

2.0 INTRODUCTION

The development and evaluation of project alternatives is central to the National Environmental Policy Act (NEPA) process. This chapter describes the Preferred Alternative that is evaluated in this Environmental Assessment (EA) as well as alternatives that were previously considered in the Project's Alternatives Analysis phase and the reasons for their elimination from further consideration.

As described in *Hudson-Bergen Light Rail Route 440 Extension Final Alternatives Analysis Report* (February 2011)¹ NJ TRANSIT identified 10 "long list" alternatives for an extension of Hudson-Bergen Light Rail (HBLR) service from West Side Avenue Station. This long list of alternatives was screened against the project's goals and objectives and four alternatives were advanced to be considered in more detail as a "short list" of alternatives. A consideration of the potential benefits and impacts of the short list of alternatives on the environment, preliminary design information, preliminary cost estimates, and potential ridership information were used to recommend the Preferred Alternative described below. For more information on the alternatives considered during this process, see section 2.3 below.

NJ TRANSIT adopted the Preferred Alternative as its Locally Preferred Alternative in May 2011. As required by NEPA, a No Action Alternative is also presented in this EA to serve as a benchmark to identify potential impacts from the Preferred Alternative.

2.1 EXISTING HBLR SYSTEM

HBLR is a 17.5-mile light rail system that operates in Hudson County and serves the cities and townships of Jersey City, Hoboken, Bayonne, Weehawken, Union City, and North Bergen (see **Figure 2-1**). HBLR has three routes: West Side Avenue (Jersey City) to Tonnelles Avenue (North Bergen); 22nd Street (Bayonne) to Hoboken Terminal; and Tonnelles Avenue to Hoboken Terminal.

HBLR operates seven days a week, including holidays. Trains operate between 4 AM and 2:30 AM on weekdays and from 5 AM to 2:30 AM on weekends and holidays. At certain stations, service begins a bit later and ends a bit earlier. The service between Tonnelles Avenue and Hoboken Terminal operates only on weekdays.

HBLR has a total of 23 stations. At three stations, Hoboken Terminal, Pavonia/Newport, and Exchange Place, HBLR provides connections to Port Authority Trans Hudson (PATH) trains. HBLR provides connections to NJ TRANSIT commuter rail at Hoboken Terminal (which, in turn,

¹ The Hudson-Bergen Light Rail Route 440 Extension Final Alternatives Analysis Report is available on the project website at <http://hblr440.com/document-library-2/final-alternatives-analysis/>

connect to Metro-North commuter rail service in Rockland and Orange Counties in New York), and local buses serve many of the HBLR stations. Five stations, Tonnelle Avenue, Liberty State Park, West Side Avenue, 34th Street, and 22nd Street, have customer parking.

HBLR serves the study area with the West Side Avenue–Tonnelle Avenue Branch. The terminal station on the south end of the branch is the West Side Avenue Station. West Side Avenue Station is located on the east side of West Side Avenue between Claremont Avenue and Kearney Avenue.

The station itself consists of a 22.5-foot wide, 300-foot-long, center platform designed to accommodate three-car consists. Tracks terminate at the western end of the platform at a pedestrian plaza with access to two stairs leading to West Side Avenue. Passengers can also access the platform via an enclosed pedestrian bridge, which crosses over West Side Avenue, to an elevator and stairs on the west side of the street. The bridge and vertical circulation elements are enclosed in a weather-protected structure.

The station's park-and-ride parking lot is on the west side of West Side Avenue. This at-grade parking lot has 800 spaces. Access to the parking lot is from Claremont, Mallory, and Pollock Avenues. A customer drop-off area is located at the east end of the lot, near the elevator, and is accessed from the Claremont Avenue entrance.

2.2 PREFERRED ALTERNATIVE

2.2.1 DESCRIPTION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative (also referred to as the Proposed Project) consists of a two-track, approximately 3,700-foot extension of the HBLR from West Side Avenue Station to a new Bayfront Station, which would be located west of Route 440 at the northern boundary of the new Bayfront development.

The Preferred Alternative would include the following components:

- A new viaduct extending from the West Side Avenue Station platform across West Side Avenue, through the existing station parking lot and across Mallory Avenue, through the next block and across Route 440;
- Modifications to the existing West Side Avenue Station and its parking lot to accommodate the new viaduct; and
- A new terminal station, the Bayfront Station, west of Route 440 that would be integrated into the new Bayfront development being planned there.

These are discussed below and illustrated in **Figure 2-2**.

2.2.1.1 NEW VIADUCT STRUCTURE FROM WEST SIDE AVENUE STATION TO BAYFRONT STATION

The Preferred Alternative would extend the HBLR alignment from West Side Avenue Station on two separate viaducts, one for each track. Horizontal and vertical alignments and station designs 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. The viaducts would extend from the existing West Side Avenue Station platform and 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 (see **Figures 2-3 and 2-4**). 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 (discussed below). 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 viaduct's structural components would be typical of the existing HBLR system and would generally consist of welded steel plate girder spans. The entire viaduct structure would consist of 35 girder spans of varying length and type, depending on the need for vertical clearance and other factors. Pier spacing would allow for Jersey City's planned changes to the street grid between Mallory Avenue and Route 440 as well as the planned redevelopment of Route 440.

Concrete plinths on reinforced concrete deck would provide for direct-fixation light rail track with continuous welded rail. 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 (of approximately 5.5 feet in diameter, 20 feet deep) 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 as noted below.

2.2.1.1.1 Viaduct Across West Side Avenue

To extend the tracks over West Side Avenue, the existing pedestrian bridge that extends across West Side Avenue to provide access between the station parking lot and the platform would be removed and replaced with two separate viaducts, one for each track, with a span length of 150 feet (adequate to span West Side Avenue). A replacement pedestrian bridge would also be constructed, as discussed in section 2.2.1.2 below.

It is anticipated that with a typical floorbeam system, a 12-foot, 4-inch vertical under-clearance would be provided over West Side Avenue. This is comparable to the approximately 13-foot underclearance that exists with the current pedestrian overpass 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 of 14 feet, 6 inches set forth in the NJDOT Design Manual for Bridges and Structures. Constructing a new transit aerial structure that would meet NJDOT's clearance standard would involve considerable work to raise the grade of the existing West Side Avenue Station. Therefore, 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, as well as the existing structure at West Side Avenue. Limited vertical clearance would not adversely affect bus operations on West Side Avenue and is also not expected to have an impact on truck traffic, since this portion of West Side Avenue is not a designated truck route.

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

West of West Side Avenue, the new alignment would continue on a viaduct diagonally across the West Side Avenue Station parking lot to Mallory Avenue, and would then continue across the privately owned property on the west side of Mallory Avenue to Route 440. West of Mallory Avenue, it would follow the former alignment of the Central New Jersey (CNJ) Railroad, which extends through a property most recently occupied by Cookson Electronics.

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 (see **Figures 2-3** through **2-5**). 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.

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 as discussed below in section 2.2.1.2.

2.2.1.1.3 Viaduct Across Route 440

At Route 440, the alignment would curve so that the new Bayfront Station (discussed below) would be located at the northern end of the Bayfront project. The alignment across Route 440 has been designed so that only one supporting pier is required within the Route 440 right-of-way, and this pier would be within the median of the roadway both in the roadway's existing condition and if the roadway is reconstructed as an urban boulevard according to Jersey City's conceptual plan for Route 440.

To accommodate Jersey City's 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. 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 type of pier would minimize the amount of ground area required to support the viaduct structure (see **Figure 2-6**).

2.2.1.1.4 Viaduct from Route 440 to Bayfront Station

From Route 440, the alignment would continue approximately 1,000 feet to a new terminus at Bayfront Station (discussed below). 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 new Bayfront Station to accommodate a center platform (see **Figure 2-7**). In this area, the two separate structures would be supported on two simple spans of 92 feet each. Each deck would 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.

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, each with a reinforced concrete shaft cap with four drilled shafts.

The new Bayfront Station tail tracks would be the terminus of the Preferred Alternative. However, final design of the extension and Bayfront Station would not preclude a potential future extension of the HBLR system from Bayfront across the Hackensack River to Kearny.

2.2.1.2 MODIFICATIONS TO EXISTING WEST SIDE AVENUE STATION AND PARKING LOT

The Preferred Alternative would include modifications to the existing West Side Avenue Station, including changes to the existing pedestrian bridge. The existing northern staircase to the station from West Side Avenue would be removed as a result of the modifications. Two new access points to the station from the east would be created.

2.2.1.2.1 Station Modifications

As noted earlier, the existing pedestrian bridge over West Side Avenue and the existing elevator tower that connects that bridge to the parking lot below would be demolished so that the HBLR tracks can be extended westward in their place. Between the new tracks, a new walkway would extend westward from the existing platform across West Side Avenue to a new elevator tower that is located closer to the centerline between the tracks than the current elevator. A stair would also be provided at this location (see **Figure 2-3**).

On the east side of West Side Avenue, the existing stairs connecting the sidewalk to the platform would be moved and reconfigured to accommodate the viaduct and track extensions. These stairs currently ascend to a plaza at the west end of the tracks that provides access to the station platform. Since the station is currently the terminus of service, pedestrians do not need to cross the tracks to walk from the plaza to the platform. However, when the tracks are extended, a pedestrian crossing across the tracks would be necessary, similar to the pedestrian

crossings that exist at other HBLR stations. At this level of design, it is assumed that in the reconfigured station, one stair south of the alignment 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. A new ramp would be added adjacent to the reconfigured southern staircase to provide access under the Americans with Disabilities Act (ADA).

In addition to these changes, the station would also be modified to improve access from the east. This modification was suggested during a public open house conducted during the Alternatives Analysis phase of the Proposed Project. Today, customers coming from the east must walk past the station via local streets to West Side Avenue, which is west of the station. To eliminate the additional distance this creates, an additional access point would be created via a 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 **Figure 2-3**). The ramp would comply with the Americans with Disabilities Act (ADA).

The ramp would require the modification or removal of a series of structural supports that are currently adjacent to the tracks that remain from the former CNJ right-of-way. In addition, dumpsters used by the adjacent building (the Board of Education building on West Side Avenue) would be moved to the north and screened with a fence and gate.

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

2.2.1.2.2 Parking Lot Modifications

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.

2.2.1.3 NEW BAYFRONT STATION

Under the Preferred Alternative, one new station, the Bayfront Station, would be constructed west of Route 440 and would serve as the new HBLR terminal station. The station would be along the north side of the Bayfront development's northern street (see **Figure 2-7**).

The new Bayfront Station would be a center-island station with a platform width of 20.5 feet. To accommodate passenger flows anticipated at this time, stairs would be located at each end of the platform and an elevator would be located at one end. During subsequent design phases, the anticipated arrival and departure patterns of passengers will be studied in detail. If these studies determine that a stairway in the center of the platform is needed to accommodate passengers and/or to meet emergency egress requirements, then the conceptual design would be modified accordingly.

The stairwells would be enclosed for weather protection. 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. As with other elements of the station development process, these access considerations will require ongoing coordination with the Bayfront team.

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.

While the existing HBLR West Side Avenue Branch operates with two-car consists, the Bayfront Station would be constructed to allow for three-car consists, to accommodate a potential future to consist length on the branch.

A new electrical substation may be required for the operation of Bayfront Station; the need for the substation would be determined as the design of the Preferred Alternative progresses. The substation would be constructed within the footprint of Bayfront Station.

2.2.2 PROPERTY INTERESTS

An interest in three properties will be required for the proposed new right-of-way of the Preferred Alternative:

- An area extending southwesterly through the Fry's Metals/Cookson Electronics/Alpha Metals property east of Route 440 (referred to throughout this EA as the Cookson Electronics site), located in a portion of the study area bounded by Mallory Avenue, Culver Avenue, Route 440, and Claremont Avenue. This property is privately owned.
- A small area within the southeast corner of Hudson Nissan parking lot, west of Route 440. This property is privately owned.
- An area extending westerly across the northern boundary of the Bayfront development. This property is currently owned partly by the City of Jersey City and partly by Honeywell Inc., but is all designated for redevelopment as part of the Bayfront project.

The right-of-way would also extend across the West Side Avenue Station parking lot, which is owned by NJ TRANSIT, and over public streets.

2.2.3 OPERATIONS

With the Preferred Alternative, all West Side Avenue Branch service would operate to the new terminus at Bayfront Station. Trains would turn around at Bayfront Station, rather than at West Side Avenue Station as they do today. West Side Avenue Station would become a through station on the branch.

No changes to the schedule or other operations of the HBLR West Side Avenue Branch are proposed as part of the Preferred Alternative, other than small changes to peak-hour headways to accommodate the longer route.

The round trip between West Side Avenue Station and Bayfront Station would be approximately eight minutes, including layover time at the new terminal and with a running time of one minute 30 seconds between stations. 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.

2.2.4 COST

Based on the conceptual design completed to date, the estimated cost to construct the Preferred Alternative, including final design, capital costs, property interests, environmental remediation, and contingencies, is \$213.9 million in 2017 dollars (the estimated mid-point year of construction). The estimated annual operating and maintenance cost of the extension is \$1.8 to \$2.0 million in 2019 dollars (the estimated opening year).

2.2.5 COMPLETION YEAR

The completion of the Preferred Alternative alignment and the new Bayfront station would be timed to coincide with the opening of the third phase of the Bayfront development, currently anticipated to be 2019, although this is subject to change.

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative the HBLR Route 440 Extension would not be constructed. Any planned and/or funded improvements, repairs, or maintenance on the existing HBLR system would still take place under the No Action Alternative. Although not funded or finalized, potential improvements could include a new HBLR station on the Bayonne branch to support the Canal Crossing Redevelopment Area, a new station in Jersey City near the Hoboken border between Hoboken Terminal and 2nd Street Station, and a new station in Hoboken between 9th Street-Congress Street and Lincoln Harbor Stations. None of these projects has been finalized, designed or funded but are included here for informational purposes only.

No alterations to the existing West Side Avenue Station would be required under the No Action Alternative and the station would continue to serve as the terminus of the West Side Avenue branch. Planned development at Bayfront and NJCU would be supported by the existing West Side Avenue station and other existing public transit. As with other portions of Jersey City, planned and existing development near the study area would continue to be accessible by other forms of transportation such as shuttle busses, private automobiles, taxis, and bicycles.

2.4 OTHER ALTERNATIVES CONSIDERED

Consistent with FTA requirements for its Major Capital Investment Program, NJ TRANSIT conducted an Alternatives Analysis (as summarized in the *Hudson-Bergen Light Rail Route 440 Extension Final Alternatives Analysis Report*, February 2011) to identify goals and objectives for the transit enhancement, evaluate potential alternatives, and select a Locally Preferred Alternative (LPA).

An initial long list of alternatives was developed that included a Transportation Systems Management (TSM) Alternative, as required by the FTA process, and light rail alignments that extended northward, southward, and westward from the West Side Avenue Station to the Lincoln Park, Society Hill and Bayfront areas, respectively, of the western waterfront. The initial list was refined after analysis of traffic flows and operational issues on Route 440 indicated that alternatives that crossed this road at grade would be impractical and should be eliminated. The refined long list of alternatives also responded to public input by including an assessment of a new station located just east of Route 440.

The refined long list was narrowed based on the ability of each alternative to meet the project's goals. If an alternative did not at least partially meet all goals, it was eliminated from further consideration. This analysis eliminated all alternatives extending to the north and south (terminating near Lincoln Park or Society Hill) based on inconsistency with local planning efforts, potential harm to HBLR operations, and substantial property impacts. Thus, six alternatives were discarded, and a short list of alternatives was advanced for further study.

The four short list alternatives were as follows:

- The TSM Alternative, a shuttle bus service between the West Side Avenue Station and the western waterfront, with stops at Society Hill (an existing residential development), the NJCU West Campus, and Bayfront. Shuttles would meet the arrival and departure of each HBLR train at West Side Avenue Station.
- An alternative that extended the HBLR system from West Side Avenue Station westward on a viaduct to Bayfront with one station at Bayfront.
- An alternative that extended the HBLR system from West Side Avenue Station westward on a viaduct to Bayfront with two stations—one on the east side of Route 440 and one at Bayfront.
- An alternative that did not extend to the Bayfront site, with one new station, a new terminal station east of Route 440.

The evaluation of the short list of alternatives (comprising the TSM Alternative, and three alternatives with westward alignments) considered their consistency with the project's goals and with the objectives established for each goal. The alternative that was found to perform better than other alternatives and to fare more favorably with respect to the project goals was then recommended as the LPA. While the recommended LPA was found to be more costly than some of the other short list alternatives, it would directly serve Bayfront and attract substantially more new riders than most of the other short list alternatives. In addition, it would be most compatible with the HBLR operating plan of the light rail alternatives.

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An alternative was identified as a potential LPA by the Alternatives Analysis process and subsequently adopted by NJ TRANSIT as the LPA in May 2011 and by the North Jersey Transportation Planning Authority in September 2011. That LPA is the Preferred Alternative discussed above and evaluated in this EA. *