Chapter 4: Short List of Alternatives

4.0 INTRODUCTION

The short list of alternatives includes three options to extend the Hudson-Bergen Light Rail's (HBLR) West Side Avenue–Tonnelle Avenue Branch from its current terminus at West Side Avenue Station to serve new development in the western waterfront area of Jersey City. The short list also includes a Transportation System Management (TSM) Alternative, which would provide a circulator bus service between the West Side Avenue Station and the western waterfront area.

This chapter provides an overview of the engineering and environmental context that guided the further development of the short list of alternatives, and describes the alternatives and their potential benefits and constraints in detail. It concludes with a comparative evaluation of the short list of alternatives. This evaluation serves as the basis for the recommendation of the Locally Preferred Alternative.

4.1 ENGINEERING, OPERATIONS, AND ENVIRONMENTAL CONTEXT

Following its evaluation of the long list of alternatives, NJ TRANSIT undertook a rigorous analysis of the remaining alternatives (the short list alternatives). It developed conceptual horizontal and vertical alignments, station designs, and operating plans for the three light rail alternatives. NJ TRANSIT prepared estimates of capital costs and operating and maintenance costs and forecasts of anticipated ridership for all of the short list alternatives.

4.1.1 ENGINEERING CONSIDERATIONS

Horizontal and vertical alignments and station designs for the light rail alternatives were developed in accordance with HBLR design guidelines specified in the HBLR Manual of Design Criteria, as well as the New Jersey Department of Transportation (NJDOT) Design Manual for Bridges and Structures, where relevant. Where necessary, these guidelines were supplemented with accepted engineering practices from similar light rail systems.

4.1.1.1 ALIGNMENT

In all three light rail alternatives, the HBLR extension beyond West Side Avenue Station would be carried above grade on a viaduct structure. Alignments would have two tracks. Consistent with HBLR design criteria, a minimum 500-foot radius was assumed for curves on the elevated structure.

The viaduct's structural components would be typical of the existing HBLR system and would generally consist of welded steel plate girder spans. Concrete plinths on reinforced concrete deck would provide for direct fixation light rail track with continuous welded rail (CWR). Except in limited locations (e.g., western tail tracks and at West Side Avenue Station), a single deck would support both tracks. The overhead catenary system would be supported by concrete

pedestals on the deck edges with structural support elements under the pedestals. A maintenance walkway would be provided along the viaduct deck, and this walkway would be on top of a systems cable trough integrated with the deck.

The superstructure would be supported by either elastomeric or disc-type bearings on concrete substructures and circular piers. Except where the viaduct crosses Route 440, the deck would be supported by double columns spanned by a single concrete cap beam. At Route 440, single hammerhead-type piers would be used to support the structure, which would require less land area at the base. A deep foundation system was assumed to handle the heavy axial and lateral loads imposed by the superstructure of the HBLR, as well as the soil conditions along the route. At this stage of project development, it is anticipated that drilled shafts would be a viable foundation option. The large-diameter drilled shafts would be socketed into rock to provide sufficient axial and lateral support.

The height of the structure above grade was set, where feasible, at a 14-foot, 6-inch clearance to underside of structure. However, exceptions to this clearance would be necessary at certain locations along the new extension (i.e., across West Side Avenue and through the West Side Avenue Station parking lot).

The drilled shafts, substructure, and superstructure would be constructed from within the existing or future right-of-way from West Side Avenue, through Route 440, to Bayfront. Traffic detours may be required during the construction of piers in the vicinity of Route 440 and the erection of the superstructure over Route 440, West Side Avenue, and Mallory Avenue.

For all three light rail alternatives, the existing West Side Avenue Station would remain at its current location, but modifications would be made to the station. The existing pedestrian overpass would be removed and other alterations to existing station features would also be required (see Section 4.2.2.2.1 below). For the new stations, platforms were designed to be 300 feet long, which would more than accommodate 3-car train consists.

As noted in Chapter 1, “Background and Planning Context,” the City of Jersey City is undertaking the Route 440/Routes 1&9T Multi-use Urban Boulevard and Through Truck Diversion Concept Development Study (Route 440 Study) to investigate a potential redesign of the roadway. The City provided drawings of the potential future alignment of Route 440 assuming that the boulevard improvements are implemented. To accommodate these plans in the development of HBLR alternatives, a 232-foot right-of-way was assumed for the new roadway from the existing centerline of Route 440. Vertical infrastructure for the light rail alternatives that is required within the future Route 440 right-of-way was placed at median locations identified in the City’s preliminary roadway plans.

Conceptual plans for a light rail extension considered the street grid that has been adopted by the City of Jersey City for the planned new Bayfront development on the west side of Route 440. During design development, it was determined that the necessary curvature for the HBLR viaduct across Route 440 would conflict with the alignment of the northernmost street in the adopted street plan for the Bayfront development. Through coordination between the Bayfront developers, City of Jersey City, and NJ TRANSIT, the Bayfront street plan is being modified to accommodate the horizontal and vertical alignment requirements of the HBLR extension. A draft plan of the proposed modified street grid for Bayfront is provided in **Appendix B**.

4.1.1.2 STATION PLANNING

Since all three light rail alternatives would run on a viaduct, any new stations would be elevated stations. Center-island platforms were assumed for each location. As noted above, new stations were planned to accommodate existing HBLR trainsets, which operate with 2-car train consists, and also the potential for longer trains in the future with 3-car train consists. Stations were placed adjacent to existing streets or planned future streets, to allow for pedestrian access to the stations.

New stations would conform to the HBLR Manual of Design Criteria and/or existing conditions on the HBLR system. The following assumptions were used for the station design development:

- 300-foot-long platforms, which is more than the 270 feet required by the HBLR Design Criteria for 3-car trains;
- 13 ¾-inch platform height (above top of rail); and
- Center-island platforms that are 20.5 feet wide (which allows space for ticket machines or seating and the required clear space for circulation).

The same types of platform amenities would be provided at each of the new stations as currently exist at the West Side Avenue Station. Each station would be served by one elevator for the access required by the Americans with Disabilities Act (ADA), and stairs would also be provided. Where ramps are provided they would be designed for the ADA standard of a 5 percent slope if circumstances allow. If this is not feasible, other ADA-compliant measures would be incorporated.

The new stations would have customer drop off/pick up areas and bicycle parking areas, but would not have provision for customer parking. The parking lot at West Side Avenue Station would be reconfigured as required to accommodate the new rail viaduct, which would cross the parking lot.

4.1.2 CAPITAL AND OPERATING AND MAINTENANCE COSTS

Capital cost estimates for the alternatives reflect the cost required to complete the design and construction of the alternatives, including the cost of property interests. Costs are provided in 2010 dollars as well as 2017 dollars, which is the estimated midpoint year of construction.

Unit costs for the HBLR alternatives were developed based on data obtained from NJ TRANSIT's HBLR Minimum Operating Segment 3 (MOS3) 8th Street Bayonne Extension and the Miami–Dade Transit's North Corridor Metrorail Extension, which is also an elevated light rail project similar to the Route 440 extension project. Concrete and structural steel costs were developed using both sources. Train control and signaling costs and communication system costs were based on the double-track mile costs of the Miami–Dade Transit North Corridor project. These sources were employed as a base to arrive at appropriate unit costs for various elements of the HBLR Route 440 extension's construction means, methods, and materials. The cost of new stations was based on the recently completed HBLR MOS3 (8th Street) station costs, adjusted to account for the differences in design. The cost estimates also account for necessary modifications that would be required at the existing West Side Avenue Station and its parking lot to allow for the light rail alignment to be extended westward.

Property interest costs were estimated based on comparable property sales in the area. The cost analysis assumed the full acquisition of the Cookson Electronics site and a small piece of the Hudson Nissan Property. In both cases, the type of property interested that would be required for the proposed HBLR extension has not yet been determined.

Environmental remediation costs were estimated by BEM Systems, Inc. based on data prepared for the hazardous materials assessment (see Section 4.1.5.8) and typical costs for remediation efforts in the New York metropolitan area.

A number of contingencies were applied to the base capital costs to arrive at the total estimate for each alternative. These adjustments included overhead and profit, bonds and insurance, design contingency, construction contingency, and arts-for-transit.

Operating and maintenance costs were developed using estimates provided by NJ TRANSIT. Costs are provided in 2010 dollars as well as 2019 dollars, which is the year when the TSM Alternative or light rail extension is anticipated to be operational. Since NJ TRANSIT contracts the operation of the HBLR system to a private entity, the actual operating and maintenance costs would ultimately be negotiated with the operator.

4.1.3 OPERATIONS PLANNING

All three light rail alternatives (1A, 1C, and 1D) were analyzed using the RAILSIM® Train Performance Calculator (TPC) Version 8.0.0.30. Unimpeded trip times in the inbound and outbound directions were computed for each alternative, and each direction was studied using a Maximum Authorized Speed (MAS) of 25, 35, and 45 miles per hour (MPH). Each of these speeds is supported by an existing automated train control (ATC) speed command already in use on the HBLR system. In addition to the overall civil speeds of 25, 35, and 45 MPH, civil speed restrictions of 25 MPH were applied to Alternatives 1A and 1C as they traverse the 500- and 700-foot radius curves across Route 440 to Bayfront. The analysis assumed a consist of two HBLR cars, fully loaded with passengers.

Off-line adjustments were applied to the raw cycle-times generated by RAILSIM® TPC to estimate the total run time between West Side Avenue Station and the new terminal station. The off-line adjustments included dwell time at West Side Avenue and the intermediate station (Alternative 1C only), turnaround time at the terminal, and schedule recovery. The total additional travel time was then compared to the existing HBLR schedules to determine any necessary changes in headways.

4.1.4 RIDERSHIP FORECASTING

NJ TRANSIT's North Jersey Transit Demand Forecasting Model was used to estimate ridership generated by each of the short list alternatives. In addition to the general background growth that is anticipated, the model accounts for the full build-out of Bayfront and the New Jersey City University (NJCU) West Campus. Trips associated with these developments were estimated using land use categories and factors from the Institute of Transportation Engineers' Trip Generation Manual. Consistent with FTA methodology for alternatives analyses, the ridership forecasts assume that the same future growth occurs with all alternatives. However, full build-out of Bayfront is permitted only with the provision of light rail to the Bayfront development. Therefore, ridership forecasts for the TSM Alternative and Alternative 1D, which do not bring light rail transit to Bayfront, potentially overstate the ridership benefits of those alternatives.

The model was used to project ridership changes at the West Side Avenue Station as well as at new light rail stations and also to predict the mode of access to and from these stations.

4.1.5 ENVIRONMENTAL CONTEXT

Existing and future conditions were assessed for the full range of environmental topics typically evaluated during a review of a transportation project by the FTA in accordance with the National Environmental Policy Act (NEPA). The level of analysis conducted for this study was not as detailed as would be conducted during NEPA review, however, since the purpose of this analysis is to provide enough baseline information to allow for a comparison of the alternatives, rather than to fully evaluate and disclose their environmental impacts.

A study area was established to identify the setting and context of potential impacts of the alternatives on the built and natural environment. Following federal and state guidance and methodology, study areas for different environmental topics vary, depending on the area where impacts may occur. For some topics, the appropriate study area is the limits of construction (e.g., archaeology, hazardous materials). For others topics, the study area is expanded beyond the limits of construction by varying degrees to encompass a larger area that might be affected (e.g., land use, social conditions, noise).

For most of the topics covered in this analysis, the study area consists of a 400-foot buffer of the alignment to identify the environmental setting and potential effects of the project alternatives. However, for land use and social conditions (including environmental justice), a larger study area was assessed to provide a broader context for the identification of potential impacts, and for noise, a 750-foot buffer from the potential right-of-way of the light rail alternatives was used in accordance with the FTA's noise methodology.

4.1.5.1 LAND USE AND SOCIAL CONDITIONS

Figure 4-1 shows the existing land uses in the study area, based on available property information from the City of Jersey City, updated and adjusted by field surveys conducted in spring and fall 2010.

The study area has a history of industrial and commercial uses, but recent and proposed development has and will result in more residential and institutional uses. West of Route 440, the study area includes an automobile dealership (Hudson Nissan) with a large parking lot, a complex of buildings occupied by the City of Jersey City Department of Public Works (DPW), and a vacant, formerly industrial site (currently owned by the Jersey City Redevelopment Authority and Honeywell).

East of Route 440, the study area includes two large city blocks and smaller blocks to their north and south. A metal works facility (Fry's Metals/Cookson Electronics/Alpha Metals) formerly occupied a large portion of the block bounded by Claremont Avenue, Mallory Avenue, Culver Avenue, and Route 440. A recent development of townhomes and condominiums (the "West Side Station" development) is located on the northeastern portion of this block, fronting on Claremont Avenue and Mallory Avenue. The southwestern corner of this block is occupied with an auto-related use (car wash). Auto-related, industrial, and transportation uses also occupy much of the block immediately south of Culver Avenue.

The HBLR West Side Avenue Station parking lot occupies most of the block between West Side Avenue, Mallory Avenue, Claremont Avenue, and Pollock Avenue. At the eastern end of this block, an HBLR structure provides elevator and stairway access to the West Side Avenue Station via a pedestrian bridge over West Side Avenue. The southeastern corner of this block, south of the parking lot, contains a newly constructed residential building, smaller residential properties, and commercial uses that front on Pollock Avenue, West Side Avenue, and Grant Avenue.

The block to the north of Claremont Avenue is generally industrial with interspersed parking lots and vacant parcels. Commercial properties are located along the block's Mallory and West Side Avenue frontages. The block south of Pollock Avenue also has commercial uses along its Mallory and West Side Avenue frontages, with a mix of new residential construction, older homes, industrial buildings, and parking lots in the midblock.

As noted in Chapter 1, "Background and Planning Context," several major changes are anticipated in the future in and near the study area. The City of Jersey City has adopted two large-scale land use plans—Bayfront I Redevelopment Plan and NJCU West Campus Plan—that will replace vacant and underused industrial sites in and near the study area with active residential and commercial uses. In addition to these redevelopment plans, the City of Jersey City is conducting the Route 440 Study to identify options for reconstruction of Route 440 as an "urban boulevard." **Figure 4-2** shows the future land use of the study area with completion of the Bayfront and NJCU West Campus. Although additional redevelopment plans have not been identified at this time, it is anticipated that other new residential development may occur in this area by the time that Bayfront and NJCU West Campus are complete.

Chapter 1, "Background and Planning Context," includes a description of the ethnicity and income characteristics of the population in the study area. As noted there, much of the study area is an environmental justice community. Of the 21 Census block groups in the study area (based on the 2000 Census; 2010 census data are not yet available):

- 17 block groups are considered minority communities as their minority population is greater than 50 percent of the total;
- 2 block groups are considered minority and low-income communities, with greater than 50 percent minority population and with low-income population at or greater than 18.6 percent of the total; and
- 2 block groups are neither low-income nor minority communities.

In terms of property ownership, the study area contains both publicly and privately owned parcels (see **Figure 4-3**). A public–private partnership between the City of Jersey City and Bayfront Development LLC owns the complex of buildings and surrounding parking lots occupied by the City's Department of Public Works. The New Jersey Department of Transportation owns the property that comprises the Culver Avenue jug-handle, and NJ TRANSIT owns the West Side Avenue Station parking lot. The other lots within the study area are privately owned.

4.1.5.2 NATURAL RESOURCES

The Hackensack River and a small area of its shoreline are mapped wetlands (see **Figure 4-4**), and because of the study area's close proximity to the river, portions are within the 100-year

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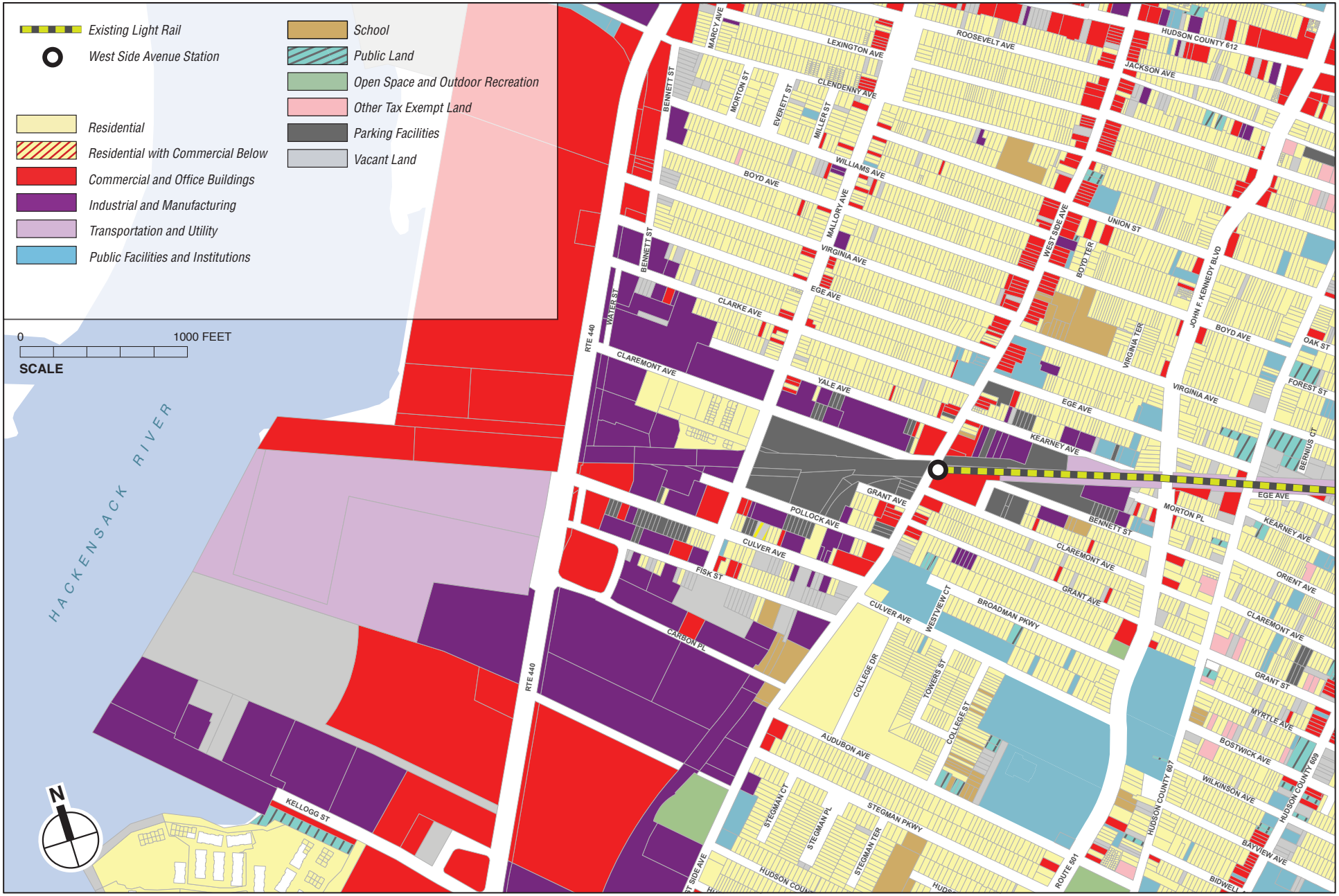

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Existing Land Use
Figure 4-1

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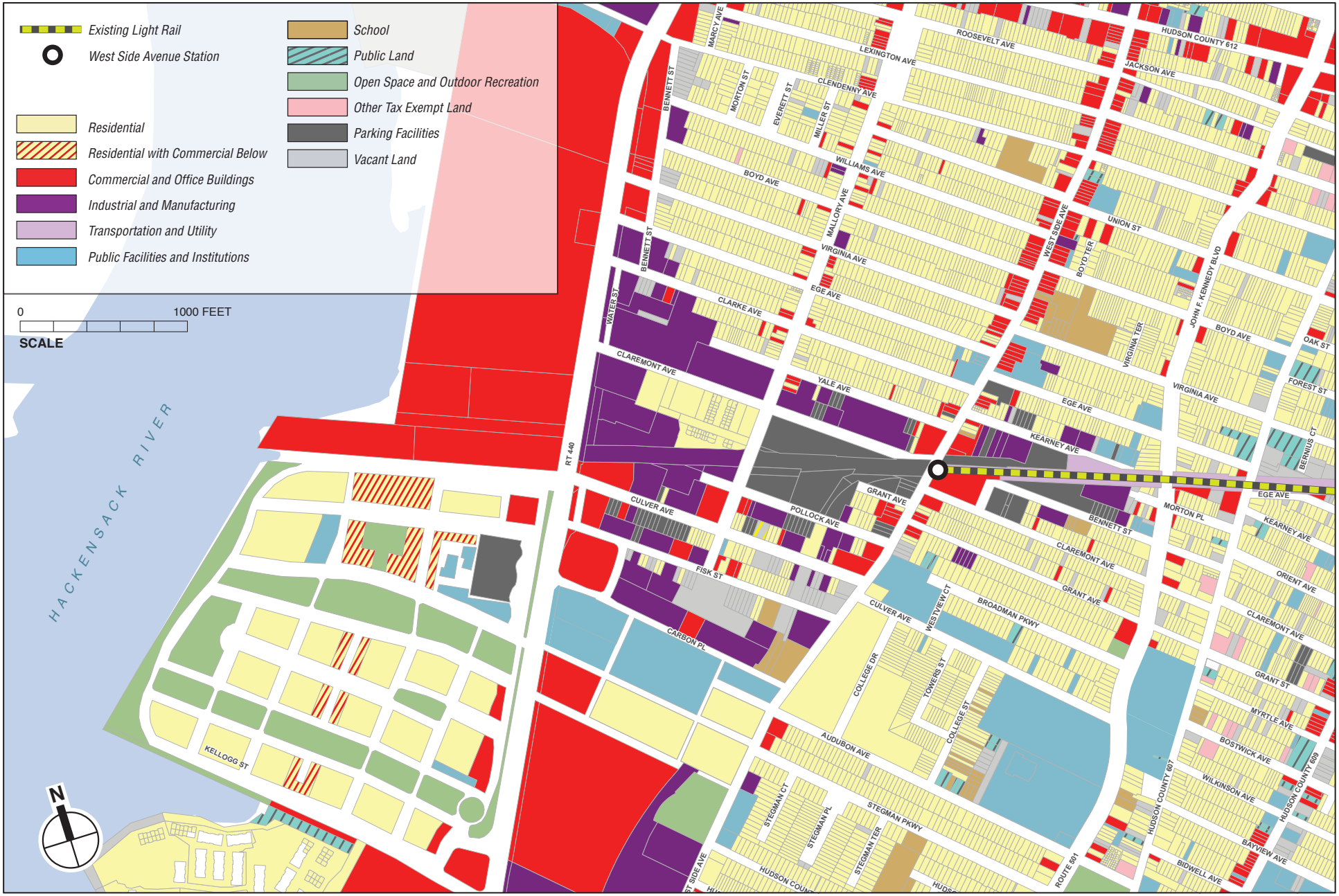

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Future Land Use (ca. 2035)
Figure 4-2

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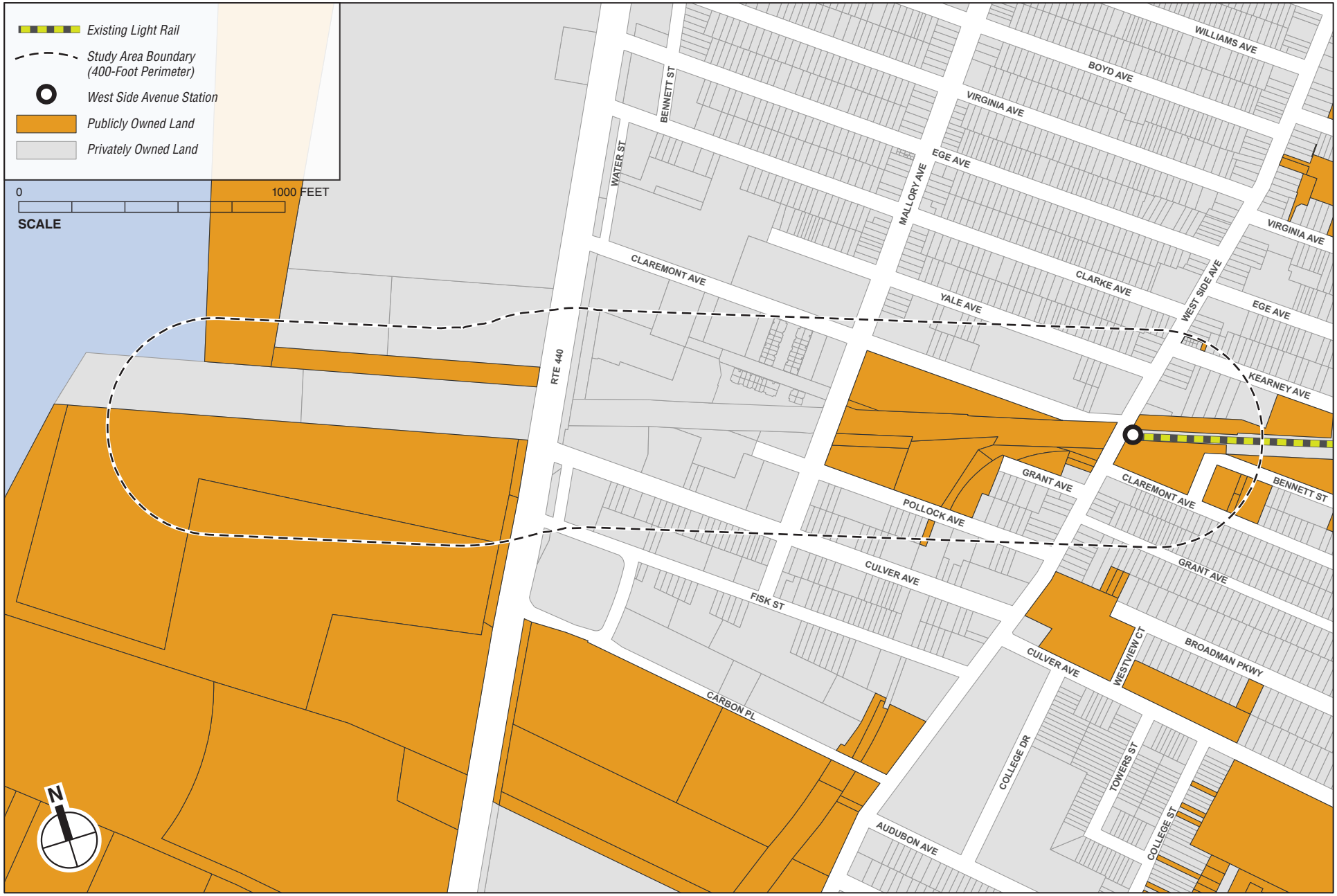


HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Land Ownership: Public and Private Land

Figure 4-3

2.8.11

Existing Light Rail

Study Area Boundary (400-Foot Perimeter)

West Side Avenue Station

NJDEP Wetland

National Wetlands Inventory Estuarine and Marine Deepwater Wetland

National Wetlands Inventory Estuarine and Marine Wetland

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Wetlands Mapped by National Wetlands Inventory and NJDEP

Figure 4-4

and 500-year flood elevation (see **Figure 4-5**). This portion of the study area also falls within the jurisdiction of the New Jersey Department of Environmental Protection (NJDEP) under its coastal zone program (the Waterfront Development Law, which regulates activities in tidal waters and in adjacent areas extending from the mean high water line to the first paved public road, railroad or surveyable property line, at least 100 feet but no more than 500 feet inland from the tidal water body). No designated Critical Environmental Areas are located in the study area, and field reconnaissance identified no significant habitats. The ecological characteristics of the study area are typical of an urban environment.

4.1.5.3 CULTURAL RESOURCES

To evaluate historic and archaeological resources, available documentation was reviewed including the draft Cultural Resources analysis dated March 25, 2010 prepared for the Route 440 Study, the Final Environmental Impact Statement (FEIS) completed in August 1996 for the HBLR, and databases of historic resources maintained by the New Jersey State Historic Preservation Office (SHPO) at the NJDEP. Possible historic resources observed during field surveys in spring and fall 2010 were also noted.

The study area includes one historic site that is listed on the State and National Registers of Historic Places (S/NR)—the Morris Canal Historic District (see **Figure 4-6**). The Morris Canal Historic District follows the route of the former Morris Canal, which spanned New Jersey from the Delaware River to the Hudson River and was completed between 1834 and 1836. The canal, used to transport coal and iron ore from the Lehigh Valley in Pennsylvania to New York City, was considered a technological marvel because of its extensive use of inclined planes to overcome the large elevation changes needed to cross the northern New Jersey hills. The canal was formally abandoned in 1924. If any features of the canal remain in the study area, they are buried beneath Route 440.

The study area also includes one structure that has been determined eligible for the S/NR by the SHPO, the Jersey City Board of Education building at 366 Claremont Avenue. This building was formerly a candy factory and was identified as an architectural resource during preparation of the HBLR project's FEIS. Originally the Greek American Confectionery Company, it was built as part of a complex of buildings in 1905.

During field visits, the stone retaining wall on the east side of West Side Avenue beneath the HBLR pedestrian bridge was noted as a potential historic resource. This wall may be more than 50 years old, and may have been part of the Central Railroad of New Jersey (CNJ) viaduct that once crossed West Side Avenue. The viaduct has been removed and is now the location of the pedestrian overpass between the West Side Avenue Station and the station's parking lot. Therefore, portions of this retaining wall were likely altered during construction of the HBLR.

Research undertaken as part of Route 440 Study identified areas where archaeological resources may be buried—referred to as areas that have potential archaeological sensitivity—in the study area near Route 440. The study identified the potential for industrial artifacts to remain on the former Crucible Steel Company, which was subsequently the Fry's Metals/Cookson Electronics/Alpha Metals site. Two sites west of Route 440 in the vicinity of the Culver Avenue jug-handle may contain foundations of former buildings and other artifacts.

Given the long history of industrial uses in the area, there is also potential for industrial artifacts beneath the West Side Avenue parking lot. Further research regarding the presence, extent, and nature of any archaeological sensitivity or significance would be required as part of the future environmental review of the HBLR Route 440 extension project.

4.1.5.4 PARKLANDS AND OPEN SPACE

Presently, there is no parkland or public open space in the study area. Parkland is planned within the Bayfront development, which will include a waterfront greenway and two linear parks (see **Figure 4-7**).

4.1.5.5 VISUAL RESOURCES

The study area does not contain prominent visual resources, such as National Historic Landmarks and notable vistas, viewsheds, and view corridors. Redevelopment of the Hackensack River waterfront would make views of the riverfront publicly accessible and could create view corridors through the Bayfront site to the river via the Bayfront development's streets and east-west parks.

4.1.5.6 AIR QUALITY, ENERGY, AND GREENHOUSE GASES

Hudson County has been designated by the U.S. Environmental Protection Agency (EPA) as a moderate non-attainment area for the 8-hour National Ambient Air Quality Standard (NAAQS) for ozone. Hudson County is also a non-attainment area for the 1997 and 2006 NAAQS for $PM_{2.5}$ (fine particulate matter smaller than 2.5 microns).

4.1.5.7 NOISE AND VIBRATION

Following the FTA's guidance provided in *Transit Noise and Vibration Impact Assessment*, May 2006 (FTA-VA-90-1003-06), this assessment considers "noise-sensitive" sites within 750 feet of the location of the potential alignment, which is the appropriate study area for fixed-rail transit. The FTA classifies noise-sensitive uses by three categories.

- ***Category 1*** includes uses where quiet is an essential element in the uses' intended purpose (i.e., indoor concert halls and National Historic Landmarks where outdoor interpretation routinely takes place). There are no Category 1 uses in the study area.
- ***Category 2*** uses include buildings where people sleep (i.e., hotels and residences). The noise study area contains residential buildings.
- ***Category 3*** uses include institutional land uses with primarily daytime and evening such as schools and churches. This category includes schools, libraries, and churches. Certain parks are also included. For purposes of this memorandum, the new parks at Bayfront are considered to be Category 3 uses.

Figure 4-8 identifies the noise sensitive land uses in the study area.

4.1.5.8 HAZARDOUS MATERIALS

A review of current and past uses was undertaken for the study area to determine the potential presence of contaminated soils and/or groundwater. A compilation of state and federal environmental records was obtained for the study area from Environmental Data Resources, Inc. (EDR), a commercial environmental database company. A total of 31 properties

2.8.11

Existing Light Rail

Study Area Boundary (400-Foot Perimeter)

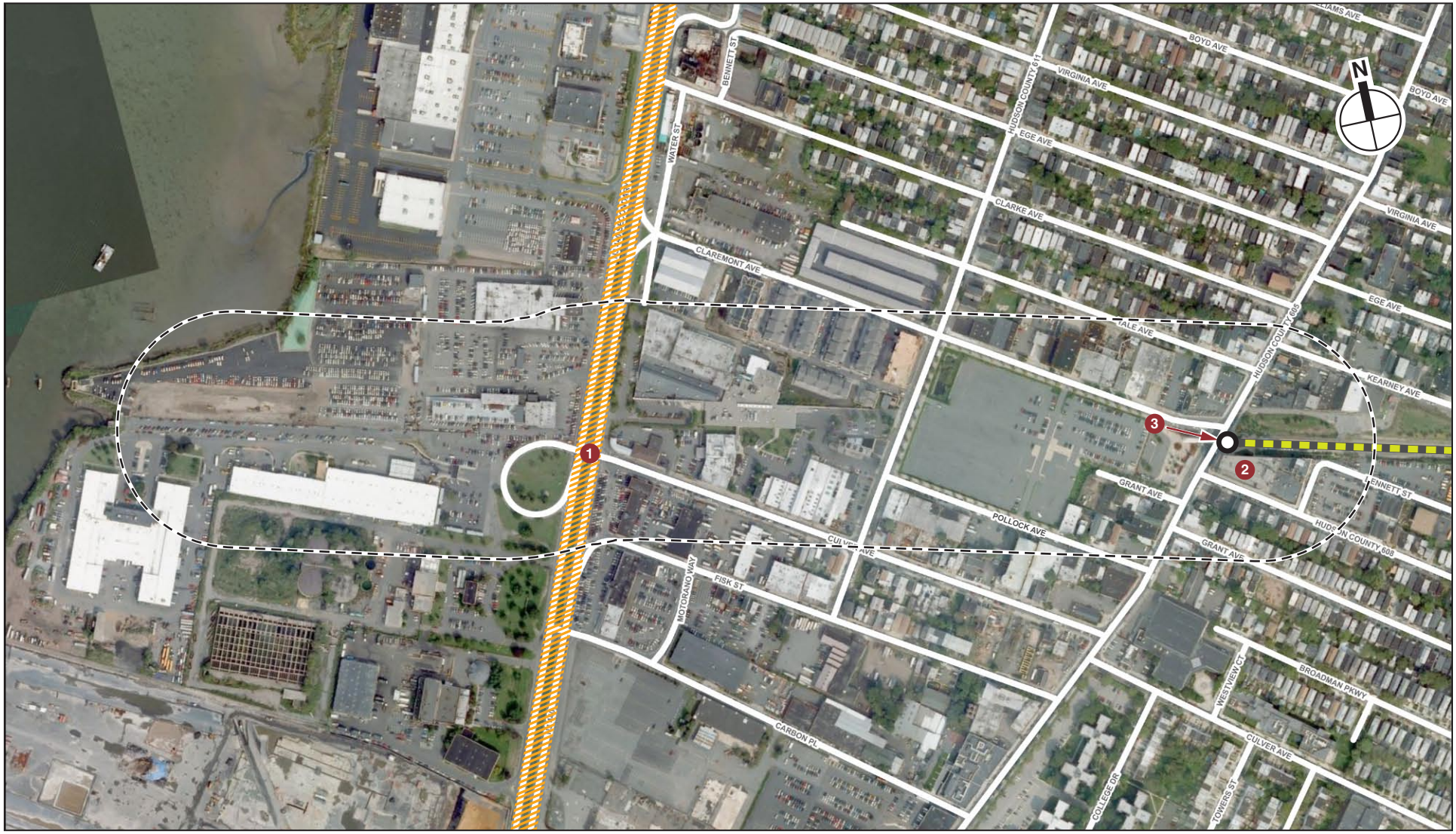
West Side Avenue Station

500-year Floodplain

100-year Floodplain

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Floodplains
Figure 4-5



Existing Light Rail

Study Area Boundary (400-Foot Perimeter)

West Side Avenue Station

Morris Canal Historic District - National Register

Historic Resources

1. *Morris Canal Historic District (S/NR-Listed)*
2. *Former Candy Factory (S/NR-Eligible)*
3. *CNJ Retaining Wall at West Side Avenue (Potential)*

0 1000 FEET

SCALE

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Historic Resources
Figure 4-6

2.8.11

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Existing and Proposed Publicly Accessible Open Space

Figure 4-7

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

Future Land Use and FTA Land Use Categories

Figure 4-8

with potential sources of environmental concerns were identified within a ⅛-mile radius from the center line of a potential HBLR extension (Alternatives 1A and 1C). Sites reviewed include former and current Underground Storage Tank (UST) sites, including gas stations and residences, sites with Above Ground Storage Tanks (ASTs), chrome sites, and other commercial properties that had a history of handling, storing, and/or releases of hazardous substances. A detailed characterization of site conditions was prepared by BEM Systems, Inc. They found that there is the potential for contamination in the soils and groundwater of the alignment, which would have to be further investigated and remediated during construction.

4.2 DESCRIPTION OF ALTERNATIVES

4.2.1 TSM ALTERNATIVE

Consistent with FTA alternatives evaluation procedures, Transportation System Management (TSM) Alternatives are lower cost solutions to improve mobility without the capital costs incurred by a build alternative. They serve as a baseline condition for evaluation of the comparative benefits and deficiencies of the build alternatives. During development of the long list of alternatives, three potential TSM Alternatives were identified and evaluated. As described in Chapter 3, "Long List of Alternatives," only one of these options was carried forward to the short list for further consideration.

4.2.1.1 ALIGNMENT

The TSM Alternative would consist of circulator bus service between the West Side Avenue Station and Society Hill, passing by the Bayfront development and New Jersey City University (NJCU) West Campus (see **Figure 4-9**). It would closely mirror a potential light rail connection to Bayfront and provide additional service to Society Hill.

Leaving the West Side Avenue Station, the circulator bus service would head southward on West Side Avenue from the HBLR station and then turn westward on Carbon Place, passing the NJCU West Campus. The route would enter Bayfront on Stegman Boulevard (at Route 440) and then travel within Bayfront via C Street and Kellogg Street. The bus would then operate on Route 440 to the Society Hill stop, turn around, and make its return trip through Bayfront via B Street and back along Carbon Place and West Side Avenue to the HBLR station.

4.2.1.2 STATIONS

Bus stops for the TSM Alternative would be similar to NJ TRANSIT's existing bus stops in Jersey City. Typically, bus stops would have an informational sign on a pole; some stops may also include a shelter. Six bus stops are proposed:

- West Side Avenue at the HBLR station;
- Carbon Place at West Side Avenue (NJCU West Campus);
- Stegman Boulevard at C Street (Bayfront);
- Kellogg Street at C Street (Bayfront);
- Society Hill Drive stop; and
- B Street at 4th Avenue (Bayfront).

The potential station locations are shown in **Figure 4-9**.

4.2.1.3 COST

Based on the proposed route and schedule (see the discussion below in Section 4.2.1.4), peak hour service would require five buses. Capital costs were assumed to be approximately $2.2 million (in 2010 dollars) for six 35-foot coaches (the five required vehicles and one spare) and less than $5,000 (in 2010 dollars) for new bus stops (assuming signs rather than shelters). As shown in **Table 4-1**, the total capital cost would be $2.7 million (in 2010 dollars).

Table 4-1
Cost Estimates for the TSM Alternative

Cost Estimate	2010 Dollars	Future Year Dollars
Capital Cost	$2.7 Million	$2.9 Million
Annual Operating and Maintenance Costs	$1.9 Million	$2.6 Million

Note: Future year capital costs are projected in 2017 dollars.
Future year operating and maintenance costs are in 2019 dollars.

To provide for a comparison to the light rail alternatives (Alternatives 1A, 1C, and 1D), the capital costs for the TSM Alternative were projected for a 2017 construction year. Assuming a price escalation of 3.2 percent per year, the TSM Alternative would have a total capital cost of about $2.9 million in 2017 dollars.

The annual operating cost (in 2010 dollars) is expected to be approximately $1.54 million for weekdays and $0.40 million for Saturdays, Sundays, and holidays. The total annual operating cost would be approximately $1.9 million (in 2010 dollars). The anticipated future opening year (2019) operating and maintenance costs would be about $2.6 million per year.

NJ TRANSIT's forecasts for the TSM Alternative assumed a fare of $1.50 for the circulator bus. This would be in addition to the fare paid for the HBLR.

4.2.1.4 OPERATIONS

It is assumed that NJ TRANSIT would operate the shuttle bus service. This service would mirror the hours of HBLR service to the West Side Avenue Station (approximately 5 AM to 2 AM). The service frequency would vary throughout the day with buses meeting the schedule of HBLR trains. For Saturday, Sunday, and holiday service, the projected schedule would meet 112 of 114 total trains (some late-night trains would be impractical to meet, inbound) and all last trip and next-to-last trip trains would be met.

The buses would be maintained at an existing NJ TRANSIT bus maintenance facility. This analysis assumes that the buses would operate from the Ironbound Garage in Newark, since many of the local NJ TRANSIT bus depots are at or near capacity. It is not anticipated that any additional construction would be needed at the Ironbound Garage for this slight increase in fleet size.

The increase in ridership on HBLR trains as a result of the TSM Alternative would not adversely impact the HBLR system's loading capacity. During the peak period, HBLR trains on average would operate at approximately 70 percent of their capacity at their peak load point.

HUDSON-BERGEN LIGHT RAIL
Route 440 Extension Alternatives Analysis

TSM Alternative
Figure 4-9

4.2.1.5 RIDERSHIP

Ridership forecasts prepared by NJ TRANSIT estimate total weekday boardings on the TSM Alternative's shuttle bus service of approximately 1,095 boardings. A total of 385 boardings would be new to the HBLR system in comparison to the No Action Alternative (i.e., an alternative in which future development occurs but no transit improvements are made). The remaining 710 of these boardings would otherwise walk or drive to the West Side Avenue Station in the No Action Alternative without the TSM Alternative's shuttle bus service. **Table 4-2** summarizes the ridership estimates for the TSM Alternative.

Table 4-2
2035 Daily HBLR Boardings for the TSM Alternative

Station	Existing (October 2010)	No Action Alternative	TSM Alternative
Shuttle Bus Boardings	—	—	1,095
Other Boardings (Arrive by auto, walk, or existing bus route)	1,686	4,400	3,690
Total HBLR Boardings at West Side Avenue	**1,686**	**4,400**	**4,785**

4.2.1.6 ENVIRONMENTAL CONSIDERATIONS

Table 4-3 presents the environmental screening analysis for the TSM Alternative. As an alternative that does not involve new construction—other than bus stops in the public right-of-way—the TSM Alternative would not require property interests and would not have direct impacts on structures, parklands, or natural features. It would also not impair view corridors or important views.

The TSM Alternative would use buses that burn fuel and generate emissions, but increases in pollutant concentrations would likely be nominal. Buses would operate on existing and planned roadways and would not be likely to result in perceptible increases in ambient noise levels at nearby locations.

Construction activities would be limited to the installation of bus shelters and bus stops within public sidewalks and would not impact private property. Subsurface construction would be minimal, and therefore, the TSM Alternative would have limited potential to disturb hazardous materials or potential archaeological resources.

However, while the TSM Alternative would improve transit access for existing and proposed land uses in the western waterfront area, it would not be consistent with Jersey City's adopted plan for Bayfront, which calls for extension of light rail service to the new development. Without light rail service at Bayfront, the new development is required to be smaller than would be permitted with light rail. In addition, with a total of 1,095 daily HBLR boardings in this alternative, of which only 385 would be new to the HBLR system, the TSM Alternative would not result in notable reductions in vehicle trips and vehicle miles traveled, and therefore would not serve to reduce traffic congestion and air emission appreciably.

Table 4-3
Environmental Screening Analysis of the TSM Alternative

Area of Analysis	Potential Environmental Effects
Land Use	Proposed land use patterns would support enhanced transit service. The TSM Alternative would operate on-street and would not directly impact land use plans. However, absent light rail service, Bayfront would be required to develop at lower density.
Neighborhoods and Community Cohesion	The TSM Alternative would improve access to new development at Bayfront and the NJCU West Campus, but it would not allow for development of a density or scale that is desired by the City of Jersey City, since the Bayfront development would be required to have a lower density without light rail.
Environmental Justice	The TSM Alternative would operate in public right-of-way. Disproportionate adverse impacts are not anticipated.
Regional and Local Economies	The TSM Alternative would not require property interests.
Natural Resources	The TSM Alternative would not be constructed in mapped wetlands or the coastal zone boundary and would not require in-water and/or over-water construction work. Dewatering is unlikely to be necessary, and stormwater discharges would be minimal. Signage and bus shelters near Route 440 may be located in a floodplain and be subject to applicable federal, state, and local regulations. Overall, the TSM Alternative is not expected to adversely impact habitats or wildlife in the study area.
Cultural Resources	The TSM Alternative would not alter architectural resources since it would operate in city streets. If subsurface disturbance is required for construction, coordination with the SHPO would be necessary to identify any potential impacts on areas with archaeological sensitivity.
Parks and Recreational Resources	The TSM Alternative would not have direct or indirect effects on existing or proposed parkland.
Visual Resources	No substantial changes in visual character are anticipated.
Air Quality, Energy, and GHG	Assumed regional reduction in emissions from small decreases in vehicle miles traveled (VMT). Buses would generate localized emissions.
Noise and Vibration	Buses would operate on-road and could increase ambient noise levels at less-trafficked locations. However, increases in noise levels near Route 440 would likely not be perceptible due to high traffic volumes. Vibration is typically not a substantial concern for bus operations on city streets.
Hazardous Materials	Remediation of soils may be necessary if any subsurface disturbance is required.
Construction	Limited, if any, construction is required. Construction of TSM infrastructure could typically be completed in a week or less and would result in minimal impacts on surrounding uses.

4.2.2 ALTERNATIVE 1A: ELEVATED EXTENSION TO BAYFRONT WITH ONE STATION

Alternative 1A would extend HBLR service west to Bayfront via an elevated rail structure crossing the West Side Avenue Station parking lot, continuing through the Cookson Electronics property, and curving across Route 440. One new station would be provided, a Bayfront Station at the north end of the Bayfront development in approximately the location anticipated in Bayfront's approved plans. **Appendix C** shows the plans and profiles for Alternative 1A.

4.2.2.1 ALIGNMENT

Alternate 1A would extend the light rail tracks on a viaduct structure that would begin at the existing West Side Avenue Station (see **Figure 4-10**). Two separate viaducts would cross West Side Avenue at the existing track-center spacing of 30 feet before transitioning to a single structure with a track spacing of 14 feet. The alignment would then continue approximately 2,000 feet before entering into a symmetrical reverse curve using spiraled and super-elevated curves of 700-foot radii (per HBLR Design Criteria) with an 80-foot tangent section between the reverse curves. The alignment would then proceed approximately 600 feet before entering into a No. 8 crossover, either of the single or double type design, which would end a minimum of 45 feet before the east end of the alignment's terminal station, the Bayfront Station. The crossovers would allow operational flexibility to either side of the station platform. Beyond the western platform limit, the alignment would have an additional 250 feet of stub-end tail track, with bumping posts at the western end.

The overall length of the Alternative 1A alignment is approximately 3,700 feet, beginning at the West Side Avenue Station. The viaduct structure would consist of 35 steel-girder spans of varying length and type, depending on the need for vertical clearance and other factors.

4.2.2.1.1 Viaduct Across West Side Avenue

To extend the tracks over West Side Avenue, the existing pedestrian bridge would be removed and replaced with two separate viaducts, one for each track, with a span length of 150 feet. It is anticipated that with a typical floorbeam system, a 12-foot, 4-inch vertical under-clearance would be provided over West Side Avenue. A shallower floorbeam system could improve the vertical under-clearance to a maximum of approximately 13 feet, 2 inches. However, in either case, the vertical clearance would not meet the minimum criteria set forth in the NJDOT Design Manual for Bridges and Structures. Constructing a new transit aerial structure that would obtain the standard, minimum 14-foot, 6-inch clearance would involve considerable work to raise the grade of the existing West Side Avenue Station. Therefore, at this level of design, it is assumed that the new structure over West Side Avenue would require a design exception, approval from the appropriate agencies, and height warning signage at the structure. It is anticipated that this design exception would be permitted, since other existing structures on the HBLR system have limited vertical under-clearances—at the viaduct over Marin Boulevard and over Grove Street, Jersey City, with vertical under-clearance of 12 foot, 6 inch and 13 foot, 6 inch respectively. Limited vertical clearance would not adversely affect bus operations on West Side Avenue and is also not expected to have an impact on truck routes, since this portion of West Side Avenue is not a designated truck route.

4.2.2.1.2 Viaduct from West Side Avenue Station Parking Lot to Route 440

West of the through-girder span crossing West Side Avenue, the alignment would continue on two separate viaducts for approximately 285 feet, where the tracks would join on a single deck. This short section of separated track would consist of a concrete deck on three simple-span, separated deck, girder superstructure units with a span length of 95 feet. The vertical clearance under the viaduct to the driveway at the current station drop-off/pick-up area would only be 9 feet, 11 inches and would likely require the relocation of the drop-off-pick-up area to eliminate the potential for interference. Relocation options are discussed below in Section 4.2.2.2.1.

From the West Side Avenue Station parking lot to Route 440, the viaduct would consist of a single concrete deck carrying both tracks, supported by welded steel plate girders. This segment would have 15 spans, composed of three-span continuous units, with a distance ranging from approximately 94 feet to approximately 109 feet. Because of the type of superstructure and topography, there would be limited vertical clearance within the existing West Side Avenue parking lot except near Mallory Avenue. Therefore, a reconfiguration of the lot would be required and is discussed below in Section 4.2.2.2.1.

On the deck west of West Side Avenue, the tracks would be spaced 14 feet apart. The cross section would consist of a reinforced concrete deck with a constant width of approximately 32 feet, supported by four plate girders at about 7-foot spacing. The substructure would consist of concrete pier caps supported by twin-column, reinforced concrete, drilled shaft columns.

4.2.2.1.3 Viaduct Across Route 440

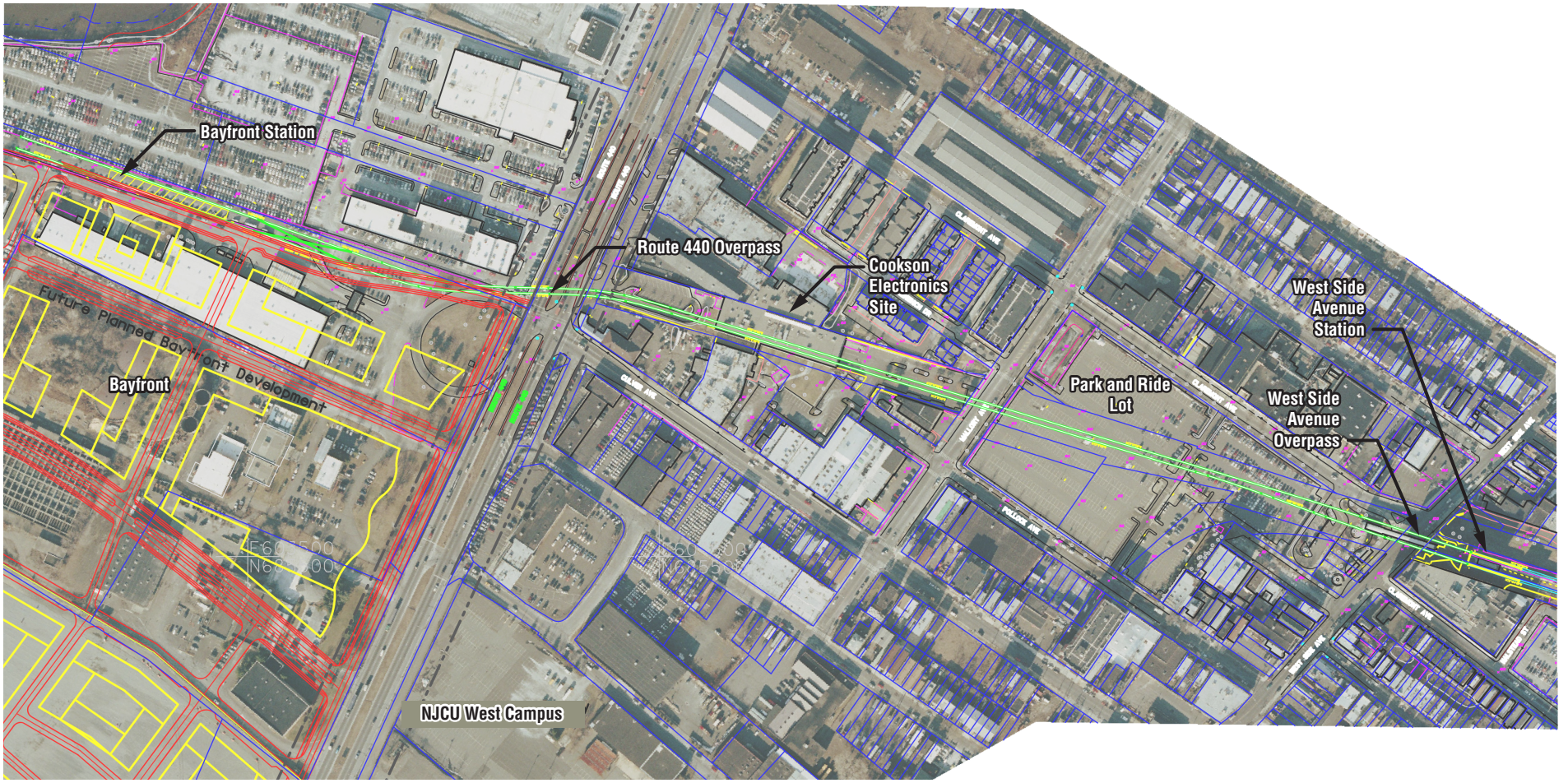
At Route 440, the alignment would curve and, as noted earlier, would be supported on single hammerhead-type piers to minimize the amount of ground area required to support the viaduct structure. Two approximately 150-foot center spans and two approximately 120-foot flanking spans would be used to cross Route 440. This section would have reinforced concrete deck with four plate girders spaced at approximately 7 feet. The superstructure would be supported on reinforced concrete hammerhead-type piers founded on drilled shafts. This column type and their locations have been chosen to accommodate the future widening of Route 440 and to avoid utility conflicts. However, an existing water main under the Route 440 median would likely need to be relocated to accommodate pier construction. In addition, a 54-inch sewer force main that runs across Route 440 would need to be evaluated during preliminary/final design to determine if it would have to be relocated to accommodate pier construction.

If the Route 440 reconstruction precedes the HBLR extension, it is anticipated that a travel lane would be needed to support construction work within the future roadway median. It is anticipated that two 10-foot, 6-inch lanes could be maintained during the construction, which would minimize traffic impacts as much as possible.

4.2.2.1.4 Viaduct from Route 440 to Bayfront Station

Immediately west of Route 440, the alignment would widen as the distance between track centerlines is increased in anticipation of the track width needed at the terminus station. In this area, the two separate structures would be supported on two simple spans of 92 feet each. Each deck would each be 17 feet wide and supported by a pair of welded steel plate girders. West of this section, a single deck structure, consisting of four spans with lengths varying from 92 to 105 feet, would support the alignment up to the Bayfront Station. At the station, three separate 100-foot spans would support each track through the length of the station. West of the station, the tail tracks would continue on two separate decks, each with three spans ranging from 70 to 100 feet.

At the Bayfront Station, the platform structure running between the rail structures would be supported on separate welded steel plate girders. In this section, the viaduct would be supported by reinforced concrete pier caps on a twin-column, and drilled shafts under each column, except for the end piers. The end piers would consist of individual single column piers,



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SCALE

Alternative 1A - Elevated Extension to Bayfront with One Station
Figure 4-10

each with a reinforced concrete shaft cap with four drilled shafts. An 8-foot drainage chamber located in this area would need to be relocated for construction of the viaduct.

4.2.2.2 STATIONS

Alternative 1A would require modifications to West Side Avenue Station to accommodate the extension of HBLR service beyond the station and would include a new terminal station at Bayfront.

4.2.2.2.1 West Side Avenue Station

As noted above, the existing pedestrian bridge over West Side Avenue would be demolished and replaced with two separate viaduct structures that support the HBLR tracks. Between the tracks, a walkway would run across West Side Avenue to a new elevator. On the west side of West Side Avenue, the existing elevator tower would be demolished and replaced with one closer to the centerline between the tracks to provide adequate clearance. A stair would also be provided at this location.

On the east side of West Side Avenue, the existing stairs connecting the sidewalk to the platform must be moved and reconfigured to accommodate the viaduct and track extensions. These stairs currently ascend to a plaza that connects to the center platform. Currently, this plaza is beyond the end of the tracks. However, when the tracks are extended, a pedestrian crossing across the tracks would be necessary. Though not an ideal circumstance, similar pedestrian crossings exist at other HBLR stations. At this level of design, it is assumed that one stair would be provided from West Side Avenue to the platform level. With the extension of the tracks, the stair to the north may require additional right of way to be reconfigured, and there appears to be sufficient capacity with only one stairway.

In addition to these changes, further modification at West Side Avenue Station has been developed to improve access to the station from the east, in response to a suggestion made during a public open house for this project. An additional access point would be created via an ADA-compliant ramp from the corner of Halstead Street and Orient Avenue that ascends parallel to the tracks to the reconfigured plaza on the west end of the platform (see the station concept drawings in **Appendix D**). The new ramp would require the modification or removal of structural supports of the former Central Railroad of New Jersey right-of-way. Based on preliminary design, the space between the Board of Education building wall and the existing HBLR tracks appears to be within the HBLR right of way. In order to provide a reasonable entry to the station from Halstead Street and Orient Avenue, the dumpsters serving the Board of Education would be moved to the north and screened with a fence and gate.

In addition to the ramp, it would also be possible to construct a stairway to access the east end of the platform from the corner of Halstead Street and Orient Avenue. This stair would require a second pedestrian crossing of the tracks at the east end of the platform.

A second ADA access ramp could be constructed alongside the stair from the east side of West Side Avenue to meet the ramp from Halstead Street. This ramp could be in addition to or an alternative to providing the elevator on the west side of West Side Avenue.

As the new HBLR viaduct crosses the West Side Avenue Station parking lot, there would not be sufficient clearance between the HBLR viaduct and ground level for vehicles to pass beneath

the viaduct. Therefore, the parking lot would be reconfigured to provide separate parking areas on the north and south sides of the tracks. The existing parking lot driveways on Claremont and Mallory Avenues would provide access to the north lot and the existing parking lot driveway on Pollock Avenue would provide access to the south lot. One connection point under the viaduct between the two parking lots would be available at the western end of the parking lot near Mallory Avenue, where vertical clearance would be greater.

The existing station configuration has a drop-off/pick-up area that is accessed from Claremont Avenue. With the HBLR viaduct crossing the parking lot, the location that is currently the passenger drop-off/pick-up area would be on the south side of the viaduct, an area that would no longer be accessible from Claremont Avenue (because vehicles would not be able to pass beneath the viaduct). Therefore, as part of the parking lot reconfiguration, the station's passenger drop-off/pick-up area would be moved to the north side of the viaduct, so that access would continue to be from Claremont Avenue.

4.2.2.2.2 Bayfront Station

Alternative 1A would provide one new station, west of Route 440, at the northern boundary of the Bayfront development. The Bayfront Station would be the new HBLR terminal station. The station would be along the north side of the Bayfront development's northern street.

The new Bayfront Station would be a center-island station with a platform width of 20.5 feet. Stairs would be located at each end of the platform and an elevator would be located at one of those ends. Although a stair to the center of the platform may also be appropriate to accommodate passengers and potentially to meet emergency egress requirements, a minimum dimension center stair (4-foot clearance between handrails) cannot be accommodated in the 20.5-foot platform width without encroaching slightly into the 7-foot, 8-inch clear space to edge of platform on either side. During subsequent design phases, the anticipated arrival and departure patterns of passengers will be studied in detail. If these studies determine that a center stairway is appropriate, then the conceptual design would be modified to widen the station by approximately 2 feet to provide adequate clearance.

The stairwells would be enclosed for weather protection (to protect from icing in the winter). A shelter and seating similar to those at other HBLR stations would be provided on the platform.

Drop-off/pick-up facilities would be curbside alongside the station for both cars and buses. These facilities would be partially protected by the structure supporting the tracks and station platform. A raised crosswalk could be provided at the midpoint of the block to create a pedestrian-friendly connection between Bayfront and the HBLR station. A grade-separated pedestrian crossing from an upper level of the Bayfront building could also be provided to allow direct access to the HBLR station from that building.

The area underneath the tracks and platforms would be well lit and pedestrian-friendly, with adequate lighting, train information boards, ticket vending machines and benches. Vending carts or kiosks, artwork (Arts in Transit), and temporary exhibits may also be provided.

4.2.2.3 COST

The cost to construct Alternative 1A, including final design, capital costs, property interests, environmental remediation, and contingencies, is $171.6 million in 2010 dollars and $213.9

million in 2017 dollars (see **Table 4-4**). The estimated annual operating and maintenance costs of the extension under Alternative 1A are $1.3 to $1.5 million in 2010 dollars and $1.8 to $2.0 million in 2019 dollars.

Table 4-4
Cost Estimates for Alternative 1A

Cost Estimate	2010 Dollars	Future Year Dollars
Capital Cost	$171.6 Million	$213.9 Million
Annual Operating and Maintenance Costs	$1.3 to $1.5 Million	$1.8 to $2.0 Million

Note: Future year capital costs are projected in 2017 dollars.
Future year operating and maintenance costs are in 2019 dollars.

4.2.2.4 OPERATIONS

The extension of HBLR service to the new Bayfront Station would increase the run-time for HBLR trains. The total increase in run-time would be eight minutes (8'00") for the round-trip between West Side Avenue Station and Bayfront Station, including layover time at the new terminal. This additional run time would generally be accommodated by the existing 10-minute intervals (headways) between trains during peak periods and the 15- to 20-minute headways during off-peak periods. However, there are currently 6-minute headways on the HBLR schedule during limited periods during the peak hour. These headways would need to be revised to accommodate a full run to the Bayfront Station.

Assuming that the number and length of trains would not be changed in the future, there would be adequate capacity to accommodate new ridership under Alternative 1A. It is estimated that trains would operate at 83 percent of their capacity at the maximum load point on the Bayfront–Tonnelle Avenue route during peak periods.

The Bayfront Station of Alternative 1A would be constructed to allow for three-car consists, and therefore, would be consistent with long-term plans for HBLR operations. Alternative 1A would also bring HBLR service to the eastern shore of the Hackensack River and would not preclude a potential extension across the river to Kearny.

4.2.2.5 RIDERSHIP

Alternative 1A would result in 4,700 new daily HBLR boardings as compared to the No Action Alternative. The new Bayfront Station would serve 6,300 total daily boardings, and the West Side Avenue Station would serve 2,800 total daily boardings (see **Table 4-5**). Because some ridership would be diverted from the West Side Avenue Station to the new Bayfront Station with implementation of Alternative 1A, there would be 1,600 fewer daily boardings at the West Side Avenue Station as compared to the No Action Alternative.

4.2.2.6 ENVIRONMENTAL CONSIDERATIONS

Alternative 1A would support existing and proposed land uses and populations in the study area with limited environmental consequences. **Table 4-6** presents the environmental screening analysis for Alternative 1A, and the potential environmental benefits and effects of this alternative are described in more detail below.

Table 4-5
2035 Daily HBLR Boardings for Alternative 1A

Station	Existing (October 2010)	No Action Alternative	Alternative 1A
West Side	1,686	4,400	2,800
Bayfront	—	—	6,300
TOTAL	**1,686**	**4,400**	**9,100**

The Bayfront I Redevelopment Plan allows for a maximum development density (8,100 residential units and 1.8 million square feet of commercial space) if direct HBLR service is provided. As Alternative 1A would serve the Bayfront development with a new station, it would allow for the full build-out of the Bayfront Plan at its maximum density. By providing for a transit connection across Route 440, Alternative 1A would also improve access to new parkland proposed as part of the Bayfront Plan for residents east of Route 440. Alternative 1A would also be designed in coordination with the Route 440 Study such that its infrastructure would not impede plans for an urban boulevard.

The alignment for Alternative 1A would require an interest in three properties. These are the Fry's Metals/Cookson Electronics/Alpha Metals Site east of Route 440, a portion of the parking lot of Hudson Nissan, and a portion of the property currently occupied by the DPW. The Fry's Metals/Cookson Electronics/Alpha Metals Site is currently vacant and for sale and DPW plans to vacate its property to allow for its redevelopment as part of the Bayfront Plan. Therefore, the required interest in these properties would not displace businesses or residents. The alignment would span a small area of the parking lot of Hudson Nissan, immediately north of the Bayfront Site. NJ TRANSIT met with the property owner to identify the potential need for this property interest, and it is not anticipated that the interest in this property would adversely impact the continued operation of the automobile dealership.

The extension of HBLR service to Bayfront in Alternative 1A would improve access to the west side of Route 440 for low-income and minority residents who live east of Route 440. At the same time, the environmental impacts of Alternative 1A would be minimal. Therefore, Alternative 1A is not expected to result in disproportionate impacts on environmental justice communities.

Alternative 1A would have minimal, if any, effects on natural resources. It would not impact wetlands, surface waters, or natural habitats. Dewatering may be required for subsurface excavation. However, as groundwater is not a potable water source in this area, these dewatering activities would not adversely impact the municipal water supply. Stormwater discharges would be managed by the municipal system, but further coordination with the NJDEP would be required to determine if stormwater control measures are warranted. As portions of the alignment would be located within mapped floodplains and mapped coastal areas of the Hackensack River, compliance with federal, state, and local flood management and coastal zone policies would be required. Compliance with these regulations is standard practice.

Table 4-6
Environmental Screening Analysis of Alternative 1A

Area of Analysis	Potential Environmental Effects
Land Use	Proposed land use patterns would support an extension of the HBLR. The proposed Bayfront Station would be generally consistent with the adopted Bayfront I Redevelopment Plan and would allow for Bayfront's maximum permitted density. Alternative 1A would require an interest in private property, including a vacant building and a small portion of the parking lot of an automobile dealership. Alternative 1A would also require reconfiguration of the existing West Side Avenue Station and its parking lot.
Neighborhoods and Community Cohesion	Alternative 1A would improve access to Bayfront and other uses along the west side of Route 440. The new viaduct would be adjacent to new residential development adjacent to the West Side Avenue parking lot and west of Mallory Avenue. However, HBLR operates in close proximity to residential uses throughout Jersey City.
Environmental Justice	There is limited residential use along the potential alignment, and generally these residences are not anticipated to be environmental justice communities. Alternative 1A is not anticipated to result in disproportionate adverse impacts on environmental justice communities.
Regional and Local Economies	Alternative 1A would require an interest in three properties: 1) Block 1775.1, Lot 83, (Fry's Metals Inc./Cookson Electronics/Alpha Metals); 2) Part of Block 1290.A, Lot A.1 (Hudson Nissan); and 3) Part of Block 1290.A, Lot 16A.99 (City of Jersey City Redevelopment Authority; Bayfront/Honeywell) Block 1775.1, Lot 83 is currently vacant and is for sale. Block 1290.A, Lot A.1 is an operating business, but the HBLR alignment would be above its parking lot and would not displace the auto dealership. DPW plans to vacate its public works garage at Block 1290.A, Lot 16A.99.
Natural Resources	Alternative 1A would not be constructed in mapped wetlands and would not require in-water and/or over-water construction work. Dewatering may be needed for subsurface excavation, but groundwater is not a potable water source in this area. Alternative 1A is also not expected to adversely impact habitats or wildlife in the study area. Columns and station egress associated with Alternative 1A over and west of Route 440 would be located in a floodplain and be subject to applicable federal, state, and local regulations. Consistency with applicable Coastal Zone Management Rules (N.J.A.C. 7:7E) would also be necessary. Stormwater discharges from the viaduct and station would be managed by municipal stormwater systems, but consultation with NJDEP would be required to determine if stormwater control measures are warranted.
Cultural Resources	Columns for Alternative 1A's viaduct over Route 440 would impact the Morris Canal Historic District. Alterations of the West Side Avenue Station have the potential to impact the possible CNJ retaining wall and the former candy factory. The potential right of way may have buried archaeological remnants related to the historic industrial uses of the area. Further research is necessary to determine the areas of archaeological sensitivity and, if any such areas are identified, coordination with the SHPO would be required.
Parks and Recreational Resources	Alternative 1A would not have direct effects on existing or proposed parkland. Proposed parks in Bayfront would be sensitive noise receptors, but Alternative 1A operations would not substantially impair the enjoyment of these resources. Alternative 1A would improve access to new parkland, including the new waterfront park, for residents east of Route 440.
Visual Resources	The new viaduct and station may be visible from existing and proposed residential and commercial uses as well as the Hackensack River waterfront.
Air Quality, Energy, and GHG	Alternative 1A would result in a regional reduction in emissions from decreases in VMT. Electric-powered trains would not generate localized emissions.

Table 4-6 (Cont'd)
Environmental Screening Analysis of Alternative 1A

Area of Analysis	Potential Environmental Effects
Noise and Vibration	Potential noise impacts may extend up to 750 feet from the viaduct where there are no intervening buildings and up to 375 feet where there are intervening buildings. Noise from Alternative 1A operations would likely not be perceptible near Route 440 because of high ambient levels from automobile and truck traffic. Vibration may be perceptible for residences (FTA Land Use Category 2) within 100 feet of the viaduct, but design measures would likely avoid a significant effect on occupants.
Hazardous Materials	Subsurface work is required; therefore, remediation is likely necessary.
Construction	Construction activities have the potential to result in adverse traffic, air quality, and noise impacts of varying degree throughout construction. Impacts would likely be most noticeable during the excavation and viaduct construction phases.

Columns associated with Alternative 1A's viaduct over and adjacent to Route 440 have the potential to impact the Morris Canal Historic District. Furthermore, alterations at the West Side Avenue Station may impact the CNJ retaining wall and the former candy factory. Archeological resources that should be maintained in place (e.g., burial grounds) are not anticipated in the areas of potential subsurface disturbance. However, as this area has a long history of industrial uses, there is potential for buried historic-period archaeological resources. Further investigation of the potential alignment would be required to determine the potential presence and extent of such resources, and if any potential sensitivity is identified, coordination with the SHPO would be required to identify mitigation measures. Any anticipated impacts on historic structures or archaeological resources would be minimized in coordination with SHPO and in accordance with the National Historic Preservation Act (16 USC 470 et seq.).

Alternative 1A's viaduct and station may be visible from existing and proposed residential and commercial uses as well as the Hackensack River waterfront. The viaduct would also be visible from vantage points along Route 440. However, the study area does not contain prominent visual corridors or viewsheds that would be adversely impacted by the new viaduct.

As noted above, Alternative 1A would generate 4,700 new daily boardings on the HBLR system as compared to the No Action Alternative. Some of these new riders would be diverted from private automobiles, and therefore, Alternative 1A would reduce vehicle miles traveled (VMT). In turn, a decrease in VMT would lower vehicular emissions, energy demand, and greenhouse gases as compared to the No Action Alternative and would improve local and regional air quality, including ozone and $PM_{2.5}$, which are pollutants of concern for Hudson County.

Operation of the HBLR extension under Alternative 1A would introduce a new noise and vibration source in close proximity to existing and planned residential uses (FTA Land Use Category 2) in the study area. Noise associated with these operations could be perceptible at a distance of up to 750 feet from the viaduct where there are no intervening buildings and at a distance of 375 feet from the viaduct where there are intervening buildings. Depending on the final design, vibration may be perceptible at up to 100 feet of the viaduct. The study area already experiences high levels of ambient noise from vehicular traffic on Route 440, and HBLR operates in close proximity to residential uses throughout Jersey City without harm to their

occupants. Therefore, increases in noise and vibration levels associated with Alternative 1A would likely not adversely impact existing and future residents of the study area.

Given the long history of industrial uses in the study area, residual contamination of subsurface soils and groundwater has been identified in the area of the Alternative 1A alignment. These environmental conditions would need to be remediated during construction in accordance with local, state, and federal regulations. Construction activities also have the potential to result in adverse traffic, air quality, and noise impacts of varying degree throughout construction. However, impacts would likely be most noticeable during the excavation and viaduct construction phases. As part of its environmental review of the project, NJ TRANSIT would explore measures to minimize the inconveniences of construction activities on residents and businesses in the study area.

4.2.3 ALTERNATIVE 1C: ELEVATED EXTENSION TO BAYFRONT WITH TWO STATIONS

Alternative 1C would extend HBLR service west to Bayfront via an elevated rail structure crossing the West Side Avenue Station parking lot, continuing through the Cookson Electronics property, and curving across Route 440—the same alignment as Alternative 1A. Two new stations would be provided, a Bayfront Station at the north end of the Bayfront development in approximately the location anticipated in Bayfront's approved plans, and an intermediate station between West Side Avenue Station and Bayfront, on the east side of Route 440. **Appendix C** shows the plans and profiles for Alternative 1C.

4.2.3.1 ALIGNMENT

Alternate 1C would extend the light rail tracks on elevated viaduct structure that would begin at the existing West Side Avenue Station (see **Figure 4-11**). Two separate viaducts would cross West Side Avenue at the existing track-center spacing of 30 feet before transitioning to a single structure, also with a track spacing of 30 feet. Approximately 1,650 feet west of the existing West Side Avenue Station, this alternative would have a new station, the Route 440 East Station. In the area just east of the new Route 440 East Station, a single or double No. 8 crossover would be installed on 30-foot track centers, allowing access to either side of station.

West of the Route 440 East Station, the alignment would narrow to 14-foot track centers and travel over and across Route 440 on a symmetrical reverse curve section using spiraled and super-elevated curves of 700-foot radii (per HBLR Design Criteria) with an 80-foot tangent section separating the reverse curves. As in the Alternative 1A alignment, a second crossover would be installed to the east of Bayfront Station approximately 600 feet from the west end of the reverse curves at Route 440. This crossover would provide platform berthing flexibility at the Bayfront Station. Beyond the western platform limit, the alignment would have an additional 250 feet of stub-end tail track, with bumping posts at the western end.

Like Alternative 1A, the overall length of the alignment for Alternative 1C would be approximately 3,700 feet, beginning at the West Side Avenue Station. Alternative 1C would also consist of 35 spans beginning at West Side Avenue and terminating at the Bayfront Station.

4.2.3.1.1 Viaduct Across West Side Avenue

The first span of this alternative, crossing West Side Avenue, would be the same as described above for Alternative 1A. As discussed there, this would consist of two separate viaducts

carrying the tracks in place of the existing pedestrian bridge that crosses West Side Avenue today. The same vertical clearance limitation would occur in Alternative 1C as in Alternative 1A.

4.2.3.1.2 Viaduct from West Side Avenue Station Parking Lot to Route 440

On the west side of West Side Avenue, Alternative 1C would continue at the same 30-foot track spacing until the Route 440 East Station, and therefore would differ from Alternative 1A in this section. The two tracks would be carried on separate structures, each with 17-foot wide decks, for the next eight spans, with span lengths of 95 and 109 feet. East of the new station, the next four spans would be 102 and 109 feet long, supporting a single deck on which the crossover would be located.

The Route 440 East Station would consist of three 100-foot simple-spans with two separate structures, each 17 feet wide and supported by a pair of plate girders. The platform structure would run between the rail structures and be supported by welded steel plate girders. Immediately west of the Route 440 East Station, the separate structures would merge together via three 86-foot simple-spans to allow a crossing of Route 440 on a single structure.

The remainder of the viaduct to the Bayfront Station would be the same as for Alternative 1A.

4.2.3.2 STATIONS

4.2.3.2.1 West Side Avenue Station

Alternative 1C would require the same reconfiguration of the West Side Avenue Station and its parking lot as Alternative 1A, described above in Section 4.2.2.2.1.

4.2.3.2.2 Route 440 East Station

Alternative 1C would provide a new elevated station on the block between Mallory Avenue and Route 440. The station platform would be located approximately 200 feet west of Mallory Avenue and 300 feet west of the West Side Avenue Station parking lot. The station cannot be farther west because of the alignment's curve as it crosses Route 440.

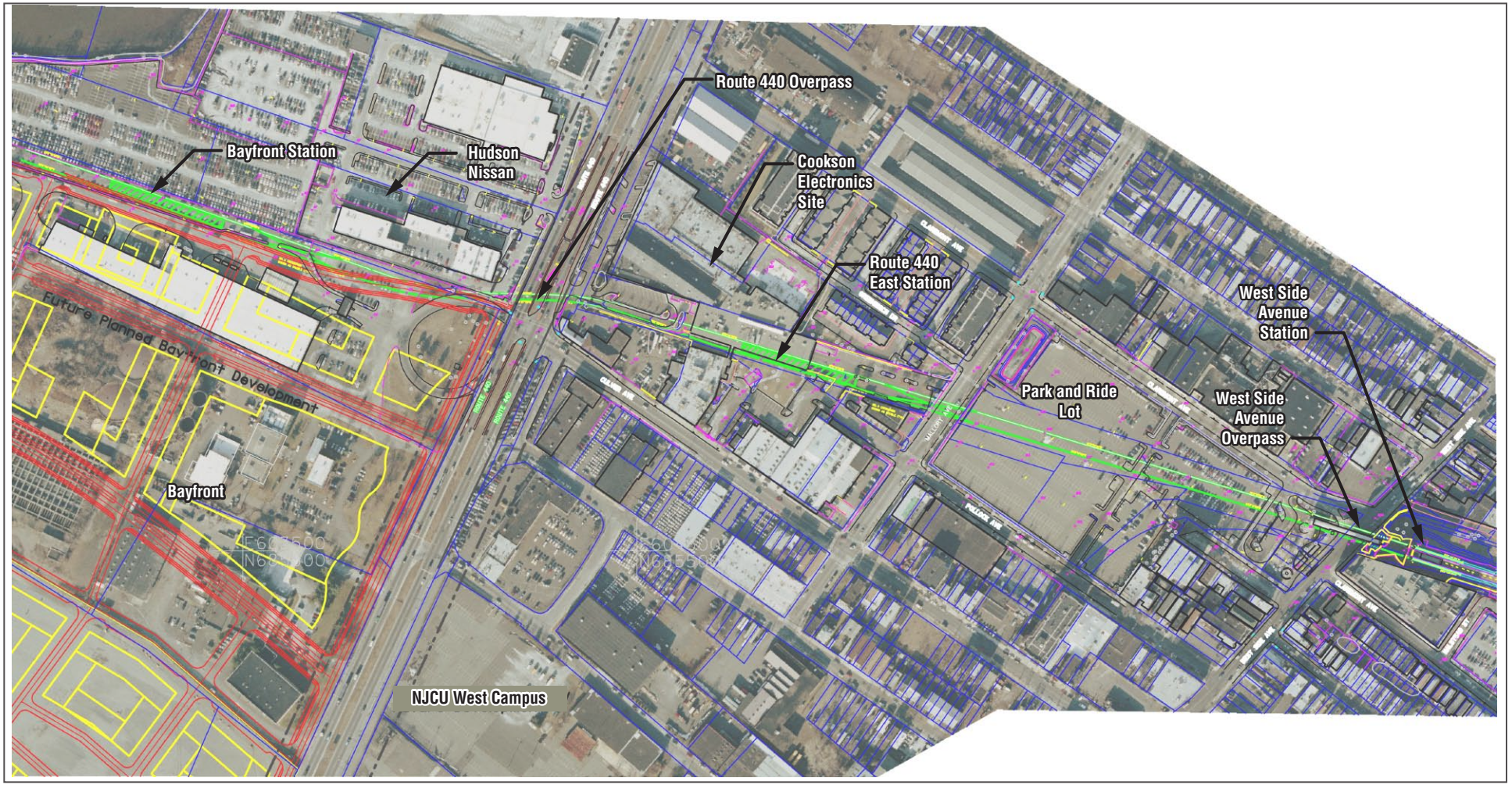
To provide pedestrian access to the Route 440 East Station, two entrance drives would be created in approximately the same location as the two Cookson Electronics driveways—one from Mallory Avenue across from Pollock Avenue and the other from Culver Avenue. These two drives would connect to form an L-shaped road system, which would have two lanes and lead to a drop-off/pickup location alongside the rail right-of-way. Additional pedestrian access can be provided underneath the rail structure to Route 440.

Although the Route 440 East Station would be somewhat closer to the new NJCU West Campus, pedestrian access from the new campus to the station would require walking along either Route 440 or West Side Avenue, since no through-block pedestrian access is available directly between the site of the new campus and the location of the new station. Taking walking paths into consideration, this station would not be closer to most locations on the new campus than the existing West Side Avenue Station.

4.2.3.2.3 Bayfront Station

Alternative 1C would provide a new terminal station at Bayfront. The configuration of the station would be the same as under Alternative 1A, described above in Section 4.2.2.2.2.

2.10.11



Alternative 1C - Elevated Extension to Bayfront with Two Station

Figure 4-11

4.2.3.3 COST

The cost to construct Alternative 1C, including capital costs, property interests, environmental remediation, and contingencies, is $193.9 million in 2010 dollars and $241.6 million in 2017 dollars (see **Table 4-7**). The estimated increase in HBLR's annual operating and maintenance costs with Alternative 1C is $1.3 to $1.5 million in 2010 dollars and $1.8 to $2.0 million in 2019 dollars.

Table 4-7
Cost Estimates for Alternative 1C

Cost Estimate	2010 Dollars	Future Year Dollars
Capital Cost	$193.9 Million	$241.6 Million
Annual Operating and Maintenance Costs	$1.3 to $1.5 Million	$1.8 to $2.0 Million
Note: Future year capital costs are projected in 2017 dollars. Future year operating and maintenance costs are in 2019 dollars.		

4.2.3.4 OPERATIONS

Alternative 1C would increase the length of the HBLR West Side Avenue–Tonnelle Avenue Branch and add two new stations. Together, this would result in a nine-minute (9'00") increase in the run-time for HBLR trains. As noted above, HBLR trains generally operate with 10-minute headways or longer, which would typically accommodate this increase. However, given its required round-trip run time, Alternative 1C poses potential threats to the HBLR operations plan. As trains would require 9 minutes for a round trip across the extension, it may become difficult to maintain the scheduled 10-minute headways. This would be particularly problematic when there are operational difficulties such as an equipment malfunction, a sick passenger, or other such delays. Also, where 6-minute headways are provided in the HBLR schedule, it may be necessary to change operations to provide the additional time required to serve the new Route 440 East and Bayfront Stations.

Alternative 1C includes two station stops (Route 440 East and Bayfront) over a short distance (approximately ½-mile). HBLR trains would have to accelerate and decelerate multiple times over the short distance between West Side Avenue Station and the new Bayfront Station, and as a result, HBLR trains would barely (if at all) achieve an operating speed of 35 miles per hour over this segment of the alignment.

Assuming that the number and length of trains would not be changed in the future, there would be adequate capacity to accommodate new ridership under Alternative 1C. It is estimated that trains would operate at 84 percent of their capacity at the maximum load point during peak periods.

The Route 440 East and Bayfront Stations of Alternative 1C would be constructed to allow for three-car consists, and therefore, would be consistent with long-term plans for HBLR operations. Alternative 1C would also bring HBLR service to the eastern shore of the Hackensack River and could allow for a potential extension across the river to Kearny.

4.2.3.5 RIDERSHIP

As shown in **Table 4-8**, 4,980 new daily HBLR boardings are projected under Alternative 1C as compared to the No Action Alternative. The new Route 440 East Station and Bayfront Station would serve 515 and 6,130 daily boardings, respectively. West Side Avenue Station would see a decline in ridership as compared to the No Action Alternative because some of its passengers would divert to one of the two new stations.

Table 4-8
2035 Daily HBLR Boardings for Alternative 1C

Station	Existing (October 2010)	No Action Alternative	Alternative 1C
West Side	1,686	4,400	2,735
Route 440 East	—	—	515
Bayfront	—	—	6,130
TOTAL	**1,686**	**4,400**	**9,380**

Note: The 2035 forecast includes off-model estimate of 200 additional riders from NJCU West Campus.

4.2.3.6 ENVIRONMENTAL CONSIDERATIONS

Alternative 1C would support existing and proposed land uses and populations in the study area with limited environmental consequences. **Table 4-9** presents the environmental screening analysis for Alternative 1C.

Alternative 1C would generally result in the same environmental effects as described above for Alternative 1A. It would benefit local communities by improving access to destinations both east and west of Route 440. It would support future plans for Bayfront and the Route 440 Study. In addition, it would provide a station in close proximity to the NJCU West Campus. However, as noted earlier, pedestrian access from the new campus to the station would require walking along either Route 440 or West Side Avenue, since no through-block pedestrian access is available directly between the site of the new campus and the location of the new station. Taking walking paths into consideration, this station would not be closer to most locations on the new campus than the existing West Side Avenue Station.

Alternative 1C would also reduce VMT and vehicular emissions as compared to the No Action Alternative and would improve access to new parkland planned for the Bayfront development.

Alternative 1C would require an interest in the Fry's Metals/Cookson Electronics/Alpha Metals Site east of Route 440 and portions of the parking lot of Hudson Nissan and the property currently occupied by DPW west of Route 440. As described above for Alternative 1A, the potential interest in these properties would not displace businesses or residents.

Alternative 1C would result in a new noise and vibration source in close proximity to existing and proposed residential uses, but HBLR operates in close proximity to residential uses throughout Jersey City without harm to their occupants. Alternative 1C has the potential to impact historic and archaeological resources, but any anticipated impacts would be minimized

Table 4-9
Environmental Screening Analysis of Alternative 1C

Area of Analysis	Potential Environmental Effects
Land Use	Proposed land use patterns would support an extension of the HBLR. The proposed Bayfront Station would be generally consistent with the adopted Bayfront I Redevelopment Plan and would allow for Bayfront's maximum permitted density. The Route 440 East Station would serve the planned NJCU West Campus. Alternative 1C would require an interest in private property, including a vacant building and a small portion of the parking lot of an automobile dealership. Alternative 1C would also require reconfiguration of the existing West Side Avenue Station and its parking lot.
Neighborhoods and Community Cohesion	Alternative 1C would improve access to Bayfront and marginally improve access to the NJCU West Campus and other uses along and near the east side of Route 440. The new viaduct would be adjacent to new residential development adjacent to the West Side Avenue parking lot and west of Mallory Avenue. However, HBLR operates in close proximity to residential uses throughout Jersey City.
Environmental Justice	There is limited residential use along the potential alignment, and generally these residences are not anticipated to be environmental justice communities. Alternative 1C is not anticipated to result in disproportionate adverse impacts on environmental justice communities.
Regional and Local Economies	Alternative 1C would require an interest in three properties: 1) Block 1775.1, Lot 83, (Fry's Metals Inc./Cookson Electronics/Alpha Metals); 2) Part of Block 1290.A, Lot A.1 (Hudson Nissan); and 3) Part of Block 1290.A, Lot 16A.99 (City of Jersey City Redevelopment Authority; Bayfront/Honeywell) Block 1775.1, Lot 83 is currently vacant and is for sale. Block 1290.A, Lot A.1 is an operating business, but the HBLR alignment would be above its parking lot and would not displace the auto dealership. DPW plans to vacate its public works garage at Block 1290.A, Lot 16A.99.
Natural Resources	Alternative 1C would not be constructed in mapped wetlands and would not require in-water and/or over-water construction work. Dewatering may be needed for subsurface excavation, but groundwater is not a potable water source in this area. Alternative 1C is also not expected to adversely impact habitats or wildlife in the study area. Columns and station egress associated with Alternative 1C over and west of Route 440 would be located in a floodplain and be subject to applicable federal, state, and local regulations. Consistency with applicable Coastal Zone Management Rules (N.J.A.C. 7:7E) would also be necessary. Stormwater discharges from the viaduct and station would be managed by municipal stormwater systems, but consultation with NJDEP would be required to determine if stormwater control measures are warranted.
Cultural Resources	Columns for Alternative 1C's viaduct over Route 440 would impact the Morris Canal Historic District. Alterations of the West Side Avenue Station have the potential to impact the possible CNJ retaining wall and the former candy factory. The potential right of way may have buried archaeological remnants related to the historic industrial uses of the area. Further research is necessary to determine the areas of archaeological sensitivity and, if any such areas are identified, coordination with the SHPO would be required.
Parks and Recreational Resources	Alternative 1C would not have direct effects on existing or proposed parkland. Proposed parks in Bayfront would be sensitive noise receptors, but Alternative 1C operations would not substantially impair the enjoyment of these resources. Alternative 1C would improve access to new parkland, including the new waterfront park, for residents east of Route 440.
Visual Resources	The new viaduct and stations may be visible from existing and proposed residential and commercial uses as well as the Hackensack River waterfront.
Air Quality, Energy, and GHG	Alternative 1C would result in a regional reduction in emissions from decreases in VMT. Electric-powered trains would not generate localized emissions.

Table 4-9 (Cont'd)
Environmental Screening Analysis of Alternative 1C

Area of Analysis	Potential Environmental Effects
Noise and Vibration	Potential noise impacts may extend up to 750 feet from the viaduct where there are no intervening buildings and up to 375 feet where there are intervening buildings. Noise from Alternative 1C operations would likely not be perceptible near Route 440 because of high ambient levels from automobile and truck traffic. Vibration may be perceptible for residences (FTA Land Use Category 2) within 100 feet of the viaduct, but design measures would likely avoid a significant effect on occupants.
Hazardous Materials	Subsurface work is required; therefore, remediation is likely necessary.
Construction	Construction activities have the potential to result in adverse traffic, air quality, and noise impacts of varying degree throughout construction. Impacts would likely be most noticeable during the excavation and viaduct construction phases.

in coordination with SHPO and in accordance with the National Historic Preservation Act. Any subsurface disturbance would require remediation of contaminated soils and groundwater.

Construction activities for Alternative 1C would have the potential to result in adverse traffic, air quality, and noise impacts of varying degree throughout construction. However, these impacts would likely be most noticeable during the excavation and viaduct construction phases. As part of its environmental review of the project, NJ TRANSIT would explore measures to minimize the inconveniences of construction activities on residents and businesses in the study area.

4.2.4 ALTERNATIVE 1D: ELEVATED EXTENSION TO BAYFRONT WITH STATION AT ROUTE 440

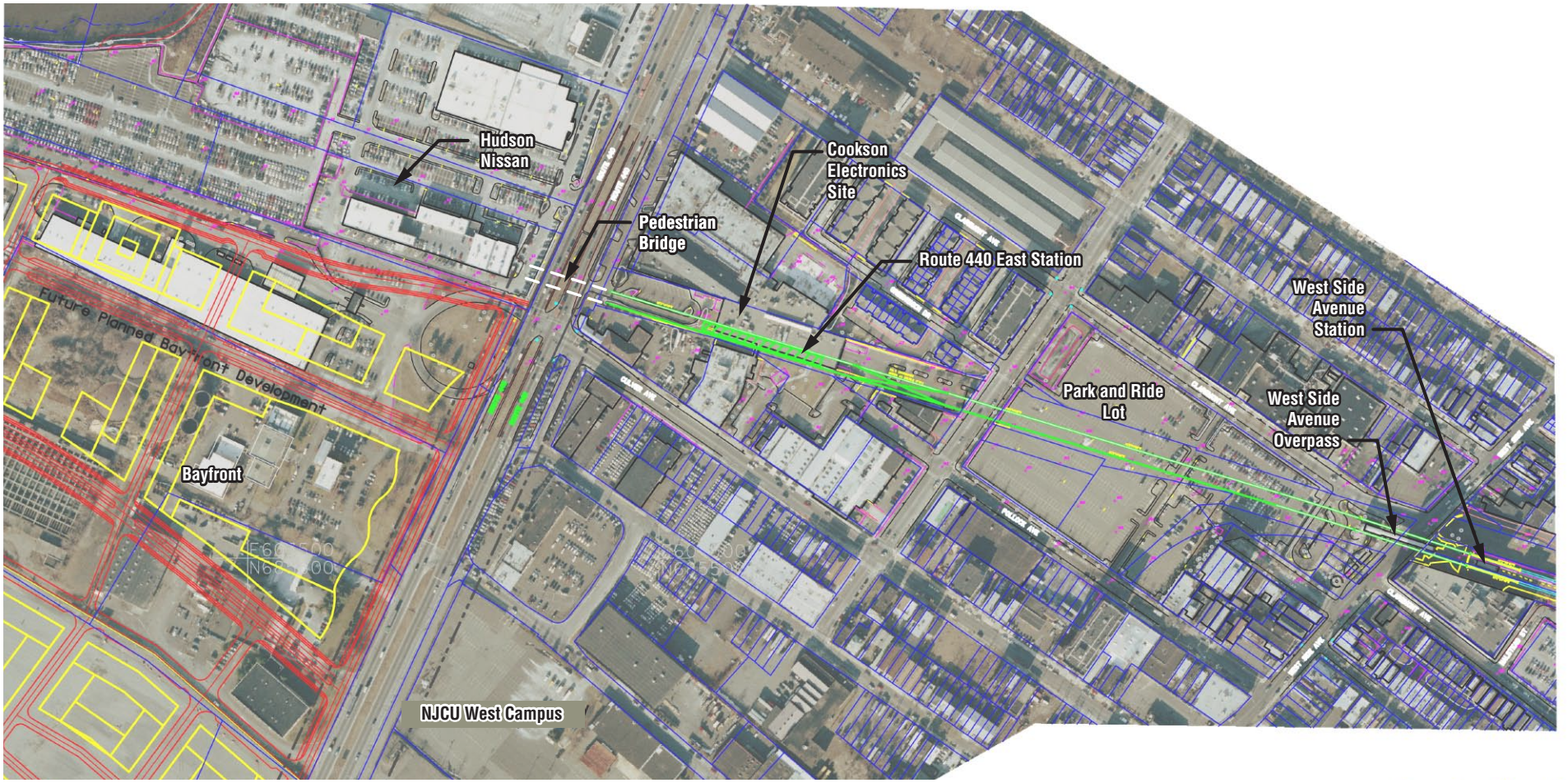
Alternative 1D would extend HBLR service west to Bayfront via an elevated rail structure crossing the West Side Avenue Station parking lot, continuing through the Cookson Electronics property, and terminating on the east side of Route 440. One new station would be provided, just east of Route 440. **Appendix C** shows the plans and profiles for Alternative 1D.

4.2.4.1 ALIGNMENT

Alternative 1D would be similar to Alternatives 1A and 1C in that it would extend the light rail tracks on an elevated viaduct structure that would begin at the existing West Side Avenue Station, but this alternative would terminate on the east side of Route 440 rather than at Bayfront (see **Figure 4-12)**.

Two separate viaducts would cross West Side Avenue at the existing track-center spacing of 30 feet before transitioning to a single structure, also with a track spacing of 30 feet. In this alternative the Route 440 East Station would be located closer to Route 440 than in Alternative 1C, as the track centers would not require a western transition to cross over Route 440. The new station would be approximately 1,800 feet west of the existing West Side Avenue Station (150 feet farther west than in Alternative 1C). In the area just east of the Route 440 East Station, a single or double No. 8 crossover would be installed on 30-foot track centers, allowing access to either side of station platform.

West of the Route 440 East Station, the alignment would have an additional 250 feet of stub-end tail track to the west of the platform end, with bumping posts at the western end. A



Alternative 1D - Elevated Extension to Bayfront with Station at Route 440

Figure 4-12

pedestrian bridge would provide grade-separated across Route 440 to Bayfront. Passengers would descend to grade on the west side of Route 440.

The overall length of this alignment alternative would be approximately 2,200 feet. The alignment would consist of 21 spans beginning at West Side Avenue and terminating to the east of Route 440.

4.2.4.1.1 Viaduct Across West Side Avenue

The first span of this alternative, crossing West Side Avenue, would be the same as described above for Alternatives 1A and 1C. As discussed there, this would consist of two separate viaducts carrying the tracks in place of the existing pedestrian bridge that crosses West Side Avenue today. The same vertical clearance limitation would occur in Alternative 1D as in Alternatives 1A and 1C.

4.2.4.1.2 Viaduct from West Side Avenue Station Parking Lot to Route 440

On the west side of West Side Avenue, Alternative 1D would have the same structure as Alternative 1C, with two separate but parallel structures crossing the West Side Avenue Station parking lot. At Mallory Avenue, the structure would support a single deck, to allow for a track crossover before the new terminal station.

The Route 440 East Station would consist of three 100-foot simple-spans with two separate structures, each 14 feet wide and supported by a pair of plate girders. The platform structure would run between the rail structures and be supported by welded steel plate girders. Immediately west of the Route 440 East Station, the tail tracks would be on two separate decks, each with three spans of 80 feet each

4.2.4.2 STATIONS

4.2.4.2.1 West Side Avenue Station

Alternative 1D would require the same reconfiguration of the West Side Avenue Station and its parking lot as Alternatives 1A and 1C, described above in Section 4.2.2.2.1.

4.2.4.2.2 Route 440 East Station

Alternative 1D would provide a new terminal station at Route 440. Although the station would be located 150 feet farther west than in Alternative 1C, the configuration of the station and its new access roads and pick-up and drop-off point would be the same as under Alternative 1C, described above in Section 4.2.3.2.2.

4.2.4.3 COST

The cost to construct Alternative 1D, including capital costs for the HBLR infrastructure and the pedestrian bridge, property interests, environmental remediation, and contingencies, is $114.2 million in 2010 dollars and $142.4 million in 2019 dollars (see **Table 4-10**). The estimated annual increase in operating and maintenance costs with the Alternative 1D extension is about $740,000 to $940,000 per year in 2010 dollars and $1.0 to $1.2 million per year in 2019 dollars.

Table 4-10
Cost Estimates for Alternative 1D

Cost Estimate	2010 Dollars	Future Year Dollars
Capital Cost	$114.2 Million	$142.4 Million
Annual Operating and Maintenance Costs	$740,000 to $940,000	$1.0 to $1.2 Million
Note: Future year capital costs are projected in 2017 dollars. Future year operating and maintenance costs are in 2019 dollars.		

4.2.4.4 OPERATIONS

The extension of HBLR service between West Side Avenue Station and a new Route 440 East Station would require seven minutes (7'00") of additional run-time for HBLR trains. As trains generally operate with 10-minute headways or longer, the new run-time required for Alternative 1D could generally be accommodated under the existing operating schedule. However, where 6-minute headways are provided, it may be necessary to change operations to provide the additional time required to serve the Route 440 East Station.

Assuming that the number and length of trains would not be changed in the future, there would be adequate capacity to accommodate new ridership under Alternative 1D. It is estimated that trains would operate at 76 percent of their capacity at the maximum load point during peak periods.

The Route 440 East Station in Alternative 1D would be constructed to allow for three-car consists, and therefore, would be consistent with long-term plans for HBLR operations. Alternative 1D would not cross Route 440 and could preclude a potential extension of HBLR service across the Hackensack River to Kearny.

4.2.4.5 RIDERSHIP

Alternative 1D is projected to result in almost 2,000 new daily boardings on the HBLR system as compared to the No Action Alternative (see **Table 4-11**). A total of2,760 riders would board at the new Route 440 East Station. Of these, about 1,960 trips would be new to the HBLR system as a direct result of Alternative 1D. About 800 riders would be diverted from the West Side Avenue Station, resulting in a reduction in that station's patronage as compared to the No Action Alternative.

Table 4-11
2035 Daily HBLR Boardings for Alternative 1D

Station	Existing (October 2010)	No Action Alternative	Alternative 1D
West Side	1,686	4,400	3,600
Route 440 East	—	—	2,760
TOTAL	**1,686**	**4,400**	**6,360**
Note: The 2035 forecast includes off-model estimate of 200 additional riders from NJCU West Campus.			

4.2.4.6 ENVIRONMENTAL CONSIDERATIONS

Table 4-12 summarizes the environmental screening analysis for Alternative 1D. Alternative 1D would marginally improve access to the NJCU West Campus and would bring HBLR service in closer proximity to Bayfront than the No Action Alternative. However, as noted earlier, pedestrian access from the new campus to the station would require walking along either Route 440 or West Side Avenue, since no through-block pedestrian access is available directly between the site of the new campus and the location of the new station. Taking walking paths into consideration, this station would not be closer to most locations on the new campus than the existing West Side Avenue Station. In addition, the Bayfront pedestrian bridge is not consistent with the adopted Bayfront Plan.

Table 4-12
Environmental Screening Analysis of Alternative 1D

Area of Analysis	Potential Environmental Effects
Land Use	Proposed land use patterns would support an extension of the HBLR. The right-of-way would require an interest in of private property, including a vacant building. Small pieces of property may also be acquired for the western landing of the pedestrian bridge. The Bayfront pedestrian bridge is not consistent with the adopted Bayfront Redevelopment Plan. Without direct HBLR service, the adopted plan requires reductions in development density. A new station east of Route 440 would support future development to some degree, but without a station west of Route 440, Alternative 1D would not directly serve Bayfront.
Neighborhoods and Community Cohesion	The extension of the HBLR service would marginally improve access to the NJCU West Campus and uses along and the east side of Route 440. A pedestrian bridge would make the new station accessible from Bayfront and other sites west of Route 440, but it would be less convenient than direct HBLR service to Bayfront. The new viaduct would be adjacent to new residential development adjacent to the West Side Avenue parking lot and west of Mallory Avenue. However, HBLR operates in close proximity to residential uses throughout Jersey City.
Environmental Justice	There is limited residential use along the potential alignment, and generally these residences are not anticipated to be environmental justice communities. Alternative 1D is not anticipated to result in disproportionate adverse impacts on environmental justice communities.
Regional and Local Economies	Alternative 1D would require an interest in Block 1775.1, Lot 83, (Fry's Metals Inc/ Cookson/Alpha Metals). The pedestrian bridge over Route 440 may require an interest in of portions of Block 1290.A, Lot A.1 (Hudson Nissan) and Block 1290.A, Lot 16A.99 (City of Jersey City Redevelopment Authority; Bayfront/Honeywell). The Fry's Metals Inc./Cookson/Alpha Metals property is currently vacant and is for sale. The automobile dealership is an operating business, but the pedestrian bridge would likely be above its parking lot and would not displace the dealership. DPW plans to vacate its public works garage.
Natural Resources	Alternative 1D would not be constructed in mapped wetlands or the coastal zone boundary and would not require in-water and/or over-water construction work. Dewatering may be needed for subsurface excavation, but groundwater is not a potable water source in this area. Alternative 1D is also not expected to adversely impact habitats or wildlife in the study area. Columns and station egress associated with Alternative 1D near Route 440 may be located in a floodplain and be subject to applicable federal, state, and local regulations. Stormwater discharges from the viaduct and station would be managed by municipal stormwater systems, but consultation with NJDEP would be required to determine if stormwater control measures are warranted.

Table 4-12 (Cont'd)
Environmental Screening Analysis of Alternative 1D

Area of Analysis	Potential Environmental Effects
Cultural Resources	Columns for Alternative 1D's viaduct near Route 440 may impact the Morris Canal Historic District. Alterations of the West Side Avenue Station have the potential to impact the possible CNJ retaining wall and the former candy factory. The potential right of way may have buried archaeological remnants related to the historic industrial uses of the area. Further research is necessary to determine the areas of archaeological sensitivity and, if any such areas are identified, coordination with the SHPO would be required.
Parks and Recreational Resources	Alternative 1D would not have direct or indirect effects on existing or proposed parkland.
Visual Resources	The Route 440 East Station and viaduct may be visible from existing and proposed residential and commercial uses. Intervening structures of the Bayfront development would likely obstruct views of the viaduct and station from the Hackensack River waterfront.
Air Quality, Energy, and GHG	Alternative 1D would result in a regional reduction in emissions from decreases in VMT. Electric-powered trains would not generate localized emissions.
Noise and Vibration	Potential noise impacts may extend up to 750 feet from the viaduct where there are no intervening buildings and up to 375 feet where there are intervening buildings. Noise from Alternative 1D operations would likely not be perceptible near Route 440 because of high ambient levels from automobile and truck traffic. Vibration may be perceptible for residences (FTA Land Use Category 2) within 100 feet of the viaduct, but design measures would likely avoid a significant effect on occupants.
Hazardous Materials	Subsurface work is required; therefore, remediation is likely necessary.
Construction	Construction activities have the potential to result in adverse traffic, air quality, and noise impacts of varying degree throughout construction. Impacts would likely be most noticeable during the excavation and viaduct construction phases.

Alternative 1D would result in minimal, if any, impacts on environmental justice communities, natural resources, parklands and recreational resources, and visual resources. Alternative 1D is expected to reduce VMT, and therefore, would benefit air quality, energy demand, and greenhouse gas emissions.

The alignment for this alternative would require an interest in the Fry's Metals/Cookson Electronics/Alpha Metals Site east of Route 440. The pedestrian bridge may require an interest in a portion of the parking lot of Hudson Nissan and a portion of the property currently occupied by DPW. As described above for Alternative 1A, the potential interest in these properties would not displace businesses or residents.

Alternative 1D would result in a new noise and vibration source in close proximity to existing and proposed residential uses, but HBLR operates in close proximity to residential uses throughout Jersey City without harm to their occupants. Alternative 1D has the potential to impact historic and archaeological resources, but any anticipated impacts would be minimized in coordination with SHPO and in accordance with the National Historic Preservation Act. Any subsurface disturbance would require remediation of contaminated soils and groundwater. Construction activities for Alternative 1D would have the potential to result in adverse traffic,

air quality, and noise impacts of varying degree throughout construction. However, these impacts would likely be most noticeable during the excavation and viaduct construction phases. As part of its environmental review of the project, NJ TRANSIT would explore measures to minimize the inconveniences of construction activities on residents and businesses in the study area.

4.3 EVALUATION OF SHORT LIST ALTERNATIVES

The evaluation of the short list alternatives considers the consistency of the transit options with the goals and objectives of the project presented in Chapter 1, "Background and Planning Context." Alternatives that would not meet one or more goals are considered inconsistent with the purpose and need for the project, and it would not be sensible to carry these options forward to design and construction. Alternatives that would fully or partially meet the project goals could be implemented with varying degrees of benefits and detriments. In order to select the most favorable alternative to move forward, these options were compared to determine the highest performing alternative in terms of its consistency with the objectives set forth for the project.

4.3.1 ENGINEERING, COST, OPERATIONAL, RIDERSHIP, AND ENVIRONMENTAL CONSIDERATIONS

Figure 4-13 summarizes the engineering, cost, operational, ridership, and environmental characteristics of the four short list alternatives.

4.3.1.1 TSM ALTERNATIVE

The TSM Alternative would have minimal infrastructure requirements and limited, if any, environmental impacts. The TSM Alternative would also be far less costly to implement than the other three alternatives. However, the TSM Alternative would provide, by far, the least robust improvement to transit service and therefore would attract the fewest new riders to the HBLR system of the alternatives under consideration (385 daily boardings). At the same time, it would have highest annual operating and maintenance costs ($1.94 million in 2010 dollars and $2.6 million in 2019 dollars). The TSM Alternative would not provide high-capacity, light-rail service to Bayfront, which is inconsistent with the City of Jersey City's plans for that redevelopment. Therefore, the Bayfront project would not be allowed to achieve the maximum development potential of its approved plan.

4.3.1.2 ALTERNATIVE 1A

Alternative 1A would result in the second highest net increase in ridership (4,700 daily boardings) of the alternatives under consideration. At the same time, it would have minimal effects on HBLR's operating schedule. Alternative 1A would bring HBLR trains directly to Bayfront, and therefore, that project could be developed to the maximum permitted density of its approved plan. This alternative would involve lower capital costs than Alternative 1C. While its capital costs would be greater than for the TSM Alternative and Alternative 1D, Alternative 1A would have a lower capital cost per new rider. Alternative 1A, like the other light rail alternatives under consideration, has the potential to result in adverse impacts on historic resources, but it would otherwise have minimal adverse environmental effects.

4.3.1.3 ALTERNATIVE 1C

Alternative 1C would be the same as Alternative 1A, except that it would have an additional station, the Route 440 East Station. This alternative would have the highest cost to construct but would also generate the greatest number of new riders (4,980 daily boardings, which is 280 more than the second-highest alternative, Alternative 1A). The new Bayfront Station would serve 6,130 daily riders. The Route 440 East Station would serve 515 daily boardings. When compared to October 2010 boardings at HBLR stations (see Chapter 1, "Background and Planning Context"), the Route 440 East Station would be the least patronized of the entire HBLR system. It should be noted that some of these 515 boardings would use either the West Side Avenue Station or the Bayfront Station under Alternative 1A, and therefore, the additional station provided under Alternative 1C would only attract 280 new customers to the HBLR system as compared to Alternative 1A.

The Route 440 East Station would increase the capital costs of Alternative 1C by $20.3 million as compared to Alternative 1A. The cost to construct, operate, and maintain Alternative 1C would have limited ridership benefits, since as stated above, the Route 440 East Station would attract only 280 more new customers to the HBLR system than Alternative 1A.

Like Alternative 1A, Alternative 1C would bring light rail service directly to Bayfront, and therefore, would facilitate the maximum permitted density of the approved Bayfront Plan. The potential environmental effects of Alternative 1C would be essentially the same as for Alternative 1A.

Alternative 1C would support long-term plans for three-car trains on the HBLR system. However, Alternative 1C poses potential threats to the HBLR operations plan. As trains would require 9 minutes for a round trip across the extension, it may become difficult to maintain the scheduled 10-minute headways. This would be particularly problematic when there are operational difficulties such as an equipment malfunction, a sick passenger, or other such delays.

4.3.1.4 ALTERNATIVE 1D

Alternative 1D would be less costly to construct, operate, and maintain than Alternatives 1A and 1C. However, it would attract far fewer new riders to the HBLR system than the other light rail alternatives and would offer less convenient connections to destinations west of Route 440. It would have the highest capital cost per new rider of all alternatives and the highest operations and maintenance cost per new rider of the light rail alternatives.

Like the TSM Alternative, Alternative 1D would not facilitate the maximum build-out of Bayfront. Although it would result in a shorter alignment than Alternatives 1A and 1C, its potential environmental effects are nearly the same. Alternative 1D would not preclude 3-car trains on the HBLR system.

4.3.2 CONSISTENCY WITH PROJECT GOALS AND OBJECTIVES

This assessment reviews the engineering, cost, operations, ridership, and environmental characteristics of the short list alternatives and whether these considerations are consistent with the project goals and objectives identified in Chapter 1, "Background and Planning Context." The three project goals are as follows:

Category	Transportation Systems Management (TSM) Alternative	Alternative 1A Elevated Extension to Bayfront with One Station	Alternative 1C Elevated Extension to Bayfront with Two Stations	Alternative 1D Elevated Extension to East Side of Route 440 with One Station
ENGINEERING				
Alignment and Structures	On-street operation between West Side Avenue and Bayfront and Society Hill	3,700 feet of new double-track viaduct between West Side Avenue and Bayfront (west of Route 440) Results in substandard clearance above West Side Avenue and West Side Avenue Station park-and-ride lot.	3,700 feet of new double-track viaduct between West Side Avenue and Bayfront (west of Route 440) Results in substandard clearance above West Side Avenue and West Side Avenue Station park-and-ride lot.	2,200 feet of new double-track viaduct between West Side Avenue and east side of Route 440 Results in substandard clearance above West Side Avenue and West Side Avenue Station park-and-ride lot.
Stations	New bus stops at NJCU West Campus, Bayfront, and Society Hill. No modification to existing HBLR stations	One new station: Bayfront. Requires modifications to West Side Avenue Station and its park-and-ride lot.	Two new stations: Bayfront and Route 440 East. Requires modifications to West Side Avenue Station and its park-and-ride lot.	One new station: Route 440 East with a pedestrian bridge across Route 440. Requires modifications to West Side Avenue Station and its park-and-ride lot.
COST				
Capital[1]	$ 2.7 million	$ 213.9 million	$ 241.6 million	$ 142.4 million
Operations & Maintenance[2]	$ 2.6 to 2.8 million per year	$ 1.8 to 2 million per year	$1.8 to 2 million per year	$ 1 to 1.2 million per year
OPERATIONS				
Run-Time	One Way = 12'00" (Society Hill to West Side Avenue Station) Round Trip = 24'00" (Does not include layover time at West Side Avenue Station)	One Way = 1'50" (Bayfront to West Side Avenue) Round Trip = 8'00" (Includes layover time at terminal)	One Way = 2'30" (Bayfront to West Side Avenue) Round Trip = 9'00" (Includes layover time at terminal)	One Way = 1'20" (Route 440 East to West Side Avenue) Round Trip = 7'00" (Includes layover time at terminal)
Schedule	No Impact	Can operate within 10-minute headway, schedule may need adjustment to eliminate periods of 6-minute headways	Can operate within 10-minute headway, schedule may need adjustment to eliminate periods of 6-minute headways	Can operate within 10-minute headway, schedule may need adjustment to eliminate periods of 6-minute headways
Peak Load per Car[3]	0.70	0.83	0.84	0.76
Long-Term Planning	No Impact	Supports 3 car consists	Supports 3 car consists	Supports 3 car consists
RIDERSHIP				
Total[4]	4,785	9,100	9,380	6,360
Net New[5]	385	4,700	4,980	1,960
ENVIRONMENTAL				
Land Use	TSM Alternative would operate on-street and would not directly impact land use plans. However, absent light rail service, Bayfront would be required to develop at lower density.	The proposed Bayfront Station would be generally consistent with the adopted Bayfront I Redevelopment Plan and would allow for Bayfront's maximum permitted density.	The proposed Bayfront Station would be generally consistent with the adopted Bayfront I Redevelopment Plan and would allow for Bayfront's maximum permitted density.	With no Bayfront Station, the Bayfront development cannot achieve its maximum permitted density.
Neighborhoods and Community Cohesion	TSM Alternative would improve access to new development at Bayfront and the NJCU West Campus, but it would not allow for development of a density or scale that is desired by the City of Jersey City.	The extension of the HBLR service would improve access to uses along and near both sides of Route 440. The new viaduct would be adjacent to residential development, but HBLR operates in close proximity to residential uses throughout Jersey City.	The extension of the HBLR service would improve access to uses along and near both sides of Route 440. The new viaduct would be adjacent to residential development, but HBLR operates in close proximity to residential uses throughout Jersey City.	The extension of the HBLR service would improve access to uses on the east side of Route 440. The new viaduct would be adjacent to residential development, but HBLR operates in close proximity to residential uses throughout Jersey City.
Environmental Justice	Disproportionate impacts are not anticipated.	Disproportionate impacts are not anticipated.	Disproportionate impacts are not anticipated.	Disproportionate impacts are not anticipated.
Regional and Local Economies	No property interests or displacement of residents or business is required.	Requires an interest in three properties but would not result in residential or business displacement.	Requires an interest in three properties but would not result in residential or business displacement.	Requires an interest in one property for the alignment and two properties for the pedestrian bridge across Route 440 but would not result in residential or business displacement.
Natural Resources	No impact	No adverse impacts on wetlands, groundwater, surface waters, natural habitat, or wildlife resources. Stormwater would be managed by municipal systems, but coordination with NJDEP would be required to determine if stormwater control measures are warranted. Structures within the floodplain and coastal zone boundary would be subject to federal, state, and local regulations.	No adverse impacts on wetlands, groundwater, surface waters, natural habitat, or wildlife resources. Stormwater would be managed by municipal systems, but coordination with NJDEP would be required to determine if stormwater control measures are warranted. Structures within the floodplain and coastal zone boundary would be subject to federal, state, and local regulations.	No adverse impacts on wetlands, groundwater, surface waters, natural habitat, wildlife resources, or coastal zone policies. Stormwater would be managed by municipal systems, but coordination with NJDEP would be required to determine if stormwater control measures are warranted. Structures within the floodplain would be subject to federal, state, and local regulations.
Cultural Resources	No impact	Potential impacts on Morris Canal Historic District and CNJ retaining wall Areas along alignment might have archeological sensitivity	Potential impacts on Morris Canal Historic District and CNJ retaining wall Areas along alignment might have archeological sensitivity	Potential impacts on CNJ retaining wall; structures near Route 440 might impact Morris Canal Historic District. Areas along alignment might have archeological
Parks and Recreational Resources	No impact	No direct or indirect impacts. Improves access to planned parkland at Bayfront.	No direct or indirect impacts. Improves access to planned parkland at Bayfront.	No direct or indirect impacts.
Visual Resources	No impact	The new viaduct and station may be visible from existing and proposed residential and commercial uses as well as the Hackensack River waterfront.	The new viaduct and stations may be visible from existing and proposed residential and commercial uses as well as the Hackensack River waterfront.	The new station and viaduct may be visible from existing and proposed residential and commercial uses but would not likely be visible from the Hackensack River waterfront.
Air Quality, Energy, and GHG	Modest reduction in vehicle emissions, energy demand, and greenhouse gases from diversion of automobile trips to transit	Regional reduction in emissions from decreases in VMT. Electric-powered trains would not generate localized emissions.	Regional reduction in emissions from decreases in VMT. Electric-powered trains would not generate localized emissions.	Regional reduction in emissions from decreases in VMT. Electric-powered trains would not generate localized emissions.
Noise and Vibration	Minimal impact from new bus operations	New noise and vibration source at nearby uses, but impacts would be minimal	New noise and vibration source at nearby uses, but impacts would be minimal	New noise and vibration source at nearby uses, but impacts would be minimal
Hazardous Materials	Limited, if any, subsurface disturbance is required.	Remediation is likely necessary for subsurface work.	Remediation is likely necessary for subsurface work.	Remediation is likely necessary for subsurface work.
Construction	Limited, if any, construction is required.	Potential adverse traffic, air quality, and noise impacts of varying degree throughout construction.	Potential adverse traffic, air quality, and noise impacts of varying degree throughout construction.	Potential adverse traffic, air quality, and noise impacts of varying degree throughout construction.

Notes :

1. Capital costs are escalated to estimated midpoint of construction, 2017.

2. Operations and maintenance costs are escalated to estimated first year of operation, 2019.

3. Peak load at maximum load point based on two-car consists.

4. Total boardings at West Side Avenue Station and proposed new stations.

5. Net new boardings as compared to No Action Alternative.

Engineering, Cost, Operations, Ridership, and Environmental Considerations for the Short List of Alternatives

Figure 4-13

- Project Goal 1: Support existing and proposed development in the West Side community;
- Project Goal 2: Minimize effects on existing and proposed HBLR operations; and
- Project Goal 3: Minimize adverse effects on the built and natural environment.

Figure 4-14 shows the project goals and objectives and identifies whether the various characteristics of each alternative meet, partially meet, or do not meet each objective. Where an alternative would partially meet one or more objectives of a particular goal, it was considered to partially meet the overall goal. If an alternative would not meet one or more objectives of a particular goal, it was considered not to meet that goal. Therefore, in order to fully meet a goal, an alternative must meet each of all its objectives.

As described above, alternatives that do not meet one or more project goals are not considered prudent options to carry forward. The TSM Alternative and Alternative 1D would partially or fully meet Project Goal 2, "Minimize effects on existing and proposed HBLR operations," and Project Goal 3, "Minimize adverse effects on the built and natural environment." However, these alternatives would not provide the same transit benefit as Alternatives 1A and 1C, in that they would not enhance transit accessibility in the western waterfront area as well as the other two alternatives. For this reason, the TSM Alternative and Alternative 1D would attract far fewer new riders to the HBLR system. Moreover, neither of these alternatives would meet Project Goal 1, "Support existing and proposed development in the West Side community," since they would not support the Bayfront development as it is currently planned and approved. Since the TSM and Alternative 1D would fail to meet Project Goal 1 and would not serve the basic purpose of the project (enhancing transit service) as well as the other two alternatives, they are not recommended for further consideration.

Alternatives 1A and 1C would meet or partially meet all three project goals and their supporting objectives with varying degrees of potential benefits and/or detriments. Both alternatives would meet Project Goal 1, "Support existing and proposed development in the West Side community." Both would directly serve Bayfront and would facilitate its maximum permitted development density and both would be consistent with the NJCU West Campus plan. Alternative 1A would not provide a station in closer proximity to the West Campus, and therefore, its users would be served by the existing West Side Avenue Station. Alternative 1C would provide a new station east of Route 440, but it would require a circuitous route for pedestrians to reach the campus and for much of the campus would not be notably closer than the existing West Side Avenue Station. Thus, in either case, much of the campus will be better served by the existing West Side Avenue Station.

Alternative 1A would meet Project Goal 2, "Minimize effects on existing and proposed HBLR operations," while Alternative 1C would only partially meet this goal. Alternative 1C poses operational difficulties for the HBLR schedule since it would require 9 minutes of additional run-time to traverse the extension. As noted above, this additional run time may jeopardize the scheduled 10-minute headways, particularly when there are equipment problems, sick passengers, or other operational difficulties. Alternative 1C also results in the highest capital cost of the three alternatives under consideration, but it does not result in a substantial increase in ridership as compared to Alternative 1A (the addition of only 280 new HBLR riders). Alternative 1C also results in a higher operating and maintenance cost than Alternative 1A.

Both alternatives would meet Project Goal 3, "Minimize adverse effects on the built and natural environment." Both Alternatives 1A and 1C would have limited, if any, negative effects on the environmental aspects under consideration, and both would have the potential to improve local transit access, regional air quality, and energy demand.

Alternative 1A would meet all three project goals. Alternative 1C would meet two goals and would partially meet one goal. With the exception of Project Goal 2 (effects on HBLR operations), the potential benefits of Alternatives 1A and 1C are the same. With respect to Project Goal 2, Alternative 1A is more favorable. It poses less threat to the integrity of HBLR's operating schedule and results in lower capital, operating, and maintenance costs with only a nominal drop in ridership as compared to Alternative 1C. Therefore, Alternative 1A is considered the best option to move forward as the Locally Preferred Alternative.

4.4 CONCLUSION

Each of the short list alternatives has relative benefits in meeting the project's goals and objectives. When all goals and objectives are considered cumulatively, Alternative 1A best meets the purpose and need of the project. While Alternative 1A is more costly than the TSM Alternative and Alternative 1D, it directly serves Bayfront and is projected to attract substantially more new riders than these less costly alternatives. Alternatives 1A and 1C would have nearly the same benefits with respect to Project Goal 1 (Support existing and proposed development in the West Side community) and Project Goal 3 (Minimize adverse effects on the built and natural environment). While Alternative 1A attracts slightly fewer riders to the HBLR system than Alternative 1C, it poses less threat to the integrity of the HBLR operating plan and has lower capital, operating, and maintenance costs. Therefore, Alternative 1A fares more favorably with respect to Project Goal 2 (Minimize effects on existing and proposed HBLR operations). For these reasons, Alternative 1A is considered the best option to move forward as the Locally Preferred Alternative for the HBLR Route 440 Extension project.

Goal / Objective	Transportation Systems Management (TSM) Alternative	Alternative 1A Elevated Extension to Bayfront with One Station	Alternative 1C Elevated Extension to Bayfront with Two Stations	Alternative 1D Elevated Extension to East Side of Route 440 with One Station
SUPPORT EXISTING AND PROPOSED DEVELOPMENT IN THE WEST SIDE COMMUNITY				
Improve access to existing destinations in the study area	● Improves access between HBLR West Side Avenue Station and Society Hill	● Improves access to and from destinations along and west of Route 440	● Improves access to and from destinations along and west of Route 440	● Improves access to and from destinations along and west of Route 440
Increase ridership on HBLR system	○ Increase in total system ridership of 385 daily passengers (compared to the No Action Alternative)	● Increase in total system ridership of 4,700 daily passengers (compared to the No Action Alternative)	● Increase in total system ridership of 4,980 daily passengers (compared to the No Action Alternative)	◉ Increase in total system ridership of 1,960 daily passengers (compared to the No Action Alternative)
Support the Bayfront Redevelopment Plan	○ Improved access to Bayfront but not consistent with its plan and would not allow development at planned density (which is permitted only with development of light rail)	● Improved access to Bayfront consistent with Bayfront development plan. Allows development of Bayfront to the full planned density.	● Improved access to Bayfront consistent with Bayfront development plan. Allows development of Bayfront to the full planned density.	○ Improved access to Bayfront but not consistent with its plan and would not allow development at planned density (which is permitted only with development of light rail)
Support the New Jersey City University Master Plan	● Existing West Side Avenue Station within ¼ mile walk of most of new West Campus, and TSM shuttle bus service to serve new West Campus	● Alignment does not interfere with West Campus development plan.	● Alignment does not interfere with West Campus development plan. Existing station would best serve east side of new campus and new Route 440 East Station would best serve west side of new campus. Forecasts show low projected daily ridership at new Route 440 East Station (515 passengers)	● Alignment does not interfere with West Campus development plan. Existing station would best serve east side of new campus and new Route 440 East Station would best serve west side of new campus.
Support the planned redevelopment of Route 440	● No effect on Route 440	● Design accommodates planned roadway alignment	● Design accommodates planned roadway alignment	● No effect on Route 440
OVERALL	○ **Does Not Meet Goal**	● **Meets Goal**	● **Meets Goal**	○ **Does Not Meet Goal**
MINIMIZE EFFECTS ON EXISTING AND PROPOSED HBLR OPERATIONS				
Provide improved transit access continuing from the existing West Side Avenue terminal	◉ Improved access to and from West Side Avenue Station but requires two-seat / two-mode ride	● Improved access via extension to HBLR from West Side Avenue terminal that serves future population at Bayfront	● Improved access via extension to HBLR from West Side Avenue terminal that serves future population at Bayfront	◉ Improved access via extension to HBLR from West Side Avenue terminal, but access from Bayfront requires long walk and use of pedestrian overpass
Avoid substantial compromises to existing HBLR timetables	● No effect on timetable. Peak load per car systemwide: 0.70	● Can operate within 10-minute headway; schedule may need adjustment to eliminate periods of 6-minute headways. Peak load per car systemwide: 0.83	◉ Can operate within 10-minute headway; but leaves little cushion for schedule slips due to incidents. Schedule may need adjustment to eliminate periods of 6-minute headways. Peak load per car systemwide: 0.84	● Can operate within 10-minute headway; schedule may need adjustment to eliminate periods of 6-minute headways. Peak load per car systemwide: 0.76
Minimize capital and operating and maintenance costs [1]	● Lowest capital cost: $ 2.7 million Capital cost per new rider: $7,000	● Capital cost: $ 213.9 million Capital cost per new rider: $45,500	◉ Highest capital cost: $ 241.6 million Capital cost per new rider: $48,500	◉ Capital cost: $ 142.4 million Highest capital cost per new rider: $72,700
	◉ Highest annual operating cost: $2.6 to 2.8 million Annual operating cost per new rider: $7,000	● Annual operating cost: $ 1.8 to 2 million Annual operating cost per new rider: $400	● Annual operating cost: $ 1.8 to 2 million Annual operating cost per new rider: $400	◉ Annual operating cost: $ 1 to 1.2 million Annual operating cost per new rider: $600
Implement within a reasonable timeframe	● Can be implemented in less than a year	● Can be implemented in 3 to 5 years in time for build out of proposed development	● Can be implemented in 3 to 5 years in time for build out of proposed development	● Can be implemented in 3 to 5 years in time for build out of proposed development
Accommodate other planned systemwide HBLR capital improvements	● No effect	● No effect on planned improvements; 3-car consists	● No effect on planned improvements; 3-car consists	● No effect on planned improvements; 3-car consists
OVERALL	◉ **Partially Meets Goal**	● **Meets Goal**	◉ **Partially Meets Goal**	◉ **Partially Meets Goal**
MINIMIZE ADVERSE EFFECTS ON THE BUILT AND NATURAL ENVIRONMENT				
Avoid property acquisition to the maximum extent feasible	● No need for property interest	● Requires an interest in three properties but would not require residential or business displacement	● Requires an interest in three properties but would not require residential or business displacement	● Requires an interest in one property for the alignment and two for the pedestrian bridge across Route 440 but would not require residential or business displacement
Avoid, minimize, or mitigate adverse impacts on historic resources	● No impact	● Potential impacts on Morris Canal Historic District at Route 440, CNJ retaining wall at West Side Avenue Station, and possible archaeological resources along alignment. Effects would be minimized as required by the National Historic Preservation Act.	● Potential impacts on Morris Canal Historic District at Route 440, CNJ retaining wall at West Side Avenue Station, and possible archaeological resources along alignment. Effects would be minimized as required by the National Historic Preservation Act.	● Potential impacts on Morris Canal Historic District at Route 440, CNJ retaining wall at West Side Avenue Station, and possible archaeological resources along alignment. Effects would be minimized as required by the National Historic Preservation Act.
Minimize encroachment on view corridors	● No impact	● No significant impairment of view corridors.	● No significant impairment of view corridors.	● No significant impairment of view corridors.
Maintain access to existing and future residences and businesses in the study area	● No impairment to local roadways and improved transit access	● No impairment to local roadways and improved transit access	● No impairment to local roadways and improved transit access	● No impairment to local roadways and improved transit access
Reduce vehicular congestion, air emissions, and noise	◉ Modest reduction in vehicle trips associated with new HBLR passengers	● Regional reduction in vehicle trips and vehicle miles traveled associated with new HBLR passengers	● Regional reduction in vehicle trips and vehicle miles traveled associated with new HBLR passengers	● Regional reduction in vehicle trips and vehicle miles traveled associated with new HBLR passengers
Avoid impacts to Route 440 operations to the extent feasible	● No impact	● No impact to Route 440 alignment; reduction in vehicle trips	● No impact to Route 440 alignment; reduction in vehicle trips	● No impact to Route 440 alignment; reduction in vehicle trips
Minimize construction impacts to the extent feasible	● No construction other than bus stops and no impact	● Potential traffic, air quality, and noise impacts during construction to be minimized through construction planning	● Potential traffic, air quality, and noise impacts during construction to be minimized through construction planning	● Potential traffic, air quality, and noise impacts during construction to be minimized through construction planning
Avoid impacts on parklands, open space, natural features and coastal waters	● No impact	● No impact	● No impact	● No impact
OVERALL	◉ **Partially Meets Goal**	● **Meets Goal**	● **Meets Goal**	● **Meets Goal**

MEETS: ● **PARTIALLY MEETS:** ◉ **DOES NOT MEET:** ○