

2 DESCRIPTION OF PROJECT AND ALTERNATIVES CONSIDERED

This chapter summarizes the alternatives development process, the No-Build Alternative, and the Build Alternative considered for the project.

2.1 PROJECT OVERVIEW

The project comprises a new fourth track and improvements at the BWI Rail Station, an additional station platform and a new, replacement station building.

The project study area, shown in Figure 2.1-1, begins at the southern terminus of the Grove Interlocking (approximately a mile north of the Odenton MARC Station) in Anne Arundel County, MD, and continues northward to the Winans Interlocking (approximately a third of a mile south of the Halethorpe MARC Station) in Baltimore County, MD. The project corridor is approximately nine miles long.

2.1.1 Project Components

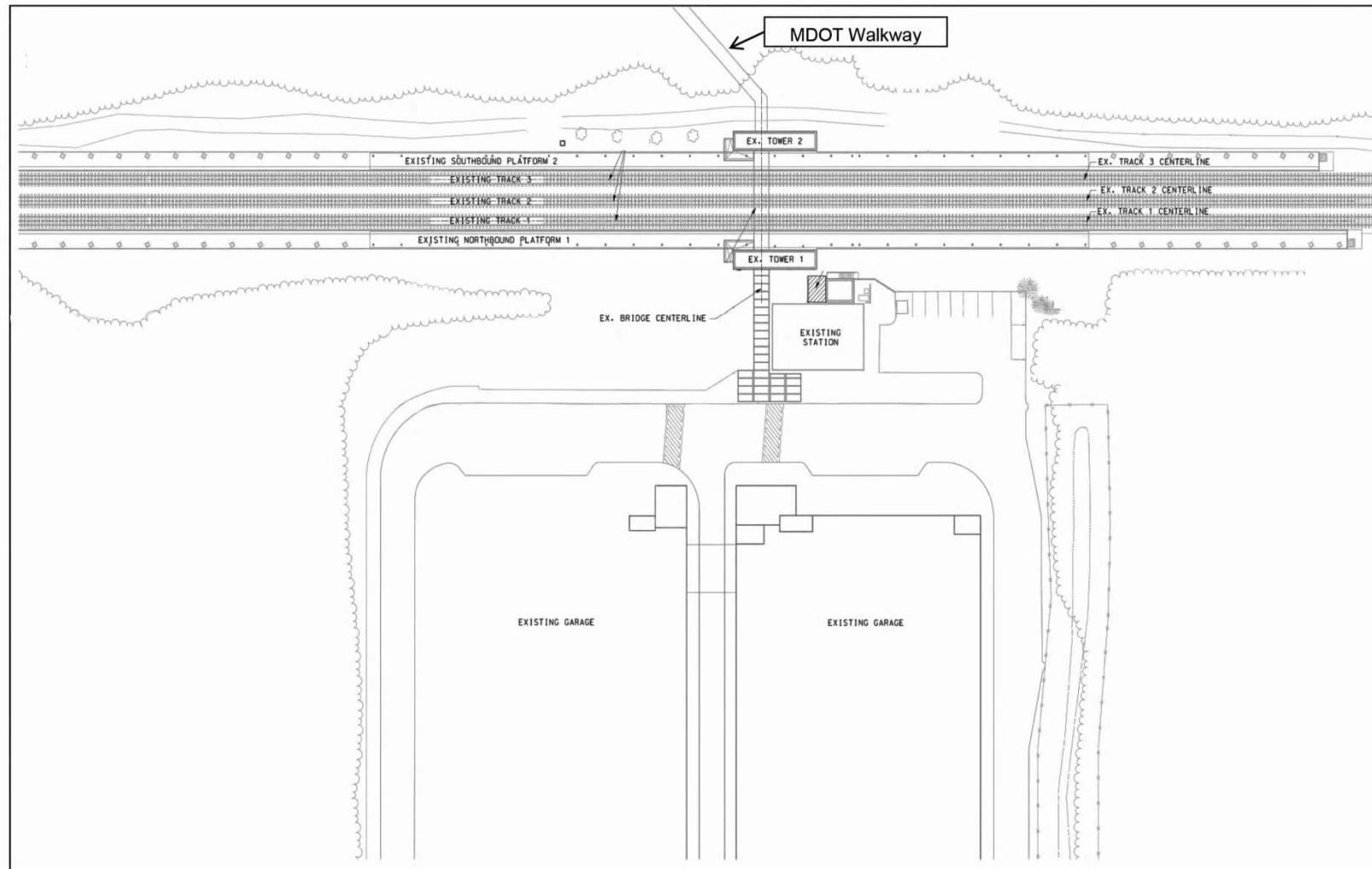
The project consists of three elements: the addition of a third station platform; the addition of nine miles of fourth track; and the replacement of the existing BWI Rail Station building. Figure 2.1-2 illustrates the existing platform, track and station elements at the BWI Rail Station.

The first element consists of adding nine miles of fourth track. The new fourth track through the station area would require reconfiguration of the existing tracks adjacent to the station platforms and to the north and south of the station. The new fourth track would extend from the Grove Interlocking (north of Odenton) to the Winans Interlocking (near Halethorpe).

When complete, this improvement would result in 14 miles of a four-track railroad, extending from the Grove Interlocking to the Bridge Interlocking south of the Baltimore and Potomac (B&P) Tunnel. In a separate project, Amtrak will improve the Bridge Interlocking with the addition of a new crossover track.

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FIGURE 2.1-2: TRACK DIAGRAM OF EXISTING BWI RAIL STATION CONFIGURATION



Not to scale

BWI Rail Station Improvements and Fourth Track Project



Existing Station and Platforms

The Bridge Interlocking controls train movements from the two-track B&P Tunnel to the four-track section of the NEC that already exists between Winans Interlocking and Bridge Interlocking.

The second element consists of adding a third platform at the station. Currently, the station has two platforms, which serve the two outside tracks. The project will add a new center platform such that each track will have an adjacent platform.

The third element consists of replacing the existing station building and associated structures with a larger station building and new structures, including an elevated concourse walkway. The new station facility would include an elevated, and more accommodating, concourse-level walkway and passenger waiting area. Stairs and elevators would connect these areas with the ground level of the facility, which would include ticketing, restrooms, and improved passenger amenities. All proposed improvements will be fully compliant with the Americans with Disabilities Act (ADA).

2.2 ALTERNATIVES DEVELOPMENT PROCESS

MTA, in consultation with FRA, began development of project alternatives at the conceptual level by assessing the most reasonable and feasible alignments for locating a fourth track. For the conceptual alternatives for the new fourth track, MTA considered two options west of the existing tracks and one option east of the existing tracks. MTA evaluated the options for their ability to meet the project purpose and need while also reducing environmental effects, right-of-way acquisition, structural constraints, and cost. MTA advanced the East Alignment alternative for the project corridor both north and south of the BWI Rail Station; however, MTA dropped the West Alignment alternatives from further consideration due to potential impacts to sensitive environmental resources. Appendix B of the *Alternatives Report*, which MTA released in June 2014, describes the process by which MTA developed and evaluated the various alternatives.

2.2.1 Conceptual Alternatives Considered

The BWI Rail Station area contains sensitive resources that influenced the designs for the new and relocated tracks and station platforms, station building, and supporting facilities. Therefore, MTA evaluated the BWI Rail Station area and the two miles of track nearest the station separately from the remaining track alignment alternatives. The goal was to determine the platform/station configurations that best met the purpose and need, operational and constructability considerations, and minimized resource impacts, to the greatest extent practicable. A review of five potential station concepts led to the determination that two concepts would meet the project purpose and need. These two concepts, the BWI East Option and the BWI West Option, advanced to preliminary engineering.

During preliminary engineering, MTA evaluated each of the BWI Rail Station alternatives regarding three key factors: its ability to meet the purpose and need of the project; relative

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operational benefits, passenger safety and constructability; and potential for environmental impacts. MTA combined each of the BWI Rail Station alternatives with the north and south segments of the East Alignment, beyond the BWI Rail Station area, to conduct a final corridor-wide comparison of the East Alignment-BWI East Option and the East Alignment-BWI West Option alternatives. Both alternatives effectively met the project purpose and need. However, due to its relative advantages in constructability, higher degree of station functionality during construction, fewer impacts to sensitive Wetlands of Special State Concern (WSSC) and streams, and lower cost, MTA recommended the East Alignment-BWI East Option for further evaluation. MTA coordinated the analysis of alternatives with regulatory and resource agencies and agency comments and concerns were an integral part of the choices MTA and FRA made in the development and advancement of the Build Alternative.

Avoidance and minimization of negative effects to environmental resources was a priority throughout both the conceptual and preliminary design phases. While the relatively fixed nature of the project corridor and rail design requirements prohibits the complete avoidance of resource impacts, minimization of impacts was a prominent factor in determining feasible alternatives, and a primary factor in identifying the Build Alternative. Table 2.2-1 summarizes the primary differences between these two alternatives.

TABLE 2.2-1: PRIMARY EVALUATION FACTORS FOR ALTERNATIVES¹

Evaluation Factors	East Alignment-BWI West Option	East Alignment-BWI East Option		
Purpose and Need				
Meets Purpose & Need	Yes	Yes		
Operational Considerations at Station				
Segregates modes of ground transportation	Partially	Yes		
Constructability/Construction Considerations at Station				
Temporary facilities would be required to maintain station activities during construction.	Yes	No		
Impacts to vehicular and pedestrian traffic flow during construction	High	Moderate		
Safety challenges during construction	More	Less		
Time anticipated for construction	More	Less		
Primary Natural Resources Affected				
Wetlands (acres)	Non-WSSC ²	WSSC	Non-WSSC	WSSC
Palustrine Emergent Wetlands	2.29	2.08	3.86	1.34
Palustrine Scrub Shrub Wetlands	0.02	0.00	0.03	0.00
Palustrine Emergent Wetlands	0.50	1.98	1.57	0.18
Subtotal	2.81	4.06	5.46	1.52
Grand Total	6.87		6.98	

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Evaluation Factors	East Alignment-BWI West Option	East Alignment-BWI East Option
Stream (linear feet)	5,510	4,647
Floodplain (acres)	18.70	19.62
Forests (acres)	17.39	17.30
Differences in Cultural Resources Potentially Affected		
Higgins Site	None	Overlap of boundary for ~ 800 feet
Other archeological sites ³	One	One
Costs		
Construction Costs ⁴ (Millions)	394.7	355.9
Program Costs ⁵ (Millions)	602.0	543.7

Notes: ¹ With the exception of purpose and need, this table reflects only those factors/resources that were different between alternatives and could be used to evaluate the relative advantages and disadvantages of the alternatives

²WSSC=Wetlands of Special State Concern as designated by the Code of Maryland Regulations

³The East Alignment-BWI West Option encroaches on archaeology Site 18AN1209 while the East Alignment-BWI East Option encroaches on Site 18AN621. For both sites, MTA based the estimated impacts on preliminary designs of drainage/stormwater conveyance facilities that will be refined in later design phases, and will consider avoidance of these sites.

⁴Construction costs include allocated contingency costs

⁵Includes construction, design, construction management, allocated & unallocated contingencies and escalation costs

MTA recommended the East Alignment-BWI East Option for further evaluation based on the following advantages:

- The East Alignment-BWI East Option increases overall wetland impacts by 0.11 acre, but reduces impacts to sensitive WSSC by 2.54 acres, making the East Alignment-BWI East Option more likely to receive regulatory authorizations in future phases of design. The regulatory agencies have indicated that the level of WSSC impacts anticipated under the East Alignment-BWI West Option would be unacceptable if other viable alternatives existed with less impact to WSSC.
- The East Alignment-BWI East Option affects fewer linear feet of stream channel (824 linear feet).
- The East Alignment-BWI East Option will be operationally safer during construction, as construction activities would occur further from the central activities of the existing station.
- The East Alignment-BWI East Option allows the existing station and pedestrian access to remain in operation during construction of the station facility, including the pedestrian bridge/walkway/patron waiting area.
- The East Alignment-BWI East Option improves traffic flow by separating taxis, kiss & ride and buses, and including bus lanes, busbays and a relocated taxi queue.

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- The East Alignment-BWI East Option's station facility construction avoids the existing facility as modifications are not required to the parking garage and construction will not be required above existing Amtrak Way, the access road to the station, and above the existing station facility. The construction should be more straightforward and phasing of the work would require fewer steps, less time, and less cost to construct the station while maintaining station operations.
- The East Alignment-BWI East Option's kiss & ride, bus lanes and busbays eliminate the need for bus and kiss & ride patrons to cross Amtrak Way, which increases safety.
- The East Alignment-BWI East Option has lower construction costs and program costs.
- The East Alignment-BWI East Option reduces potential impacts to the Higgins Site since the area of interaction occurs on the extreme western edge of the archeological site. Recent testing of the Higgins Site found only two intact (non-disturbed) soil profiles that are just beyond the project limits of disturbance (LOD). Discussions with the MHT indicate that, with continued coordination and avoidance and minimization measures, this alternative would be acceptable.

Based on the reasons above, this EA further evaluates the East Alignment-BWI East Option and the No-Build Alternative. MTA eliminated the East Alignment-BWI West Option from further consideration.

2.2.2 No-Build Alternative

The No-Build Alternative represents the conditions in the future (year 2020) without the project in place.

Three Tracks

The segment of the NEC between Grove Interlocking and Winans Interlocking consists of three tracks, and then expands to four tracks north of Winans Interlocking. Of the three tracks serving the BWI Rail Station, only the two outside tracks have platforms. The existing track layout lies west of the station with three tracks numbered, from east to west, as 1, 2, and 3. An electrified overhead catenary system serves all three tracks.

Access roads are present intermittently along the existing tracks to provide maintenance crews access to signals, structures, and other features located within the project corridor. Existing maintenance access roads within the NEC right-of-way have varying degrees of condition with some paved and some made up of compacted ballast.

The No-Build Alternative would not construct new track in the project corridor. The physical conditions of the three-track configuration in this section would resemble current conditions, as ongoing standard maintenance would continue to ensure compliance with safety standards. With the No-Build Alternative, congestion would continue in this segment of the NEC. Operational constraints would continue to impair trip times for MARC and Amtrak passengers. MARC passengers would experience longer delays, as Amtrak trains

take precedence in movement and boardings/alightings at the BWI Rail Station. Lack of a fourth track would continue to restrain the operational flexibility of train movements in the project corridor, and delays associated with service deviations and maintenance operations will continue. Further, with the No-Build Alternative, northbound Acela Express trains will continue to require a switching movement to access the northbound BWI Rail Station platform. The diversion of trains from the middle Track 2 to Track 1 to access platforms will add as much as two to three minutes to the current travel time.

Two Platforms

The station platforms extend along Tracks 1 and 3, while Track 2 passes through the middle and is not accessible from either platform (see Figure 2.2-1). The existing southbound platform (Platform 2) is approximately 12 feet wide and 1,030 feet long. The existing northbound platform (Platform 1) is approximately 12 feet wide and 1,050 feet long.

The No-Build Alternative includes no additional improvements, beyond those current improvement projects to the platforms at BWI Rail Station, or platform accessibility to Track 2.

BWI Rail Station Building

The existing BWI Rail Station building is a small, square building clad in scored concrete panels. The existing building is 43 feet wide and 63 feet long, and is oriented lengthwise to the tracks. An existing pedestrian bridge connects the station to the platforms and the elevated Corporate Center Drive Pedestrian Walkway, located just south of the BWI Rail Station, connects the station to the office development to the west. The Corporate Center Drive Pedestrian Walkway crosses designated WSSC.

With the No-Build Alternative, the existing BWI Rail Station would have no improvements in passenger accommodation or amenities. The existing station building has a small, outdated waiting area and a limited concession area. Ticket lines often extend out the door of the building. For pedestrians moving between the station building and the platforms, the heavy congestion currently experienced by rail passengers (many of whom have luggage) will continue.

2.2.3 Build Alternative

The Build Alternative represents the conditions in the future (year 2020), with the project in place, approximately five years after completion of the NEPA process. The Build Alternative was established from the analysis described earlier in this chapter and is presented in more detail in the June 2014 *Alternatives Report* (see Appendix B).

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FIGURE 2.2-1: VIEWS OF EXISTING STATION AND PLATFORMS



Looking North



Looking South

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Views of Existing Station and Platforms

New Fourth Track

The Build Alternative includes approximately nine miles of additional track (fourth track) between Grove Interlocking (MP 112.4) and Winans Interlocking (MP 103.4) to facilitate train operations and minimize delays along this segment of the NEC (see Figure 2.2-2). The new track would extend from Grove Interlocking in the south, through BWI Rail Station, where all four tracks would have direct platform access, and would extend north and tie into existing segments of fourth track north of Winans Interlocking.

The Build Alternative places the fourth track within the existing NEC and minimizes the amount of right-of-way needed for construction within the project corridor. In addition, the Build Alternative places the fourth track on the east side of the project corridor in a location with available space within the existing embankment. The proposed fourth track, Track A, would be immediately east of existing Track 1.

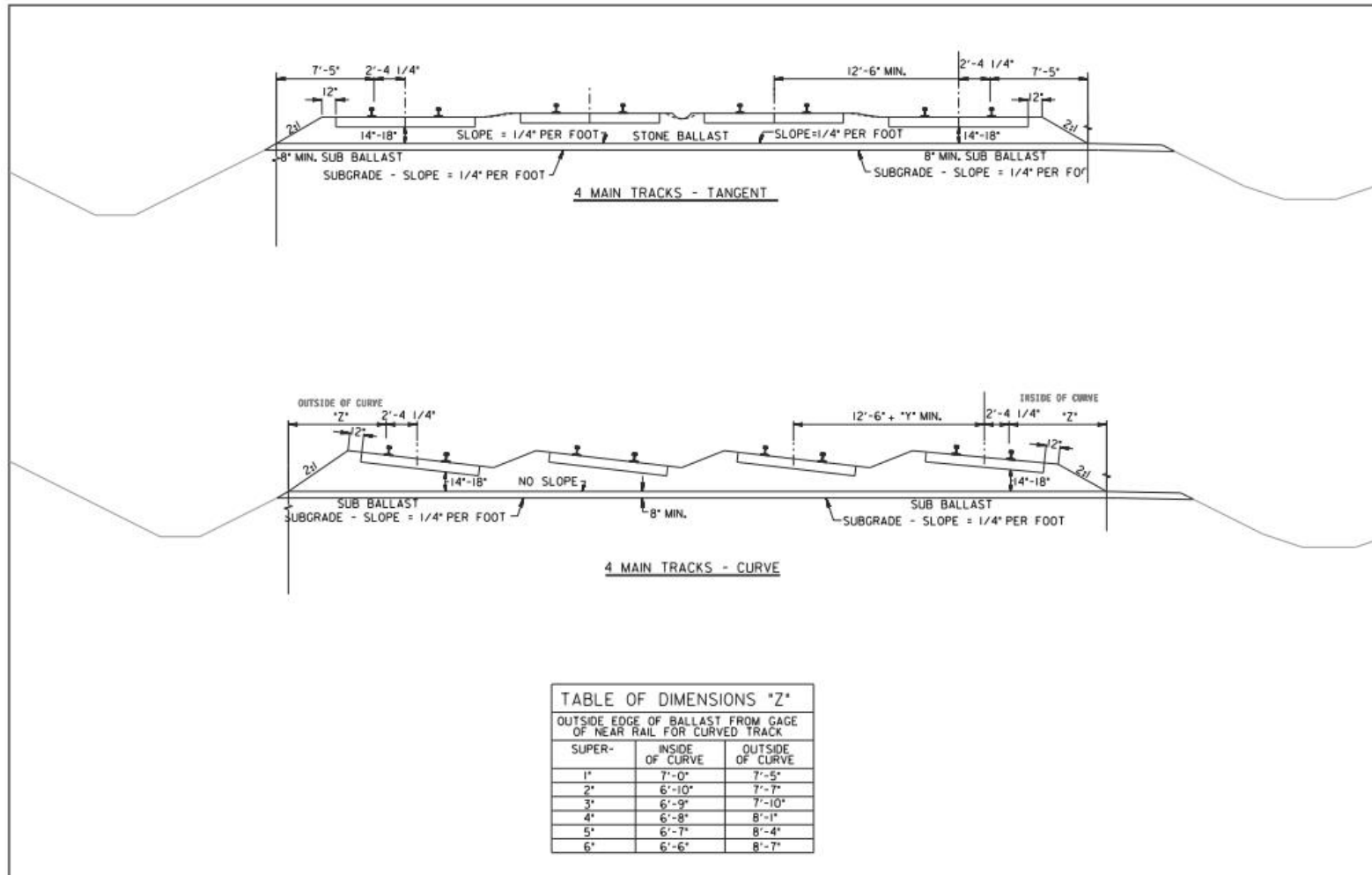
In the station area, between MP 105.4 and MP 107.0, the Build Alternative would widen the existing trackbed by approximately 40 feet to accommodate the new station platforms and relocated station tracks. Within this same area, existing Track 3 would remain in its current location along the southbound platform (Platform 3); existing Track 2 would have a minor shift; a new Track 1 would be built on the east side of the new 24-foot-wide center island platform (Platform 2); and a new Track A would be built further east adjacent to a new northbound platform (Platform 1). Overall, as the proposed rail alignment goes through BWI Rail Station, the trackbed widens and shifts to the east to permit the additional and relocated tracks, and additional and expanded platforms at the station.

As the existing four tracks north of Winans Interlocking would connect to the proposed four tracks constructed south of Winans Interlocking, modifications to the existing signal and communications system between Grove Interlocking and Bridge Interlocking would be necessary, including the removal of Winans Interlocking. Grove Interlocking would require reconfiguration to allow for the shift in track from the existing three tracks south of Grove Interlocking to the existing three tracks and the new fourth track (Track A) north of Grove Interlocking. The new Track A would require a new overhead catenary system for Track A including modification or replacement of existing catenary structures, where required. The proposed fourth track and overall track improvements would require:

- Major modifications to four railroad structures
- Replacement of one single-span highway structure with a longer structure
- Modifications to 17 drainage structures/pipe crossings to accommodate the new track/access road

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FIGURE 2.2-2: TYPICAL NEC SECTION WITH FOURTH TRACK



Not to scale

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Typical NEC Section with Fourth Track

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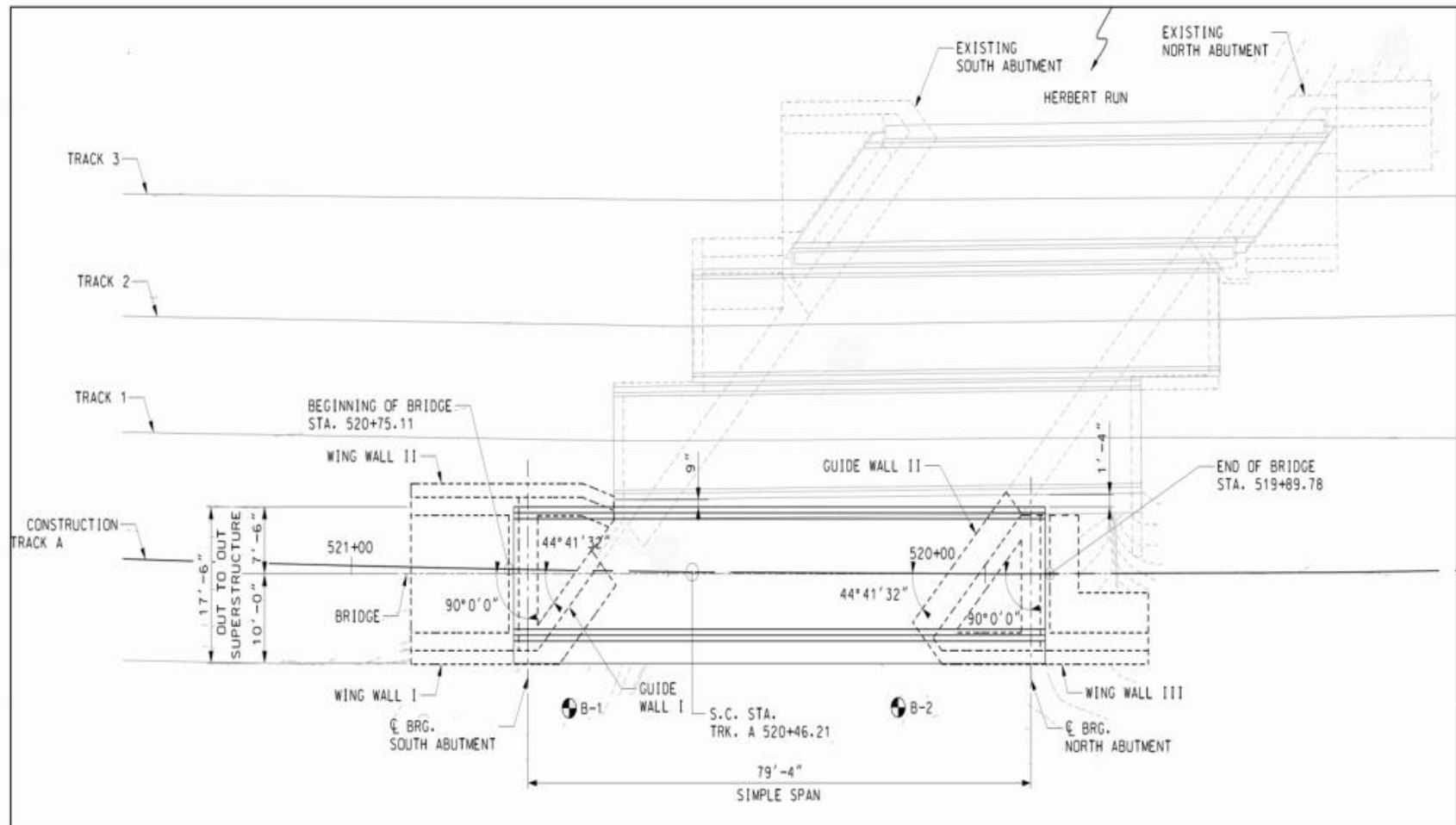
The four railroad structures that require major modifications to accommodate the fourth track are:

- The Herbert Run Bridge (MP 103.52)
- The Patapsco River Bridge (MP 104.36)
- The Furnace Road Bridge (MP 104.88)
- A pedestrian underpass (MP 110.12)

The railroad bridge crossings over Herbert Run and the Patapsco River would require the construction of independent parallel structures supported by new abutments to carry the proposed Track A on an alignment relatively parallel to the existing bridge structures. The overall length of the proposed structure over Herbert Run is approximately 68 feet. The Build Alternative would construct the proposed structure adjacent to the west side of the existing three-track bridge, but it would remain structurally separate (see Figure 2.2-3). The overall length of the proposed structure over the Patapsco River is approximately 560 feet. The proposed structure would consist of an eight-span, single-track, ballasted deck structure located to the east of the existing three-track bridge with approximately 18 feet of clearance at the southern end of the existing three-track bridge transitioning to nine feet at the northern end (see Figure 2.2-4).

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FIGURE 2.2-3: HERBERT RUN RAILROAD BRIDGE



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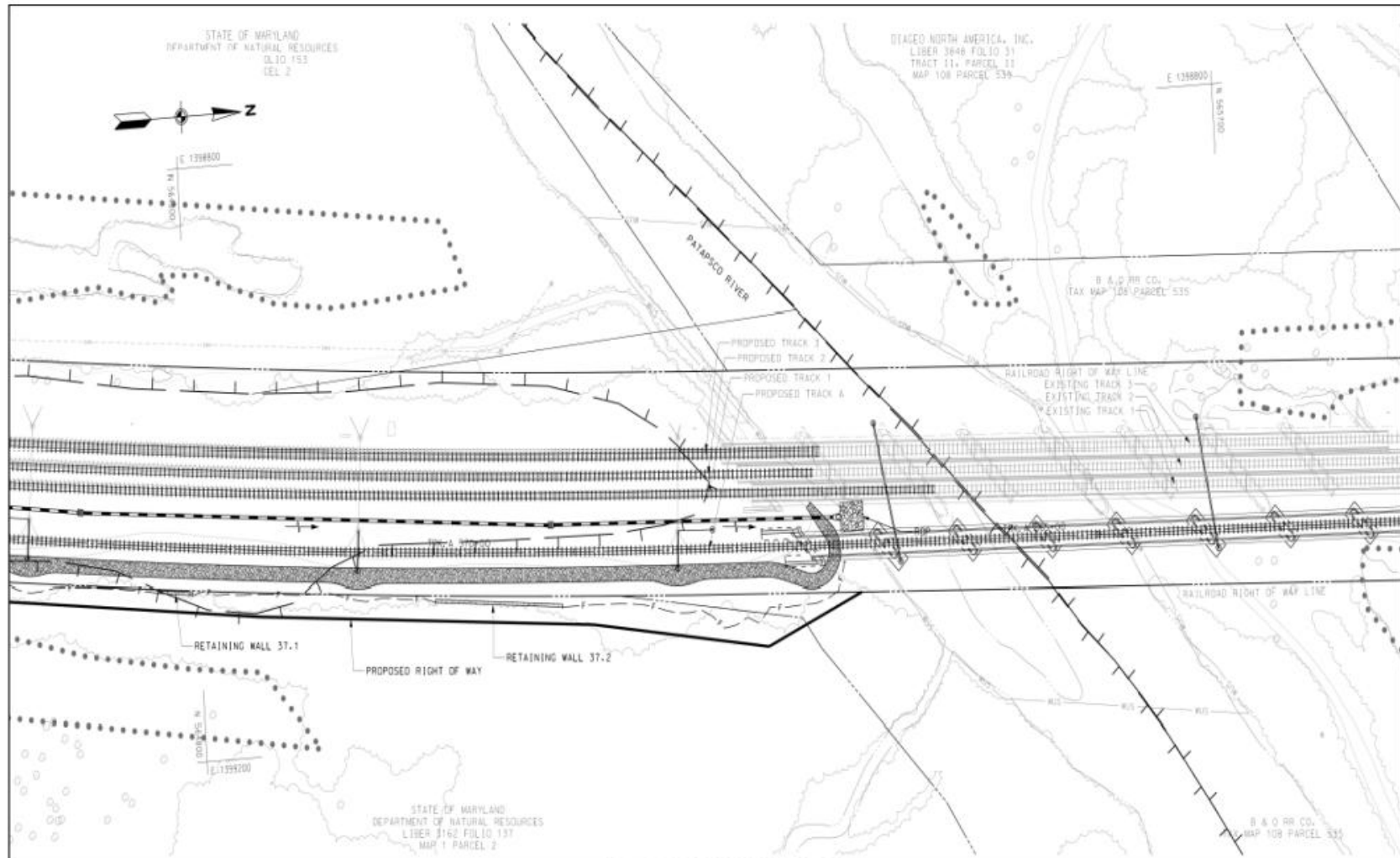
Not to scale



Herbert Run Bridge

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FIGURE 2.2-4: PATAPSCO RIVER RAILROAD BRIDGE



Not to scale

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Patapsco River Bridge

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To accommodate the proposed fourth track, the Furnace Road Bridge would require an expansion of approximately 15 feet on the west side of the existing structure. The Build Alternative would construct the proposed structure adjacent to the existing three-track bridge; however, a longitudinal joint would keep the proposed structure separated from the existing bridge. The existing 68-foot pedestrian underpass at MP 110.12 would require an extension of approximately 37 feet on the east side to accommodate the proposed fourth track.

The existing single-span Reece Road Bridge will not accommodate the proposed additional track underneath and does not provide adequate clearance under the bridge to provide for an alignment that meets the design velocity required for the curve under the bridge (110 miles per hour for Amtrak and MARC trains). As a result, the construction of a new overpass bridge to replace the demolished Reece Road Bridge at MP 110.30 is required. The project would construct a new, approximately 96-foot-long structure to replace the existing Reece Road Bridge in order to accommodate the proposed fourth track and higher train speeds (see Figure 2.2-5).

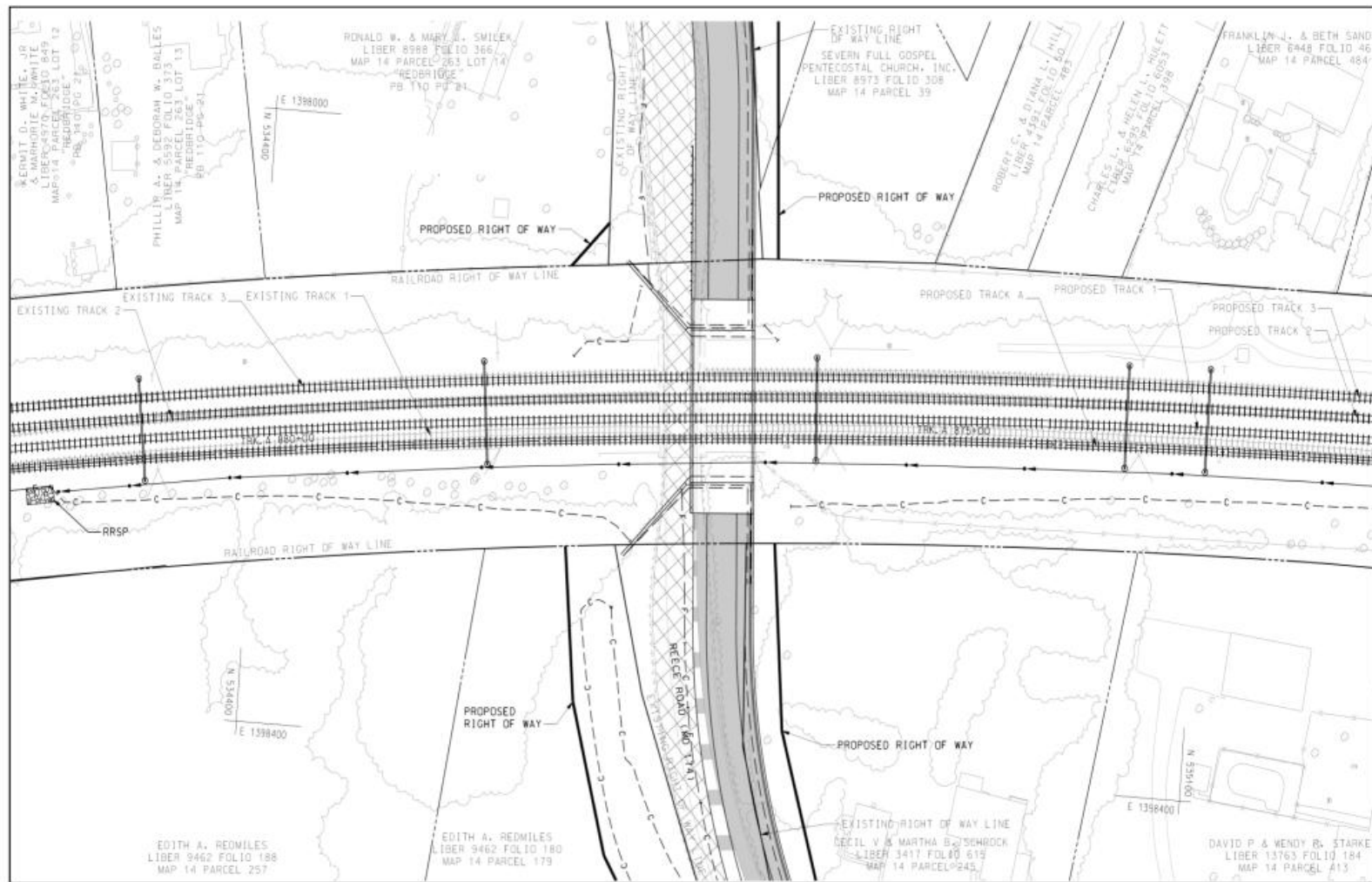
In locations where the proposed Track A alignment would impact existing access roads, the design for the Build Alternative includes replacement access roads, where space is available, or identifies alternative access methods. The design for the Build Alternative locates the majority of the replacement access roads directly adjacent to proposed Track A. The access roads would be 10 feet wide and would be made of compacted aggregate/ballast material.

All catenary modifications would accommodate a possible future NEC catenary upgrade to constant tension design. Modifications to signaling operations, signaling structures, and other facilities to support rail operations would accommodate the fourth track. Based on conceptual engineering, the existing right-of-way can accommodate all improvements and would require only limited right-of-way acquisition. In addition to the fourth track, the design for the Build Alternative includes space for a gauntlet track to accommodate freight movements.

The Build Alternative includes stormwater management features in accordance with Maryland Department of the Environment (MDE) requirements. Since MDE stormwater management requirements for an existing ballasted corridor are still evolving, MTA will likely need to revisit the MDE requirements during final design.

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FIGURE 2.2-5: REECE ROAD HIGHWAY BRIDGE



Not to scale



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Reece Road Bridge

Three-Platform Configuration

The Build Alternative includes modifications to platforms at the BWI Rail Station that would provide passenger access to all four tracks through construction of a three-platform configuration with a double-wide center platform (see Figure 2.2-6). To accomplish this, the structural design of the platforms would include a new, approximately 12-foot-wide and 1,050-foot-long, northbound platform (Platform 1) located east of the existing station. It would include widening a portion of the existing platform (Platform 2) and installing a full-width section (approximately 24 feet) of platform to accommodate a center platform with a total length of approximately 1,050 feet. The design would partially expand the existing 1,030-foot southbound platform (Platform 3) to the west to accommodate the new stairs and escalators on this platform, which would mirror the new northbound Platform 1.

The outer platforms (Platforms 1 and 3) would each serve one track and the inner platform (Platform 2) would serve two tracks – one on each side of the platform:

- Platform 1 (closest to the station) would serve northbound traffic on new Track A
- Platform 2 (middle platform) would serve traffic on new Tracks 1 and 2
- Platform 3 (furthest from the station) would serve southbound traffic on new Track 3

The Build Alternative would provide each platform (with canopy) with two stairs, two elevators, and two escalators. The platforms would connect to the new concourse level 100-foot-wide combination pedestrian bridge and passenger waiting area structure located over the NEC tracks placed approximately 23 feet above the platforms. The BWI Rail Station area would connect directly to the wider, more passenger-friendly pedestrian bridge and passenger waiting area serving the station and platforms.

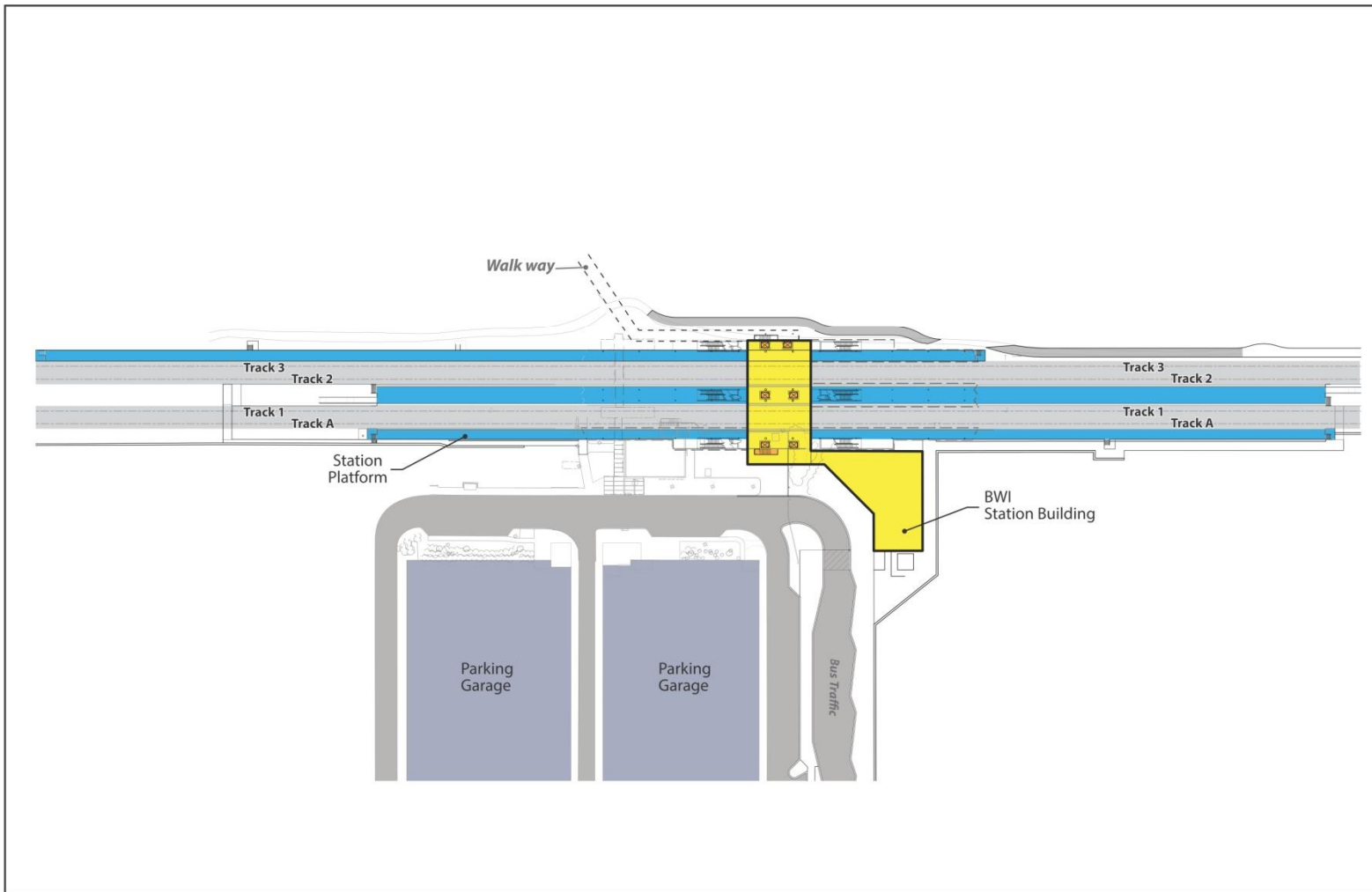
New BWI Rail Station Building

The Build Alternative would replace the existing BWI Rail Station building with a new structure just to the north but contiguous to the current station/garage complex (refer to Figure 2.2-6). The new station facility would accommodate the addition of the proposed fourth track, the existing three tracks, and the new platform arrangement at the BWI Rail Station.

The new station facility would include an elevated, and more accommodating, concourse-level pedestrian bridge and passenger waiting area. Stairs and elevators would connect these areas with the ground-level portion of the facility, which would include ticketing, restrooms, and improved passenger amenities. All proposed work would be fully ADA-compliant.

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FIGURE 2.2-6: PLAN VIEW OF PROPOSED STATION



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Not to scale

Plan View of Proposed Station

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The new bus lanes and busbays and expanded kiss & ride would provide safe and convenient passenger drop-off/pick-up at the facility. The new BWI Rail Station would reflect modern design standards and meet the Leadership in Energy and Environmental Design (LEED) Silver Level.

New vertical circulation elements including stairs, escalators, and elevators would connect the larger and more passenger-friendly concourse level pedestrian bridge and passenger waiting area structure to all platforms providing for ADA-compliant passenger circulation.

2.3 CONSTRUCTION PHASING (BUILD ALTERNATIVE)

A major design objective of the project was to implement a cost-effective approach that allowed construction activities to proceed in a timely manner, while minimizing negative impacts on railroad operations, minimizing environmental impacts, and maintaining vertical and horizontal clearances along the NEC.

A major consideration of the design approach for the project was maintenance of Amtrak and MARC services during construction. As required, the Build Alternative maintains Amtrak and MARC services. In addition, Amtrak has specified that at least two tracks must remain operational at all times for Amtrak's intercity passenger rail service through the project limits and each of the two tracks must have an operational platform at the BWI Rail Station. As such, construction sequencing and scheduling depends on the impacts the construction will have on Amtrak and MARC services and Amtrak's access to the requisite number of tracks and platforms. Overall construction time to fully implement the facilities and train control systems would be approximately 42 months.

Construction access from outside the NEC onto Amtrak right-of-way will primarily use existing Amtrak maintenance access locations. See Appendix C for more details regarding construction phasing.