January 2020

To: Lanterra Developments From: Hatch

Marion PATH Station Physical Feasibility Study

Executive Summary

This report has been prepared to study the physical feasibility of a new Port Authority Trans-Hudson (PATH) station in the Marion neighborhood of Jersey City adjacent to developments proposed by Lanterra Developments and the Mana Group.

This report addresses the following:

1. The **physical feasibility** of locating a PATH station in the vicinity of Newark Avenue between Senate Place/Van Wagenen Avenue to the east and Wallis Avenue to the west;
2. The best **location** along the aforementioned stretch of tracks to physically locate a new PATH station; and
3. A confirmation that the **distance** between the proposed Marion Station and existing Journal Square PATH Station is adequate to locate a new station.

Summary of Conclusions and Recommendations for Further Discussion:

This report finds that it is physically feasible to locate a new PATH station in the vicinity of the Lanterra and Mana development sites.

Hatch examined two options for locating the proposed PATH station and platform. The first option, Option A, seeks to minimize property impacts on Fayette Avenue (located to the south of the existing right-of-way (ROW)). The second option, Option B, expands the ROW into Fayette Avenue in order to minimize impacts to the Waldo Running Track. Both options incorporate a station platform capable of accommodating a 10-car PATH train (20 feet by 663 feet).

Further analysis will be required on both options in order to understand impacts on signals and communication equipment, site drainage, and both additional operational and site constraints and considerations. Hatch recommends considering the following as this project moves forward:

- Studying the signals and communications required by PANYNJ for PATH stations;
- Conducting topographic and metes and bounds surveys to verify layout and elevations of existing track alignments and functional right-of-way limits;
- Performing a title search to provide additional information about property ownership and the physical extent of the subject properties and land;
- Investigating details of right-of-way acquisition adjacent to the Nanak Naam Jahaj Gurudwara temple; and
- Maintaining updates on the status of the PANYNJ's Marion PATH Station Feasibility Study.

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1. Report Purpose

This report has been prepared to study the physical feasibility of a new Port Authority Trans-Hudson (PATH) station in the Marion neighborhood of Jersey City adjacent to developments proposed by Lanterra Developments and the Mana Group.

This report addresses the following:

1. The **physical feasibility** of locating a PATH station in the vicinity of Newark Avenue between Senate Place/Van Wagenen Avenue to the east and Wallis Avenue to the west;
2. The best **location** along the aforementioned stretch of tracks to physically locate a new PATH station; and
3. A confirmation that the **distance** between the proposed Marion Station and existing Journal Square PATH Station is adequate to locate a new station.

2. Site Overview

The development site is composed of two sites shown in Figure 1:

- **Mana development site** is located to the north of Newark Avenue at 888 Newark Avenue and the surrounding parcels. The site is bounded by Newark Avenue to the south, Wallis Avenue to the west, the Pulaski Skyway to the north-west, St. Pauls Avenue to the north, and Senate Place to the east. The Mana development site and proposed redevelopment concept is shown in detail in red outline in Figure 1.
- **Lanterra development site** is located to the south of the PATH/freight tracks at 1072 and 1075 West Side Avenue. The site is bounded by Broadway to the south, Giles Avenue to the west, and Corbin Avenue to the east. The Lanterra development site and proposed surrounding redevelopments are shown in Figure 1.

The development sites are located in the Marion neighborhood of Jersey City, and are both approximately a 13-minute walk from the Journal Square PATH Station located at 138 Magnolia Avenue in Jersey City.

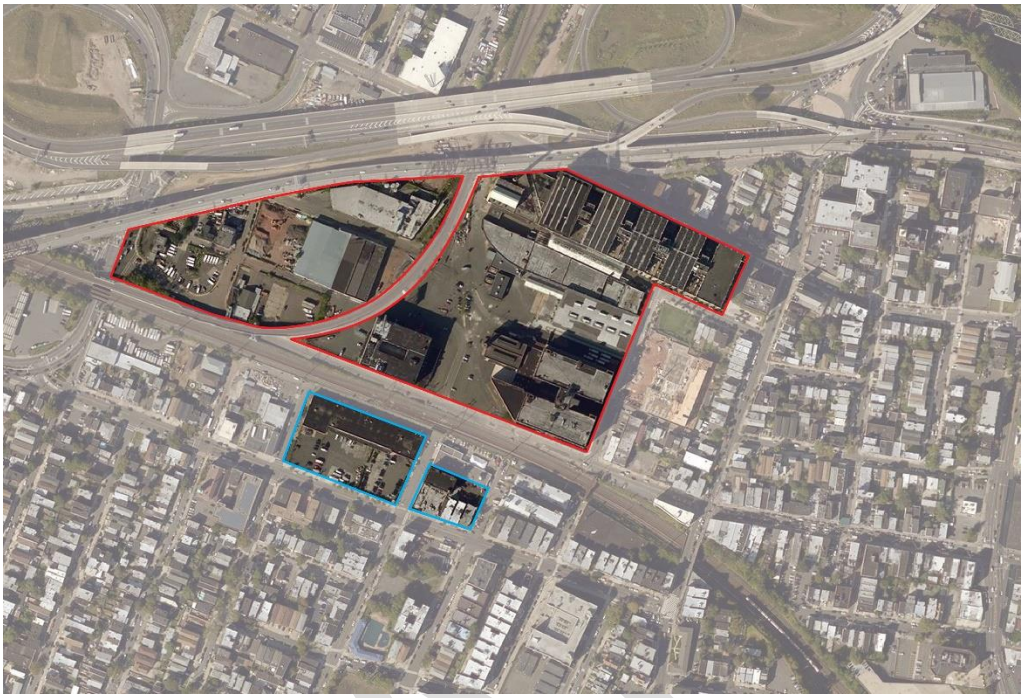


Figure 1: Indicative Boundaries of Lanterra (indicated in blue) and Mana (indicated in red) Development Sites (Source: Bing Maps)

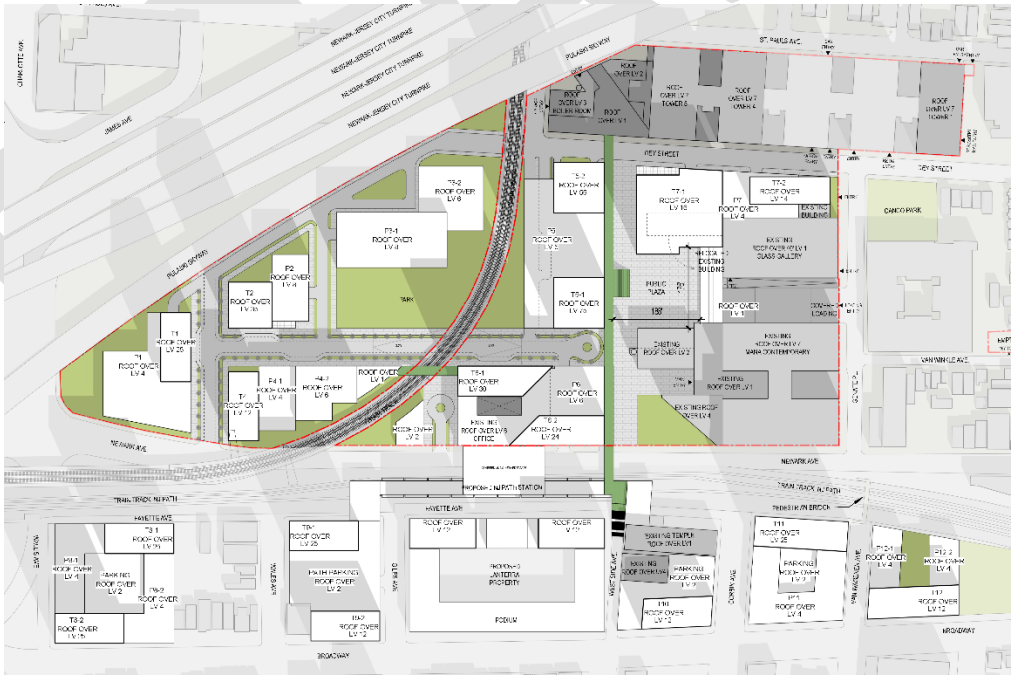


Figure 2: Proposed Master Plan Concept Design (Source: Arquitectonica)

3. Marion PATH Station Physical Feasibility

Lanterra Developments is interested in understanding if it is physically feasible to locate a new PATH station in the vicinity of their development site and the Mana development site, along Newark Avenue to the north, Fayette Avenue to the south, and roughly between Giles Avenue to the west and Van Wagenen Avenue to the east.

This section provides an overview of the PATH system, and then discusses the physical feasibility of a new PATH station.

3.1 PATH Background and Context

3.1.1 PATH Overview

The Port Authority Trans-Hudson (PATH) system is a heavy-rail rapid-transit system that connects New Jersey cities in Hudson and Essex Counties to Manhattan. The Port Authority Trans-Hudson Corporation was established in 1962 as a subsidiary of The Port Authority of New York and New Jersey (PANYNJ) and owns and operates the PATH system.[1]

The system length is 13.8 miles (22.2 kilometers). PATH operates 13 stations and four lines: Newark-World Trade Center, Hoboken-World Trade Center, Journal Square-33rd Street, and Hoboken-33rd Street. The four PATH lines are shown in Figure 3.

PATH operates 24 hours a day, 7 days a week. PATH stations provide connections to various other modes of transit, including the NYC Subway and NYC Transit (NYCT) Bus, Hudson-Bergen Light Rail, NJ Transit Commuter Rail and Bus, New York Waterway ferries, Newark Light Rail, and Amtrak.

Figure 3: PATH System Map (Source: PANYNJ)

The PANYNJ charges a single flat fee of $2.75 per ride. 10-trip, 20-trip, and 40-trip PATH SmartLink Cards are $2.50 per trip.[2] There are no free transfers or transfer discounts with

[1] *About PATH*. PANYNJ, 2019, panynj.gov/path/en/about.html. Accessed 23 December 2019.
[2] *Fares*. PANYNJ, 2019, panynj.gov/path/en/fares.html. Accessed 23 December 2019.

adjacent transit systems. As of December 2019, the year-to-date average weekday ridership in was 286,803. The year-to-date weekday count (i.e. annual ridership) was 65,677,962 as of November 2019.[3] These figures are not inclusive of December 2019, as updated numbers were not available at the time of writing.[4]

In 2018, PATH became the first railroad in the New York-New Jersey region to become Positive Train Control (PTC) compliant, ahead of federal mandate.[5]

PATH has a track gauge of 4 feet, 8.5 inches standard gauge.[6] The electrification is 650 volts with a third rail.[7] PATH's current rolling stock is made up of Kawasaki's PA5 model and currently uses 8-car trains. The PATH Improvement Plan (described below) details plans for adding additional cars in the future.

3.1.2 PATH Improvement Plan

In June 2019, the PANYNJ announced the $1 billion PATH Improvement Plan to make upgrades to the system addressing signal issues, switch failures, car equipment failures, track conditions, sick passengers, and unattended bags. The plan also commits to adding new trains to the fleet, having all trains on the Newark to World Trade Center line be 9-car trains (currently 8-car trains), adding a new signal system allows trains to run every three minutes, and adding two trains from existing fleet into service during the morning and evening rush to the Newark to World Trade Center and Journal Square to 33rd Street Lines.[8] The plan also commits to trains running every three minutes during the busiest times on the Newark-World Trade Center Line.[9] The plan also calls for studying a future expansion to 10-car trains.[10] Ongoing implementation of the system upgrades will be fully complete by 2022.

3.1.3 PATH Extension to Newark Airport

PATH's Newark to World Trade Center Line currently terminates at Newark Penn Station. Extending PATH's system from its current terminus to the Newark Liberty International Airport Station close to Newark Liberty International Airport (EWR) would improve transit access for airport customers and commuters coming from many of the communities currently served by PATH.[11] A preliminary alternative has been identified, which includes the extension of PATH's Newark-World Trade Center line from its existing terminus at Newark Penn Station to the Newark Liberty International Airport Station.

As of the second quarter of 2019, an FTA determination was expected to be made, either a Finding of No Significant Impact (FONSI) or a Preparation of Environmental Impact Statement (EIS) would be required.

[3] *PATH Monthly Ridership Report*, PANYNJ, 2019, http://2019-PATH-Monthly-Ridership-Report.pdf. Accessed January 3, 2020.
[4] *Stats*. PANYNJ, 2019, panynj.gov/path/en/stats.html. Accessed 23 December 2019.
[5] *History*. PANYNJ, 2019, panynj.gov/path/en/history.html. Accessed 23 December 2019.
[6] PANYNJ Civil Design Guidelines. Accessed 3 January 2020.
[7] PANYNJ Electrical Design Guidelines. Accessed 3 January 2020.
[8] *Modernizing PATH*. PANYNJ, 2019, panynj.gov/path/en/modernizing-path.html. Accessed 3 January 2020.
[9] *Modernizing PATH*. PANYNJ, 2019, panynj.gov/path/en/modernizing-path.html. Accessed 3 January 2020.
[10] "PATH plans to add longer trains to ease commuter rush crush." NJ.com, October 23, 2019, nj.com/traffic/2019/10/path-plans-to-add-longer-trains-to-ease-commuter-rush-crush.html. Accessed 7 January 2020.
[11] *PATH Extension Project*. PANYNJ, 2019, panynj.gov/path/en/schedules-maps/extension-project.html. Accessed 7 January 2020.

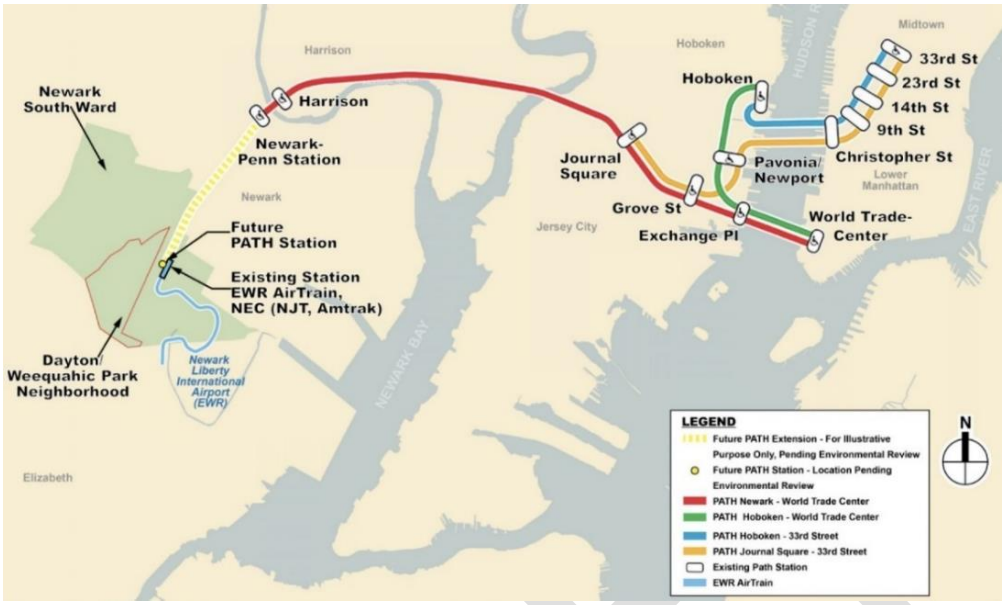


Figure 4: Proposed PATH Newark Airport Extension Map (Source: PANYNJ)

3.2 The Railroad Right-of-Way

The Lanterra and Mana development sites are located to the south and north, respectively, of an existing east-west freight and passenger railroad right-of-way (ROW), which is bordered by Newark Avenue to the north and Fayette Avenue to the south. The ROW contains three railroad tracks and associated railroad appurtenances (e.g. signaling and communication equipment, traction power systems, turnouts, etc.).[12] Other signature features within the ROW include the elevated pedestrian bridge that crosses above the ROW near the intersection of Newark Avenue and Senate Place, and the railroad bridges that carry the ROW over Wallis Avenue to the west.

The ROW is generally straight between Wallis Avenue and West Side Avenue. To the east of West Side Avenue, however, the ROW and the railroad tracks begin a gentle curve to the south.

3.2.1 The Waldo Running Track

The first track, which runs along the northern boundary of the ROW, is exclusively dedicated to freight rail operations and is known as the Waldo Running Track. The Waldo Running Track is owned and operated by Conrail as a part of the railroad's Passaic & Harsimus Line (P&HL). The P&HL is a standard gauge, non-electrified rail line that originates at a point near Newark Liberty International Airport, continues eastward across Newark Bay, and enters Jersey City before terminating at Journal Square.

After crossing Newark Bay, eastbound freight trains traveling via the P&HL can either divert to the north onto Conrail's Northern Branch via the Marion Running Track or, alternatively, remain on the P&HL and continue to Journal Square via the Waldo Running Track. The

[12] Hatch recommends that the legal ownership and physical extent of the ROW be confirmed via a title search and an associated metes and bounds survey.

Waldo Running Track splits into two tracks via a single turnout[13] that is located near the intersection of Newark Avenue and Senate Place. The turnout leads to a 4,200 feet rail siding, a track that can be used for railcar storage.

3.2.2 The PATH Newark-World Trade Center Line

The remaining two tracks within the ROW (to the south of the P&HL) are dedicated to PATH's Newark-World Trade Center Line passenger operation. As previously mentioned, these standard gauge tracks are electrified via a third rail traction power system.

The two tracks—the north PATH track and the south PATH track—run essentially parallel to one another. A double crossover[14] located near the intersection of Fayette Avenue and West Side Avenue allows PATH trains to move between the two PATH tracks.

A grated channel runs near the south side of the south PATH track along a portion of the ROW.

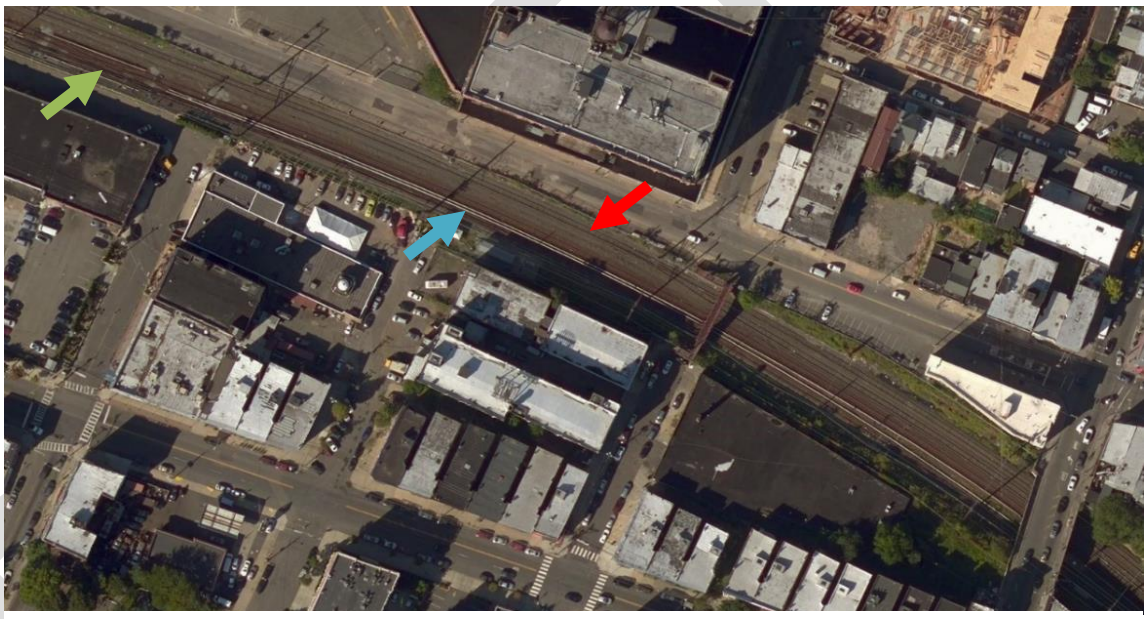


Figure 5: Aerial view showing the Waldo Running Track (indicated by the red arrow) and PATH tracks (indicated by the blue arrow). PATH's double crossover is indicated by the green arrow. (Source: Bing Maps)

[13] A "turnout" is a technical railroad term used to describe an assembly of track components that collectively permit two tracks to merge with one another. A turnout is within a category of track design known as "special track work."
[14] A "double crossover" is a technical railroad term used to describe an assembly of track components—four turnouts and a diamond—that allow trains to move between two parallel tracks. Similar to a turnout, a double crossover is also within a category of track design known as "special track work."

Figure 7: An eastward view of the ROW from the pedestrian bridge. The photograph shows (from left to right): the Conrail Waldo Running Track and siding, the north and south PATH tracks, and the grated channel (indicated by the red arrow). (Source: Hatch)

Figure 6: A westward view of the ROW from the pedestrian bridge. The photograph shows (from left to right): the grated channel, the south and north PATH tracks, and the Conrail Waldo Running Track and siding. (Source: Hatch)

3.3 Station Feasibility

Hatch found that it is physically feasible to locate a new PATH station in the vicinity of the Lanterra and Mana development sites.

Hatch examined two options for locating the proposed PATH station and platform. The first option, Option A, seeks to minimize property impacts on Fayette Avenue (located to the south of the ROW). The second option, Option B, expands the ROW into Fayette Avenue in order to minimize impacts to the Waldo Running Track. Both options incorporate a station platform capable of accommodating a 10-car PATH train (20 feet by 663 feet).

Further analysis will be required on both options in order to understand impacts on signals and communication equipment, site drainage, and additional operational considerations. There is also an existing grated channel appears to be running parallel to the PATH tracks on the south side. This will need to be examined and possibly relocated depending on the purpose of the channel.

Appendix A contains plan views and section sheets for both options. As both plan views describe, the colored lines on the plans indicate the following:

- Blue - Existing Right-of-Way
- Magenta - Proposed Right-of-Way
- Red - Existing Track
- Green - Proposed Realigned Track

3.3.1 Option A

Option A realigns both the existing Waldo Running Track and the north PATH track further to the north, while pushing the existing south PATH track further to the south. The proposed PATH station platform is located as far to the west as possible in order to avoid the curving tracks/ROW to the east; however, a portion of the platform extends slightly into this curve by approximately 95 feet.

This option would likely require the relocation of special trackwork as well as minor accommodations to retaining walls located along the ROW.

The realignment of the Waldo Running Track for the proposed PATH station would require the removal and relocation of the aforementioned turnout located near the intersection of Newark Avenue and Senate Place. The turnout would be relocated further to the east along the curved portion of the track. Conrail may see this relocation as unfavorable for two reasons:

1. Placing a turnout on curved track is generally against good design practice and may present operational hazards if implemented; and
2. Relocating the turnout will effectively shorten the length and storage capacity of the rail siding by approximately 164 feet.

In addition to modifying freight rail infrastructure, Option A will also require the relocation of PATH's double crossover located near the intersection of Fayette Avenue and West Side Avenue. The double crossover would likely have to be relocated to a point along the ROW that is west of Wallis Avenue. It could not be accommodated between Wallis Avenue and the western end of the proposed PATH station platform. Nor can it be accommodated to the east of the proposed PATH station: a double crossover cannot be placed on curved track.

There appear to be two sections where there is insufficient horizontal clearance for the track realignments. One is at the east end of the retaining wall between Newark Avenue and the

rail corridor across from Giles Ave, but no additional property is required. The second section is located near the northern footing of the pedestrian bridge that crosses the ROW (where Senate Place meets Newark Avenue, under the pedestrian bridge). Accommodating the realignment may require a minor taking of a portion of Newark Avenue. The existing retaining wall would also need to be replaced and pushed back to accommodate the new track and clearance requirements. A photograph of the retaining wall is shown in Figure 8.

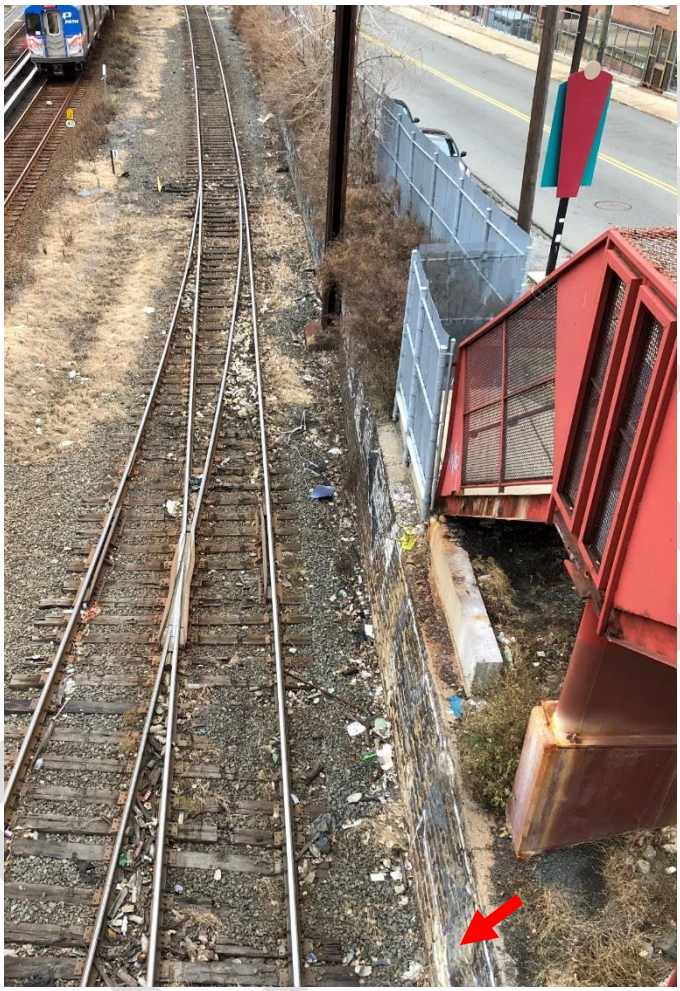


Figure 8: An eastward view of the ROW and retaining wall (indicated by the red arrow) from the pedestrian bridge. (Source: Hatch)

3.3.2 Option B

Option B leaves both the Waldo Running Track and the north PATH track untouched. A realigned south PATH track is accommodated through extending the ROW approximately 15 feet to the south from the existing ROW, between Wales Avenue to Corbin Avenue.

Option B will still necessitate the relocation of PATH's double crossover and will certainly have to address the grated channel that is located to the south of the existing south track. However, the platform will be in an optimal position as there will be sufficient tangent track to accommodate the complete 663 foot platform length.

3.3.3 Distance to Journal Square Station

The Journal Square PATH Station is located approximately 2,030 feet from the easternmost edge of the station platform in Option A, and approximately 2,180 feet from the easternmost edge of the station platform in Option B as measured from Google Earth.

The distance from Journal Square Station was measured from the western edge of the underpass under John F. Kennedy Boulevard. The exact track length between the Journal Square PATH Station and the proposed Marion PATH Station would need to be verified by PANYNJ.

Distances between existing PATH stations vary from roughly 1,280 feet to over 5 miles. Using Google Earth and measuring from roughly the center of the street located over the station, the following approximate station spacings were found:

- 33rd Street Station to 23rd Street Station – 2,355 feet
- 23rd Street Station to 14th Street Station – 2,280 feet
- 14th Street Station to 9th Street Station – 1,280 feet
- 9th Street Station to Christopher Street Station – 2,180 feet
- Christopher Street Station to Hoboken Station – 1.4 miles
- Hoboken to Grove Street Station – 1.8 miles
- Grove Street Station to Journal Square Station – 1.4 miles
- Journal Square Station to Newark Penn Station – 5.6 miles

The exact length of track between the stations above would need to verified by the PANYNJ.

Publicly available information on PATH headways in relation to distances between stations was not available. The impact on headways with a new station would need to verified with the PANYNJ.

3.3.4 Assumptions

In our analysis, plans, and drawings, Hatch made the following assumptions about the track requirements for a new PATH station:

- Minimum desirable track spacing of 13 feet as per the PANYNJ Civil Design Guidelines.
- Minimum desirable wayside clearance of 8 feet 6 inches. The minimum required wayside spacing through station platforms is 4 feet 7.5 inches. Track spacing from centerline to edge of platform is approximately 4 feet 8 inches. Minimum distance from ROW to centerline of track is approximately 8 feet 4 inches.
- Speeds are assumed to be 60 miles per hour for passenger trains and 60 miles per hour for freight trains.
- The proposed tie-in to the existing curve just west of Tonnele Avenue is a very high level design effort. A topographic survey (additional detail is provided in section 3.4) is required to ensure that it would be possible to properly tie-in through this curve.
- Relocation of all special trackwork to be confirmed viable by both Conrail and the PANYNJ, and locations are to be confirmed.

In our analysis, plans, and drawings, Hatch made the following assumptions about platform requirements for a new PATH station:

- The PANYNJ Civil Design Guidelines state that the minimum length of a platform is 530 feet. We assume this is for 8-car trains, as the current PATH trains run with 8 cars. PANYNJ may move to using 10-car trains in the future. For 10-car trains, we have assumed a 663 foot platform. For 9-car trains, we have assumed a platform length of 596 feet. These platform lengths were developed thought the assumption of the minimum platform length of 530 feet being sufficient for an 8-car train, and interpolating the extended platform lengths.
- Minimum platform width is assumed to be 20 feet as per comparable heavy-rail train systems. This is not specified in the PANYNJ Civil Design Guidelines, and the PATH Track Standards Manual, which may contain platform standards, is not publicly available referenced in the PANYNJ Civil Design Guidelines.
- The distance required from centerline of track to edge of platform is not mentioned in the PANYNJ Civil Design Guidelines. It does state that a 1 inch gap is required between the train and the edge of the platform. It was assumed that 4 feet 8.1 inches (approximately half the trains width plus 1 inch) would be the minimum distance for platform placement.

3.4 Additional Considerations

3.4.1 Signals and Communications

Signals and communications for both Option A and Option B will need to be analyzed to ensure proper operations are maintained. There is also an existing grated channel that appears to be running parallel to the PATH tracks on the south side. This will need to be examined and possibly relocated depending on the purpose of the channel.

3.4.2 Topographic and Metes and Bounds Surveys

It is recommended that a detailed topographic and metes and bounds survey of the ROW in the vicinity of the Lanterra and Mana development sites be undertaken. By completing a topographic survey, the Hatch team will be able to verify layout and elevations of existing track alignments and functional right-of-way limits. This would allow Hatch to confirm the proposed design of tracks and the platform location. It will also allow for a preliminary look into possible drainage design.

A metes and bounds survey (accomplished with a title search, mentioned below) will identify the physical and legal extents of the ROW and adjacent properties. This will allow the team to further evaluate the impacts and feasibility of either rail options.

3.4.3 Title Search

A title search will provide additional information about property ownership and the physical extent (the metes and bounds) of the subject properties. This information will, combined with the aforementioned metes and bounds survey, will prove invaluable to the team as they make strategic decisions about potential project impacts to the ROW and adjacent property owners.

3.4.4 Right of Way Acquisition

The Nanak Naam Jahaj Gurudwara Sikh temple is located on a parcel of land (Block 9301, Lot 31) adjacent to the Lanterra-owned parcels at 1072 West Side Avenue (Block 9301, Lots 24 and 27 to 30). The temple is located directly to the south/adjacent to Fayette Avenue (also called County Road 641 in this location), and is located between West Side Avenue and

Corbin Avenue. The section of Fayette Avenue between West Side Avenue and Corbin Avenue has a gate installed at the intersection of West Side Avenue and Fayette Avenue. A title search (mentioned above) would provide property ownership details and the physical extent of the temple property, as well as the existing ROW extent. The ownership of this property will need to be considered as Option B shifts the ROW 15 feet to the south of the current ROW.

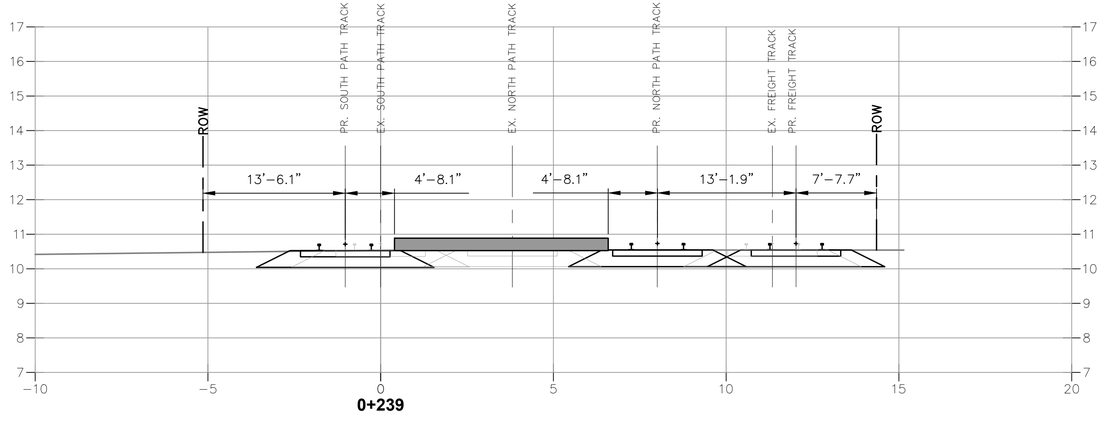
3.4.5 PANYNJ Marion PATH Station Feasibility Study

In March 2018, the Port Authority Board of Commissioners agreed to settle a $400 million lawsuit brought against the PANYNJ by Jersey City. As part of this settlement, the PANYNJ agreed to conduct a feasibility study to examine building a new PATH station in the Marion neighborhood of Jersey City. As of January 2020, further details and status of the study are not publicly available.

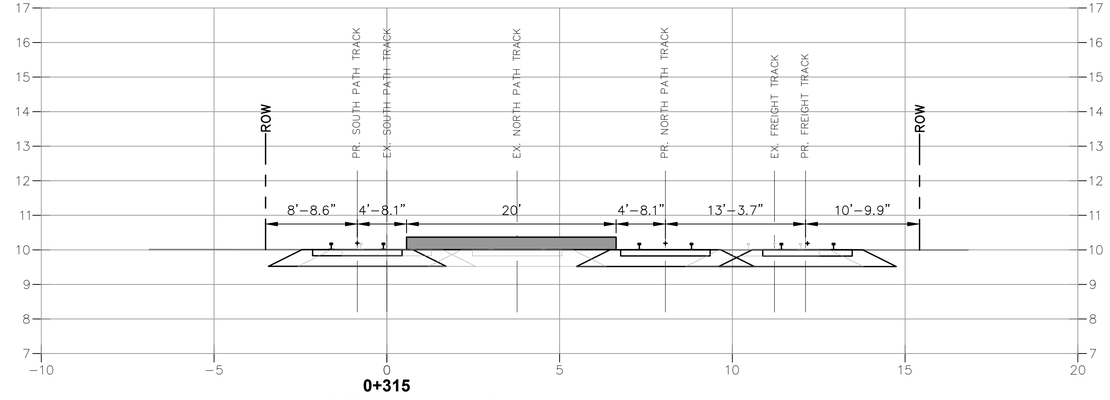
Appendix A: Plans and Elevations

Option A

OPTION A PLAN VIEW



SECTION – A



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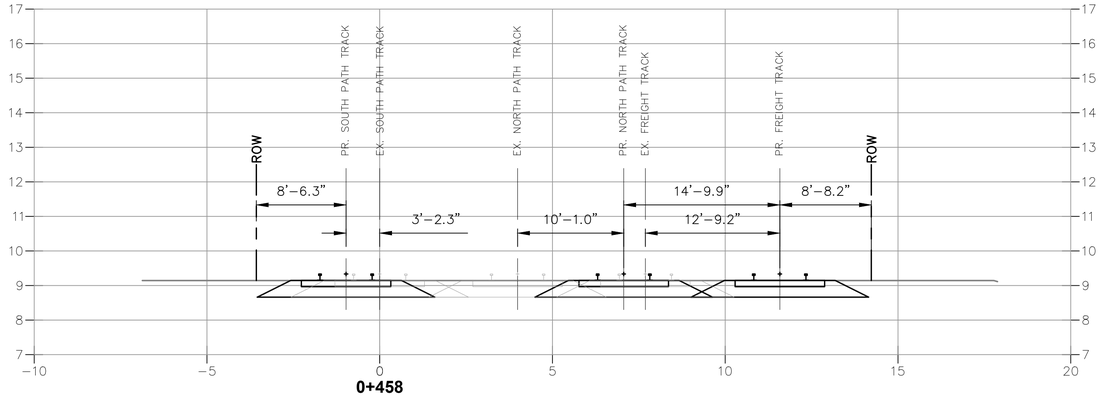

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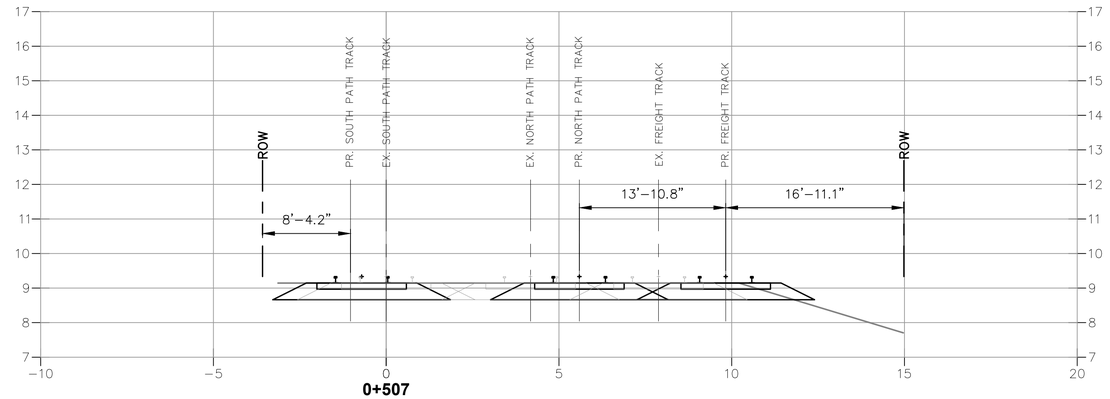
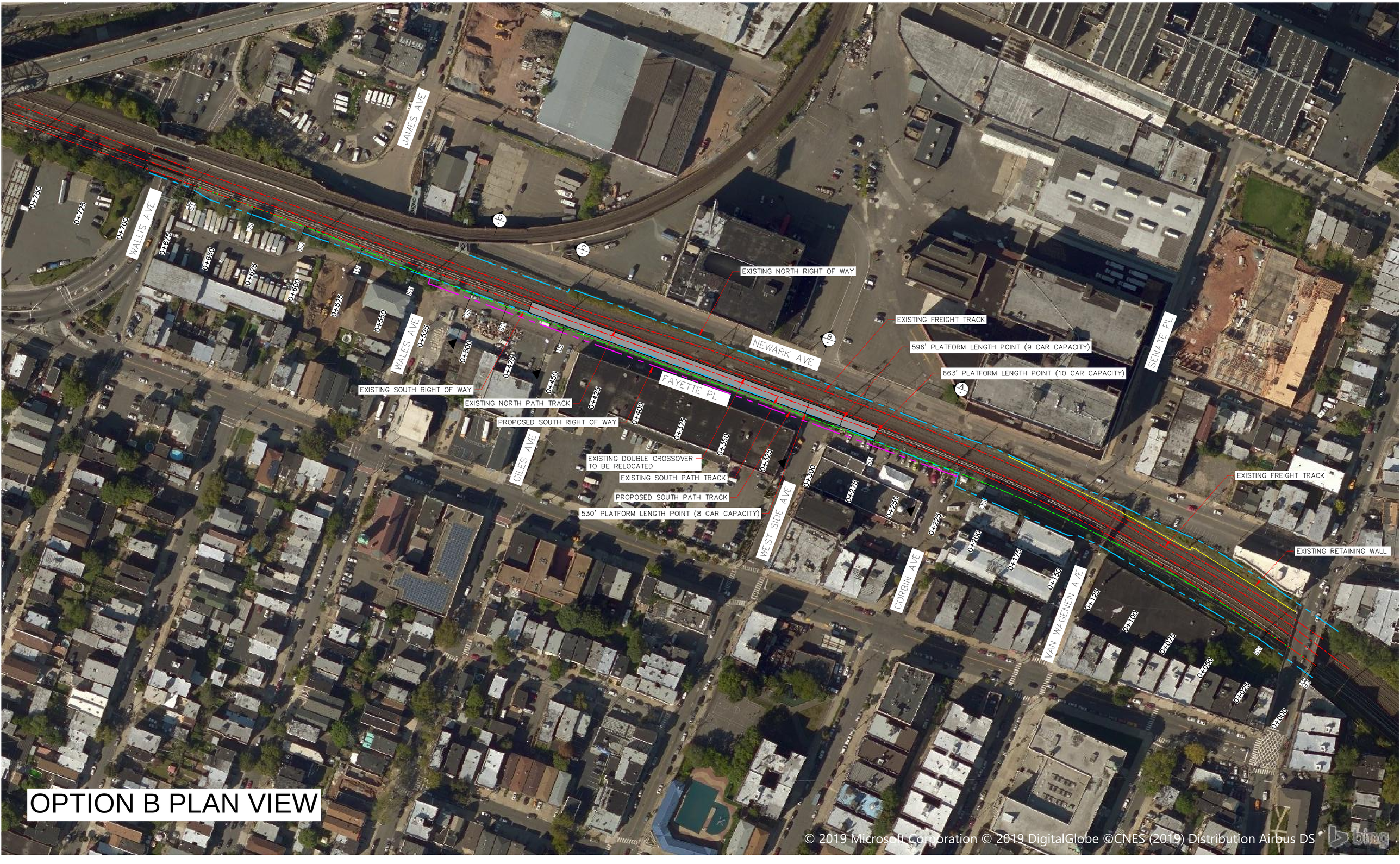


SECTION – D

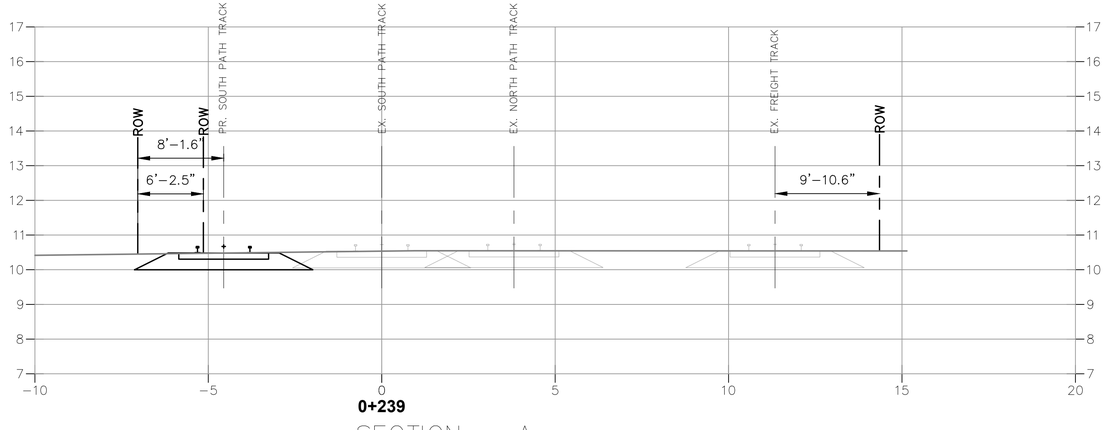
OPTION A SECTIONS

Appendix A: Plans and Elevations

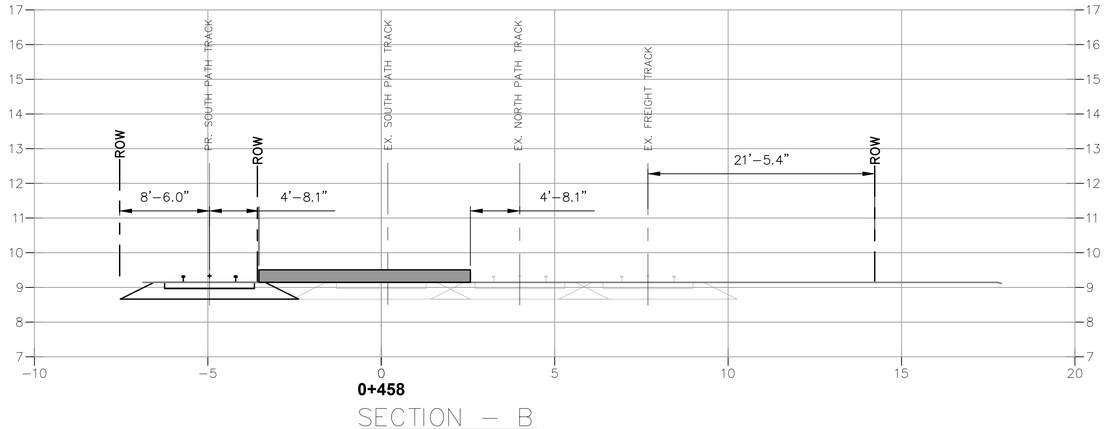
Option B



OPTION B PLAN VIEW



SECTION – A



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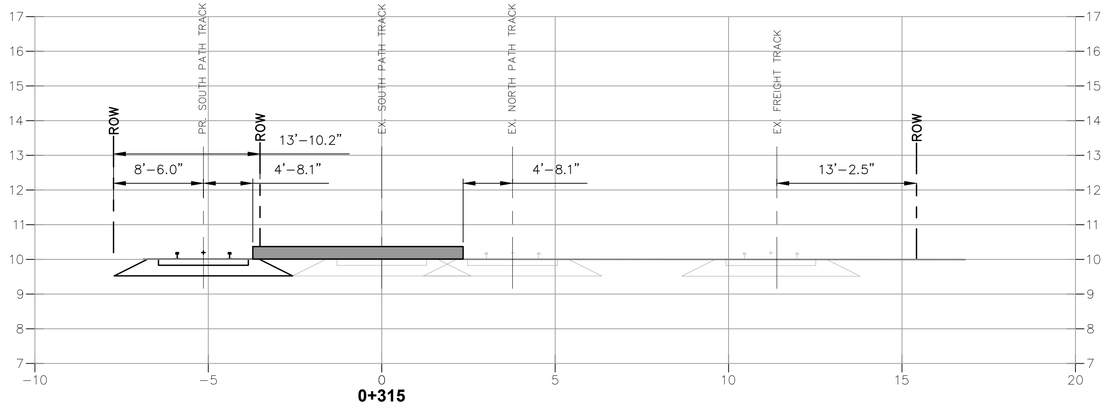

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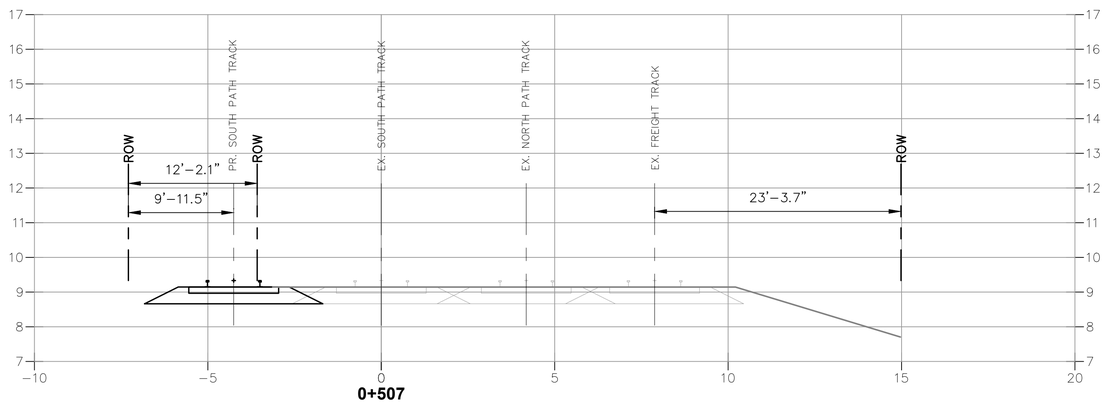

SECTION – D

OPTION B SECTIONS

Exhibit A – Disclaimer

Important Notice to the Reader

This report was prepared by Hatch Associates Consultants, Inc. and Hatch Limited (collectively "**Hatch**") for the sole and exclusive benefit of Lanterra Developments (the "**Client**") for the sole purpose of assisting the Client to determine the physical feasibility potential of a new PATH station in the Marion section of Jersey City (the "**Project**"), and must not be provided to, relied upon or used by any other party. The use of this report by the Client is subject to the terms of the relevant contract dated November 1, 2019 between Hatch and Client.

This report is meant to be read as a whole, and sections should not be read or relied upon out of context. The report includes information provided by the Client and by certain other parties on behalf of the Client. Unless specifically stated otherwise, Hatch has not verified such information and does not accept any responsibility or liability in connection with such information.

This report contains the expression of the opinion of Hatch using its professional judgment and reasonable care, based upon information available at the time of preparation. The quality of the information, conclusions and estimates contained in this report is consistent with the intended level of accuracy as set out in this report, as well as the circumstances and constraints under which this report was prepared.

As this report is a feasibility study, all estimates and projections contained in this report are based on limited and incomplete data. Accordingly, while the work, results, estimates and projections in this report may be considered to be generally indicative of the nature and quality of the Project, they are not definitive. No representations or predictions are intended as to become the results of future work, and Hatch does not promise that the estimates and projections in this report will be sustained in future work.