compatibility	• Connection to LIRR Far Rockaway Branch and new station will be in conflict to recently approved Far Rockaway rezoning.	• Same as existing

* This table includes sections of the previous RBB that are not being considered as part of this report.

5. CONSTRUCTABILITY ANALYSIS

In terms of construction feasibility, there is no single "fatal flaw" that would disqualify either of the LIRR or NYCT alternatives from being constructed and operated. However, both options have a number of impacts associated with reactivating the proposed services that are presented for consideration with each of the alternatives.

5.1 LIRR ALIGNMENT

This alternative calls for the re-establishment of service that had previously been operated from Midtown Manhattan along the LIRR Main Line in Queens and along the Rockaway Beach Branch to the Rockaway Peninsula. As mentioned earlier, the SYSTRA Team has determined that the provision of LIRR service past Howard Beach Station presents vast challenges including high cost, the environmental impacts of constructing a bridge across Jamaica Bay, and conflicts with the recently approved Far Rockaway rezoning. As a result, the extension of service to the Rockaway Peninsula is not under further consideration.

Unlike the NYCT alternative, this alternative does not require any construction of new tunnels, but does require reactivation of the former White Pot Junction that connected the LIRR Main Line with the RBB ROW. This alignment will be described in two segments: the Main Line between Woodside Station and the former White Pot Junction and the RBB between the former White Pot Junction and LIRR Howard Beach Station.

5.1.1 Main Line between Woodside Station and the former White Pot Junction

The proposed reactivation of service would require the rehabilitation of the two existing trackways along the LIRR Main Line between 51st Avenue and the former White Pot Junction. The trackways have been unused since 1962 when the last RBB trains operated along them. Reactivation will require the laying of new track as well as installation of new train signals and 3rd rail traction power that had been completely removed. Based upon the Team's review of the existing bridge structures, we contend that at this level of engineering detail, there is no requirement for replacement of the structures. Constructability issues associated with reactivation of the trackways on the extreme south and north sides of the Main Line would be accomplished from within the ROW. Potential additional substations may be required for the additional trains to be operated along the Main Line.

Potential constructability impacts are:

- Possible acquisition of additional property for increased traction power substation.
- Increased noise for residents and businesses during construction due to construction equipment and potential substation construction.
- Impact to LIRR scheduled trains during construction could include slow orders along sections under construction with associated impacts to LIRR customers.

5.1.2 White Pot Junction Tunnel

This existing tunnel would carry the westbound track under the LIRR Main Line tracks. The extent of work required to rehabilitate this tunnel is subject to further investigation based on its condition. In addition, the potential change in the westbound track grade that may impact the footings if it is a three-sided frame structure. Reconstruction of this tunnel, even if it is only for replacement of its top slab as called for in previous reports, can significantly impact the operation of the Main Line tracks.

5.1.3 RBB between former White Pot Junction and Howard Beach Station

This alternative would require the reactivation of the eastbound and westbound alignments from the Main Line and the RBB. This would require clearing the area of existing vegetation and trees as well as removing abandoned rail (including remnants of existing 3rd rail) and associated structures such as signal towers. This would also require the reinstallation of the White Pot Junction (WPJ).

The aforementioned constructability impacts also exist for this section of the alignment. The following are additional constructability impacts to be considered:

- *Reactivation of the alignment between White Pot Junction and Fleet Street*
  - The existing underpass beneath the Main Line requires rehabilitation, but not replacement, based upon available information.
  - The area immediately adjacent to the portals on either side of the Main Line requires excavation and rebuilding of the track bed and profile. New Retaining walls may be required.
  - Reactivation of the alignment (using the existing alignment) may impact recreational properties. In addition, the current access roadway adjacent to the RBB would need to be permanently relocated to another portion of the ballfields.

- *South of Liberty Avenue, the current ROW would need to be widened for sufficient clearance for the operation of both the NYCT and LIRR services*
  - Widening will require extending the trackways beyond the current retaining walls and cantilevering the tracks over adjacent street and roadways.
  - Will require reconstruction of existing retaining walls and existing bridge structures south of Liberty Avenue and the existing Howard Beach Station.

- *Aqueduct Raceway/NYCT Station*
  - The combined station would be designed to provide a transfer at that point north of North Conduit Avenue by use of an ADA-equipped pedestrian crossing bridge.
  - Existing adjacent property may be required, but the impact is limited to non-residential property.
  - During construction, the existing NYCT service will have service delays and slow orders south of Liberty Avenue.

- *Howard Beach Station*
  - Under this operation, the LIRR service would terminate either at the Howard Beach Station at a single-track platform or at a relay and two-track layover area that would be built on JFK Airport property north of the station. The second alternative would be used if a four-track yard could not be constructed south of the station due to environmental concerns or other constraints.

5.2 NYCT ALIGNMENT

As noted earlier, the NYCT alignment provides a one seat ride from Midtown Manhattan utilizing the QBL in Queens to connect with the existing RBB ROW at the former WPJ, which was removed in 1962.

Construction of this alternative between the QBL and the existing NYCT Howard Beach Station will be described in two segments; the tunnel segment and the existing RBB ROW segment that would be reactivated.

5.2.1 Tunneling Segment Constructability

The tunneling segment will be located between just north of the Fleet Street overpass at-grade within the existing RBB ROW. The alignment will tunnel under the existing LIRR Main Line tracks and continue north under 66th Street to Queens Boulevard. Connection to the QBL subway will be made via an existing tunnel segment that was constructed when the Queens Boulevard subway was designed in 1932 (see *Figure 18*). Construction of the segment will include the use of: tunnel boring machine (TBM) using segmental precast concrete liners; Sequential Excavation Method (SEM) using cast in place liners; and Cut-and-Cover and cut sections using cast in place construction. The use of these differing construction methods is dictated by the current available geotechnical information and the surface and foundation conditions which include low and high-rise structures.

Potential Construction Impacts include:

- During the construction of the tunnel, the primary laydown area and TBM launch pit will be in the area between Fleet Street and the LIRR Main Line.
- Portions of the ballfield immediately north of Fleet Street may be impacted by the location of the TBM and supporting equipment in the area south of the LIRR Main Line for vehicle access.
- Impact to residential or public facilities is anticipated adjacent to and along the ROW, subject to future detailed engineering.
- Movement of muck from the site and material into the site may be either via freight cars during non-commuter hours on the LIRR Main Line or use of trucks via Fleet Street to Queens Boulevard and the LIE.
- TBM and SEM tunneling may require underpinning existing building between the north side of the LIRR Main Line and the connection at Queens Boulevard with the existing QBL subway, subject to future detailed engineering.
- Buildings founded on steel piles may require demolition to remove the piles, subject to future detailed engineering. Currently no information on building foundations is available, but multi-story residential buildings potentially will have steel pile foundations based upon the age of the buildings.
- Buildings not constructed on piles may be subjected to settlement during the TBM operations; as a result, may have grouting programs to prevent or minimize settlement to the structures.
- Tunneling under the LIRR Main Line tracks at WPJ is anticipated to require ground stabilization and monitoring. Existing track will need to be monitored and re-ballasted as needed as a result of any settlement during construction. During the actual period of TBM activity under the Main Line, LIRR trains may have reduced speeds in the area of WPJ.

- During construction, segments adjacent to or above active tunneling will be subject to ground borne noise and vibration. The extent of which would be subject to further design and geotechnical information.
- Residential and recreational facilities in the vicinity of the TBM insert and laydown area between WPJ and Fleet Street will be subject to periodic noise and truck traffic along Fleet Street, if used.
- Creation of a temporary freight rail spur on the south side of the LIRR from east of Woodside to WPJ would permit the removal of tunnel muck and delivery of materials to the construction site but would still require Fleet Street access for employees and increased non-truck vehicular traffic.
- Construction along Queens Boulevard would include creation of a TBM removal reception pit and cut-and-cover construction to connect the tunneled segments to the QBL.
- Existing vehicular and pedestrian activity would be impacted with temporary roadway and sidewalks required which would increase traffic delay in the area.
- Impacts to the subway would be slow orders and divergence of local subway service along the local tracks to facilitate tunnel connection, as well as track and signal installations. Most of these outages would be during overnight periods and weekends during the actual connection of the tracks and signals.
- A tunnel ventilation building may be required to satisfy fire/life safety requirements of NFPA 301. Existing station ventilation may also need to be upgraded to meet code requirements.
- Impact to station operations may be required to connect the new westbound track to the existing station track.
- Use of the existing tunnel beneath the QBL will need to be evaluated for additional ventilation requirements.
- Nine buildings near or appearing to be on the right-of-way may be impacted to allow track alignment and tunnel construction clearances to be satisfied, subject to future detailed engineering.
- Third-party interfaces will be required for utilities temporary or permanent relocations.

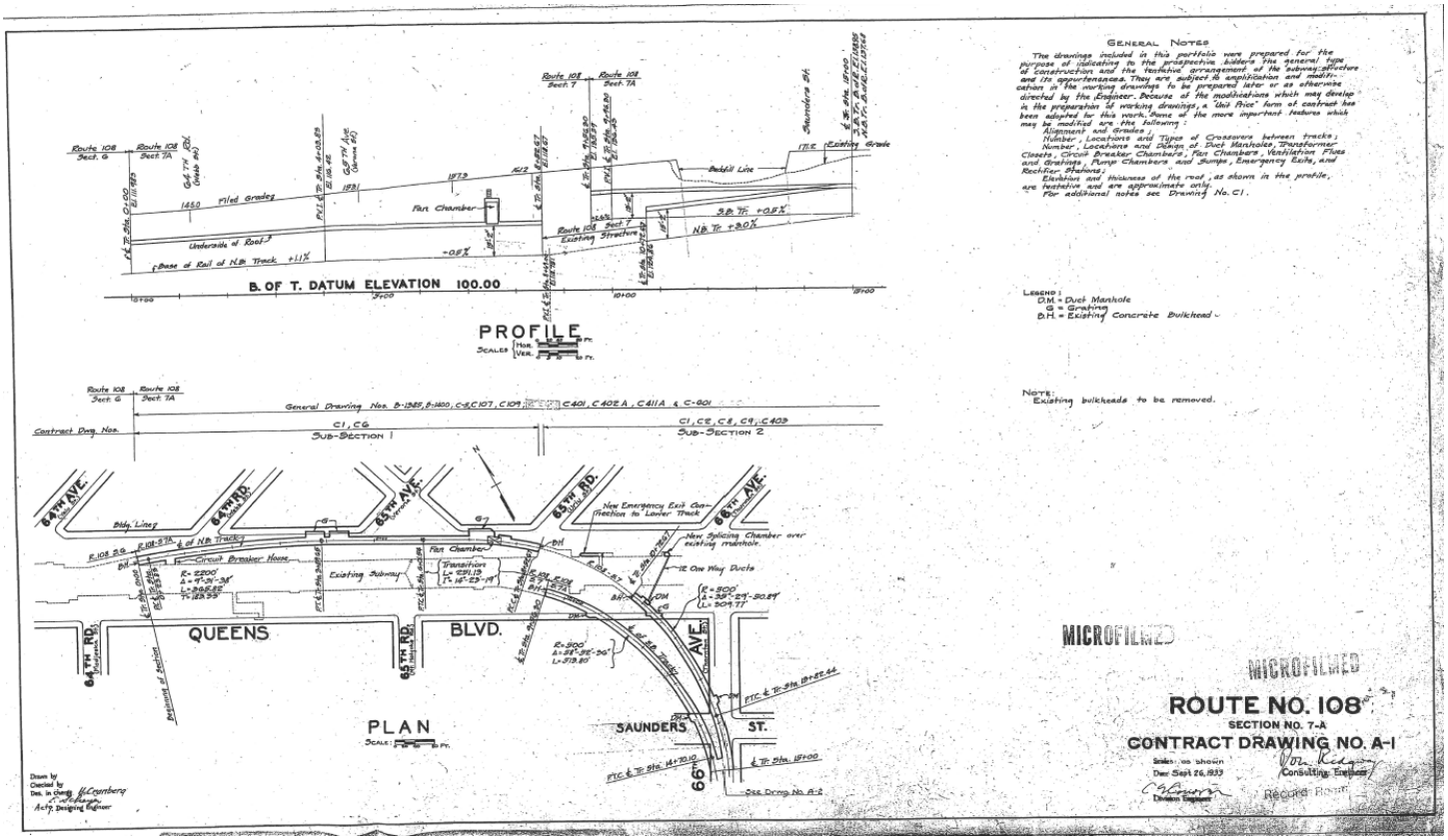


Figure 18: Existing QBL Tunnel (1933 Plan)

5.2.2 Right-of-Way Impacts of Construction

The following is a list of potential ROW impacts during construction:

- Between WPJ and Fleet Street, the impact of the construction of the tunnel portion of the NYCT alignment would be the temporary loss of the use of recreational properties constructed on the ROW and access to the ballfield access road adjacent the remaining fields. Permanent impacts may be the relocation of the three ballfields atop the new tunnel north of their present location.
- Between the LIRR Lower Montauk Branch and Union Turnpike, the ROW has been paved over by a local shopping center. The area is used for truck deliveries. An impact of reclaiming the ROW is the permanent loss of the delivery area for the shopping complex.
- Between Union Turnpike and Forest Park, the two-track alignment has been paved over and is used by the Forest Park Crescent Cooperative Apartment for the parking of resident vehicles. The entire extended parking facility would have to be removed, with the permanent loss of parking spaces on the ROW.
- Between Atlantic Avenue and 97th Avenue, the existing ROW has been taken over by a private bus entity and the entire alignment has been destroyed. The private company will need to be relocated from the portion of the property needed for the reactivation of the alignment and reconstruction of the embankment.
- South of 97th Avenue, existing occupants below the existing viaduct would need to be permanently relocated, and the viaduct demolished and replaced with a two-track elevated structure. This would allow the area below the reconstructed elevated section and adjacent to it to be turned into public space for recreational activities.
- South of Liberty Avenue, the existing overpasses are currently maintained by NYCT and no replacement is envisioned at this point. Reactivation would include clearing of the unused portion of the ROW and reestablishing track, signal and power for NYCT operation. No construction impacts are anticipated since most of the construction could be done within the existing ROW.

5.2.3 Rockaway Beach Branch Segment Constructability

The SYSTRA Team concluded that the abandoned RBB bridges along the ROW should be replaced. The entire ROW would be rebuilt as a two-track alignment. In addition, the Team concluded that the existing four-track viaduct between Atlantic Avenue and Liberty Avenue should be demolished and a possible new two-track elevated structure erected in its place. Previously active stations along the alignment would be rebuilt to meet ADA requirements as well as the design standards of NYCT. The existing closed underground LIRR station on the Atlantic Branch in the vicinity of the RBB would be reactivated and made ADA accessible and a pedestrian connection and an ADA path of travel with a possible station would be built to serve the RBB. The existing stations at Aqueduct Raceway and North Conduit Avenue would be rebuilt as a single combined station and relocated further east from North Conduit Avenue. A single station would provide one stop at two relatively close stations and provide a shorter walking distance to Aqueduct Racetrack and Casino.

- Reactivation of the existing ROW would begin by removal of all vegetation and previous track, signals and station elements.
    - Rather working from off the ROW, the initial clearing of the alignment would be done from within the ROW itself.
    - Subject to a field testing, linear clearing of the ROW would be done from Liberty Avenue to WPJ with access to the viaduct from Atlantic Avenue and the current ballfield at Fleet Street.
    - Another potential access point for construction is at Union Turnpike (northeast) where the alignment embankment has been eliminated for increased access to an existing warehouse. Reconstruction of this segment will require construction of new elevated structure to replace segment destroyed, with permanent impact on the existing warehouse operation.

6. SERVICE AND OPERATING PLANS/TRAVEL TIME IMPROVEMENTS

6.1 LIRR ALTERNATIVE

6.1.1 Former RBB Service Plan

The former Rockaway Beach Branch (RBB) commuter rail service plan offered trains hourly from approximately 6:00 AM to 9:00 AM and from 4:00 PM to 7:00 PM (however, prior to the 1950 fire, service was more frequent). There was one mid-day train and two late-night/early-morning trains. The run time from Woodside to Howard Beach was determined to be 18 minutes while the overall run time from Penn Station (PSNY) to Howard Beach was 30 minutes.

6.1.2 LIRR RBB Service Plan Development and Capacity Constraints

Tables 6 and 7 show the calculated train run times for an unimpeded eight car train on the RBB, based on the track feet distances, grade and curvature for the proposed RBB alignment from Woodside Station to Howard Beach Station using SYSTRA's Railsim© Train Performance Calculator (TPC).

Table 6: LIRR Rockaway Beach Branch: Calculated Eastbound Run Times

Station ID	Event	Interval Time (Min:Sec)	Cumulative Time (Min:Sec)	Distance (in feet)	Average Speed (MPH)	Maximum Achievable Speed (MPH)
Woodside	Departure	00:00	00:00	0	--	--
Rego Park	Arrival	03:06	03:06	12,500	46	67
Rego Park	Departure	00:30	03:36	0	39	--
Parkside	Arrival	02:29	06:05	8,462	39	50
Parkside	Departure	00:30	06:35	0	32	--
Woodhaven	Arrival	02:28	09:03	8,497	39	50
Woodhaven	Departure	00:30	09:33	0	33	--
Ozone Park	Arrival	00:54	10:27	1,994	25	44
Ozone Park	Departure	00:30	10:57	0	16	--
Aqueduct	Arrival	01:42	12:39	5,426	36	50
Aqueduct	Departure	00:30	13:09	0	28	--
Howard Beach	Arrival	01:20	14:29	3,939	34	50
Total (with dwells):			14:29		32	
Total (without dwells):			11:59		39	
Cumulative Distance (in feet):				40,818		
Average Train Speed (MPH):					33	
MAS[4] MPH On Average:						52

[4] Maximum Authorized Speed

Table 7: LIRR Rockaway Beach Branch: Calculated Westbound Run Times

Station ID	Event	Interval Time (Min:Sec)	Cumulative Time (Min:Sec)	Distance (in feet)	Average Speed (MPH)	Maximum Achievable Speed (MPH)
Howard Beach	Departure	00:00	00:00	0	--	--
Aqueduct	Arrival	01:26	01:26	3,939	31	46
Aqueduct	Departure	00:30	01:56	0	23	--
Ozone Park	Arrival	01:43	03:39	5,426	36	50
Ozone Park	Departure	00:30	04:09	0	28	--
Woodhaven	Arrival	00:55	05:04	1,994	25	43
Woodhaven	Departure	00:30	05:34	0	16	--
Parkside	Arrival	02:32	08:06	8,494	38	50
Parkside	Departure	00:30	08:36	0	32	--
Rego Park	Arrival	02:58	11:34	8,699	33	50
Rego Park	Departure	00:30	12:04	0	28	--
Woodside	Arrival	03:09	15:13	12,833	46	61
Total (with dwells):			15:13		31	
Total (without dwells):			12:43		37	
Cumulative Distance (in feet):				41,385		
Average Train Speed (MPH):					31	
MAS MPH On Average:						50

Total run time for the equivalent eight miles is calculated to be 14:29 including dwell times at an average speed of between 30-35 miles per hour with an average Maximum Authorized Speed (MAS) of 52 MPH. The calculated inbound train times to Woodside from Howard Beach are approximately the same.

Graphically, eastbound and westbound train velocities and stationing values (chainage) are depicted as follows with deceleration and acceleration at stations depicted as dips and surges points, see *Figures 19 and 20*:

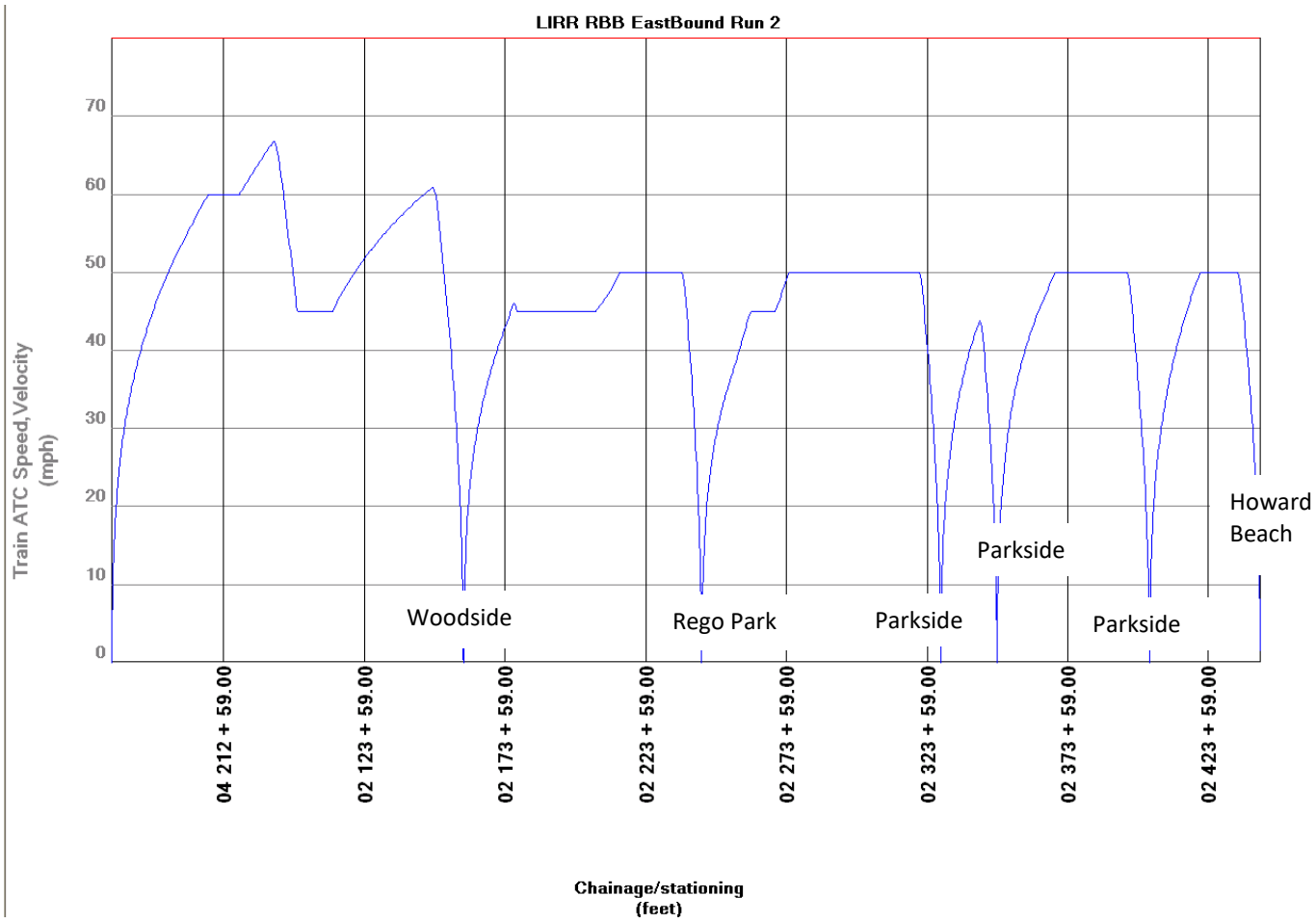


Figure 19: LIRR Rockaway Beach Branch: Eastbound Run Equipment Performance

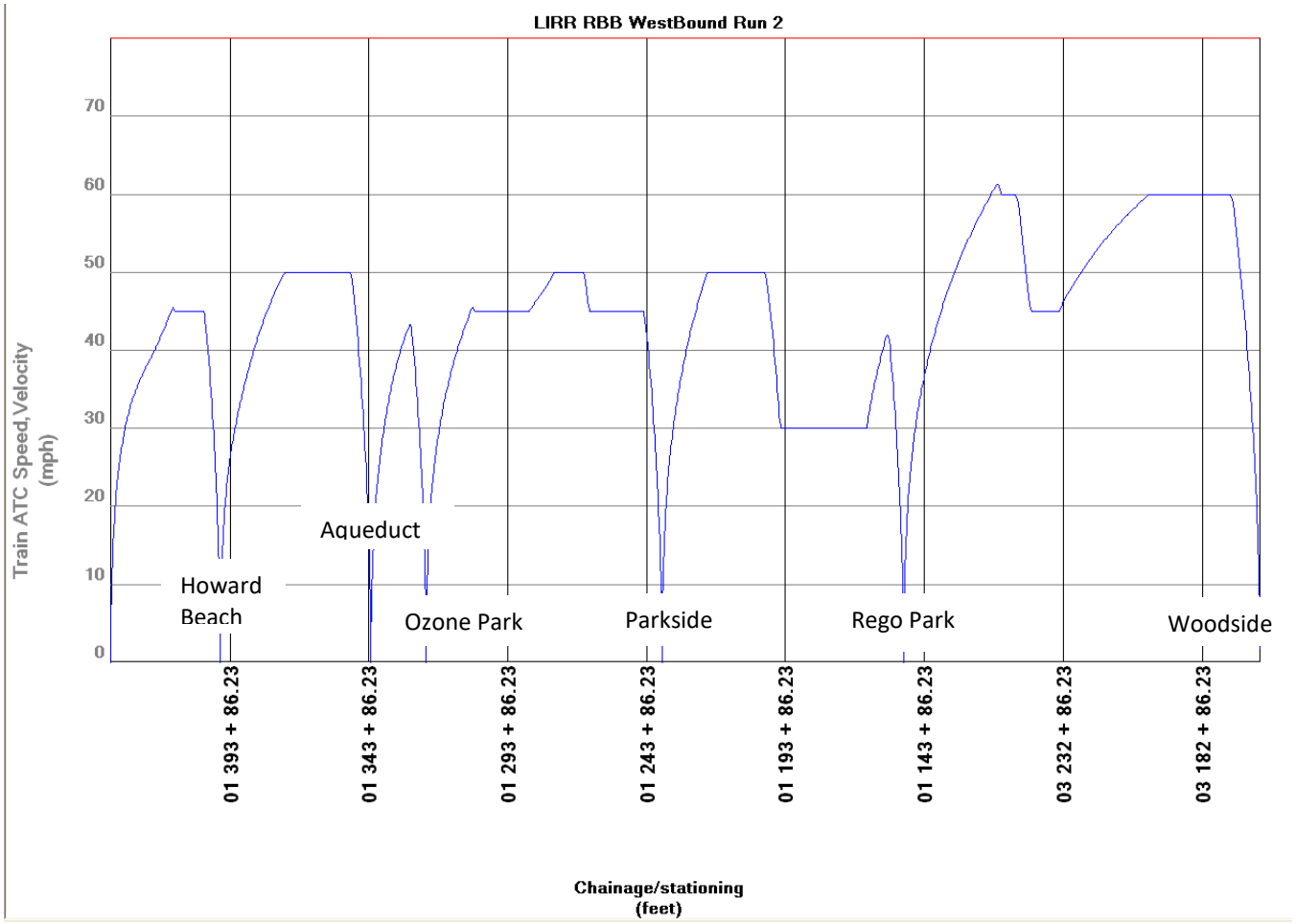


Figure 20: LIRR Rockaway Beach Branch: Westbound Run Equipment Performance

PSNY to Woodside Station is approximately five miles and the run time on that segment is an additional 10 minutes. When combined, the run time from Howard Beach to Woodside is approximately 25 minutes in total. The ROW segment between Woodside Station and PSNY is the most congested four track ROW (Lines 1 – 4) on the LIRR system as far west and inclusive of Harold Interlocking. From Harold to PSNY, the tracks are owned by Amtrak, operated jointly, and are at/near capacity. Today there are variably 37 to 38 LIRR trains in the peak direction in the peak hour and 20 to 22 trains per hour (TPH) in the reverse peak direction. With a 3 – 1 running track scenario, Main Line headways are scant and track space in PSNY is fully subscribed.

After discussions with LIRR Service Planning regarding space in PSNY after East Side Access (ESA), it is understood that available system capacity is controlled by the route to be used by RBB Trains and the ESA Opening Day service plan. Rockaway Beach Branch (RBB) trains will join the Main Line at White Pot Junction. Westbound trains will use the north most track and eastbound trains will use the south most track. These tracks are used to make local Queens stops at Forest Hills and Kew Gardens, east of Woodside Station which limits available capacity to approximately 14-15 TPH. West of White Pot Junction, RBB trains can use any of the four main line tracks as may be dispatched by LIRR.

Furthermore, during the AM peak hour (7:45 AM to 8:45 AM), 15 westbound trains are scheduled to make local stops, so no capacity is available. During off-peak hours, seven westbound trains are scheduled to make local stops, which implies there is some capacity available. The limiting capacity constraint is westbound in the peak hour. There is also concern over the ability to perform routine track maintenance which may take two of the four tracks between Jay and Harold Interlockings

out-of-service such that non-stop trains would be delegated to the local tracks. Consideration must also be given to equipment moves from western terminals to maintenance facility at Hillside.

The confluence of trains completely consumes available capacity. At Harold Interlocking, where RBB trains would be sorted between PSNY and Grand Central, capacity is constrained by sections of track where LIRR and Amtrak trains meet. Also, the LIRR Port Washington Branch trains come into the mix. East River Tunnel capacity is further constrained by non-revenue NJ TRANSIT trains moving to and from Sunnyside Yard. Additionally, a future Metro-North service to PSNY via the Hell Gate has been proposed. These shared sections of track have a capacity of 20 trains per hour. This can be easily reached during peak hours and parallel routes through the interlocking may help increase throughput. During off-peak hours, maintenance activities and equipment moves must be once again considered that would reduce available capacity.

The LIRR Service Planning staff explained that if RBB train service were to operate, there would need to be an existing tradeoff with existing service. It is the common practice of the LIRR service planning group to show the impact on existing service by eliminating trains. This is most commonly done when introducing a new service plan to a line that is already at capacity. In order to provide slots for the RBB service, the SYSTRA team made certain assumptions (listed below) and took trains off short headway branches in order to minimize system-wide impacts. LIRR staff cites that, as a benchmark, a 12-car commuter train (operating on other LIRR branches) carries a seated capacity of 1,272 passengers. If 15-minute RBB service frequencies are to be provided, it is possible that 5,000 customers per hour could be displaced. Based upon the current assessment, during the peak hours of commutation, in the peak direction, four trains currently carrying commuters would be eliminated to accommodate LIRR RBB service. Additionally, at least two commuter trains would need to be eliminated for the reverse (non-peak direction) during the same period. This could mean the displacement of as many as 7,500 current LIRR passengers. As part of this assessment, it was assumed that displacement of current trains would come from the Hempstead, Huntington, Ronkonkoma and Babylon branches, with each branch losing one train during each of the peak hours weekdays in the peak direction.

In order to incorporate future LIRR RBB service, the resulting LIRR branches will experience the following effects:

- Ronkonkoma Branch would have the number of Manhattan bound trains reduced from 25 to 21, or 10 minute headways to 11 minute headways.
- Port Jefferson/Huntington Branch would have the number of Manhattan bound trains reduced from 17 to 13, or 14 minute headways to 18 minute headways.
- Hempstead Branch would have the number of Manhattan bound trains reduced from 10 to 8, or 24 minute headways to 30 minute headways.
- Babylon Branch would have the number of Manhattan bound trains reduced from 36 to 30, or 7 minute headways to 8 minute headways.
- For eastbound reverse peak trains, Huntington Branch was reduced from 5 to 4 peak period trips from Manhattan and Ronkonkoma was reduced from 8 to 7 peak period trips from Manhattan.

In the LIRR's ESA Opening Day Plan, three tracks between Harold and Jamaica are scheduled to carry 45 westbound (WB) trains during the AM peak hour which is the total capacity for these three tracks. The remaining one eastbound track is scheduled to carry 23 eastbound (EB) trains (14 revenue and 9 non-revenue deadhead) during that same period. This is above the eastbound track's capacity and is achieved by removing station stops between Harold and Jamaica. Based on this information, a sketch service plan and tentative operating scenario for reactivating the RBB from Woodside Station to Howard Beach Station was prepared.

This information has been provided by LIRR and summarizes the capacity issues associated with reactivating the RBB. This report presents a sketch service plan and operating scenario for reestablishing the RBB on its original alignment between White Pot Junction and a new Howard Beach Station was developed.

The Rockaway Beach Branch service plan assumes 15 - 20 minute headways during peak hours which are comparable to other LIRR branch services. For initial planning and engineering purposes, four trains, eight cars in length, will be stored on the four tracks available in the proposed yard and crew base at Howard Beach station. As stated above, the run time from Howard

Beach to PSNY or GCT is 25 minutes; train turnaround at the terminals is assumed to be 15 minute revenue to non-revenue and 20 minute revenue to revenue train cycle times, which includes the crew changing ends and mandated inspections. Per 2011 FEIS Report, both PSNY and GCT were examined, as well as split service between both terminals. PSNY was selected as the terminal due to its:

- Nexus of connections with Amtrak, New Jersey Transit (NJT) and multiple NYCT transit lines.
- Although neither PSNY nor GCT will have excess capacity, GCT will have less total tunnel capacity at one track in each direction than PSNY.

Train flow diagrams (*Figure 21*) depict moderate 15 minute and 20 minute cycles with 25 minute run times for westbound and eastbound trains from PSNY to Howard Beach, subject to change pending real world operations, validation and the cost associated with frequency of service based on operating decisions and further future operating adjustments:

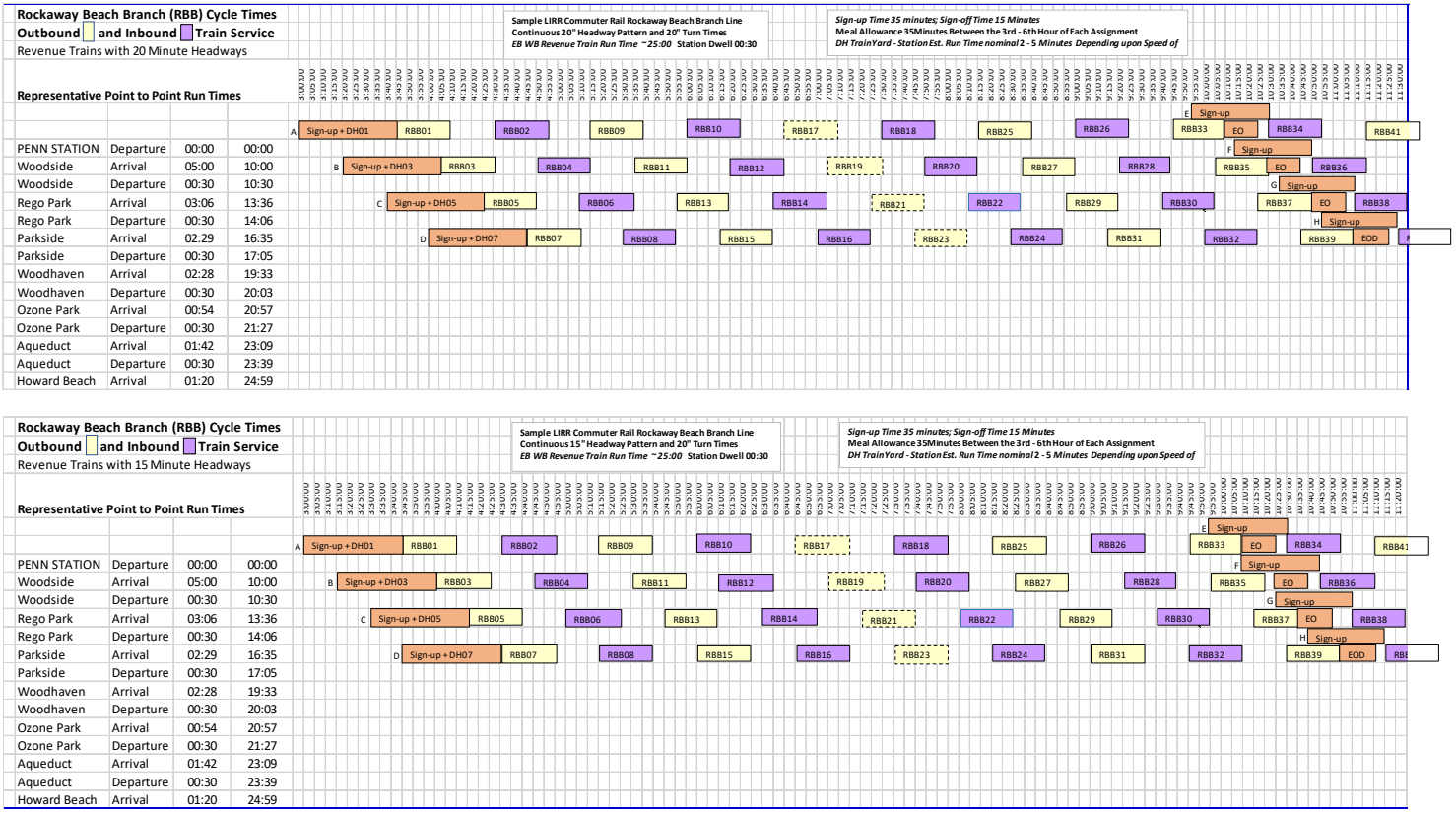


Figure 21: Tran Flow Diagrams

Note that sign-up time of 35 minutes has been added to crew hours. When starting from the yard, additional time is added to bring the train into Howard Beach Station prior to boarding passengers and departure westbound to NY Penn Station.

In addition, meal allowance of 35 minutes is identified midway in each crew assignment. Total cumulative crew run time is 7 hours and 10 minutes. Adding sign-off time of 15 minutes brings each crew assignment to 8 hours. A "relief crew" is required to operate the service during meal breaks. It is assumed that the relieve crew will be assigned from the extra list.

Meal allowances, sign-on and sign-off time is the same in the 15 minute headway scenario. There is the same number of assignments in each scenario but with different total run times. The 15 minute headway option shortens the run times. However, the 20-minute headway scenario maximizes the crew shifts in that each crew shift is 8 hours. Detail calculations are available upon request with the proviso that they are conceptual in nature. The balance of O&M costs such as propulsion,

mechanical, and station maintenance, etc. for each scenario are also conceptual costs and subject to change, depending upon more detailed analysis.

As stated above, the recommended turn time in PSNY is 20 minutes for revenue to revenue service. Tables 8 and 9 include snapshots of a representative timetable of RBB service for both 20 minute and 15 minute headways inbound Howard Beach Station to PSNY and outbound from PSNY to Howard Beach Station utilizing the four yard tracks at Howard Beach for trains to start and finish.

Table 8: Representative LIRR RBB Timetable – 20 Minute Headways

Outbound	Event	Interval Time	Cumulative Time	RBB34	RBB36	RBB38	RBB40	RBB42	RBB44
PSNY	Departure	00:00	00:00	9:50 AM	10:10 AM	10:30 AM	10:50 AM	11:10 AM	11:30 AM
Woodside	Arrival	10:00	10:00	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
Woodside	Departure	00:30	10:30	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
Rego Park	Arrival	03:06	13:36	10:03 AM	10:23 AM	10:43 AM	11:03 AM	11:23 AM	11:43 AM
Rego Park	Departure	00:30	14:06	10:04 AM	10:24 AM	10:44 AM	11:04 AM	11:24 AM	11:44 AM
Parkside	Arrival	02:29	16:35	10:06 AM	10:26 AM	10:46 AM	11:06 AM	11:26 AM	11:46 AM
Parkside	Departure	00:30	17:05	10:07 AM	10:27 AM	10:47 AM	11:07 AM	11:27 AM	11:47 AM
Woodhaven	Arrival	02:28	19:33	10:09 AM	10:29 AM	10:49 AM	11:09 AM	11:29 AM	11:49 AM
Woodhaven	Departure	00:30	20:03	10:10 AM	10:30 AM	10:50 AM	11:10 AM	11:30 AM	11:50 AM
Ozone Park	Arrival	00:54	20:57	10:10 AM	10:30 AM	10:50 AM	11:10 AM	11:30 AM	11:50 AM
Ozone Park	Departure	00:30	21:27	10:11 AM	10:31 AM	10:51 AM	11:11 AM	11:31 AM	11:51 AM
Aqueduct	Arrival	01:42	23:09	10:13 AM	10:33 AM	10:53 AM	11:13 AM	11:33 AM	11:53 AM
Aqueduct	Departure	00:30	23:39	10:13 AM	10:33 AM	10:53 AM	11:13 AM	11:33 AM	11:53 AM
Howard Beach	Arrival	01:20	24:59	10:14 AM	10:34 AM	10:54 AM	11:14 AM	11:34 AM	11:54 AM

Table 9: Representative LIRR RBB Timetable – 15 Minute Headways

Outbound	Event	Interval Time	Cumulative Time	RBB42	RBB44	RBB46	RBB48	RBB50	RBB52
PSNY	Departure	00:00	00:00	9:30 AM	9:45 AM	10:00 AM	10:15 AM	10:30 AM	10:45 AM
Woodside	Arrival	10:00	10:00	9:40 AM	9:55 AM	10:10 AM	10:25 AM	10:40 AM	10:55 AM
Woodside	Departure	00:30	10:30	9:40 AM	9:55 AM	10:10 AM	10:25 AM	10:40 AM	10:55 AM
Rego Park	Arrival	03:06	13:36	9:43 AM	9:58 AM	10:13 AM	10:28 AM	10:43 AM	10:58 AM
Rego Park	Departure	00:30	14:06	9:44 AM	9:59 AM	10:14 AM	10:29 AM	10:44 AM	10:59 AM
Parkside	Arrival	02:29	16:35	9:46 AM	10:01 AM	10:16 AM	10:31 AM	10:46 AM	11:01 AM
Parkside	Departure	00:30	17:05	9:47 AM	10:02 AM	10:17 AM	10:32 AM	10:47 AM	11:02 AM
Woodhaven	Arrival	02:28	19:33	9:49 AM	10:04 AM	10:19 AM	10:34 AM	10:49 AM	11:04 AM
Woodhaven	Departure	00:30	20:03	9:50 AM	10:05 AM	10:20 AM	11:00 AM	11:20 AM	11:40 AM
Ozone Park	Arrival	00:54	20:57	9:50 AM	10:05 AM	10:20 AM	11:00 AM	11:20 AM	11:40 AM
Ozone Park	Departure	00:30	21:27	9:51 AM	10:06 AM	10:21 AM	11:01 AM	11:21 AM	11:41 AM
Aqueduct	Arrival	01:42	23:09	9:53 AM	10:08 AM	10:43 AM	11:03 AM	11:23 AM	11:43 AM
Aqueduct	Departure	00:30	23:39	9:53 AM	10:08 AM	10:43 AM	11:03 AM	11:23 AM	11:43 AM
Howard Beach	Arrival	01:20	24:59	9:54 AM	10:09 AM	10:44 AM	11:04 AM	11:24 AM	11:44 AM

The distance between PSNY and Woodside is five miles. The maximum speed in the East River Tunnels is 60MPH once the whole train is in the tunnel. It is 15MPH in PSNY as well as through the interlockings leading to the tunnels. The total estimated running time between Howard Beach and Woodside is roughly 14 – 15 minutes, with station stops on the RBB through the connection at White Pot Junction.

6.2 NYCT OPTION

6.2.1 NYCT RBB Service Plan Development and Guidelines

In the NYCT Service Guidelines Manual, the subway system is described as "unique in its complexity, with an extensive network of three- and four-track lines featuring local and express stations and numerous track connections between lines." This complexity provides many possibilities for subway routing, incorporating ridership and origin-destination patterns, as well as operational feasibility, resource availability, schedule consistency, and resiliency. NYCT operations may be quantified using four subway service patterns to maximize efficiency and meet customer demand. The service patterns are as follows:

- *Through local service*: Trains operating to/from Manhattan and/or Downtown Brooklyn, stopping at all stations (e.g., The "L" train route).

- *Express/local service*: Trains operate on parallel tracks, with local trains making all stops and express trains making express stops only. Express/local service can operate in several configurations, such as:

    - On four-track lines with express service operating in both directions (e.g., "EFMR" service on the Queens Boulevard line);

    - On three-track lines, with express service operating in one direction only (e.g., "#7" train service on the Flushing line in Queens); generally, with the direction of express service changing to match peak passenger flows (e.g., to Manhattan in the morning and from Manhattan in the evening).

    - A variation of the express/local pattern in a zone system (e.g., "#6" train service on the Pelham line in the Bronx), where a subway line is divided into "outer" and "inner" zones. Zone express trains stop at all stations in the outer zone, and then skip all or most stations in the inner zone. Local trains make all stops in the inner zone and may originate at the boundary station between the zones (e.g., Parkchester on the "6").

- *Skip-stop service*: Trains with two separate designations operate on the same track in two stopping patterns. Some stations are served by one of the trains, some stations are served by the other train, and some services are served by both trains (e.g., "J" and "Z" service).

- *Shuttle service*: Trains operate on a branch line and terminate at a transfer point to a through service (e.g., overnight "5" shuttle trains terminate at East 180th Street, in the Bronx, where customers can transfer to the "2" train for service to Manhattan).

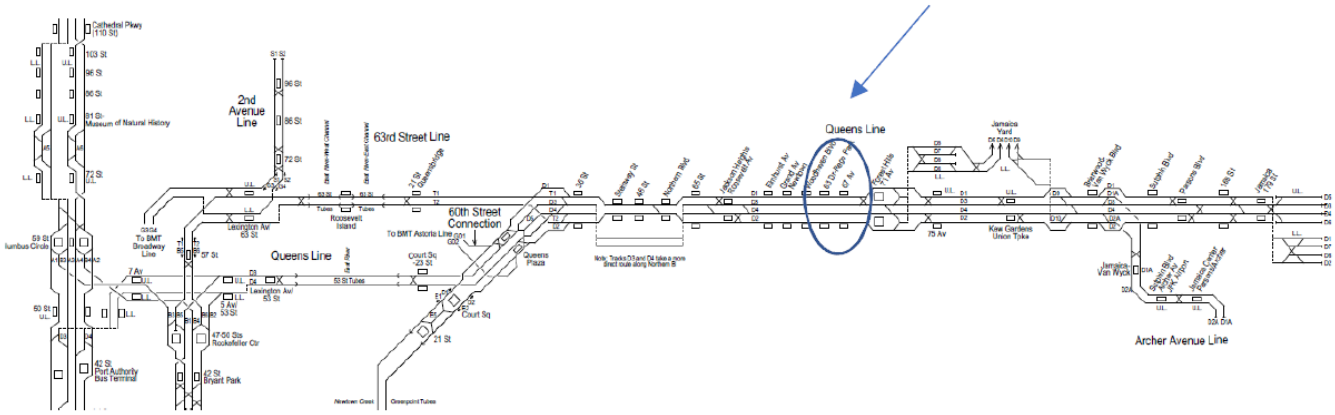


Figure 22: Existing NYCT Alignment

The NYCT route alignment proposed for service to RBB connects east of the 63rd Drive-Rego Park Station and extends to Howard Beach.

The QBL east of the 63rd Drive-Rego Park station, when constructed in 1932, had underground provisions constructed to allow eventual connection with the then LIRR-owned RBB. These provisions are the basis for proposed connection discussed in this report.

Operationally, the current services along the local tracks are the "M" service and the R service. In Manhattan, the "M" line operates via the 53rd Street tunnel to 6th Avenue, then down the 6th Avenue local tracks to the Chrystie Street connection with the Nassau Loop, then exits Manhattan over the Williamsburg Bridge. The "R" line operates via the 60th Street tunnel to the Broadway line, uses the Broadway local track down to Whitehall Street, and then travels through the Montague Street tunnel to Brooklyn. Both lines operate to 34th Street/Herald Square Station in Midtown Manhattan, one block east of PSNY, and thus the most appropriate station to use to compare with the LIRR option.

Based on the Train Performance Calculator (TPC) output (Tables 10 and 11), from Rego Park to Howard Beach, the NYCT alignment option run times are as follows:

Table 10: NYCT Alignment Option: Calculated Eastbound Run Times

Station ID	Event	Interval Time (Min:Sec)	Cumulative Time (Min:Sec)	Distance (in feet)	Average Speed (MPH)	Maximum Achievable Speed (MPH)
34th St-Herald Square	Departure	00:00	00:00	0	--	--
63rd Drive (Rego Park)	Arrival	30:00	30:00	44,083	17	50
63rd Drive (Rego Park)	Departure	00:30	30:30	0	15	--
Parkside	Arrival	04:03	34:33	8,172	23	50
Parkside	Departure	00:30	35:03	0	20	--
Brooklyn Manor	Arrival	02:25	37:28	6,742	32	50
Brooklyn Manor	Departure	00:30	37:58	0	26	--
Woodhaven	Arrival	00:47	38:46	1,753	25	45.42
Woodhaven	Departure	00:30	39:16	0	15	--
Ozone Park	Arrival	00:51	40:07	1,994	27	47.87
Ozone Park	Departure	00:30	40:37	0	17	--
Aqueduct – N. Conduit	Arrival	02:25	43:02	6,105	29	50
Aqueduct – N. Conduit	Departure	00:30	43:32	0	24	--
Howard Beach	Arrival	01:04	44:36	2,946	31	50
Total (with dwells):			44:36		18	
Total (without dwells):			41:36		20	
Cumulative Distance (in feet):				71,796		
Average Train Speed (MPH):					24	
MAS MPH On Average:						50

Table 11: NYCT Alignment Option: Calculated Westbound Run Times

Station ID	Event	Interval Time (Min:Sec)	Cumulative Time (Min:Sec)	Distance (in feet)	Average Speed (MPH)	Maximum Achievable Speed (MPH)
Howard Beach	Departure	00:00	00:00	0	--	--
Aqueduct – N. Conduit	Arrival	01:10	01:10	3,423	33	45.51
Aqueduct – N. Conduit	Departure	00:30	01:40	0	23	--
Aqueduct Racetrack	Arrival	00:36	02:16	1,161	22	50
Aqueduct Racetrack	Departure	00:30	02:46	0	12	
Ozone Park	Arrival	02:23	05:09	4,751	23	50
Ozone Park	Departure	00:30	05:39	0	19	--
Woodhaven	Arrival	00:49	06:29	1,994	27	43.27
Woodhaven	Departure	00:30	06:59	0	17	--
Brooklyn Manor	Arrival	00:46	07:45	1,753	26	50
Brooklyn Manor	Departure	00:30	08:15	0	16	--
Parkside	Arrival	02:26	10:41	6,739	31	50
Parkside	Departure	00:30	11:11	0	26	--
63rd Drive (Rego Park)	Arrival	04:30	15:41	8,222	21	61.29
63rd Drive (Rego Park)	Departure	00:30	16:11	0	--	--
34th St-Herald Square	Arrival	30:00	46:11	44,196	--	50
Total (with dwells):			46:11		18	
Total (without dwells):			42:41		19	
Cumulative Distance (in feet):				72,239		
Average Train Speed (MPH):					23	
MAS MPH On Average:						50

NYCTA TPC Notes (in General) Assuming connections with QBL are with local tracks, as shown on one seat ride feasibility tunnel text PAR 10-18- 17 *Figure 1*; Started and ended the TPC west end at extant 63rd Drive/-Rego Park QBL station; Assumed MAS/civil speed for tracks where not otherwise restricted to be 50 mph (same as QBL); Made tie-in point between extant NYCT Far Rockaway line inbound (westbound) track westbound home signal of Liberty Avenue Junction Interlocking; Made tie-in point between extant NYCT Far Rockaway line outbound (eastbound) track eastbound interlocking signal (F3-452) east of Liberty Avenue Junction Interlocking crossovers between F3 and F4 tracks.

Per the NYCT Trip Planner, the approximate travel time for each route between 63rd Drive – Rego Park and 34th Street/Herald Square is 30 minutes. Combined with the above TPC runs, an overall travel time from Howard Beach to 34th Street/Herald Square of approximately 45 minutes is derived.

An analysis to determine if NYCT service to the current Howard Beach Station can be blended with the existing volume of trains on these subway lines in conjunction with the underlying percentage of subway service delivered is inconclusive without a review of capacity in light of existing and future signaling systems. Based upon information from NYCT Operations Planning and MTA Planning staff, the QBL subway will be converted from the current "fixed block" signal system to the new Communications Based Train Control (CBTC) moving block signal system within the next 5-10 years. The proposed CBTC system will improve train schedule reliability and, as a result, may increase capacity.

Based on the combined headway of 5 minutes or 10 minutes along Queens Boulevard, it is proposed that a new service (MX) operate along the local tracks. The service should consist of three former "M" and three former "R" trains that operate along both the 6th Avenue and 7th Avenue-Broadway lines in Midtown. The new service would provide 10 minute headway along the RBB to Howard Beach. A lower frequency 15-minute headway, which would only eliminate two trains from each of the existing service, has also been tested and is provided for analysis of the impact of train frequency on NYCT passenger ridership.

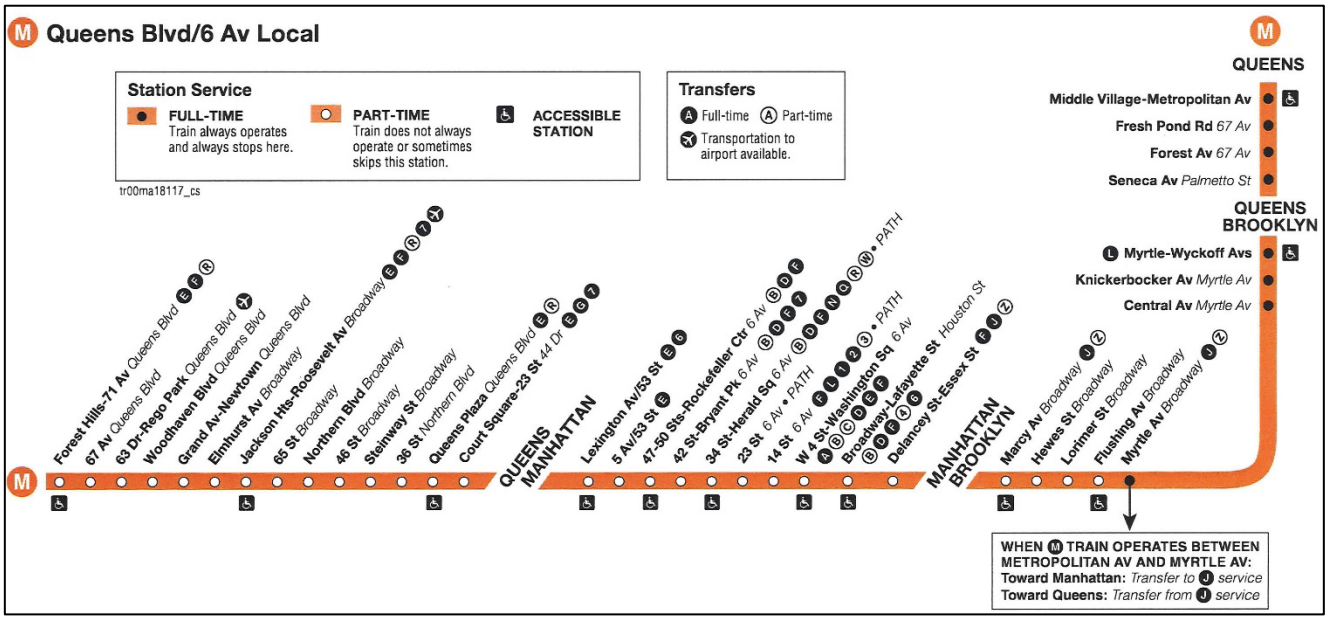


Figure 23: M Train Line Map and Timetable

Weekday Service

M Southbound

From Forest Hills-71 Av to Middle Village-Metropolitan Av, Queens

Frst Hills 71 Av	Roosevlt Av	Queens Plz	Court Sq-23 St	Lex Av 53 St	47-50 St Rock Ctr	34 St	W 4 St	Essex St	Myrtle Av	Myrtle-Wyckoff Avs	Met Av
									12:00	12:06	12:12
									12:15	12:21	12:27
									12:30	12:36	12:42
									12:45	12:51	12:57
									1:02	1:08	1:14
									1:22	1:28	1:34
									1:42	1:48	1:54
									2:02	2:08	2:14
									2:22	2:28	2:34
									2:42	2:48	2:54
									3:02	3:08	3:14
									3:22	3:28	3:34
									3:42	3:48	3:54
									4:02	4:08	4:14
									4:22	4:28	4:34
									4:42	4:48	4:54
									5:02	5:08	5:14
									5:22	5:28	5:34
									5:42	5:48	5:54
									6:02	6:08	6:14
5:24	5:34	5:44	5:45	5:48	5:52	5:55	5:59	6:06	6:18	6:24	6:30
5:34	5:44	5:54	5:55	5:58	6:02	6:05	6:09	6:15	6:27	6:33	6:39
5:44	5:54	6:04	6:06	6:09	6:12	6:15	6:20	6:26	6:38	6:46	6:52
5:53	6:03	6:13	6:15	6:18	6:22	6:25	6:30	6:35	6:48	6:55	7:01
6:04	6:14	6:24	6:26	6:29	6:32	6:35	6:40	6:45	6:58	7:07	7:13
6:15	6:25	6:35	6:37	6:40	6:44	6:47	6:52	6:57	7:10	7:18	7:24
6:26	6:36	6:46	6:48	6:51	6:54	6:57	7:02	7:07	7:20	7:29	7:35
6:36	6:46	6:58	7:00	7:03	7:06	7:09	7:14	7:19	7:33	7:42	7:48
6:46	6:56	7:06	7:07	7:10	7:16	7:19	7:24	7:29	7:43	7:52	7:58
6:56	7:06	7:16	7:18	7:21	7:25	7:28	7:32	7:38	7:50	7:59	8:05
7:04	7:14	7:26	7:27	7:31	7:34	7:37	7:42	7:47	8:01	8:09	8:15
7:11	7:21	7:31	7:33	7:37	7:40	7:43	7:48	7:55	8:07	8:16	8:22
7:19	7:29	7:39	7:41	7:45	7:48	7:51	7:56	8:03	8:16	8:24	8:30
7:26	7:37	7:47	7:49	7:53	7:56	7:59	8:04	8:10	8:22	8:30	8:36
7:33	7:44	7:55	7:57	8:00	8:04	8:07	8:12	8:17	8:31	8:40	8:46
7:38	7:49	7:59	8:01	8:05	8:08	8:11	8:16	8:22	8:36	8:45	8:51

Shuttle service→

Statistical Description of "M" Line NYCT Service

The "M" line has 16 station stops between 63rd Drive - Rego Park (Queens Boulevard) Station and 34th Street (Herald Square). Trains run approximately every 10 minutes, southbound and northbound. Three RBB (MX service) trains would divert from the QBL east of 63rd Drive - Rego Park station; have a run time of 14 minutes with dwells at six planned stations at an average speed of 50 MPH, per the TPC. Running time from 63rd Drive - Rego Park to Midtown Manhattan on the MX service would be approximately 45 minutes between Howard Beach Station and Midtown Manhattan (Herald Square - 34th Street).

The "M" alternative run time is approximately 20 minutes longer than the RBB service alternative.

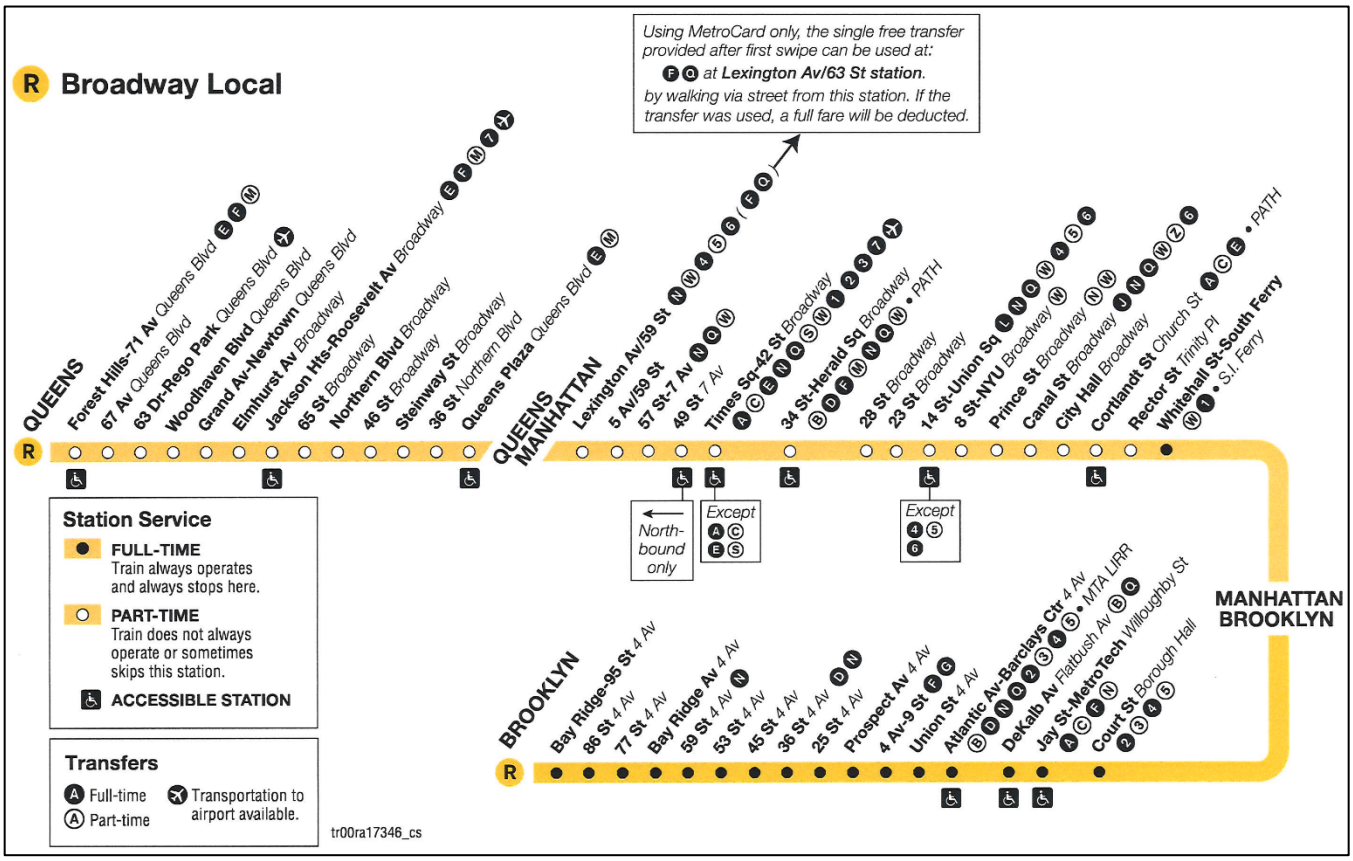


Figure 24: R Train Line Map and Timetable

Weekday Service

R Southbound

From Forest Hills-71 Av, Queens, to 95 St, Brooklyn

Frst Hills 71 Av	Roosevelt Av	Lex Av	Times Sq	Canal St	Whitehall St	DeKalb Av	Atlantic Av-Barclays Ctr	36 St	59 St	95 St
					12:15	12:24	12:27	12:36	12:41	12:48
					12:35	12:44	12:47	12:56	1:01	1:08
					12:55	1:05	1:08	1:17	1:22	1:29
					1:15	1:24	1:27	1:36	1:41	1:48
					1:35	1:44	1:47	1:56	2:01	2:08
					1:55	2:04	2:07	2:16	2:21	2:28
					2:15	2:24	2:27	2:36	2:41	2:48
					2:35	2:44	2:47	2:56	3:01	3:08
					2:55	3:04	3:07	3:16	3:21	3:28
Shuttle Service→					3:15	3:24	3:27	3:36	3:41	3:48
					3:35	3:44	3:47	3:56	4:01	4:08
					3:55	4:04	4:07	4:16	4:21	4:28
					4:15	4:24	4:27	4:36	4:41	4:48
					4:35	4:44	4:47	4:56	5:01	5:08
					4:55	5:04	5:07	5:16	5:21	5:28
					5:15	5:24	5:27	5:36	5:41	5:48
					—	—	—	5:41	5:46	5:54
					5:35	5:44	5:47	5:55	6:00	6:08
					—	—	—	6:01	6:06	6:14
					5:55	6:04	6:07	6:15	6:20	6:28
5:18	5:28	5:43	5:51	6:00	6:08	6:18	6:21	6:29	6:34	6:42
5:31	5:40	5:56	6:03	6:14	6:22	6:32	6:35	6:44	6:49	6:56
5:42	5:52	6:08	6:15	6:26	6:34	6:42	6:45	6:53	6:58	7:06
5:51	6:01	6:17	6:24	6:35	6:44	6:51	6:54	7:03	7:08	7:15
6:02	6:12	6:30	6:37	6:49	6:57	7:05	7:09	7:17	7:22	7:30
6:13	6:23	6:39	6:46	6:58	7:06	7:14	7:17	7:26	7:31	7:38
6:17	6:27	6:44	6:51	7:03	7:11	7:19	7:22	7:31	7:36	7:43
6:24	6:34	6:50	6:57	7:09	7:17	7:25	7:29	7:37	7:42	7:50
6:29	6:39	6:55	7:02	7:14	7:23	7:30	7:34	7:42	7:47	7:55
6:34	6:44	7:00	7:07	7:19	7:28	7:35	7:39	7:47	7:52	8:00

Statistical Description of "R" Line NYCT Service

The "R" line has 16 stops between 63rd Drive - Rego Park (Queens Boulevard) Station and 34th Street (Herald Square). Trains run approximately every 10 minutes, southbound from Midtown Manhattan (34th Street) would leave the QBL east of the 63rd Drive -Rego Park station. Similar to the MX trains operating down 6th Avenue, the Queens running times would be the same and the total runnig time to Manhattan.

The running times from Howard Beach to Midtown via the 7th Avenue-Broadway line would be approximately 45 minutes.

7. SKETCH TRAVEL DEMAND FORECASTS

7.1 LIRR

For the LIRR alternative, the RBB was modeled with 15-minute headways in both directions in the 4-hour AM peak period. In order to create capacity going between Manhattan and Long Island, the following branches require a reduction in service:

- Port Jefferson/Huntington Branch reduced Manhattan bound train headways from 14 minute to 18 minute headways, eastbound trains reduced service from Manhattan from 48 to 60 minute headways.
- Ronkonkoma Branch reduced Manhattan bound train headways from 10 minute to 11 minute headways, eastbound trains reduced service from Manhattan from 30 minute headways to 34 minute headways.
- Hempstead Branch reduced Manhattan bound train headways from 24 minute to 30 minute headways.
- Babylon Branch reduced Manhattan bound train headways from 7 minute to 8 minute headways.

Table 12 demonstrates the year 2025 forecasted station level ons and offs for the RBB with 15 minute headways for the 4-hour AM peak period. Using an AM peak period to a daily factor of 2.678 for LIRR ridership, the branch level daily ridership is forecasted to be approximately 11,200 riders per average weekday. It's important to note that the ridership demand is driven by the assumption of a zone fare for LIRR and a flat fare for NYCT. The LIRR service for most riders would require a transfer at Penn Station with LIRR fares plus NYCT fares for the transfer.

Table 12: Forecasted Year 2025 LIRR RBB AM Peak Period Ridership by Station with 15 Minute Headways

	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	209	0	0	83
Aqueduct	97	0	0	32
Ozone Park	269	0	0	139
Woodhaven	389	1	1	136
Parkside	300	1	2	112
Rego Park	952	12	14	314
Woodside	918	70	75	218
Manhattan (PSNY or GCT)	0	3,050	942	0
Totals	**3,134**	**3,134**	**1,034**	**1,034**

A second LIRR alternative for the RBB was also modeled with 20 minute headways in both directions in the 4-hour AM peak period. In order to create capacity going between Manhattan and Long Island, the following branches require a reduction in service:

- Port Jefferson/Huntington Branch reduced Manhattan bound train headways from 14 minute to 17 minute headways, eastbound trains reduced service from Manhattan from 48 to 60 minute headways.
- Ronkonkoma Branch reduced Manhattan bound train headways from 10 minute to 11 minute headways, eastbound trains reduced service from Manhattan from 30 minute headways to 34 minute headways.
- Hempstead Branch reduced Manhattan bound train headways from 24 minute to 27 minute headways.
- Babylon Branch reduced Manhattan bound train headways from 7 minute to 8 minute headways.

Table 13 demonstrates the year 2025 forecasted station level ons and offs for the RBB with 20 minute headways for the 4-hour AM peak period. Using an AM peak period to a daily factor of 2.678 for LIRR ridership, the branch level daily ridership is forecasted to be approximately 10,800 riders per average weekday.

Table 13: Forecasted Year 2025 LIRR RBB AM Peak Period Ridership by Station with 20 Minute Headways

	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	198	0	0	82
Aqueduct	73	0	0	25
Ozone Park	228	0	0	106
Woodhaven	372	1	1	128
Parkside	285	1	1	93
Rego Park	929	9	10	288
Woodside	1,027	68	58	215
Manhattan (PSNY or GCT)	0	3,033	867	0
Total	**3,112**	**3,112**	**937**	**937**

7.2 NYCT

For the NYCT alternative, the RBB was modeled with 10 minute headways in both directions in the 4-hour AM peak period. In order to create capacity along the Queens Boulevard track line, the following subway lines require a reduction in service:

- "R" train reduced inbound and outbound trains to and from Manhattan from 6 minute to 8.67 minute headways.
- "M" train reduced inbound trains to Manhattan from 6 minute to 8.67 minute headways and outbound trains from Manhattan from 10 minute to 20 minute headways.

Table 14 demonstrates the year 2025 station level ons and offs for the RBB for the 4-hour AM peak period. Using an AM peak period to a daily factor of 2.91 for NYCT ridership, has the project stations of Howard Beach to Parkside generating approximately 47,000 riders per day.

Table 14: Forecasted Year 2025 NYCT RBB AM Peak Period Ridership by Station

	Inbound		Outbound	
	Ons	*Offs*	*Ons*	*Offs*
Howard Beach	9,063	0	0	4,616
Aqueduct	871	0	0	709
Ozone Park	4,015	317	118	2,857
Woodhaven	1,278	215	170	763
Brooklyn Manor	2,537	781	499	1,276
Parkside	837	512	446	426
63rd Drive-Rego Park	852	2,492	1,720	262
Total	**19,453**	**4,317**	**2,953**	**10,909**

8. COST ESTIMATES

8.1 CAPITAL COSTS

Table 15 provides capital cost estimates prepared for both the LIRR and NYCT alternatives. All costs were developed on an order of magnitude basis and do not include costs for any potential land acquisition.

Table 15: Capital Cost Estimate

Alternative	Capital Cost Estimate
Long Island Rail Road	$6,774,400,000
New York City Transit	$8,102,400,000

Table 16 includes a summary of associated costs as prepared as part of this Phase 1 White Paper.

Table 16: Associated Cost Estimate

Cost Categories	LIRR Option	NYCT Option
Bridge Replacements	$132,700,000	$97,900,000
Bridge Rehabilitations	$32,500,000	$0
Viaducts	$482,400,000	$482,400,000
Tunnels	$1,500,000	$2,191,700,000
Site Work	$1,275,200,000	$646,000,000
Stations	$897,500,000	$585,000,000
Trackwork	$479,700,000	$215,800,000
Systems	$724,200,000	$643,400,000
Force Accounts	$711,600,000	$803,800,000
Soft Costs	$2,037,100,000	$2,436,400,000
Totals	**$6,774,400,000**	**$8,102,400,000**

Notes:

1. Values shown include all cost estimate mark-ups (i.e., General Conditions, OH&P, Insurance & Bonding, Contingency, Escalation).
2. Site Work Category includes: Retaining Walls, Sound Walls, Embankments & ROW Vegetation Removal.

The basis of estimate is based on the following assumptions and exceptions:

1. Direct Costs are in 2016 dollars, rounded to the nearest one hundred thousand.
2. Estimate is based on internal meetings regarding scope and constructability, various reports and white papers, and schematic alignment layouts.
3. For LIRR alternative, estimate includes new retaining walls, excavation, and allowance for repairs to existing inactive WB tunnel below LIRR Mainline in White Pot Junction.
4. For LIRR alternative, estimate includes new turnouts for connection between LIRR Mainline and Rockaway Branch (RBB) track running along Mainline ROW.
5. Estimate includes clearing and grubbing along abandoned portions of ROW.
6. Estimate includes removal of existing track, ties, and existing high-tension poles where required.
7. Estimate includes providing geogrid stabilization mattresses on approximately 25 percent of embankment slopes.
8. Estimate includes ballast retaining curbs along approximately 25 percent of the trackway between White Pot Junction and Liberty Avenue.
9. Estimate includes eight-foot high security fence and access gates along the ROW between White Pot Junction and Liberty Avenue.
10. Estimate includes ballasted track on grade sections and aerial structures and Direct Fixation (DF) track in tunnels and boat sections.
11. Estimate includes cleaning of viaduct where required prior to demolition.
12. For LIRR alternative, estimate includes cleaning and painting along with miscellaneous repairs to four UG bridge structures along the LIRR Mainline.
13. For LIRR alternative, estimate includes replacement of 11 UG bridge structures between White Pot Junction and Pitkin Ave.
14. For NYCT alternative, estimate includes replacement of nine UG bridge structures between White Pot Junction and Atlantic Avenue.
15. For BOTH alternatives, estimate includes full replacement of viaduct between 97th Avenue and Rockaway Boulevard.
16. For LIRR alternative, estimate includes cantilever structural modification of retained embankment between Rockaway Boulevard and Pitkin Avenue.
17. Estimates include requisite allowances for signals, traction power and communications.
18. For NYCT alternative, estimate includes two Tunnel Ventilation Plants for new tunnels between Rego Park Station and Portal north of Fleet Street.

19. Estimate includes allowances for environmental issues regarding lead abatement, hazardous/contaminated soils, and other fugitive environmental conditions.
20. Contingency of 30 percent is included commensurate with preliminary schematics of project.
21. Soft costs for Agency Costs, Project Management, and Engineering Review and Inspection as shown and per direction from LIRR.
22. Soft costs for Professional Services (Design advancement, Construction Management, Risk Assessments, Specialists, Public Outreach as shown and per direction from LIRR.
23. Soft costs for Agency Service Support Costs (Utility Companies, etc.) assumed at 18 percent of cost.
24. Force accounts costs as shown assumed at five percent of cost.
25. No costs for real estate acquisitions or rolling stock whatsoever is included.
26. Indirect costs included at 18 percent of direct cost; overhead and profit at 21 percent of direct cost.
27. Insurance and bond costs included at seven percent per direction of LIRR
28. For simplicity, absent a schedule of program implementation, 10 years of escalation at 4.25 percent per annum is included across the board.

8.2 OPERATING AND MAINTENANCE COSTS

This feasibility study briefly analyzed the operating and maintenance cost of operating LIRR and NYCT service on the RBB. This analysis was done on an order of magnitude level based on the sketch operating plans and construction elements discussed in the previous sections of the document. The Operating and Maintenance costs are projected to be in the range of $12 to $12.5 million per year for LIRR service and $13.5 to $14 million per year for NYCT service. Additional, refined analysis is needed to further establish the operating and maintenance costs of either of these services.

9. TRANSIT ORIENTED DEVELOPMENT

9.1 INTRODUCTION

9.1.1 PURPOSE OF ANALYSIS

Within the Rockaway Beach Branch Feasibility Study, there was interest in evaluating the potential for Transit-Oriented Development (TOD) around stations along the potentially reactivated Rockaway Beach Branch (RBB). This evaluation provides a sketch level analysis of potential TOD opportunities adjacent to four station locations along the RBB. Current TOD principles seek to reestablish neighborhood-based mixed use development adjacent to transit service in order to make better home-work-community connections and to reduce the need for single occupancy vehicle travel.

9.1.2 PROJECT AREA

The study area is located in Queens between the Long Island Rail Road (LIRR) Main Line and JFK Airport. The RBB alignment generally runs north-south, parallel to Woodhaven Boulevard. The analysis of TOD potential sites includes only Parkside, Woodhaven (LIRR Atlantic Branch and RBB), Ozone Park, and Aqueduct Stations. The study area is defined as approximately ½ mile radius around the station site.

9.1.3 STUDY CONTEXT

Most of the buildings in the study area date from the 1930s and 1940s. The RBB was electrified in the 1920s and was heavily used when active through 1950. Service on the RBB was reduced following a 1950 fire on the Jamaica Bay Trestle. Limited service was provided between 1950 and 1962, when the northern portion of the RBB was abandoned. The neighborhoods therefore were the traditional form of transit-oriented development: concentrated single and multifamily housing with neighborhood retail within walking distance of regular transit service.

9.1.4 TRANSIT ORIENTED DEVELOPMENT

According to the Federal Transit Administration (FTA), "TOD includes a mix of commercial, residential, office, and entertainment centered around or located near a transit station[5]." The potential success of TOD depends on population and/or job density adjacent to a station as well as convenient access to the station. TOD is characterized by density, walkability, a mix of uses, and connectivity. TOD typology describes the aspirations of a station area relative to its ultimate build-out according to four stages of TOD "readiness": long-term, emerging, ready, or an arrived status.

9.2. ANALYSIS

Each station site analysis is summarized based on transit and real estate market potential. Observations from the analysis are detailed in the following sections.

9.2.1 MOBILITY FRAMEWORK

- Street Network and Parking: The RBB generally runs parallel to/east of Woodhaven Boulevard/Cross Bay Boulevard. None of the proposed RBB stations currently have large public parking lots or structures within the immediate vicinity.
- Current Travel Patterns: The majority of people living within the vicinity of the proposed RBB stations commute to Midtown Manhattan for work. Large proportions of the local population also commute to Lower Manhattan, Downtown Brooklyn, or JFK Airport for work, while other residents work locally in the Ozone Park area, Jamaica, and along Queens Boulevard.
- Transit Connectivity: Currently NYC Transit and MTA Bus operate subway, local bus, and express bus service and the LIRR operates commuter rail service within the City Terminal Zone in the vicinity of the RBB. The area surrounding the proposed RBB stations has substantial public transit options, but it is more focused on local travel in Queens and Brooklyn than travel into Manhattan. The proposed reactivation of the RBB would add a faster, high quality 1-seat transit option to Manhattan.
- RBB Project Projections: With substantial travel time savings, in many cases with travel times to Midtown Manhattan halved or more, the restoration of service on RBB has the potential to dramatically change the desirability of living within the vicinity of the proposed RBB stations.

9.2.2 REAL ESTATE MARKET

- Trends: Overall, the areas near the proposed train stations are populated by middle class families whose household income is at or slightly below the median household income for families in New York City (NYC); and above those for households in New York State (NYS). For the most part, the neighborhoods have been fully developed and remain stable, with few sites available for TOD. One sizeable exception is the area around Aqueduct Racetrack, which has both significant vacant parcels as well as portions of the adjacent neighborhood that is in disrepair and has shown signs of significant vacancy (more than 10%).
- Demographics: Incomes lower than Queens average, but at or close to NYC and NYS overall levels. The study area's relatively blue collar character and moderate housing prices will serve as a bulwark against any wholesale change in local character like gentrification.
- Land Use/Zoning Mix: The current land use consists of low rise, 1 – 3 story buildings. This is consistent both along the main retail thoroughfares of Jamaica, Atlantic and Metropolitan Avenues and the residential area of Woodhaven, Parkside and Ozone Park. The Aqueduct Racetrack is also 3 stories, and is expanding with a sizeable parking garage and gaming space. The vast majority (64.1%) of the zoning within the study area is low density (R1-R4) residential. Commercial zone C-8 is the next most prevalent zoning (13.9%). Immediately outside the half mile radius, low density residential is still the most prevalent zoning. Two transit-supportive commercial overlay districts currently exist in the study area.
- TOD Typology: TOD is not a "one size fits all" concept. It can occur in many different configurations of usage, shapes, sizes, and densities. In the study area, given the residential nature of the corridor and the potential travel time savings

[5] Federal Transit Administration. Transit-Oriented Development, https://www.transit.dot.gov/TOD, 2018.

of the RBB for commuters into Midtown Manhattan, a mid-rise residential project with first floor commercial and convenient pedestrian access to the station is envisioned as the most applicable TOD product type.

- Value Capture: Value capture financing and property revenue yield are not applicable here because of minimal opportunities available for redevelopment. Opportunities would need to be addressed on a site by site basis depending on the size of a parcel.

9.2.3 TOD EVALUATION

The following components form the basis for the use of a TOD-readiness tool that classifies each station based on several measures of TOD potential (e.g, policy/regulatory; market; mobility; physical; social). The scorecard developed for each of the station sites also includes a calculation of future value-added (property real estate valuation) and economic benefit generated by new transit investment. It assesses a station area's unique strengths and weaknesses, and helps to develop targeted strategies to increase readiness for TOD for the individual station area.

Each station area is evaluated based on the following criteria:

- Scale and type of supportive zoning/land use
- Extent of land availability (vacant, underutilized, developable, parcel size, infill sites) and development capacity
- Ease of assemblage formation within a district
- Magnitude and level of new development activity by type and product size
- Market strength and trajectory
- Market interest and extent station area growth induced by restoration of transit service
- Socio-demographic conditions; neighborhood stability and cohesiveness
- Presence of amenities and quality of public realm
- Level of future transit ridership demand and connectivity
- Walkability and access conditions of the area
- Nature of complementary transportation investments
- TOD readiness

9.3 FINDINGS AND OPPORTUNITIES

9.3.1 TRANSIT DIVIDEND

While the local TOD potential around RBB station areas is limited, with established residential neighborhoods and little opportunity/space to dramatically increase population density, the region would experience economic growth through increased property values, desirability/quality of life benefits, accessibility, and mobility options through leveraging the improved travel times to Midtown Manhattan for the study area's primarily middle class residents.

Overall, the middle class established neighborhoods prevalent along the RBB do not lend themselves well to TOD potential. However, there are some pockets of opportunity. These pockets of opportunity include:

- Parkside Station: limited potential low rise commercial uses including possible structured parking for RBB passengers
- Woodhaven Station: limited potential upzoning and parcel assemblage on either side of the LIRR ROW and 100th Street south of Atlantic Avenue
- Ozone Park Station: limited potential upzoning east of station area in currently industrial/manufacturing area surrounded by residential areas
- Aqueduct Station: potential mixed-use mid-rise TOD and larger scale commercial/recreational development

9.3.2 TOD READINESS

Every proposed station has some narrow potential for development that would support/benefit from/make a case for the reactivation of RBB service. Within the study area, two station areas are already zoned for developments with transit

preference/reduce parking requirements: Woodhaven and Ozone Park. These two station areas also have some potential for TOD through upzoning on a few parcels. The Aqueduct Station has the greatest degree of TOD potential with 42 acres of vacant land within a half mile of the station. It also already has NYCT subway access. In the case of Parkside, the neighborhood mix is not conducive to mid-rise residential TOD, but it could be a location of other low rise commercial uses, which could include structured parking.

9.3.3 TOD TIMEFRAME

With a forecast year of 2025 used to estimate service reactivation of the RBB, as assumed in the main RBB study, TOD is estimated to occur between 2023 and 2030. Real estate acquisitions for TOD development may start to occur as early as 2020-2022 once service reactivation is guaranteed or once construction of the RBB is underway.

10. NEXT STEPS

In consideration of advancing this project, local and state political support as well as available funding is assumed to be drivers in advancing the work. An environmental review and conceptual engineering would be a next step to the project. The environmental review will follow NEPA (Federal Process) or SEQRA (State Process). The available funding source for the project will determine whether NEPA is required in addition to SEQRA. If federal funding were utilized to construct rail service on the RBB, the FTA would likely be the funding agency. In this case, the NEPA process would be followed. The FTA would likely be the federal sponsor leading the EIS process following the National Environmental Policy Act (NEPA) statutes in accordance with FTA Environmental Impact and Related Procedures (23 C.F.R 771). Further, if no federal funds were utilized, the SEQRA would be followed, and the New York State Environmental Quality Review Act (SEQRA) review process would require a state-level EIS for the project. Since the project may impact both parkland and existing historic resources, a federal Section 4(f) evaluation may also be required.

It should be noted that typically when a State Authority such as the MTA is the local lead entity, the state environmental process is used; however, the RBB right-of-way is a City owned and controlled property. It may be necessary to examine their role as at least a participating reviewing agency. NYC CEQR compliance is necessary if the project requires: discretionary approvals or permits from any city agency; city funding, or the project is being directly undertaken by a city agency. In any case, it may be necessary to examine their role as at least a participating reviewing agency.