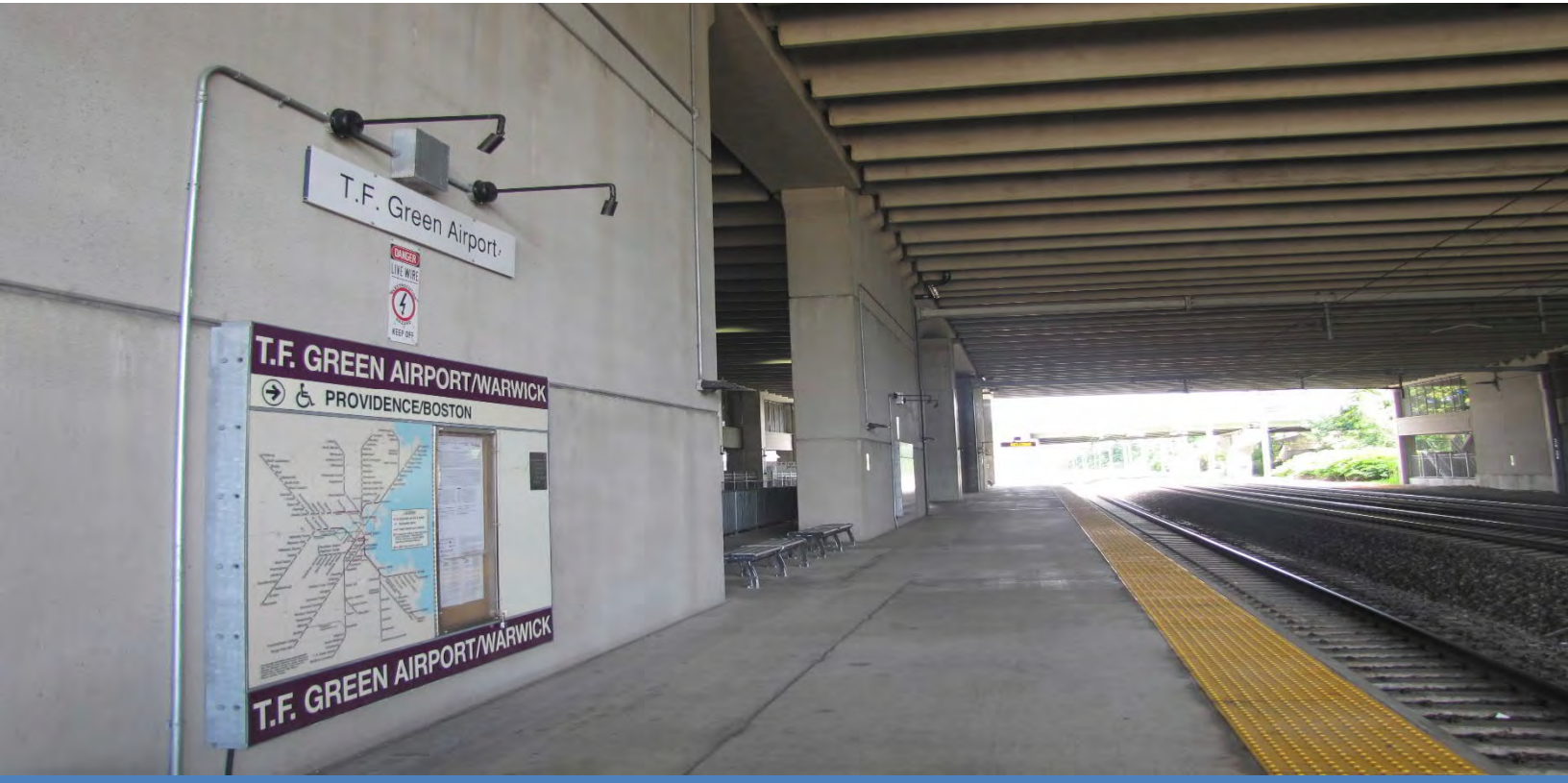


Attachment #4

Intercity Rail Passenger Service at T.F. Green Airport Station: Concept Report

10% Design Concept Report

May 21, 2020

Table of Contents

I. Executive Summary I-1

II. Introduction II-4

A. Purpose II-4

B. Proposed Alternates II-4

C. Key Design Considerations II-5

III. Station and Platform Architecture III-6

A. Existing Conditions III-6

B. Design Criteria III-6

A. Proposed Design III-8

1. Platforms III-8

a. Track 3 Passenger Platform III-8

b. Track 4 Passenger Platform III-8

2. Passenger Waiting Area / Vertical Circulation III-8

a. Option A III-9

b. Option B III-10

B. NFPA Criteria III-11

1. Occupant Load III-11

2. Egress Requirements III-12

3. Wayfinding III-14

C. Alternate Recommendation III-14

IV. Track IV-15

A. Existing Conditions IV-15

B. Track Design Criteria IV-16

1. Design Exception Requests IV-18

2. Design Exception Mitigations IV-19

C. Proposed Design IV-19

1. Design Requirements IV-19

D. Design Alternates IV-20

1. Alternate 1 ..... IV-21

2. Alternate 4 ..... IV-22

3. Alternate Comparison Matrix IV-23

E. Interlocking Systems IV-23

1. "Packard" Interlocking Extension (MP 175) – Alternate 1 Only IV-24

2. "Packard" Interlocking Extension (MP 175) – Alternate 4 Only IV-24

3. "Barden" Interlocking (MP 177) IV-24

5. "Cranston" Interlocking (MP 181) IV-25

F. Track 3 Lowering for Electrification IV-25

G. Track 4 Pocket Length IV-26

H. Alternate Recommendation IV-27

V. OCS V-28

A. General Existing Conditions V-28

B. Design Criteria V-28
1. Civil/Structural Elements V-28
C. Other System Elements....V-32
D. Alternate Recommendation V-33
VI. Signaling VI-34
A. "Packard" Interlocking – MP 175.0....VI-34
B. "Post" Interlocking – MP 178.5....VI-35
C. "Barden" Interlocking (Proposed)....VI-36
D. "Cranston" Interlocking (MP 181.2)....VI-36
E. Braking & Acceleration Distances....VI-37
F. Alternate Recommendation VI-37
VII. Structures VII-38
A. Overall Approach to Clearance....VII-38
B. Structure Protection....VII-38
C. Overhead Structures VII-39
1. Main Avenue Overhead Bridge....VII-39
a. Existing Conditions....VII-39
b. Proposed Condition....VII-39
2. T.F. Green Airport Connector Road Overhead Bridge....VII-40
a. Existing Conditions....VII-40
b. Proposed Design....VII-40
3. T.F. Green Parking Structure....VII-41
a. Existing Conditions....VII-41
b. Proposed Design....VII-42
4. Coronado Road Overhead Bridge....VII-42
a. Existing Conditions....VII-42
b. Proposed Design....VII-43
5. Route 37 Northbound and Southbound Overhead Bridges....VII-44
a. Existing Conditions....VII-44
b. Proposed Design....VII-44
D. Alternate Recommendation VII-45
VIII. Civil VIII-46
A. Right of Way Security Fencing....VIII-46
B. Drainage VIII-46
C. Utilities VIII-46
D. Excavation VIII-47
E. Alternate Recommendation VIII-48
IX. Environmental Assessment IX-49
A. Previous Studies IX-49
B. Comparison of Original EA to Current Design IX-49
C. Conclusion and Next Steps....IX-50
X. Constructability X-51

A. Site Access & Contractor Work Areas X-51
B. Construction Phasing X-51
1. Phase 1 ..... X-52
2. Phase 2 ..... X-53
3. Phase 3 ..... X-53
4. Phase 4 ..... X-54
5. Phase 5 ..... X-54
C. Schedule X-55
D. Cost Estimate X-57
1. Track Lowering at Route 37 (no Bridge Reconstruction) X-58
2. Route 37 Reconstruction X-58
3. Alternate Recommendation X-59
XI. Recommendations XI-60
Project Alternates Comparison XI-61

Appendices

Appendix I **NEPA PLANNING ASSESSMENT**
Appendix II **PLANS**
Appendix III **STAGING DIAGRAMS**
Appendix IV **PROJECT SCHEDULE**
Appendix V **CONSTRUCTION COST ESTIMATE**
Appendix VI **80-mph DIVERGE CONCEPT**

I. Executive Summary

In May of 2019, Amtrak in conjunction with Rhode Island Department of Transportation (RIDOT) and T.F. Green Airport (RIAC) secured the services of AECOM to:

- Develop to a conceptual (10%) level of design to add a fourth track and second platform to the existing T. F. Green Commuter Rail Station in Warwick, Rhode Island to expand the service of the intermodal station to include intercity Amtrak Northeast Regional Services.
- Develop an order of magnitude cost estimate and schedule
- Evaluate the existing 1999 Environmental Assessment and subsequent reevaluations and provide recommendations on the next steps that may be required to ensure environmental compliance.

This proposed station expansion requires upgrades to the existing station and infrastructure along the Northeast Corridor (NEC) tracks for approximately 6.2 miles between existing Interlockings at "Packard" and "Cranston." Additionally, interlocking work will be performed at the existing Cranston Interlocking.

The existing T.F. Green Station provides a vital commuter rail to air link for the region. The station consists of a single platform along non-electrified Track 3 served by only MBTA diesel powered consists. It links the T.F. Green Airport/Skywalk and the overbuild parking garage to rail transit for the Providence/Boston corridor. In order to accommodate Amtrak Northeast Regional service to the station, the following improvements are required:

- An "Eastbound" Platform needs to be constructed for stops by Amtrak Northeast Regional Service. As part of this new platform construction a new dedicated electrified Track 4 station track must be constructed to reduce/minimize operational impacts to Amtrak Northeast Regional Service, MBTA Service and Acela (express) services which would be caused by station stops for TF Green on NEC Track 2.
- The existing "Westbound" Platform must be extended to meet Amtrak minimum platform lengths.
- Track 3 must be electrified from "Packard" Interlocking to "Post" interlocking.
- Track 3 and 4 geometry must be realigned to accommodate a Maximum Authorized Speed (MAS) of 80-mph.

The infrastructure improvements identified above present challenges when designing the various aspects to meet current Amtrak Standards and industry best practices. Many of the current conditions in the corridor are either substandard or not desirable, necessitating improvements to permit operations to a new TF Green Station. These improvements include lateral track clearances between existing NEC tracks, the lateral and overhead clearances to overhead bridge structures, the arrangement and type of special trackwork in the bounding interlockings, significant upgrades to the Communications and Signal system, and the expansion and modification of the Overhead Contact System (OCS).

Four (4) initial conceptual alternates were developed for this project to address the infrastructure improvements required for the expansion of the station service. In the development of these alternates, it became apparent that the critical criteria for the project was the lateral track clearances to adjacent tracks, or "track centers".

<u>Alternate 1:</u> This alternate was created as a baseline alternate, where all geometric criterion for the track were met. This alternate created significant impacts to existing overhead structures along the project corridor, specifically Coronado Road and the T.F. Green Parking Structure. The required reconstruction of these structures, while technically possible, are quite costly and rendered this alternate undesirable.

<u>Alternates 2 and 3:</u> These alternates were developed as modifications to Alternate 1, which sought exceptions mainly to track center criteria, but fell short of mitigating the structural impacts listed above or improving upon the existing substandard track centers. These alternates have been eliminated from further analysis.

Alternate 4: This alternate eliminated the majority of structural impacts by shifting the locations of the Track 4 tie-ins and improved upon existing track centers by proposing minimum track centers in excess of existing conditions. While this proposed condition would not be in accordance with the current standards, this alternative would be the most desirable from an engineering perspective.

For the purposes of this Concept Report, Alternates 1 and 4 were progressed in the alternatives analysis process to evaluate constructability, identify staging constraints, schedule, and costs. This analysis is presented in this report.

Upon analyzing Alternate 1 and 4, it was determined both alternates are constructible; however Alternate 1 may require significant structural modifications to the TF Green Airport Parking garage to accommodate 16'+/- track centers, as well as significant capital costs to reconstruct Coronado Road overhead bridge. For this reason, Alternate 1 while feasible is not desirable as it would be more costly and require additional planning and coordination with RIDOT.

Furthermore, given that Alternate 4 is constructible and the most feasible according to the analysis contained within this report, AECOM recommends Alternate 4 as the preferred alternative. The following are key project elements that were evaluated as part of the conceptual design and should be fully analyzed in order to advance Alternate 4:

- Tracks 3 and 4 from "Packard" Interlocking to "Post" Interlocking must be electrified by a combination of portal and cantilever OCS structures.
- Track 3 electrification must provide for Plate J freight clearances, which requires either track lowering or overhead bridge modification or reconstruction.
- Relocation of approximately 4 miles of fiber optic cable
- Lighting of interlockings
- Structure reconstruction of Route 37 overhead bridges
- Acceptable limits of undercutting/track lowering
- Permissible track outages and potential single tracking
- Disposal of spoils on the railroad right-of-way or offsite.

The constructability of Alternate 4 looked at accessibility to the work site, limiting impact to railroad operations, identification of contractor work areas, staging of construction into 5 phases, and total schedule duration. The basis of the proposed schedule is the use of overnight and weekend work schedules and lowered productivity ratings in order to minimize impacts to railroad operations. The critical path for all work is based on track construction and OCS. This assumes a significant overlap in phases of construction, taking advantage of multiple crews working outages. It is estimated the duration of Alternative 4 starting with 30% design through construction would be 1432 days. A detailed schedule, including staging, is provided within this report.

The conceptual cost estimate of Alternative 4 considers the level of design done to this point and factoring in a contingency for the unknowns in the project. The following design elements were considered in the development of the conceptual cost estimate: track, station, OCS, right-of-way, structures, drainage, and communications and signals systems. While the quantities have varying amounts of conservatism, the unit prices used in the estimate are all based on experience in the industry and built-in contingencies. The estimate incorporates a 35% unallocated contingency, which AECOM feels is an appropriate at the current level of design. The cost estimate also assumes the total reconstruction of Route 37 overhead bridges as a major capital cost should statutory lateral clearances not be achieved due to the required track lowering and realignment. The conceptual cost of Alternative 4 is $247M.

In 1999, an Environmental Assessment was performed at the TF Green Station Site to evaluate the environmental impacts of the proposed station design at that time. The historic environmental documents applicable to the current proposed capital project, were reviewed as part of Concept Design. In review of these documents, AECOM has assessed the most probable requirements for either utilizing the previous study and any additional environmental work required. Twenty years (20) has passed since the original FONSI decision and its subsequent reevaluations, and the proposed scope of work exceeds the scope covered in the original study; therefore, a new environmental assessment would likely be required by the sponsoring Agency

In conclusion, based on the Alternates developed during the conceptual design, the most cost effective and potentially least disruptive (shortest duration) concept is Alternate 4. It should be noted here this Alternate requires Amtrak acceptance of several Design Exception Request (DER's) which include maintaining existing conditions which meet minimum statutory requirements for lateral and vertical clearances. Furthermore, in order to advance this alternate, an Environmental Assessment (EA) re-evaluation to fully meet Environmental Clearance prior to final design approval and construction would be required.

In order to fully confirm these findings, the recommended next steps for Amtrak and the all other project stakeholders are:

1. Perform a complete topographic survey of the project corridor, including survey to confirm lateral and vertical clearances under all existing overhead bridges structures.
2. Develop a project specific set of design criteria with a goal of compliance with Specification 63 and Amtrak's Stations & Facilities Guidelines.
3. Perform ridership and cost benefit analyses, i.e. revenue impacts
4. Establish engineering guidelines for all criteria which cannot be fully complied with due to physical constraints
5. Determine location of proposed crash walls
6. Evaluate the operational assumptions for track outages and other restrictions as part of the overall project constructability analysis.
7. Develop a disposal plan of all excavated spoils currently anticipated to remain on railroad property
8. Initiate environmental assessment and compliance process
9. Evaluate the project budget and verify potential funding sources.

II. Introduction

In 2017, Amtrak and Rhode Island Department of Transportation (RIDOT), along with the Federal Railroad Administration (FRA), developed the Feasibility Study for Intercity Rail Service to T.F. Green Airport (the T.F. Green Feasibility Report). This report evaluated several alternates to increase service to the T.F. Green Airport Station in Warwick RI, one of which involved the construction of an eastbound platform, a new electrified station track (Track 4) for use by Amtrak Northeast Regional service, and electrification of existing Track 3 which currently accommodates access for diesel consists only to the westbound side platform constructed in 2010 by RIDOT for MBTA service. In January 2019, Amtrak and RIDOT agreed to further analyze the costs associated with the design and construction of the infrastructure work needed at the T.F. Green Airport Station to provide electrified Amtrak service both east- and westbound platforms. RIDOT seeks to maximize investments in the Northeast Corridor (NEC) for passenger rail purposes at T.F. Green Airport as it is one of the most direct air-to-rail intermodal connections in the country.

Following the initial feasibility study for an Amtrak Station at TF Green Airport in 2017, as part of the 2019 Consolidated Rail Infrastructure and Safety Improvements (CRISI) grants the Federal Railroad Administration (FRA) has issued a $2.8 million CRISI grant to push forward plans for an Amtrak connection at the T.F. Green International Airport.

In May 2019, Amtrak with stakeholders RIDOT and RIAC secured the services of AECOM to develop a 10% or conceptual level of design, develop a rough order of magnitude cost estimate in order to inform funding efforts, and review the historical National Environmental Policy Act (NEPA) previously secured for the intermodal station and provide a recommended path forward for permitting the project. AECOM evaluated a total of four alternates which investigated different Track configurations, Overhead Contact System (OCS) and Communications and Signals (C&S) modifications, and architectural options for platform and station access at the existing T.F. Green Airport garage facility. The following sections of this report will describe each alternate in greater detail.

A. Purpose

This project seeks to expand the existing intermodal station in order to accommodate Amtrak Northeast Regional Service. To achieve this, many infrastructure improvements are required to upgrade the station to meet minimum requirements to implement an intercity stop at the T.F. Green Airport along Amtrak's Northeast Corridor (NEC). These infrastructure improvements include a fully coordinated design which will continue to provide for existing operations while still allowing for new service. The AECOM team identified the following key items that are required across all alternates evaluated to construct a new station stop:

- Construction of a new fourth track (Track 4) with an 80-mph Maximum Authorized Speed (MAS) to serve the proposed Eastbound Platform/Station stop.
- Electrification of Track 3 while maintaining Plate-J clearance for freight traffic beneath all overhead bridges.
- Realignment of Track 3 to provide for 80-mph MAS i.e. design speed.
- Replacement of existing double cantilever OCS poles on Track 1 and 2 with portal structures for electrification of all four tracks.
- Interlocking reconstruction and reconfiguration for the installation of new #32.7 Turnout and cross-overs and #24 Turnout and cross-overs along with track and Communications and Signals improvements to provide for proposed operation of Tracks 3 and 4.

B. Proposed Alternates

Four (4) alternates were evaluated and the designs initially progressed to a level at which Amtrak and RIDOT was able to make an informed decision on which alternates to progress to the 10% design. These alternates deal mostly with variations in track geometry and varying degrees of impacts to existing overhead structures within the project limits.

- Alternate 1 - consists of four tracks spaced a minimum of 16' on center, with significant structural impacts throughout the corridor;
- Alternate 2 - consists of four tracks with Tracks 1 and 3 left at 17' spacing; Tracks 1, 2, and 4 (new track) spaced at 15', with similar structural impacts as Alternate 1;
- Alternate 3 - consists of 4 tracks with Tracks 3, 1 and 2 all remaining as currently spaced and new track 4 spaced at 14' from Track 2, with similar structural impacts as Alternate 1 & 2;
- Alternate 4 - Tracks 3 and 1 are held in the existing alignment; Tracks 1, 2 and 4 are spaced at 14' on center, with many structural impacts are mitigated or eliminated.

It is crucial to note that the existing track spacing, i.e. center to center spacing of 12'-4"+/-, does not meet the current Amtrak Specification 63 criteria for the MAS (160-mph) of Track 1 and 2 which requires 16' center to center. Only Alternate 1 provides the minimum required track spacing for the controlling MAS (160-mph) without an approved Design Exception Request (DER). The controlling track centers which exist today are far below the current standard and should be increased in some manner to provide additional lateral clearance if work is performed.

Alternate 1 established a baseline design, with the remaining alternates mitigating impacts. As Alternates 2 and 3 had reduced track centers with minimal benefits, RIDOT and Amtrak instructed AECOM in June 2019 that only Alternates 1 and 4 were to be developed to a conceptual (10%) design level. A further discussion of the analysis and key issues of Alternate 1 and 4 are included here within the subsequent sections of this report. Ultimately, the analysis will show the benefit of Alternate 4 over all alternates explored through the current level of design.

C. Key Design Considerations

While initially four (4) alternates were deemed viable as solutions to the station implementation for Amtrak, RIDOT, and the T.F. Green Airport (RIAC), the following are the key issues which must be evaluated for the remaining two (2) alternates, #1 and 4. These aspects of the project in some instances drive the cost, the constructability, or the operational flexibility of the railroad during and post-construction.

- Horizontal and Vertical Clearances.
- Minimizing Structural Impacts
- Safe Stopping Distances
- Constructability

These key design considerations helped elevate the feasibility of Alternates 1 and 4 and are described further within this report.

III. Station and Platform Architecture

A. Existing Conditions

Currently three (3) tracks of the NEC are spanned by the TF Green Intermodal Parking Garage, the right of way through the garage is +-76' wide x 300' long. The northern most Track (3) has an 850' long elevated platform that facilitates diesel MBTA commuter rail service with the track also accommodating freight from the P&W. The existing platform has a vertical circulation core that has a single elevator and a 48" wide open stair. The stairs serve all levels of the garage, but the elevator only serves from the ground up to level 3. At level 3 of the garage, passengers have access to an elevated and enclosed walkway (Skywalk) to T.F. Green Airport. The existing garage and Skywalk were constructed in 2010.

Photo 1 - Aerial View of T.F. Green Station and Airport

B. Design Criteria

The Amtrak station will be designed in accordance with the following:

- **Amtrak Engineering Stations & Facilities Standard Design Practices EP 4000**
- **Amtrak Station Program and Planning Guidelines 2013**
- **Amtrak Signage Manual, August 2018**
- **National Fire Protection Association (NFPA) 130,** Standard for Fixed Guideways Transit and Passenger Rail System
- **State Building Code -1, Rhode Island State Building Code -** Incorporates the International Building Code, 2015
- **State Rehabilitation Code-1, Rhode Island State Rehabilitation Building and Fire Code for Existing Buildings and Structures**

- **State Building Code-3, Rhode Island State Plumbing Code -** Incorporates the International Plumbing Code, 2015
- **State Building Code-4, Rhode Island State Mechanical Code -** Incorporates the International Mechanical Code, 2015
- **State Building Code -5, Rhode Island State Electrical Code -** Incorporates the National Electric Code, 2017
- **State Building Code-8, Rhode Island State Energy Conservation Code -** Incorporates the International Energy Conservation Code, 2015
- **Rhode Island Fire Code (450-RICR-00-00-7) -** Incorporates NFPA 1, 2015
- **Rhode Island Fire Alarm Code (450-RICR-00-00-10) -** Incorporates NFPA 72, 2013
- **Elevator Safety Code (260-RICR-30-10-1) -** Incorporates ASME A17.1, 2016
- **Americans with Disabilities Act (ADA) Standards for Transportation Facilities, 2006**

Other Design Guides and Specifications would be

- **AISC, American Institute of Steel Construction**
- **ACI 318, American Concrete Institute Code**
- **PCI 116 and 117, Precast Concrete Institute Code**
- **American Society of Civil Engineers (ASCE) 7 -** Minimum Design Loads for Buildings and Other Structures

AECOM in working with Amtrak recognizes that the current plan for the appropriate program required at this station is based on anticipated passenger volumes. The Amtrak guideline outlines requirements for four categories of stations, as follows:

- **Category 1 – Large Stations (400,000 ~ 1,000,000 passengers)**
  - staffed to provide ticketing and support services with retail/TOD opportunities
- **Category 2 – Medium Stations (100,000 ~ 400,000 passengers)**
  - ticket offices and minimal staff, colleges and airports
- **Category 3 – Caretaker (20,000 ~ 400,000 passengers)**
  - not staffed by Amtrak, shared interior waiting area with restroom
- **Category 4 – Shelter (less than 20,000 passengers)**
  - not staffed by Amtrak

For the purposes of this concept design study, AECOM in discussions with Amtrak anticipates this location will be determined to most likely be a Category 4 station. The station development can readily be expanded to a higher category; however, this will necessitate further evaluation of items such as baggage service and platform width as well as emergency egress analysis. As noted above at this time the station has been analyzed as a Category 4.

The Amtrak Stations & Facilities Guidelines require the platform length be an absolute minimum of 850’ with a preferred minimum length of 1000’ for stations along the Northeast Corridor. The Amtrak preferred width for side platforms is 15’, the absolute minimum required platform width for stations with baggage services is 12’; as the station is not to have baggage services the recommended width would be 12’. All platforms are to be 5’-7” from centerline of Track and slope away from the Track at a maximum cross slope of 2%. Ultimately the width will be confirmed based on the occupancy calculations required by NFPA 130. Additionally, 2/3 of the platform is required to be covered to protect passengers from the weather (560’ ~ 693’ canopy).

The guidelines have many details pertaining vertical circulation elements that are also important to plan for during preliminary design. All stations are to be fully accessible, and since this location has a circulation path that requires traversing vertically from ground level up to the third floor of the garage Skywalk, elevator(s) shall be provided. The guidelines do not prescribe if redundant elevators are to be provided, but per AECOM's previous work with Amtrak and per Amtrak's Station Planning Group's suggestion a second, redundant, elevator is preferred. As ADA/Accessibility and Circulation do not require escalators, and as elevators are provided due to the projected passenger service volume, only stairs will be provided as the other means of circulation to the third floor of the Garage/Skywalk. All publicly accessed spaces will be fully accessible and barrier free. As part of the station development existing environmental land use restrictions for the former Baylis property immediately adjacent to the parking garage on the southwest quadrant of the property will need to be considered as part of any expansion program.

A. Proposed Design

As presently planned a new eastbound platform with a platform shelter will be provided, station waiting room or headhouse is not proposed; only a small weather enclosure with a vestibule will be provided for protection of the elevators and stairs to accommodate Amtrak's Northeast Regional stops at TF Green Station. The platform as previously noted is required to be a minimum of 1050'. Additionally, the existing westbound platform should be extended by 200' to the west to accommodate Amtrak's Northeast Regional stops westbound. As discussed, the eastbound platform design would include vertical circulation to the Skywalk level via stairs and elevators.

1. Platforms

All platforms will be high level, 48" above top of rail, to allow level boarding onto all trains. ADA compliant tactile warning strips will be provided the entire length of the platform. All platforms will be 1050' long and have 60% (700') of the platform covered by a canopy per Amtrak guidelines; additionally, a shelter will be provided for protection from weather. Along with the shelter a Passenger Information Display System (PIDS) will also be incorporated in the platform design.

a. Track 3 Passenger Platform

The existing platform at track 3 will be made 200' longer than the current configuration to meet Amtrak requirement of 1050' long platforms. The platform extension will be to the south as there is not enough space to the north. The elevator and stair tower will be reused but the ramp and stairs down from the platform will need to be reconstructed, along with potential emergency egress modifications.

b. Track 4 Passenger Platform

Track 4 platform will be 1050' long, 12' deep with 60% (700') of the platform covered by a canopy along with a sheltered area. All track alternates require the platform to start south of the existing garage.

2. Passenger Waiting Area / Vertical Circulation

The station building, in any option, is proposed to be a small weatherproof waiting area located with the elevators and stairs. It will be a location where passengers can get updates on the status of their train via an Amtrak compliant PIDS system, potentially with fare machines (Quik-Trak) available for use and as mentioned will be a shelter to protect passengers from inclement weather. Amtrak Engineering, Stations & Facilities, Standard Design Practices (SDP) EP4000, as well as industry best practices for Category 4 Station will dictate the design.

For the purposes of this study, two (2) options were evaluated to address standards and look for opportunities to reduce cost. The first option follows EP4000 and industry standard, and provides Amtrak owned and operated facilities all within its own footprint; while the second option assumes waving many of the requirements and repurposing existing space/facilities within the T.F. Green Parking Structure for shared usage with the proposed Amtrak service. The final recommendation for an option must be fully compliant with Amtrak's Station Programming requirements and the project stakeholders.

a. Option A

This option creates a new independent structure outside the footprint of the garage for two elevators, stairs and a waiting area enclosure lobby. The structure is about 990 sq ft with only the elevators/stair core extending up to level 3 of the garage. At level 3 this structure would connect with the existing pathway within the garage to the skywalk and the west bound platform.

Although construction of the proposed structure is adjacent to the footprint of the garage, the structure would be a free-standing station facility, with a short pedestrian bridge spanning to the garage skywalk. The headhouse would provide pedestrians safe passage to the 3rd floor of the parking structure, steps away from the existing skywalk, and preserve the first and second floors of the garage for the current use. Additionally, as a Category 4 Station the platform and the vertical circulation elements would be fully compliant with Amtrak guidelines. All emergency egress should meet ADA requirements and as such will require switch back ramps and potential permanent easements to ensure no ramp is sloped greater than 1:12 or 8%.

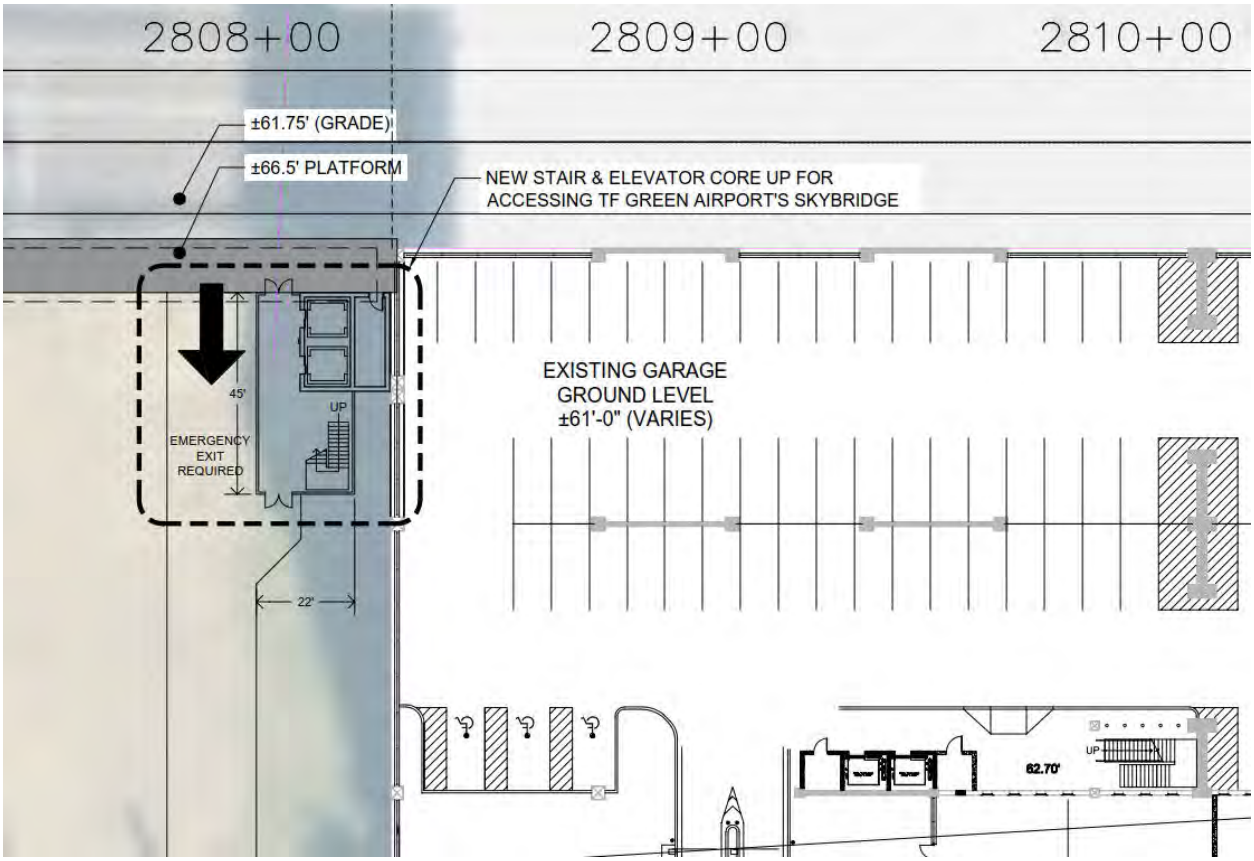


Figure 1 Independent Waiting/Vertical Circulation Option A

b. Option B

This option does not adhere to Amtrak Station Programming and Planning Guidelines, therefore, is not a viable option compared to Option A. Option B was explored to use the underutilized portions of the garage for a new waiting area and routes passengers to the two existing elevators and the existing stair tower within the garage to access level 3 of the garage for connections to the Skywalk and the west bound platform. This option requires converting 10 parking spaces on the first floor of the garage for use in the passenger waiting area, passenger circulation and requires relocation of the existing accessible parking to another location within the first floor of the garage. Furthermore, there is no direct access to the vertical circulation elements without traversing through the garage.

The proposed passenger waiting area would be built within the footprint of the first floor of the garage, with a raised slab to coincide with the platform elevation. Pedestrian traffic would be routed around the south side of the garage down ramps to reach curb/elevator elevation. Then passengers would cross the vehicular entrance/exit to this small garage. Constructing a tabletop grade crossing at the existing south side access egress point to ensure a safe condition for pedestrians and meet ADA accessibility would be a requirement.

This option, which proposes to utilize a small area of the existing garage while simultaneously accounting for all required amenities, does not meet Amtrak's criteria for visibility and direct street access. Additionally, it relies on outside stakeholder vertical circulation to access the west bound platform from the east bound platform. In order to consider this option, an Amtrak approval of waivers from the Programing and Planning Guidelines would be required. Finally, concerns for passenger safety at the grade crossing of the garage entrance, maintenance of the elevators, and the installation of PIDS are all issues that would need to be addressed and would require Amtrak approval. For these stated reasons, Option B has been removed from further consideration for this study.

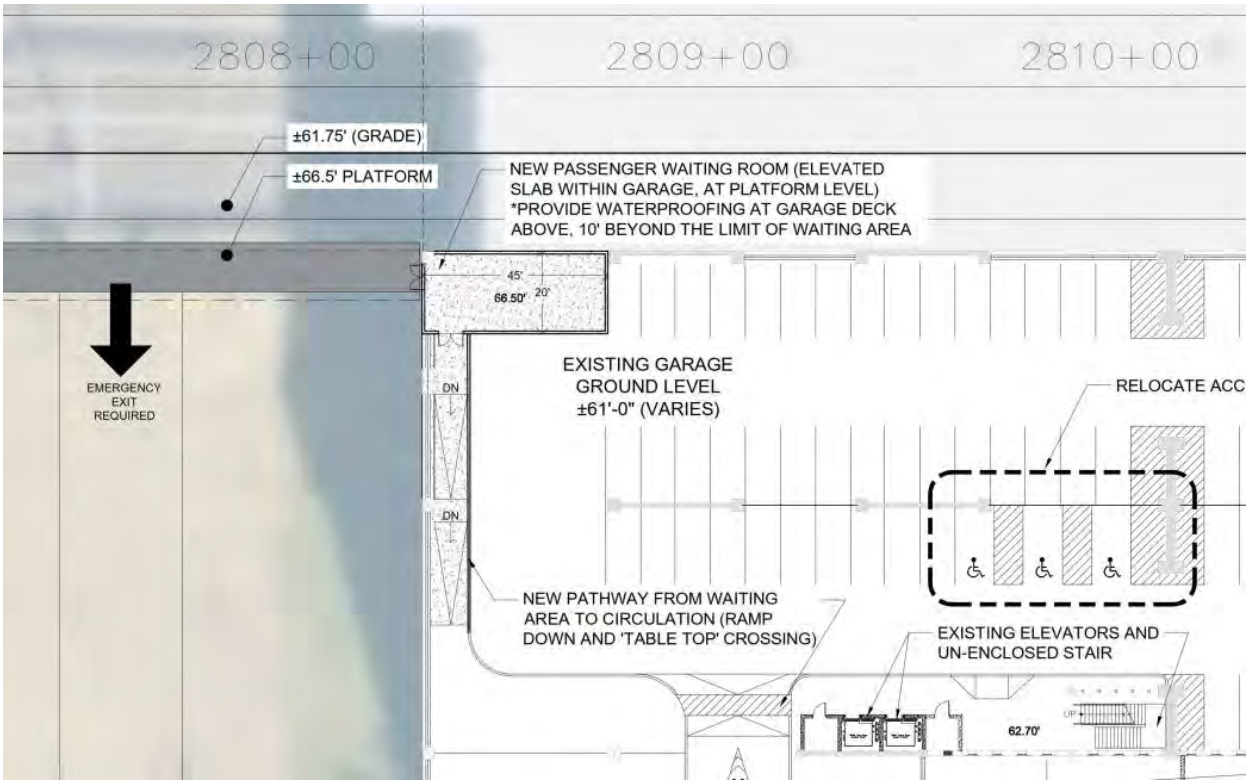


Figure 2 Independent Waiting/Vertical Circulation Option B

B. NFPA Criteria

The applicable code for transit stations fire and life safety is NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems. NFPA requires that all passengers are off the platform within 4 minutes and reach a point of safety within 6 minutes.

1. Occupant Load

NFPA 130 determines the occupant load based on the train load simultaneously entering the station on all Tracks in normal traffic direction plus the simultaneous entraining load awaiting trains.

Train Load Calculation

9 car Amtrak Northeast Regional

7 coach cars,	72 seats / car,	504 passengers
Café car,	0 occupants/ car,	0 (revenue) passengers
Business class car	62 seats / car,	62 passengers
		566 total passengers

6 car Amtrak Acela trainset

4 coach cars,	64 seats / car,	256 passengers
Café car,	0 occupants/ car,	0 (revenue) passengers
1st class car,	43 seats / car,	43 passengers
		299 passengers

On top of the actual train load, additional planned or unexpected passengers need to be accounted for. A conservative approach is to add 30% to the highest train load; that brings the train load total to 736 passengers (566 * 1.3).

Entraining Load Calculation

Since this is a new station, peak period actual ridership must be projected (estimated). For the purposes of this exercise, we will use 50 passengers on the platform during the peak period. Similar to the train load, we will add 30% for growth which brings our entraining load up to 65 passengers (50 * 1.3). Total occupant load is train load plus entraining load, 566+ 65 = **631 passengers**.

2. Egress Requirements

Confirming where to locate the exits is the first step in determining the egress requirements. NFPA requires that the maximum travel distance be 325'. This means the maximum distance between exits can be 650'. NFPA also requires the maximum common path of travel be 82' or one car length, whichever is less. For this site, this means putting an exit within 82' of each end of the platform to satisfy the common path requirement. The platform length requirement determines the need for an additional exit between the exits at the end of the platform. For the purposes of this exercise, assume the platform will be 1050' and provides the additional exit. Once the general location of exits is determined, the exits need to be sized. NFPA requires passengers evacuate the platform in less than 4 min and 6 min to egress to a point of safety, from the most remote part of the platform. In order to do these calculations, NFPA 130 prescribes:

Egress Capacities

Stairs and Escalators:	1.41 people/inch/minute (PIM)
Corridor, Platforms, Ramps and Bi-Parking Doors:	2.08 people/inch/minute (PIM)
Single lead door/gate:	60 people/minute (PPM)

Egress Travel Speeds

Stairs and Escalators (vertical rise):	48 feet/min (FPM)
Corridor, Platforms and Ramps:	124 feet/min (FPM)
Concourse:	200 feet/min (FPM)

For the purposes of this exercise, assume the platforms are 10' wide, with three 6' wide exit ramps/walkways off the platform that all serve equal percentages of the platform. The calculated total occupancy is to be 1047. Divide the total occupant load by the 3 to get the occupant load that will use each egress

1047 / 3 = 349 occupants

4 Minute Evacuation of Platform Calculation

Calculate the time to walk the distance of the platform to an exit.

Assume that the exit is furthest allowed, 325', the time it would take to get to the exit is:

325' / 124 ft/min = 2.62 min

Calculate the capacity of the most restrictive exit element.

Since the factors for a ramp are the same as the platform, we will use the most restrictive width. Using the formula above, Exit Capacity for a ramp is 2.08 PIM

72" x 2.08 PIM = 149.76 people/min (Capacity of the 6' ramp) Occupant load / Exit Capacity (349/149.76) results in 2.33 mins to exit the platform.

4 Minute Result

In this scenario, the first calculation resulted in the longest time but is still is less than 4 minutes allowed so this is compliant.

6 Minute Exit from most Remote Point to a Point of Safety Calculation

This calculation is similar to the 4 min check except it needs to include the time from the point off the platform to a point of safety (assume a public sidewalk 100' away with a 4' door). Calculate the time to walk the distance of the platform to the public way.

Assume that the exit is furthest allowed, 325', the time it would take to get to the exit is:

P2-1. (325' + 100') / 124 ft/min = 3.42 min. Calculate the capacity of the most restrictive exit element.

Since this portion of the exit has a 4' door, the door exit capacity is less than the ramp so we will use the door's capacity. Using the formula above, a single door has an Exit Capacity of 60 people/min.

Occupant load / Exit Capacity (349/60) results in 5.81 mins

6 Minute Result

In this scenario, the second calculation resulted in the longest time but is still is less than 6 minutes allowed so this is compliant.

3. Wayfinding

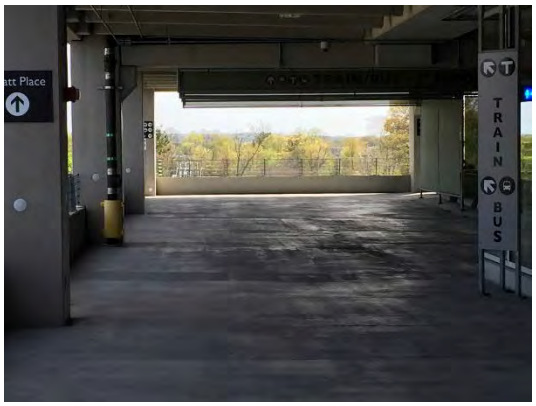


Photo 2 Garage Level 3 Pedestrian Walkway – Note poor Visibility to Wayfinding

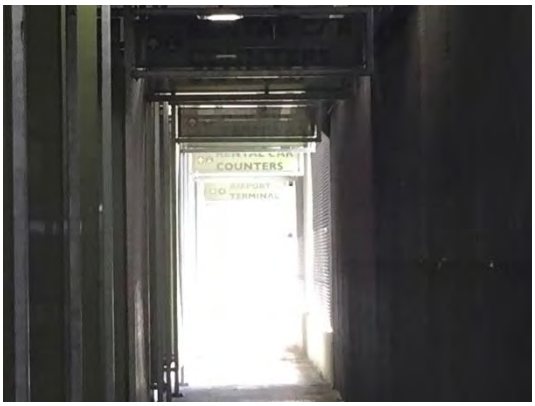


Photo 3 Garage Level 3 Skywalk to Garage Pedestrian Walkway – obstructed Signage far end on column

Passenger Pathway:

Currently there is a pedestrian pathway from the elevators on both the north and south sides of the garage to and from the Skywalk. Additionally, there is signage and wayfinding at the westbound platform from the parking garage to the platform and the vertical circulation. The pedestrian passageway at level 3 of the parking garage as observed in the photo while containing wayfinding signage is poorly lit and has portions of the wayfinding blocked or partially visible.

The station design will include wayfinding which will be in accordance with Amtrak Station Design Guidelines and include Airport Cooperative Research Program (ACRP) Bulletin 52 for tie-in to the airport signage.

C. Alternate Recommendation

Based on the preliminary analysis of the two options presented for waiting Area Shelters and Vertical Circulation, as was previously noted only Option A is fully compliant with Amtrak's criteria. Option B would require waiver approvals by Amtrak and potentially other jurisdictions: as such is not recommended to progress beyond the conceptual design level.

IV. Track

A. Existing Conditions

The study location is on the Amtrak owned "AB" mainline between "Kingston" and "Cranston" Interlockings, a portion of Amtrak's Northeast Corridor (NEC) in Rhode Island. The corridor consists of the NEC class 8 mainline tracks, designated Track 1 and Track 2, and class 3 passenger track for Track 3 on the north side of the NEC tracks which services commuter and freight traffic. The MBTA and the P&W freights currently operate/utilize Track 3 only. Figure 3 below shows the existing configuration of the project area from Apponaug Cove through "Cranston" Interlocking.

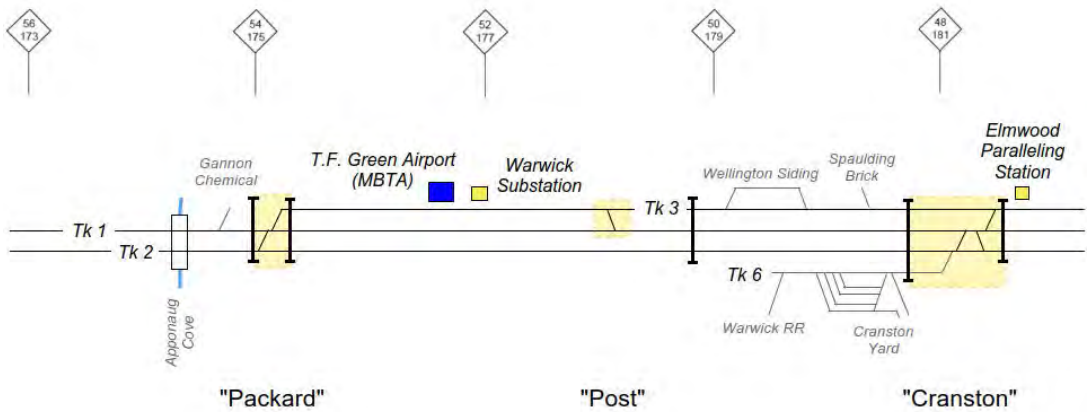


Figure 3 – Diagram for Existing AB Mainline Corridor MP 173 to MP 182

The existing NEC Tracks 1 & 2 are electrified, 160-mph tracks. Overhead contact wires are supported by portal structures at the TF Green Parking Structure and cantilever OCS structures throughout most of the project area which support the catenary for both Tracks 1 & 2. All cantilever poles are founded on the south side of Track 2. The NEC tracks are generally tangent throughout the project area from the west Apponaug Cove through "Post" Interlocking to the east, with track centers varying from 12'-2" to 12'-10". The RIDOT sponsored Freight Rail Improvement Project (FRIP) realigned Track 3 to provide Plate-H and J clearances. Track 3 services the Providence and Worchester (P&W) operating to the Port of Davisville, and MBTA commuter rail service operating to Wickford Junction west of the T.F. Green Airport Station. Track 3 connects with the Amtrak NEC Track 1 at "Packard" Interlocking to the west and extends east through the study area towards its connection with the P&W Woonsocket mainline in Providence.

The table below outlines the existing track conditions in this area of the study.

Existing Track Conditions	
Track 1	Electrified NEC mainline track – operating generally as the westbound track
	MAS = 160-mph
	Track centers to adjacent Tk 2 = 12'-2"; Tk 3 = 14'-2" (17'-4" at the station platform)
Track 2	Electrified NEC mainline track – operating generally as the eastbound track
	MAS = 160-mph
Track 3	Non-electrified track serving P&W freight and MBTA commuter operations. Existing track aligned for a gauntlet track which was never installed.
	MAS = 50-mph
	Existing 850 ft bi-directional platform

On May 22-23, 2019 a field view was performed by AECOM Track, OCS and Civil Engineers accompanied by the AECOM Transit Architects to gather preliminary field information and confirm data on the as-built and record drawings. Based on the field views, AECOM confirmed that the existing horizontal clearance under the overbuild garage is insufficient for a new platform to be located under the garage.

B. Track Design Criteria

The proposed track design will be based upon a fully developed existing conditions survey performed in accordance with "AMTRAK Land Surveying Standards and Procedures Manual, Version 2.0, dated December 1, 2014" and by "AMTRAK Engineering Track Design Specification #63, revised to June 1, 2015" and depending on the Alternate selected require the approval and incorporation of several "Design Exceptions". The project will incorporate and necessitate the following:

- New track construction
- Track Shifts
- Track lowering
- Turnout/Crossover removal & construction

Proposed Track design will comply with Amtrak Specification 63, with the key design considerations for this project per Specification 63 as follows:

Track Centers	
Section 4.11.2	Minimum track centers 16 feet where the speed is 125 mph or more.
Horizontal Curvature	
Section 4.3.1	Curves shall be designated by the chord method of degree of curve.
Section 4.3.3.	Every opportunity should be taken to lessen curvature.
Section 4.3.6.	The degrees of curves should be simplified so that the seconds are zero and the minutes are zero or multiples of five.
Section 4.5.1	Desirable minimum length of each element of a compound curve is three times the maximum velocity.
Vertical Curvature	
Section 5.3.2.	All vertical tangents must have a minimum length of three times the maximum velocity. Vertical tangents between vertical curves in the same direction must be no less than 900 feet long.
Curve and Special Trackwork Spacing	
Section 4.2.5.	Tangents and horizontal curves have a minimum length of three times the maximum velocity in miles per hour.
Section 4.3.4.	The tangent distance between reverse curves of facing same hand turnout shall be no less than 100 feet. The minimum distance along the tangent between two adjacent curves should be the greater of 100 feet of tangent track.
Section 4.3.5.	The minimum distance between a point of switch and an adjacent spiral should be three times the velocity (mph). The minimum distance between the last long tie and an adjacent spiral should be 100 feet.

Section 7.1.5.	The points of switch of turnouts that are adjacent to each other and of the same hand must be located no closer than three times the velocity through the diverging side of the turnout.
Section 7.1.6.	The points of switch of turnouts that are adjacent to each other and of opposite hand must be located no closer than 100 feet.
Superelevation	
Section 4.6.3.	Superelevation on the outside rail of a curve shall not exceed 5 1/2 in.
Section 4.6.4.	All curves should have at least ½ inch of superelevation except curves that are no sharper than 0°-15' may have a minimum of ¼ inch superelevation if the resulting underbalance is not less than 0.
Section 4.7.1.	The maximum allowable amounts of underbalance on the NEC for any passenger car not meeting A, B or D is 4 inches.
Spiral Lengths	
Section 4.9.1.	Spirals shall be provided at the ends of simple curves and between segments of compound curves.
Section 4.9.3.	Superelevation runoff must be at a uniform rate and must extend the full length of the spirals.
Section 4.9.5.	The change in superelevation should be in uniform increments, and the rate of change per 31 feet of track should not be more than ½ inch for Track Class 1-3
Section 4.9.6.	Main line spiral lengths shall be integer multiples of 31 feet and shall be at least 62 feet long.
Section 4.10.2.	Angle points must be avoided wherever possible and are not considered to be a part of acceptable designs.
Track at Platforms	
Section 5.1.3.	Grades through station platforms should be equal to or very close to 0.000% so that cars will not roll when the brakes are released.
Clearances	
Section 4.13.1	For abutments, buildings and clearance limiting-objects, see Amtrak Standard Track Plan AM 70050.
Section 4.14.13	The fouling point is considered as the point where the track centers become 13 feet.

In addition to the Amtrak standards listed above, Track 3 was designed during the FRIP project to provide clearance envelopes as defined by the Association of American Railroads Equipment Diagrams for Interchange Service, specifically the envelopes Plate H and Plate J.

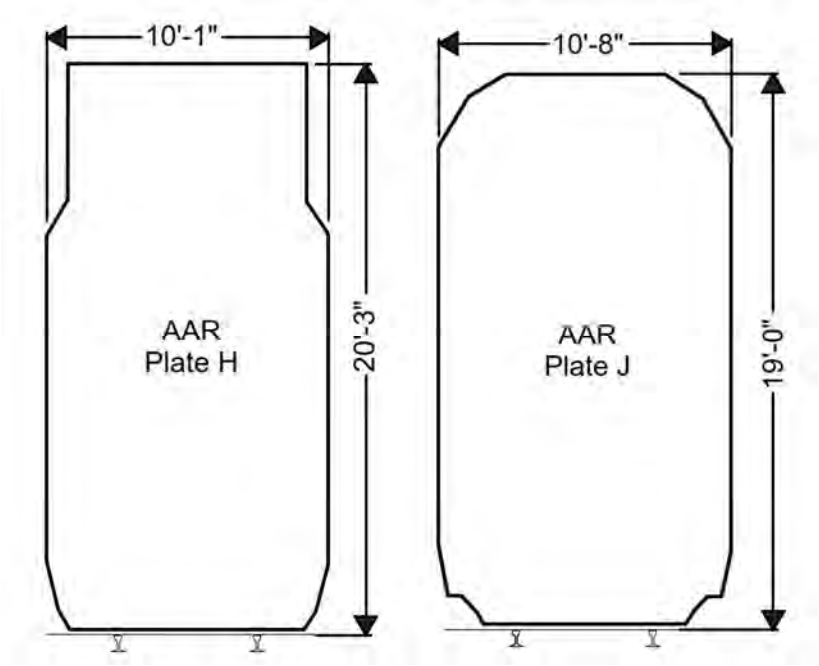


Figure 4 - AAR Plate H & Plate J Comparison

As shown in Figure 4, the two clearance envelopes differ in overall height above top of rail and width of vehicle. Based on direction from Amtrak, AECOM designed track using Plate J to define lateral and vertical clearance limits.

1. Design Exception Requests

AECOM has identified the following list of potential Design Exception Requests (DERs) which will have to be approved by Amtrak as the project moves onto detailed design. This is a list of what conditions are considered or assumed to be substandard as of the writing of this report. It is possible that with survey and further field investigation that this list may grow.

DER No.	Amtrak Specification 63 Section	Criteria	Alternate 1	Alternate 4	Location & Description
1	Section 2.4.2	Ballast and sub-ballast cross sections shall conform to Amtrak Standard Track Plan AM70003. 12" shoulders, 2:1 slope	Waiver Needed	Waiver Needed	**Alternate 1 & 4:** Ballast cross section slopes potentially exceed 2:1 due to limited right-of way.
2	Section 4.2.2	Clearances along proposed alignments must meet minimum roadway clearances prescribed in Amtrak Standard Track Plan AM 70050	Waiver Needed	Waiver Needed	**Alternate 1 & 4:** Required lateral clearances not met at existing parking structure Required vertical clearances not met at the TF Green Connector Road, Coronado Road, and Route 37 Overhead Bridges.

3	Section 4.11.2	Minimum track centers 16 feet where the speed is 125 mph or more.	N/A	Waiver Needed	**Alternate 4:** 14' minimum proposed track centers
4	Section 4.3.6.	The degrees of curves should be simplified so that the seconds are zero and the minutes are zero or multiples of five.	Waiver Needed	Waiver Needed	**Alternate 1 & 4:** Proposed track alignments contain curves that are less than five minutes, therefore are not multiples of five.
5	Section 4.2.5.	Tangents and horizontal curves have a minimum length of three times the maximum velocity in miles per hour.	Waiver Needed	Waiver Needed	**Alternate 1 & 4:** the proposed length of the 1-degree curves and turnback curves are greater than 100', but less than 3V.

2. Design Exception Mitigations

The above design exceptions focus on track geometry and clearances. For DERs 1 and 3, the proposed design for either Alternate 1 or 4 improves upon existing conditions in areas where it is not able to meet the Amtrak Standard. DER 4 and 5 addresses minimum standards related to curvature and curve lengths. The proposed design necessitates reverse curvature in locations in order to improve track centers (DER 3) through the project. This reverse curvature, as designed for the proposed MAS on each track creates situations where certain standards cannot be met in order to meet other geometric standards.

Clearances addressed in DER 2 relate the overhead structures throughout the length of the project area and the associated minimum clearances as defined in AM 70050. Lateral clearances from existing track to adjacent structures throughout the corridor varies greatly. AECOM has identified several locations where minimal clearances will be provided. In all locations where less than 12 feet of lateral clearance to an adjacent structural pier is provided, AECOM recommends a crashwalls per AREMA criteria. In locations where existing lateral clearance does not meet the minimum of 8'-6" AECOM has proposed alignments which do not reduce existing clearance and recommends considering reconstruction of the overhead structure.

The proposed design improves upon existing overhead clearances by proposing track lowering and potential bridge reconstruction. Additionally, reduced OCS sections are proposed to reduce the required clearance. See Chapter V – OCS for details as to the proposed OCS design.

C. Proposed Design

1. Design Requirements

While two (2) alternates are viable as solutions for station development and implementation for Amtrak, RIDOT, and RIAC, the following are the key issues which must be evaluated for each alternate. These aspects of the project in some instances can drive the cost, the constructability, or the operation of the railroad post-construction. Therefore, as the project continues to more detailed phases of design, solutions to the following considerations should be identified:

- **Horizontal and Vertical Clearances** – clearances between tracks, from tracks to adjacent structures, and overhead clearance are all paramount to validating the proposed project viability. The required clearances are:
  - Vertical underclearance

    - Plate J as approved by Amtrak Clearance Dept. – 19'-0" to any overhead structure or obstruction
    - Catenary clearance – requires 1'-6" additional to the contact wire or 20'-6"
    - An additional 1'-6" is the minimum typical clearance above the catenary system for a total of 22'-0" minimum
  - Horizontal or Lateral Clearance
    - Clearance to catenary pole along right-of-way 12"-0" minimum clear
    - Clearance to structure 8'-6" as approved by Amtrak Clearance Dept.
    - Existing substandard clearances cannot be reduced below existing clearance without special Amtrak approval.

- **Minimizing Structural Impacts** – While each existing overhead bridge could be rebuilt to provide the desired minimum clearances, structural modifications would involve significant clearance increases and roadway reconstruction and would make the project infeasible.
- **Safe Stopping Distances** – the addition of a short pocket track (Track 4) for the proposed eastbound platform requires consideration of standard stopping distances, as well as required stopping distances in inclement weather or any special circumstances. Therefore, AECOM has assured that the proposed alternates incorporate this distance for all vehicles anticipated to operate on Track 4 despite the implications it may have on other aspects of the project.
- **Constructability** – as an existing two track system with 13 miles between the nearest two unaffected adjacent interlockings operational compatibility for construction is a crucial factor. Operations must be maintained, and staging is a critical consideration. The primary goal of the project is to develop a viable design for an eastbound platform, an electrified fourth track on the south side of the corridor, and electrifying existing Track 3, all in order to upgrade passenger rail service to the T.F. Green Airport Station. As part of the overall project and to facilitate service by Amtrak, modifications to the existing track infrastructure between "Packard" and "Post" Interlockings will be required to accommodate operational flexibility. The infrastructure modifications are as follows:
  - Construct the proposed track (Track 4) and accompanying station platform with a Maximum Authorized Speed (MAS) of 80-mph.
  - Build a new 1050' long Track 4 platform and extend the existing Track 3 platform to 1050' to serve Amtrak Northeast Regional trainsets.
  - Ensure a Track 4 length which meets the minimum safe stopping distance for the design speed. See Appendix for Typical Diverge Station plan for additional information.
  - Electrify existing Track 3 from the west end through the existing and proposed crossovers in "Post" and increase the MAS from 50-mph to 80-mph.
  - Lower existing Track 3 where noted to maintain Plate-J clearances while providing for electrification.
  - Improve the infrastructure within the project area to meet Amtrak's current design standards.
  - Provide appropriate proposed track centers due to the type of track and the operational design speed.
  - Provide clearances to adjacent abutments or bridge piers, or plan to provide a crash wall where necessary in order to protect the overhead structure.
  - Modify Interlockings for station service and operational flexibility of train movements.
  - Replace most of the existing catenary cantilever structures within the project area with portal frames spanning all four tracks.
  - Manage criteria where it is impossible to achieve the preferred values.

D. Design Alternates

Initial evaluation involved three alternates (Alternates 1, 2, & 3) with criteria defining them. Each of the initial alternates were defined to show the breadth of the options. After initial discussions with Amtrak and RIDOT, direction was provided not to pursue Alternates 2 or 3 any further due to substandard track centers and the inability to mitigate structural impacts throughout. Soon after, AECOM was asked to investigate a new concept (Alternate 4) alongside the original remaining alternate. The following sections give detail on the Track Alternates 1 and 4:

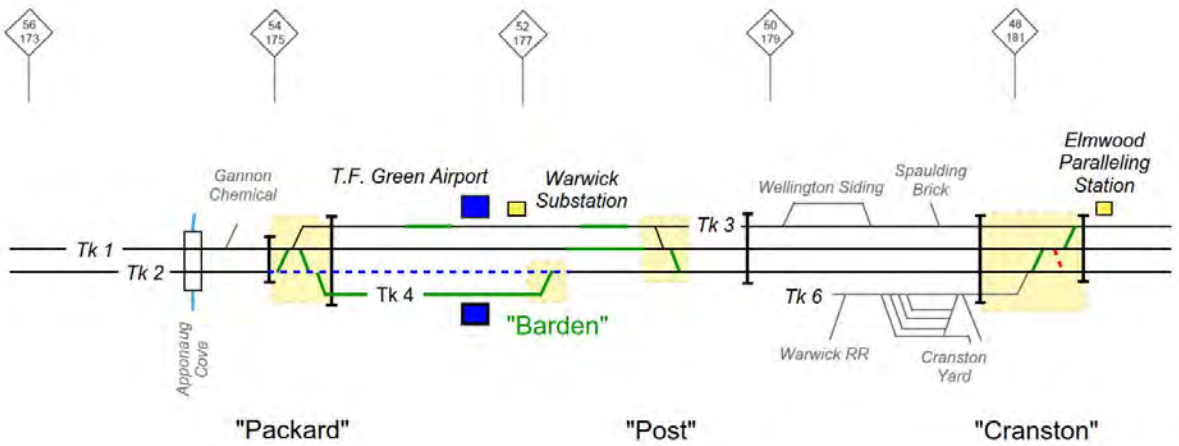


Figure 5 – Diagram for Proposed Alternates 1

1. Alternate 1

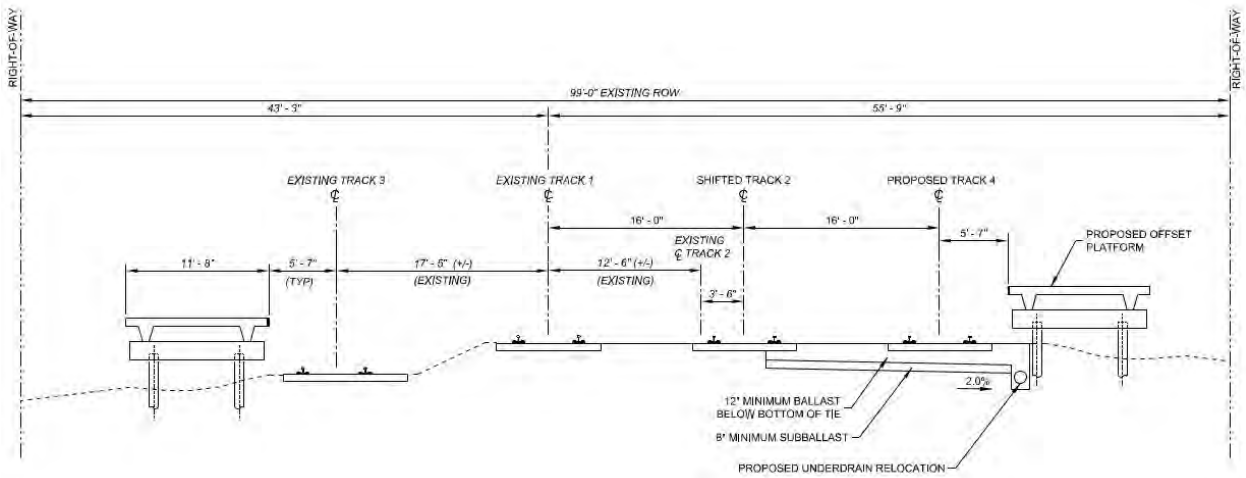


Figure 6 - Typical Section for Alternate 1 at the Platforms

Alternate 1 provides 16'-0" track centers between Tracks 1, 2, & 4. It maintains the existing Track 1 and Track 3 track centers with existing track centers of 17'-4" through the station, and 14'-0"+/- outside the station limits. To achieve the additional distance between Tracks 1 & 2, Track 2 will be shifted 3.5' south between "Packard" and "Barden". This alternate results in the widest proposed corridor footprint.

Electrification of Track 3 will require lowering under T.F. Green Connector Road and Route 37 Northbound & Southbound in order to achieve the Plate-J clearance. Lowering of Track 3 required at T.F. Green Connector Road is approximately 3.5", whereas lowering required at Route 37 is approximately 16.5". Due to the existing elevation difference between Track 1 & Track 3, and their close track centers, it is necessary to lower Track 1 the same amount as Track 3 in the vicinity of Route 37 to maintain a maximum slope between Track 1 & 3.

Due to constraints on space underneath the parking structure, the Track 4 platform must be located entirely to the west of the existing parking structure, offset from the Track 3 platform. The proposed 16' track centers between Tracks 1 & 4 will leave Track 4 with approximately 7'-9" lateral clearance to the structure, which is below Amtrak's absolute minimum clearance approved for this project. Therefore, either an exception will be required, or the modifications to the parking structure will be necessary to gain the couple inches to hit minimum allowable clearance.

In order for Proposed Track 4 to continue east of the T.F. Green Station and parking structure, the reconstruction of Coronado Road overhead bridge superstructure and removal of the center pier is required. The distance from the proposed centerline of Track 4 to the existing pier is less than 5 feet, which does not provide room for even a static train envelope.

2. Alternate 4

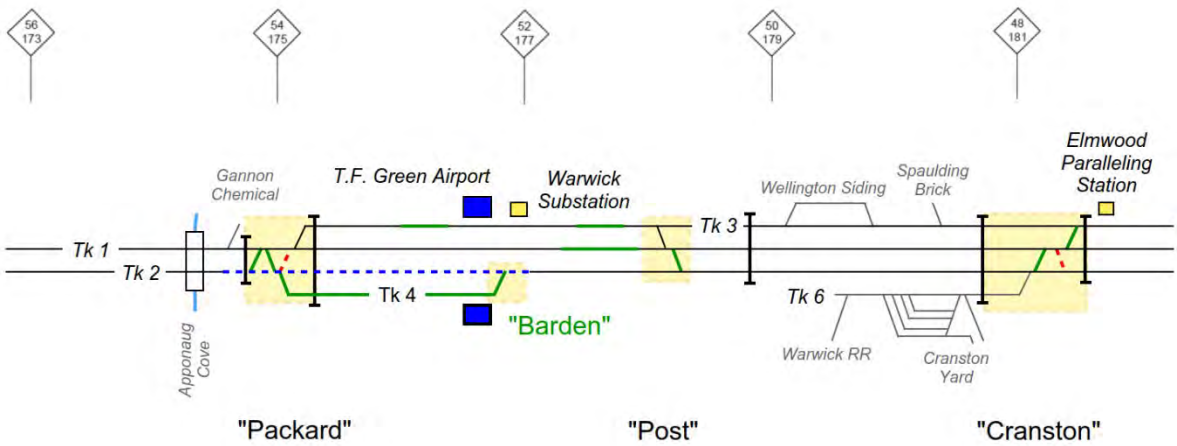


Figure 7 – Diagram for Proposed Alternate 4

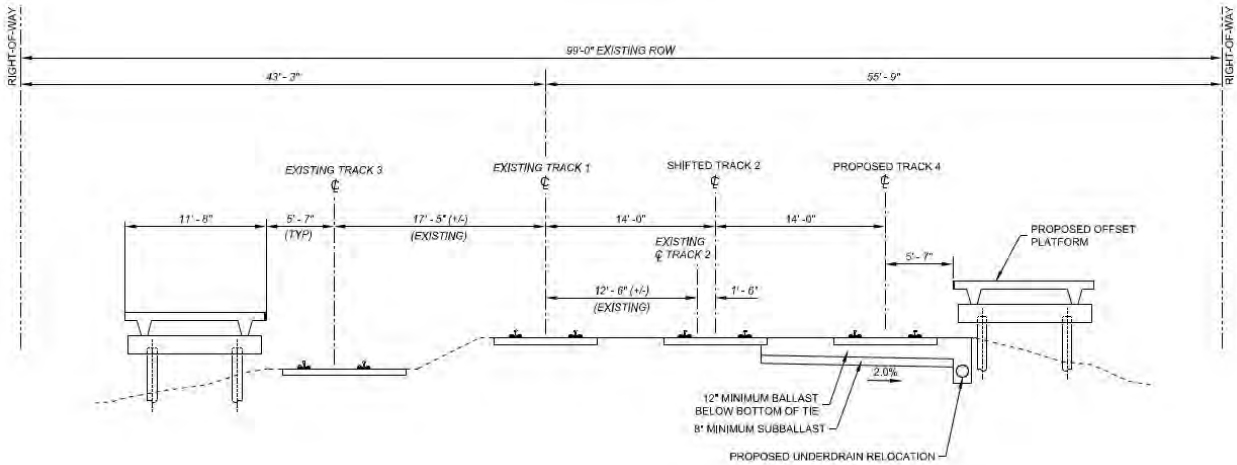


Figure 8 - Typical Section for Alternate 4 at the Platforms

Alternate 4 provides 14'-0" track centers between Tracks 1, 2, & 4. It maintains the existing Track 1 and Track 3 track centers with existing track centers of 17'-4" through the station, and 14'-0"+/- outside the station limits. To achieve the additional distance between Tracks 1 & 2, Track 2 will be shifted 1.5' south between "Packard" and "Barden".

This alternate was developed in response to the limited existing horizontal clearance from Track 2 to the substructure at Coronado Road overhead bridge. This alternate, ties the east end of proposed Track 4 into Track 2 just west of Coronado Road. The revised eastern limit of Track 4 required that the team consider extending Track 4 to the west in order to achieve the

required safe stopping distance requested. See the Signals section for information on stopping distances.

Similar to all previous alternates, electrification of Track 3 will require lowering of Track 3 under T.F. Green Connector Road and Tracks 1 & 3 under Route 37.

This alternate does not require any modifications to the existing parking structure, but still requires a crash wall. This option eliminates the need for structural modifications to Coronado Rd, except for providing a crash wall along the pier.

Alternate 4 is unique to the other alternates as Track 4 continues farther east. This difference changes the proposed locations of special trackwork in "Packard" interlocking. While the routings provided in the other proposed alternates are all maintained, Alternate 4 shifts extents of trackwork west, and with it the impacts to OCS and C&S systems shift as well.

3. Alternate Comparison Matrix

The two alternates evaluated in this conceptual design analysis are summarized below:

Summary of Design Alternates			
Design Element		**Alternate 1**	**Alternate 4**
Track 1	Horizontal	Track 1 alignment remains	
	Vertical	Lowering 16.5" @ Route 37; Maintain existing profile for the remainder of the project area	
	Speed	MAS = 160-mph	
	Minimum Centers	Tk 2 = 16'-0" Tk 3 = 14'-2" (ex)	Tk 2 = 14'-0" Tk 3 = 14'-2" (ex)
Track 2	Horizontal	Shift 3'-6" south	Shift 1'-6" south
	Vertical	Maintain existing profile	Maintain existing profile
	Speed	MAS = 160-mph	
	Minimum Centers	Tk 1 = 16'-0" Tk 4 = 16'-0"	Tk 1 = 14'-0" Tk 4 = 14'-0"
Track 3	Horizontal	Realigned to increase MAS	Realigned to increase MAS
	Vertical	Lowering 16.5" @ Route 37; Lowering 3.5" @ T.F. Green Connector Road; Maintain existing profile for the remainder of the project area	
	Speed	MAS = 80-mph	MAS = 80-mph
	Minimum Centers	Tk 1 = 14'-2" (ex)	
	Platform	Extend existing 850' platform 200' west to 1050'	
Track 4	Horizontal	Proposed 8900' track from MP 175.6 to MP 177.3	Proposed track from MP 175.1 to MP 176.7
	Vertical	Profile to match Track 2	
	Speed	MAS = 80-mph	
	Minimum Centers	Tk 2 = 16'-0"	Tk 2 = 14'-0"
	Platform	Proposed 1050' platform	

E. Interlocking Systems

The project scope includes improvements to three interlockings and the creation of a new interlocking, all within the project vicinity. The majority of these improvements include the

replacement of a crossover with a crossover with a higher diverging speed. See Figure 3 for the existing routing for the interlockings to be updated. The proposed track and interlocking enhancements will include:

1. "Packard" Interlocking Extension (MP 175) – Alternate 1 Only

- Replace the existing left-hand (LH) #20 crossover with a LH #32.7 MPF crossover, maintaining the existing switch point location on Track 1.
- Locate the proposed right-hand (RH) #32.7 crossover with a movable point frog (MPF) to the east of the existing LH #20 turnout to Track 3.
- Locate the proposed RH #32.7 MPF turnout to Track 4 a minimum of 240' east of the proposed RH #32.7 crossover.
- Replace the existing LH #20 turnout to Track 3 with a LH #32.7 MPF turnout.

Photo 4 - Packard Interlocking Looking East

2. "Packard" Interlocking Extension (MP 175) – Alternate 4 Only

- Remove the existing LH #20 crossover.
- Locate the proposed RH #32.7 MPF crossover west of Route 1 Post Road Extension overhead bridge.
- Locate the proposed LH #32.7 MPF crossover west of the RH #32.7 mentioned above by a minimum of 240 feet between adjacent switch points.
- Locate the proposed RH #32.7 MPF turnout to Track 4 west of Route 1 Post Road Extension overhead bridge.
- Replace the existing LH #20 turnout to Track 3 with a LH #32.7 MPF turnout.

3. "Barden" Interlocking (MP 177)

- Alternate 1 to locate east of the Warwick Paralleling Station.
  - Locate the proposed LH #24 turnout east of the proposed platform.
- Alternate 4 to locate west of Coronado Road Overpass
  - Locate the proposed LH #20 turnout east of the proposed platform.

4. "Post" Interlocking (MP 178)

- Locate the proposed RH #32.7 MPF crossover to the east of the existing RH #20 crossover.
- Existing RH #32.7 crossover to remain.
- Tie-in to existing before Pawtuxet River Bridge

5. "Cranston" Interlocking (MP 181)

- Replace both LH #15 crossovers with LH #20 crossovers.
- Remove existing RH #15 crossover.

F. Track 3 Lowering for Electrification

In order for Amtrak service to operate on Track 3 and serve the existing platform, Track 3 must be electrified. In addition to all the OCS considerations outlined in the next section, Track 3 must be lowered at select overhead structures in order to continue to provide AAR Plate J clearance underneath the proposed catenary wires.

The conceptual track profiles were developed to achieve the required vertical clearances for Track 3 electrification. However, as a result of previous lowering on existing Track 3 during the FRIP realignment, the current elevation difference between Track 3 and Track 1 is at or above the maximum difference to maintain a 2:1 ballast slope and 12-inch shoulder between the Tracks. Therefore, where Track 3 is to be lowered, Track 1 may also require lowering. As Tracks 1 & 3 have different design speeds, the vertical alignments will not match. Track 1 at 160-mph will require much more length of lowering than Track 3 at 80-mph. This lowering of Track 1 before and after Track 3 lowering limits will only improve the slope between the two tracks. The vertical alignment was split into 2 sections encompassing Track lowering through 3 overhead bridges (OHB's);

- T.F. Green Airport Connector Road OHB
- Route 37 Southbound OHB
- Route 37 Northbound OHB

Photo 5 - Elevation difference between Track 1 & 3

Vertical Alignment Section #1: T.F. Green Airport Connector Road OHB

- The maximum track lowering in the vicinity of T.F. Green Airport Connector Road OHB is 3.5".
- The full extents of Track lowering for Track 3 for this section of alignment is 840'.
- Track 1 does not require lowering at this overhead bridge.

The vertical alignment ties back into existing track levels prior to T.F. Green Station therefore neither the station platform nor Coronado Road require track lowering.

Vertical Alignment Section #2: Route 37 Southbound OHB & Route 37 Northbound OHB

- The maximum track lowering under Route 37 Southbound is 12".
- The maximum track lowering under Route 37 Northbound is 16".
- The full extents of Track lowering for Track 1 for this section of alignment is 2490'.
- The full extents of Track lowering for Track 1 for this section of alignment is 1600'.

G. Track 4 Pocket Length

The Track 4 pocket length (or the length of track a train could occupy without fouling the adjacent track) in Alternate 1 follows direction per the document "Typical 80 mph Diverge Station Siding" provided with the Task Order Scope of Services. This document identifies the required distances from clearance point to the platform (train length + 2,385 feet), as well as total pocket length to allow for breaking with a 0% grade (train length + 6,272 feet), according to the Pennsylvania Railroad Standard Braking Distance Curve (CE-205) defined in Amtrak Standard Signal Plan SP603 and applicable to all non-Amtrak equipment operating along the NEC. Assuming an 8-car train and a single locomotive, the train length would be roughly 755 feet. Therefore, the minimum distance from the clearance point to the platform would be 3,140 feet, and the minimum distance between clearance points would be 7,027 feet.

The following table gives approximate locations of key points along the Track 4 pocket in both Alternatives 1 & 4 and their resultant lengths:

Point of Interest	Alternate 1		Alternate 4	
	Station	Pocket Length to POI	Station	Pocket Length to POI
PS RH #32.7 T/O	2756+55	-	2728+75	-
Western Clear Point	2762+40	0'	2735+00	0'
Western Edge of Platform	2797+85	3,545'	2797+85	6,285'
Eastern Edge of Platform	2808+35	4,595'	2808+35	7,335'
Eastern Clear Point	2840+00	7,760'	2810+00	7,500'
PS LH #24 T/O	2844+35	-	2814+70	-

For Alternate 4, the pocket shifts to the west while the platform remains in the same location. Therefore, for an Eastbound train, the minimum distance from the clearance point to the platform will no longer be a controlling factor. Therefore, the controlling factor for the design of the pocket is the total pocket length calculation for the stopping distance required for CE-205 equipment. For the calculations for these distances, see the Signals chapter, Section VI.E.

Actual placement of the western turnout in Alternate 4 was influenced by vertical curvature, therefore lengths in excess of the minimum have been provided.

H. Alternate Recommendation

Alternates 1 and 4 provide the required infrastructure improvements to allow Amtrak to serve the proposed T.F. Green Station. Alternate 1 achieves the proposed track centers of 16'-0" at the expense of multiple structural impacts described in a later chapter. Conversely, Alternate 4 eliminates these impacts by reducing the track centers to 14'-0" and shifting the location of the Track 4 tie-ins which creates potential operating considerations not discussed in this report.

Alternate 4 is recommended to progress to the 30% level as the design minimizes impacts to overhead structures, provides adequate platform siding track and avoids conflicts with the southside Warwick Paralleling Station infrastructure. In advancing this alternate operational analysis should be performed to confirm operational adequacy.

V. OCS

A. General Existing Conditions

The electric traction system within the project limits was installed in 1999-2000 as part of Amtrak's Northend Electrification Project. Components include the overhead contact system (OCS), ancillary conductors, sectionalizing switches, power huts and commercial utility connections, switch heater equipment and interlocking lighting. The OCS is comprised of the typical northend simple autotension system covering both Tracks 1 and 2, each with an accompanying aerial feeder (FDR) and static wire (SW). Support and registration assemblies are standard arrangements and the support structures are generally two-track cantilevers, with occasional portals, comprised of tubular steel poles and beams. Three portal structures were installed within the project limits as part of the T.F. Green Station in 2010, with wide flange beams. Buried telecoms reside on the roadway side of Track 2. Most of the conductors are attached to the overhead bridges. It should be noted that based on the field investigation, the existing overhead bridge vertical clearances will not accommodate both OCS and AAR Plate J equipment on Track 3, and an analysis of whether a combination of Track 3 undercutting, use of low-profile catenary and bridge modifications will be required on a case by case basis.

B. Design Criteria

Applicable Amtrak and AREMA criteria govern OCS design, including:

- Amtrak Electrification Design Criteria, AED-1 and -2
- Amtrak C.E.500B and
- Amtrak Northend Electrification (NEE) standards.

  Key design considerations include:

  - Contact wire gradient limits per NEE standards are maintained at all overhead bridges and T.F. Green Station.
  - Avoid utilizing Track 3 & 4 overhead bridge attachments.
  - Utilize tunnel arm or resilient arm assemblies where limited vertical clearances dictate the use of low-profile OCS.
  - Minimum horizontal clearance to the face of new OCS columns where practical is 12'-0" plus allowance for curved Track, per AED-1.
  - Minimum electrical clearances are 10" static and 8" passing, per NEE standards.
  - Minimum of 18" between the top of the plate J clearance envelope and the contact wire

1. Civil/Structural Elements

The electric traction-related work to support the T.F. Green project may be divided into civil/structural, wire work and systems components. This section divides the project into specific locations from west to east. Both Alternates with varied track centers will require replacement of existing OCS poles within the proposed Track 4 limits, and a clearance analysis at all of the overhead bridges. In addition, an analysis of the bridge framing and existing OCS attachments will be necessary to determine the appropriate attachment modifications to accommodate the proposed track centers

Alternate 1 will impact the Airport Connector Road and Coronado Road overhead bridge substructures due to the widened Track centers and require significant bridge modifications or replacement.

Track 3 Electrification – Packard and Barden to Post

For Alternate 1, electrification of Track 3 between the two segments of Packard will require installation of single-track cantilever structures based on Amtrak North end Electrification standards (with standard systemwide foundations), the exception is the Main Avenue Overhead Bridge, described below. An approximately 600' long retaining wall is adjacent to Track 3 at Packard. This wall is comprised of steel H-piles with precast concrete panels, and sufficient space will permit the installation of new OCS foundations, as demonstrated by existing portal structure 175-9 / 175-10. East of Barden, single track cantilever structures as previously described may be installed, with certain exceptions described below. Track 3 & 4 Electrification – Packard Extension to Barden

For Alternate 1, the addition of Track 4 will impact 81 OCS poles (25 two-Track cantilever and 28 portals). To support an electrified four-track railroad, these structures may be replaced with new four-track portals based on Amtrak NEE standards (with standard systemwide foundations). These portals will also support the Track 3 OCS. While the existing portals may be modified in lieu of replacement, operational impacts must be considered. Specific constraints to be addressed are described below.

For Alternate 4, the addition of Track 4 will impact 71 OCS poles. These structures will be replaced similarly to Alternate 1 and will cover Track 3 to its western convergence with Track 1. As Packard will be expanded west of the dual US 1 overhead bridges, an additional cantilever structure will be needed on the Track 1 side to accommodate the new crossover OCS. The electrification of Track 3 east of Barden will remain the same as in Alternate 1.

OCS considerations at existing overhead bridges within the project limits will require evaluation according to the following:

Main Avenue Overhead Bridge

- Horizontal clearance precludes new OCS foundations, although this abutment's exposed footing may accommodate pedestals for new stub poles. The minimum Track 3 vertical clearance for this bridge is the east fascia, at 21.41'.

Photo 6 - Looking West - Main Ave OHB

Photo 7 - Looking West – T.F. Green OHB

T.F. Green Airport Connector Road Overhead Bridge

- Horizontal clearance to the Track 3 and 4 sides will accommodate new stub poles, although impacts to the abutments will require investigation.
- The minimum Track 3 vertical clearance for this bridge is the east fascia, at 21.26'.

T.F. Green Parking Structure

- Track Alternate 1 will impact the Track 4 poles of the three existing portal structures. Solutions for OCS supports through the station include:

Photo 8 - Looking West - Coronado Rd

Photo 9 - Looking East - T.F. Green Station

Removal of the portal beams and installation of drop tubes from the overbuild T-beams, potentially in combination with installation of Track 3 cantilevers on the remaining poles, and garage wall-mounted Track 4 brackets.

Coronado Road Overhead Bridge

- All conductors are attached to steel girders, OCS on resilient arms. Horizontal clearance to the Track 4 side abutment will accommodate new stub poles.
- The existing horizontal clearance to the Track 3 side abutment precludes new OCS foundations, although the exposed footing may accommodate pedestals for new stub poles.
- The minimum Track 3 vertical clearance for this bridge is the east fascia, at 21.66'. The adjacent signal bridge and hut will be impacted by new Track 4, as will a wood utility distribution pole in the vicinity of Kilvert Street.
- The existing horizontal clearance to the Tracks 3 and 4 side abutment and pier precludes new OCS foundations, although the exposed footing of Track 3 side may accommodate pedestals for new stub poles.Minimum Track 3 vertical clearance for this bridge is the east fascia, at 21.66'.

Warwick Paralleling Station

- For Alternates 1, new Track 4 will impact the existing Track 2 feeder structure and three portals which carry feeder and OCS sectionalizing equipment. The feeder structure and OCS portals may be

Photo 10 - Looking East

Warwick Paralleling Station

replaced, with consideration given for maintaining the existing feeder and OCS sectionalizing arrangements.

- For Alternate 4, no modifications to the existing feeder structures are anticipated. Registers and wire locations for Track 2 will still require shifting to match new track alignment.

Lincoln Avenue Undergrade Bridge

As previously discussed, Track 3 electrification east of Barden will require single Track cantilever structures. The Lincoln Avenue undergrade bridge abutment wingwalls continue as retaining walls comprised of steel H-piles with three-high precast concrete panels and then transition to all-concrete. These appear to have been part of a bridge substructure rehabilitation project. A set of panels may be modified with integrated OCS foundations at the necessary locations.

RI 37 / Lincoln Freeway Overhead Bridges

Photo 11 - Street Level along Track 3

Photo 12- Looking West - Lincoln Ave UGB

- Track 2 OCS, Feeder (FDR)Static Wire (SW) and Track 1 OCS conductors are all attached to steel girders (OCS registered with resilient arms). Track 1 FDR is attached to the roadway side of piers adjacent to Track 3. The existing horizontal clearance is 6'-7 ½", which precludes OCS foundations along Track 3 piers which are in fair condition.

Photo 13 - FDR on North Face RI 37 Pier (Track 3)

Photo 14 - Looking West - RI 37 SB OHB

- A new cantilever structure may be installed outside of each bridge's east fascia.
- The minimum Track 3 vertical clearances for these bridges are 21.30' (east fascia northbound bridge) and 21.58' (west fascia southbound bridge).

- Based on observation, bridge replacement would benefit the electrification of Track 3. However, the Rt. 37 bridges over the NEC are in the TIP for preservation only.

"Post" Interlocking

- New crossover OCS may terminate on one of the existing poles along Track 2, east of the new Trackwork. An approximately 2,400' retaining wall like the one at Packard is adjacent to Track 3, with an abutting C&S cable tray. New OCS foundations may be installed behind the retaining wall and within the slope.

Photo 15 - Looking West within "Post" Interlocking

Wire Configurations

The existing Track 1 and 2 OCS is comprised of five individual autotension wire runs plus the crossovers. Structure replacements due to the installation of Track 4, as described earlier, will require advance installation of new hardware and the staged transfer of the OCS onto new structures, and conductor reprofiling. Analysis of the effects on balance weight and midpoint anchor assembly locations, and wire run lengths will be necessary to ensure sufficient coverage. The new Track 3, 4 and crossover OCS will be of the same simple autotension configuration as the existing, with approximately one-mile maximum tension lengths as per NEE standards. Work will include sectionalizing modifications in accordance with the new crossovers at "Packard", "Barden" and "Post". Verification of a sufficient number of poles to accommodate balance weights for Track 3 and 4 electrification will also be performed.

C. Other System Elements

For Alternate 1, sufficient right of way for the Wayside Power Cubicle, utility transformer and panels, Control Instrument House (CIH) and cable trays exists south of Track 2 at Packard (East) Interlocking. Interlocking lighting equipment will be installed on new portals and existing cantilever structures within the interlocking limits, with sectionalizing equipment located on the appropriate poles. C&S hut 175.9 (as well as the previously mentioned buried conductors) will need to be relocated due to new Track 4 impacts. Vehicle access exists at this location from U.S.1, midway between the Main Avenue and Airport Connector overhead bridges. Utility distribution is located

along U.S.1. For Alternate 4 at the expanded Packard Interlocking, the Track 1 side would be the most accessible for the Wayside Power Cubicle, utility transformer and panels, CIH and cable trays. Vehicle access would be from Post Road and the intersection of Locust Avenue and Brownlee Road (Track 1). Aerial utility distribution serves adjacent industries at this location. It should be noted that cross-track cabling would be necessary to tie both halves of the interlocking, as the existing wayside equipment lies along Track 2 east of the dual U.S. 1 overhead bridges.

Sufficient right of way for the wayside power cubicle, utility transformer and panels, CIH and cable trays exists south of Track 2 at Barden Interlocking. Interlocking lighting equipment will be installed on new portals and existing cantilever structures within the interlocking limits, with sectionalizing equipment located on the appropriate poles. This location is the eastern limit for relocation of the buried telecom conductors. For Alternate 1, vehicle access may be possible from the commercial development along U.S.1, one third mile west of the Lincoln Avenue undergrade bridge, and utility distribution is located at the intersection of Kentucky and Michigan Avenues. For Alternate 4 at Barden, vehicle access is presently available from the Kilvert Street Amtrak gate, and aerial utility distribution crosses the tracks at this location. An analysis of the existing equipment at Post Interlocking will be necessary to determine adequacy for the additional switch heaters, lighting and motor-operated disconnect switches, with upgrades or supplemental equipment installed as required. Additional lighting equipment and sectionalizing equipment will be located on the appropriate new poles along Track 3 and existing poles along Track 2.

D. Alternate Recommendation

The evaluation of the existing OCS and its compatibility with the Alternate 1 or 4 indicates that the OCS must be reconstructed regardless of the alternate selected by reconstructed. Critical to the reconstruction is the extent to which the reconstruction is extended not only for the catenary but also impacts to the Warwick Paralleling Station. In an effort to minimize impacts to the paralleling station and avoid work other than connection of feeders Alternate 4 is recommended with regard to the OCS and paralleling station.

VI. Signaling

The project proposes interlocking modifications to three existing interlockings along the NEC, “Packard”, “Post”, and “Cranston” Interlockings. In addition, the project proposes to add one or two proposed interlockings, called “Barden” and “Packard Extended”. Regardless of the alternate interlocking modifications are required.

The proposed track modifications will require adjustments, relocations, and reconstruction of portions of the communications and signaling equipment that exists today. The following section will focus on the impacts of the proposed design on the existing C&S infrastructure, as well as considerations for sight distances, vehicle performance requirements, and implications on operations of the proposed station.

The existing corridor through this segment is a 2-track corridor rated for a MAS of 160-mph. The existing T.F. Green Airport station is operated by MBTA, and Track 3 is only rated for a MAS of 50-mph.

A. “Packard” Interlocking – MP 175.0

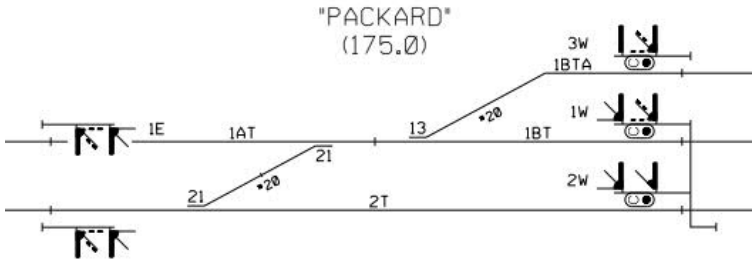


Figure 9 Existing Packard Interlocking

“Packard” interlocking is the western interlocking within the project area which connects NEC Tracks 1 & 2 with MBTA/P&W Track 3. Home signals 1E and 2E are high mast signals. Home signals 1W and 2W are mounted on a cantilever mast, while home signal 3W is on a high mast. The signal hut is located adjacent to 2E, while a cabinet is adjacent to the cantilever mast.

Although the two proposed track designs (Alternates 1 & 4) may impact the existing signal system facilities in different ways, the signal system block design and signal layout to serve the alternates are similar.

- In both alternates, Crossover 21 is to be replaced with a #32.7 crossover, roughly in the same place. This proposed crossover replacement will require relocation of 1E and 2E. Turnout 13 is similarly proposed to be replaced with a #32.7 turnout, with required movement of 3W to the east. The distant signals will be impacted due to the addition of Track 4 and extension of Track 3 platform.
- In Alternate 1, the proposed #32.7 Crossover 12 and the proposed #32.7 Turnout 24 would be incorporated in either an extension of the existing “Packard” Interlocking to the east or as an entirely new Interlocking.
- In Alternate 4, Crossover 12 will occur to the west of proposed Crossover 21 and Turnout 24 will occur roughly in-line with Turnout 13. Turnout 13 will be incorporated into “Packard”, however Crossover 21 could be an entirely new interlocking.
- Relocation of the signal hut will be necessary in Alternate 4, but potentially could remain in place in Alternate 1.

The new and modified signaling proposed in support of new Track 4 at the T.F. Green Airport Station will be based on the concepts shown in the schematic drawing “Typical 80-mph Diverge Station Siding” provided with the Task Order Scope of Services. The proposed #32.7 MPF turnouts and crossovers will provide for 80-mph diverging speeds.

For both alternates, as it is expected that new eastward home signals on Tracks 1 and 2 and new westward home signals on Tracks 1, 2 and 4 will be required regardless of either an extended interlocking or an entirely new interlocking being established, operationally there appears to be no meaningful difference in extending “Packard” to include the new movements or creating a separate interlocking. The separate interlocking approach, however, is expected to be more ACSES compatible, and will appear as a standard nested signal application for Positive Train Stop at the second home signal (both eastward and westward).

Present westward distant signals to “Packard” on Tracks 1 and 2 (1767-1 and 1767-2), and the eastward distant signal to Post on Track 1, are expected to retire, with the new home signals between Packard and Post providing appropriate distant aspects instead. Only the respective distant signals on Track 3 are expected to remain, since there are no new interlocking home signals being added on Track 3 in this section.

The proposed electric-locked hand-operated Gauntlet Track switches on present Track 3 are not in service, although signal system revisions had been designed to incorporate these. The fact that this Gauntlet Track is not proposed to be interlocked and has not yet been placed in-service after many years, would seem to indicate that this is only expected to be used very infrequently and that alternate routing can adequately handle the limited need. None of the Track and signal changes being proposed herein appear to affect placing the Gauntlet in service as originally intended (with electric-lock hand-operated switches). Optionally the Gauntlet Track could be interlocked, whereupon the existing distant signals on Track 3 could be converted to home signals to govern over the interlocked Gauntlet switches.

B. “Post” Interlocking – MP 178.5

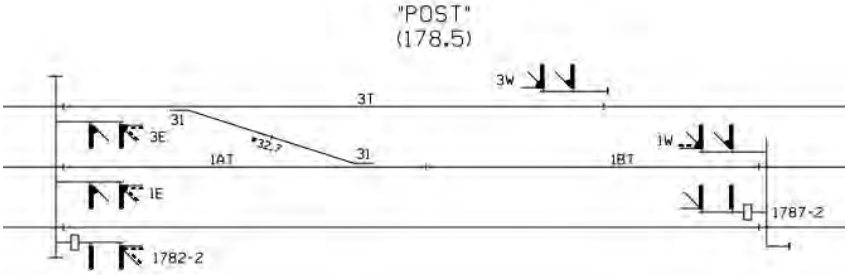


Figure 10 Proposed Post Interlocking

“Post” Interlocking is the eastern interlocking in the project area connecting Track 3 to Track 1 which connects NEC Track 1 with MBTA/P&W Track 3. Home signals 1E and 3E are mounted on a signal bridge with distant signal 1782-2. Home signal 1W is mounted on a cantilever mast with distant signal 1787-2, and home signal 3W is on a high mast. The signal hut is located at the eastern switch point for Crossover 31, and cabinets are located at both the signal bridge and cantilever mast.

In both alternates the design for “Post” interlocking is the same, and the varying location of “Barden” to the east is not anticipated to affect the design of the signals for “Post”.

- Crossover 31 is to remain in place. It is anticipated that the existing signal bridge can remain, and new home signal 2E to replace distant signal 1782-2.
- Proposed #32.7 Crossover 12 is to be installed east of Crossover 31. The proposed crossover will require relocation of the cantilever signal mast, plus a new home signals 2E and 2W. Distant signals 1790-1, 2, & 3 shall remain in place.
- Signal 3W to remain in place.

The proposed #32.7 MPF crossover will provide for 80-mph diverging speeds. For both alternates, existing “Post” Interlocking will be modified to add an eastward home signal on Track 2 (location

and mounting to be determined), with a new westward home signal bridge or cantilever placed east of the new #32.7 Tangential crossover between Tracks 1 and 2. The present bridge mounted westward signal 1W, which is shown to be west of the proposed new crossover, to be retired and replaced by the new 1W signal at the new home signal location.

C. "Barden" Interlocking (Proposed)

The proposed "Barden" Interlocking will be located where Track 4 connects with Track 2 to the east. The proposed signal system to be designed will provide a #24 (Alternative One) or #20 (Alternative Four) turnout on Track 2. The new #24 (Alternate 1) or #20 (Alternate 4) turnout will provide an 60-mph or 45-mph, respectively, converging route from Track 4 to Track 2, with the intention of not limiting trains accelerating from a station stop and expected to be the normal eastward move for trains stopping at the T.F. Green Airport Station. *It must be noted that this does not meet the original project criteria for 80 mph MAS on Track 4. This change has been per a final review comment.*

In Alternate 1, Turnout 42, and subsequently "Barden" Interlocking will be located at MP 177.2, east of Coronado Rd overhead bridge and west of Lincoln Ave undergrade bridge.

In Alternate 4, "Barden" will be located at Coronado Road (MP 176.7), with east signals at the end of the platform and the west signal east of Coronado Road.

The proposed home signals for "Barden" will likely locate home signals 2E and 4E on a cantilever signal mast west of Turnout 42. Home signal 2W will be mounted on a high mast east of Turnout 42. Signals in "Packard" and "Post" will act as distant signals for "Barden", no matter the final location of "Barden".

D. "Cranston" Interlocking (MP 181.2)

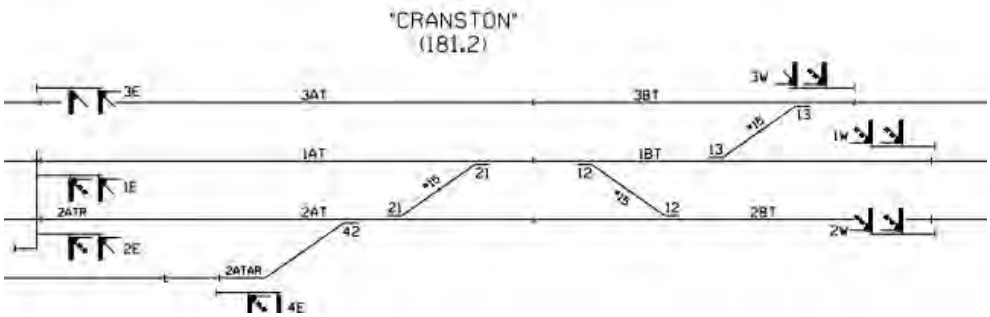


Figure 11 Existing Cranston Interlocking

"Cranston" Interlocking is east of the project area but represents additional improvements Amtrak desires to complete alongside the design improvements within the project area. Conceptual design of the geometry or exact position of the proposed improvements to "Cranston" have not been completed, therefore the exact modifications to the signal system cannot be determined at this time.

The proposed improvements to "Cranston" include the removal of Crossover 12, and the replacement of Crossovers 21 and 13 with #20 Crossovers. Turnout 42 is to remain in place; therefore, the extended length of Crossover 21 must push to the east. It isn't known at this time if there is sufficient room to maintain the western signals (1, 2, & 3) in their current place and account for the extended length of Crossover 13 to the west where Crossover 12 was removed, however it is likely that this will be the end result.

With these changes, the existing signal locations are anticipated to remain in place.

E. Braking & Acceleration Distances

With the addition of Track 4 in this project, it is important to provide safe stopping distances for the planned speed of the Track. The proposed MAS for Track 4 is 80-mph, as dictated by the turnout equipment as designed.

Following Amtrak Standard Signal Plan SP603, the required stopping distance for the AEM-7 vehicle is 4,957 equated (grade compensated) feet, with an average performance of 3,215 feet. Similarly, the required stopping distance for non-Amfleet equipment (CE-205) is 6,250 equated feet, with an average performance of 4,266 feet. Therefore, the controlling criteria to determine stopping distance is 6,250 feet. The concept of exiting Track 2 at the full 80-mph speed through the #32.7 turnout and coming to a complete stop at the station is based on having one train length (assumed 755 feet) plus safe braking distance available between the opposing exiting signals of the bounding interlockings. Therefore, the ideal distance between home signals on Track 4 is 7,027 feet.

With the shift of “Barden” to the east in Alternate 4, it also must be noted that there is insufficient room to accelerate from a stopped condition to 80-mph in order to enter NEC Track 2 (MAS of 160-mph) at 80-mph. This will have operational considerations to study that are outside the scope of this report.

F. Alternate Recommendation

Alternate 4 is the preferred or recommended alternate, however based on the issues of acceleration, full operational modeling for the alignment should be performed at 30% to validate operations from the station from Track 4 to Track 2 are acceptable.

VII. Structures

There are seven existing overhead bridges and an existing air-rights parking garage structure throughout the project area. Clearance checks were performed for the existing structures based on limited field measurement and available existing documents. Substandard horizontal clearances were measured in several locations and based on the proposed electrification design the vertical clearances will not compile with the Amtrak minimum standard underclearance of 22'-0" from top of rail to underside of structure, see Amtrak Standard Track Plan Minimum Roadway Clearances, Dwg. No.AM70050G, dated May 11, 1999. Three approaches were evaluated to obtain the required vertical and/or horizontal clearances at each bridge.

A. Overall Approach to Clearance

The initial and primary approach is to obtain vertical clearance improvements by lowering the existing track.

- In cases where large vertical clearance improvements are necessary, long vertical curve lengths will be required to accommodate the Maximum Authorized Speed (MAS).
- In areas such as noted in the first bullet lowering of the track will be significant, it is necessary in the future to investigate and determine how much ballast/soil can be removed to avoid comprising the track structure, exposing or undermining the footings of the piers/abutments of nearby bridges and inadvertently creating drainage issues.
- Jacking of the existing bridges was investigated, with the intention to alleviate the need to lower the track and negate reconstruction of overhead bridges. However, with a target raise of 4" to 6" for vertical clearance improvement, this approach would only be viable for T.F. Green Airport Connector Road since the additional vertical clearance required in that area is only about 2".
- If improved lateral clearance is required, bridge replacement will be required at Coronado Road and Route 37 Northbound and Southbound. The existing southside pier at Coronado will conflict with Track 4 in Alternate 1 and the lateral clearance at the Route 37 dual structures is under 8'-6" minimum specified by Amtrak. Additionally, the southside of the TF Green parking Garage will need to incorporate crash protection.

Approaches	Meet or Exceed Vertical Criteria	Meet or Exceed Horizontal Criteria
Lowering the Track	Yes	No
Jack bridge & Lower Track	Yes	No
Bridge Replacement	Limited	Yes
Bridge Replacement & Lower Track	Yes	Yes
Crashwall	No	Yes

B. Structure Protection

In accordance with AREMA Volume II Chapter 8, Part 2.1.5.1 bridge piers 25' or less from centerline of track are to be of heavy construction or protected by a "Crashwall". For crash walls to be considered sufficient, they must have a thickness of at least 2'-6" and composed of solid, heavy construction. The height of the crash wall in relation to the top of rail differs with the proximity to the

centerline of track. Crash walls less than 25' to the track centerline should be at least 6' above the top of rail and crash walls less than 12' from the track centerline should be at least 12' above the top of rail.

The existing Bridges at Route 37 have integral crashwalls which may need to be modified. As noted above the existing southside garage has no crash walls and if a 4th track is constructed the lateral clearance will be approximately 8'-6" and necessitate some type of integral crash wall. Coronado Road Bridge in Alternate 4 will require some type of supplemental protection for the solid pier as clearance will be reduced to approximately 11' at the tightest point.

C. Overhead Structures

1. Main Avenue Overhead Bridge

Photo 3 - Main Avenue OHB

Photo 2 - Aerial View of Main Avenue OHB

a. Existing Conditions

Main Avenue crosses the right-of-way as a five-lane simple span overhead bridge (OHB) with several intersections within 200' of the bridge. Beneath Main Avenue Bridge, Tracks 1, 2 and 3 all pass beneath the bridge. The vertical and horizontal clearances of the exterior tracks 2 and 3 are provided below. The existing lateral track clearances are to solid concrete bridge abutments and do not require "crashwalls".

Track	Vertical Clearance	Horizontal Clearance
Track 2	20'-5"	30'-6"
Track 3	21'-5"	19'-6"

b. Proposed Condition

The alignment for Track 3 has been adjusted to meet the required MAS of 80-mph, additionally Track 3 will accommodate a Plate-J and OCS vertical underclearances at Main Avenue Bridge, provided low clearance catenary supports are utilized. Existing horizontal clearances from the track centerlines to the abutments meet the criteria for lateral/horizontal clearance and as such the bridge is adequate as is. As the abutments on both sides of the right-of-way are solid

concrete wall abutments of heavy construction crash walls are not required. A comparison of the Track Alternates for the alignment at the bridge is provided below.

	Alternate 1 (16' o.c.)	Alternate 4 (14' o.c.)
Vertical Clearance (from TOR to BOS)	Existing conditions sufficient for Plate-J	Existing conditions sufficient for Plate-J
Horizontal Clearance (from centerline of Track 3 to nearest Abutment)	Existing conditions sufficient for Plate-J	Existing conditions sufficient for Plate-J

TOR – Top of Rail

BOS – Bottom of Steel

2. T.F. Green Airport Connector Road Overhead Bridge

Photo 18 – T.F. Green Airport Connector Road OHB

Photo 4 – Aerial T.F. Green Airport Connector Road

a. Existing Conditions

T.F. Green Airport Connector Road crosses the right-of-way as a seven-lane overhead bridge with the exterior two lanes connecting to Post Road and the other lanes tying into the TF Green access ramps. Existing vertical and horizontal conditions of the tracks under T.F. Green Airport Connector Road overhead bridge are as follows,

Track	Vertical Clearance	Horizontal Clearance
Track 2	19'-1"	31'-0"
Track 3	21'-3"	26'-0"

b. Proposed Design

Vertical clearances can be obtained by lowering the track and lateral clearance requirements can be adjusted depending on the situation. Based on the OCS and Plate-J vertical clearance requirements with the utilization of low clearance catenary supports, Track 3 needs to be

lowered approximately 3” in this area. Due to the proposed vertical geometry constraints, an additional lowering of 1.5” is needed. Track 3 under T.F. Green Airport Connector Road would need to be lowered approximately 4” to account for OCS and vertical track geometry. Since Track 1 is constrained by Track 3, both tracks would be lowered approximately3.5” to 4”. Vertical clearances are measured from the top of rail (TOR) to the bottom of structure (BOS). In relation to T.F. Green Airport Connector Road overhead bridge, both Alternates provide the same solution. The only difference between the Alternates is the lateral distance between the proposed Track 4 centerline and the existing nearest bridge abutment. In Alternate 1, the bridge abutment would have a lateral clearance of approximately 11’-6” from proposed Track 4 and in Alternate 4, the bridge abutment would have a lateral clearance of approximately15’-6” from the centerline of proposed Track 4. Based on the preliminary field views the abutments are solid concrete walls and do not require crashwall protection.

Comparison	Alternate 1 (16’ o.c.)	Alternate 4 (14’ o.c.)
Vertical Clearance (from TOR to BOS)	Lower Track 1 & 3 3.5”	Lower Track 1 & 3 3.5”
Horizontal Clearance (from Centerline of Proposed Track 4 to Nearest Abutment)	Existing conditions sufficient for Plate-J	Existing conditions sufficient for Plate-J

3. T.F. Green Parking Structure

Photo 20 - Trackbed of Proposed Track 4 Beneath T F Green Parking Garage Looking West

a. Existing Conditions

The T.F. Green Station Garage was built in the year 2010 in conjunction with the construction of existing Track 3 platform. The existing vertical clearances within the structure are enough to accommodate electrification of Track 3 according to the project requirements. The horizontal clearance of the structure from the track was established to accommodate a 4th track at a distance of a maximum of approximately 14’-0” from the existing NEC Track 2. Based on Amtrak’s current Specification #63 design standard this lateral track spacing is substandard and will require a Design Exception as part of Alternate 4. Tracks under T.F. Green Parking Garage are as follows, in the table below.

Track	Vertical Clearance	Horizontal Clearance

Track 2	28’-10”	27’-3”
Track 3	26’-12”	5’7” to platform

b. Proposed Design

The T.F. Green Garage differs from the other structures that are discussed in this study in two main ways. The relatively modern parking garage structure does not limit vertical clearance requirements as many of the overhead bridges do, but instead restricts Track 4 horizontal clearances. The original construction accommodates catenary via existing portal structures. Also, the existing face of the garage adjacent to Track 2 is constructed of spandrel panels and precast concrete beams supporting the 5-story parking structure. The centerline of proposed Track 4 in Alternate 1 is located approximately 8’-4” from the existing southern face of the garage structure. As this clearance is below the state minimum required clearance of 8’-6” modifications to protect the precast structural elements of the garage will be required. Further investigation of the existing support and foundation system will be required to determine the possibility of altering the load paths. Conversely, Alternate 4 was designed to maintain minimum required clearance to the garage and allow enough space for the installation of a 2’-6” thick crash wall that is independent of the existing structure. All existing vertical clearances exceed the criteria for OCS structures.

Comparison	Alternate 1 (16’ o.c.)	Alternate 4 (14’ o.c.)
Vertical Clearance (from TOR to BOS)	Existing conditions sufficient for Plate-J	Existing conditions sufficient for Plate-J
Horizontal Clearance (from centerline of proposed Track 4 to Structure)	Bridge replacement	Install Crashwall for final clearance of 8’-4”

4. Coronado Road Overhead Bridge

Photo 21 - Coronado Road OHB

Photo 5 - Aerial View of Coronado

a. Existing Conditions

Coronado Road crosses the right-of-way as a two-lane overhead bridge and serves to connect Kilvert Street to the west and Post Road to the east. Existing vertical and horizontal conditions of the Tracks under Coronado Road overhead bridge are as follows, in the table below.

Track	Vertical Clearance	Horizontal Clearance
Track 2	19'-10"	22'-4"
Track 3	21'-8"	12'-8"

b. Proposed Design

Coronado Road is constrained by the steep grades on both sides of the bridge with minimal room to tie back into the existing grade. Existing vertical clearance requirements are sufficient for the use of Plate-J and the installation of Catenary via the use of low clearance supports. Bridge replacement is required to obtain horizontal clearances for Alternate 1 as proposed Track 4 lay-out provides for tie-in to Track 2 approximately a half-mile east of the Coronado Road overhead bridge. Without any adjustment to the structure and still providing 16' track centers, the proposed Track 4 would have a horizontal clearance of approximately 4' from centerline of track the nearest point on the pier. This clearance is below the state minimum required clearance of 8'-6" and will actually foul the tracks. Therefore, bridge replacement is the only option to meet horizontal clearance requirements in Alternate 1. Reconstruction of the bridge, at a minimum, should have a lateral clearance of 25' on both sides of the right-of-way to the proposed abutments. This would result in a new bridge span of 98' clear perpendicular to the tracks which when accounting for the bridge skew would be a span in excess of 135'. Standard length to depth ratios for a bridge of this length would necessitate track lowering of approximately 2'6" to 3' in order to avoid reconstruction of the bridge with excessive steep approach roadway grades In the case of Coronado Road, Alternate 4 differs from Alternate 1 in that proposed Track 4 ties back into the existing Track 2 at approximately Coronado Road, therefore the lateral clearance while not meeting 25' clearance to the pier will exceed the minimum requirements of 8'-6" is no need to pursue additional horizontal clearances. The existing hammerhead pier on the southside of the right-of-way adjacent to Track 4 is currently anticipated to require crash wall although further analysis is recommended as the design progresses to determine if adequate structural capacity is available or if the wall is definitively required.

Comparison	Alternate 1 (16' o.c.)	Alternate 4 (14' o.c.)
Vertical Clearance	Existing conditions sufficient for Plate-J	Existing conditions sufficient for Plate-J
Horizontal Clearance (from Centerline of Track 2 to nearest abutment)	Bridge Replacement	Existing conditions sufficient for Plate-J

5. Route 37 Northbound and Southbound Overhead Bridges

Photo 6 - Route 37 OHB (NB closer; SB farther)

Photo 7 - Aerial View of Route 37 NB & SB

a. Existing Conditions

Route 37 Northbound and Southbound bridges cross the right-of-way as a three-lane three span overhead bridges with direct connection to Interstate 95. Existing vertical and horizontal conditions of the Tracks under Route 37 Northbound and Southbound overhead bridges are as follows in the table below. The existing support consists of a stub abutment at each end of each bridge along with intermediate piers with integral crash walls

Track	Vertical Clearance	Horizontal Clearance
Track 2	21’-4”	12’-4” to pier
Track 3	21’-4”	8’-7” to pier

b. Proposed Design

Route 37 Southbound is constrained by Route 37 Northbound due to the constructability of the track geometry. Due to OCS and Plate-J requirements, track beneath Route 37 Northbound bridge needs to be lowered by about 1’-3” while at the southbound bridge, track only needs to be lowered about 1” to achieve vertical clearances. However, since the bridges are only 250’ apart, both tracks beneath both bridges would have to be lowered by approximately the same amount due to the proposed geometric constraints of the MAS for the tracks. Therefore, Track3 would need to be lowered approximately 1’-6” to account for OCS and vertical Track geometry. Track 1 is constrained by Track 3 and would be lowered approximately 1’-6” as well. As shown in the table below, lowering of the Track is independent of the alignment Alternate selected.

The existing horizontal clearance from the centerline of Track 3 to the nearest pier is 6’-7”, which is below the state statue. In this case, replacement of both the north and south bound bridges would be required to achieve the statutory minimum lateral clearance of 8’-6”. Reconstruction of the bridge to a minimum lateral clearance of 25’ to each pier would increase the center span by 31’ to a total span length of approximately 78’. Reconstruction of the entire bridge is not anticipated due to tie-ins to the interstate system and as such track lowering is currently the proposed method for improved clearance. If the bridge is to be reconstructed a three (3) span continuous structure would be required to enable the required vertical underclearance be achieved via a combination of structure reconstruction and track lowering.

Additionally, it would be recommended that the lateral clearance be improved via the use of crashwalls set a 12' lateral clearance thereby minimizing the roadway vertical adjustment.

Comparison	Alternate 1 (16' o.c.)	Alternate 4 (14' o.c.)
Vertical Clearance	Lower Track 1 and 3 1'-6"	Lower Track 1 and 3 1'-6"
Horizontal Clearance	Bridge Replacement or do not reduce existing lateral clearance	Bridge Replacement or do not reduce existing lateral clearance

D. Alternate Recommendation

Based on the evaluation of structure clearances Alternate 4 eliminates or minimizes reconstruction or rehabilitation work along the corridor. The elimination of structural conflicts and reconstruction of structures, which are in fair to good condition, is desirable and apart from Route 37 bridge piers with close lateral clearance is a benefit to the project. Alternate 4 is the recommended alternate based on the structural evaluation.

VIII. Civil

A. Right of Way Security Fencing

The addition of Track 4 to the existing ROW will require reconstruction of the existing fence line in several locations along the length of Track 4. Post and panel fencing is recommended along the length of the ROW for increased safety and security. New access gates will be required east of the proposed station platform where the existing ROW fence line is within 20-25' of the existing location of Track 2. Relocation of landscape fencing installed in the vicinity of Warwick Paralleling Station would be required to expand the existing OCS dead section to include proposed Track 4. ROW fencing may also be required between the access point near Kilvert Road and proposed "Barden" Interlocking and in the area near Main Ave at the beginning of Track 4 and proposed "Extended Packard" interlocking.

Photo 8 - Security Fencing

B. Drainage

An approximation has been made for the drainage design based on two main considerations. It is assumed that drainage will be required for the full length of track lowering. A 10" PVC perforated underdrain is proposed with 3 new outfalls. Given the relatively small increase in runoff expected from the additional impervious platform and station area proposed along Track 4, stormwater will be collected and diverted into the existing drainage systems of the parking structure. Below are the approximate length of underdrains required and the number of catch basins

	Main Avenue	T.F. Green Connector Road	Coronado Road	Route 37
Length of Underdrain	3000'	3637'	2463'	3429'
# of Catch basins	60	73	49	69

Note: This drainage design is an estimation only. Further investigation into drainage requirements will be required in 30% design.

C. Utilities

As a result of the significant proposed track lowers, several existing utilities will need to be adjusted in order to provide sufficient clearance (5'-6" from bottom of tie) in accordance with Amtrak Pipeline Occupancy Specifications. Below is a list of the affected utilities and their clearances to the top of rail.

Utility Type	Station	Elevation of Pipe	Proposed Elevation of Track	Clearance from Pipe to Track
24" SP	2748+10.00	43.0	44.47	1.47
W 16" CI	2749+50.00	44.3	44.91	0.61

TEL 2 WIRES 6 DUCTS	2816+71.00	64.5	61.29	-3.21
STONE BOX	2874+90.00	44.5	47.61	3.11
36" SP	2876+47.00	40.3	46.54	6.24
W 6" ACP	2892+60.00	44.5	47.48	2.98

Note: This table does not include a number of utilities that do not have a known elevation. As per the Amtrak Pipeline Occupancy Specification a minimum clearance of 5'-6" is required from top of pipe to bottom of tie. Any utilities that do not meet this requirement will need to be adjusted accordingly.

In addition, there is an MCI Fiber Optic Cable which runs parallel to Track 2 in the approximate ranges of "Packard" Interlocking to "Post" Interlocking. This cable will need to be relocated in order to install the proposed Track 4. The cable will need to be shifted to the field side of proposed Track 4. Also, alongside Track 4 is an overhead utility pole at Kilvert Road that will need to be relocated away from proposed Track 4.

Photo 9 - MCI Fiber Location & Fiber Communications Hut with Antennas

D. Excavation

Construction of the station/platform along with Track 4, the track lowering at Route 37, regrading for the track shifts, construction of interlockings, the drilled shaft excavation for new catenary structures and the wall along the southside right-of-way will generate spoils from a Railroad right-of-way. Removal of the spoils from the property will require extensive testing and regulatory permits adding extensive costs to the project.

Anticipated - approximate excavation

OCS - 2700 cy to 3200cy spoil

Track 4 & Track 2 Widening – 10000cy spoil

Track 1 & 3 lowering – 2400cy

Interlocking Grading – 4000cy

Station/Platform (option A) – 400cy

Total – 20000cy +/- x 20% factor for miscellaneous drainage etc. = **24,000 to 25,000** cy

Portions of the spoil could potentially be utilized for grading, backfill for the retaining walls and creation of berms or embankment type barriers along the right-of-way. Next steps would include soil sampling for environmental testing and determination of disposal requirements.

E. Alternate Recommendation

While both alternates create disturbance and require excavation for general grading as well as utilities, Alternate 4 does not required the same level of soil disturbance and potential utility impacts and therefore is recommended from a Civil aspect.

IX. Environmental Assessment

As part of the TF Green Airport Station Concept Design, AECOM reviewed the historic environmental documents applicable to the current proposed capital project. In review of these documents, AECOM has assessed the most probable requirements for either utilizing the previous study and any additional environmental work required. This section and the associated Environmental White Paper found in the appendices provides a recommendation for next steps for this project to take to seek National Environmental Policy Act (NEPA) approval.

A. Previous Studies

The Federal Highway Administration (FHWA) issued a conditioned Finding of No Significant Impact (FONSI) on July 6, 1999 for the Warwick Intermodal Station Environmental Assessment (EA) dated May 1999. The EA addressed a stand-alone, multi-level station and adjacent surface parking lot. On March 29, 2001, the Rhode Island Department of Transportation (RIDOT) submitted a reevaluation of this EA to the FHWA addressing a proposed consolidated car rental facility with an integrated station. The facility would accommodate commuter/Amtrak passenger parking and a consolidated rental car facility. Additional redesign from a value engineering exercise necessitated submittal of a second reevaluation to FHWA on March 20, 2002.

B. Comparison of Original EA to Current Design

While the purpose and need of the original EA remain viable for components of the current project, the scope of the original EA excludes critical aspects to the current design. Based on a review of the environmental impact categories assessed in 1999, the proposed scope of the current capital project does not fall within the original scope of preferred build alternative approved in the FONSI, nor was it evaluated at a later date as part of the two reevaluations that were performed. In addition, twenty years (20) have passed since the impact categories were evaluated, and any potential reevaluation would have to consider that timeframe in determining the applicability of the data to current conditions.

FHWA requires consultation prior to taking any significant action on a project with a previously approved environmental document to determine if that document is still valid. This process is known as reevaluation and is generally performed any time a significant action has been delayed longer than three (3) years or a significant design change occurs since the last approval.

The platform and station design would increase the platform length on the westbound track, construct a proposed platform on the eastbound track, improve the passenger experience by creating a waiting area shelter on the platform, and improved wayfinding for passenger circulation to the TF Green Airport. While the addition of a new Amtrak platform may still comply with the original purpose and need stated in the EA, consultation with FHWA would have to occur to determine if a reevaluation would be sufficient to cover these improvements under the original FONSI.

The track design would include electrifying Track 3 and constructing an electrified Track 4. The EA specifically states in section 2.4 that “the electrified rail shuttle between Providence and Warwick proposed by RIDOT has not been evaluated in this EA. If advanced by RIDOT in the future, it will be subject of a separate environmental analysis and documentation.” The EA further reiterates this point in section 2.4.3 that “the proposed electric shuttle train service between Warwick Station and Providence Station is not part of the Preferred Build Alternative in this EA. It is described here since the planning for it should be considered in the design of the Warwick Station.”

It is anticipated that any reevaluation of the original EA for the current project would require updates to all twenty-five (25) environmental categories, including significant changes to the following:

- Social/Environmental Justice

- Pedestrian and Bicycle Movement
- Air Quality
- Noise
- Traffic
- Ridership
- Water Quality
- Permitting
- Threatened Species
- Historic and Archaeological Preservation
- Hazardous Waste Sites
- Visual
- Energy
- Construction
- Access

A detailed list of each environmental category in the original EA was reviewed to identify what updates should be considered for the reevaluation process. The details of the investigation are included in the Environmental Assessment White Paper included in the Appendix of this report.

C. Conclusion and Next Steps

Twenty years (20) has passed since the original FONSI decision and its subsequent reevaluations and the proposed scope of work exceeds the scope covered in the original study; therefore, a new reevaluation would likely be required by FHWA. Any reevaluation would take into consideration specific information on development patterns of the last 20 years and the completion status of the mitigation measures which were detailed in the FONSI.

Once the conceptual design process for the TF Green Warwick Station has progressed sufficiently to an agreed upon preferred alternative with all stakeholders, the scope of this project should be presented to FHWA to determine if the project elements fall within the scope of the original EA. Depending on the outcome of this federal agency coordination, the original EA categories should be analyzed for significant changes according to the scope of the preferred alternate, and a reevaluation submitted or a new NEPA analysis commenced to determine if a CE, EA or EIS will be required to advance NEPA approval. Given the scope of Alternate1 and 4, and the presumption of no new significant impacts are resulting from the proposed design, it is AECOM's professional opinion a CE would be required as a new undertaking to meet the reevaluation process. This is subject to lead federal agency concurrence.

X. Constructability

The construction of a proposed T.F. Green Airport stop along Amtrak's Northeast Corridor has the potential to either greatly impact Amtrak's level of service during construction or suffer significant delays greatly inflating the cost of the project. The project is located along a segment of the northeast corridor with few access points and limited available right-of-way. In order to mitigate delays and maintain acceptable train service throughout construction, coordination between the project stakeholders to provide the contractor with adequate access, staging areas, delivery and stockpile areas, and track time is critical.

A. Site Access & Contractor Work Areas

The project corridor runs along the NEC between Route 1 (Post Road Extension) and the Pawtuxet River. On either side of the ROW along this segment is a mixture of residential, industrial, and commercial properties, as well as a solar farm, a cemetery, and a baseball diamond. This dense development along the ROW limits options for contractor access and work areas. The following items address considerations for each type of construction proposed for the project:

- An existing corridor access point for maintenance vehicles is located between Route 1 OH Bridge and Main Ave, accessible via Route 1 SB lanes, immediately east of the NEC. This point likely could provide access for the contractor to the west end of the project; however, equipment may have difficulty crossing the multiple overhead structures and various existing cabinets and bungalows along the ROW.
- Bulk material deliveries must be planned in order to take advantage of the limited stockpile areas available to the project. Staging of materials and construction of track panels and OCS & C&S Structures should be done along the ROW wherever possible.
- Deliveries via rail to the edge of the ROW should be considered wherever possible.
- Cranston and Davisville Yards, as well as the T.F. Green Parking Garage all have potential to provide limited space for contractor administration/trailers, contractor parking, deliveries, and material stockpile or laydown.
- Platform and station elements will be delivered, stockpiled, and staged in the immediate vicinity of the T.F. Green Airport Parking Structure, with access provided via Glenham Avenue. This may require a construction easement through the adjacent property, repurposing the existing garage entrance as a construction entrance.
- All track construction activities are likely to be staged out of Cranston or Davisville Yards, with potential to dispatch on-track equipment from these points as required. Track materials will be staged along the edge of the ROW in order to speed up production and reduce outages required to construct the track. Ballast will be stockpiled at points along the ROW in non-outage timeframes to be available for the next outage. Track will be constructed in panels and staged along the ROW as well to be lifted into place during the next outage.
- OCS and C&S poles and structures will require heavy equipment accessing the length of the proposed corridor. This access will be primarily via Amtrak's maintenance road along the length of the ROW or on-track equipment. Staging of the construction of the proposed portals, cantilevers, and poles will be along the edge of the ROW, with erection requiring single track or full corridor outages.
- Grading operations taking place on the ROW will produce spoils which must be deposited along the ROW. Location for the spoils to be determined by Amtrak, and temporary stockpiles of spoiled material will be located on-site. These temporary spoil piles must not block other simultaneous or subsequent activities.

B. Construction Phasing

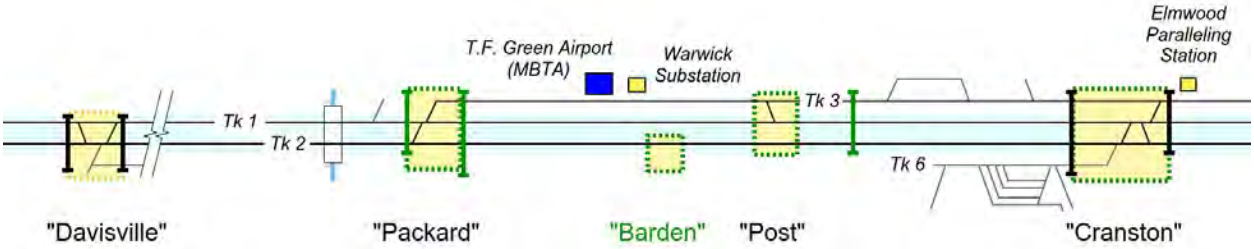
The correct phasing of any construction project on the NEC is important to minimize impacts to railroad operations. Work within the ROW, but further than 10 ft from the field side of the nearest track can occur during revenue service with the use of flagmen and slow-order operations.

However, work within the footprint of the tracks will be more disruptive to revenue operations and require outages.

AECOM has developed a preliminary phasing concept to attempt to minimize operational impacts and maximize efficiency of construction operations. Nevertheless, this project proposes changes to the NEC that require extensive construction operations where single- or multiple-track outages and slow-order operations will be sought. Short-term, likely overnight, 4- or 6-hour outages will be required to erect any structural members spanning the ROW such as OCS portals, Signal bridges, or overhead bridge beams. It is unlikely that extended outages of the corridor will be available; therefore, 55-hour, single-track outages will be necessary in order to perform certain lowering operations and turnout replacement operations.

The phasing shown below is analogous for both Alternate 1and Alternate 4, unless otherwise noted. These diagrams show overall phases without showing individual steps. It is anticipated that all special trackwork modifications must be limited to a single interlocking at a time, maintaining adjacent interlockings for service. In addition, crossover reconstruction in “Cranston” interlocking should be considered independent of this project in order to provide for crossover movements between tracks while “Packard” and “Post” are under construction.

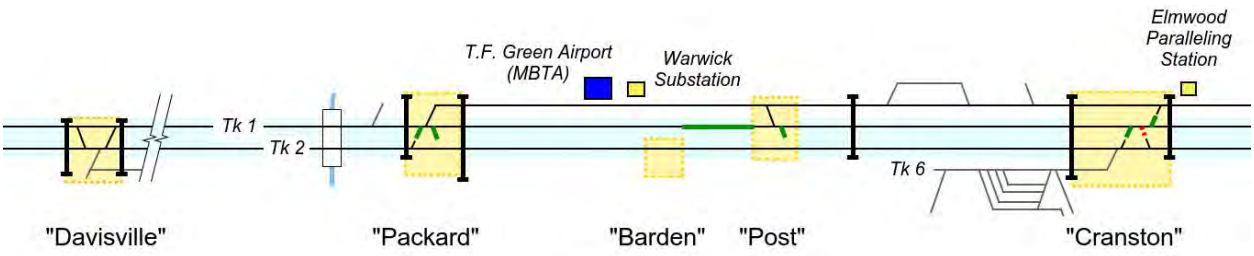
1. Phase 1



Phase 1 includes the preparation of all the systems along the ROW, the construction of required retaining walls, and the relocation of existing utilities and drainage.

P1-1. Construct proposed OCS portal structures, cantilever structures, and stub poles along the ROW.
P1-2. Construct proposed signal bridges and cantilever signal structures. Relocate or place new signal aspects.
P1-3. Reconstruct Feeder Structure at Warwick Paralleling Station and rewire feeder wires. <Phase 1 Only>
P1-4. Under limited outages, hang new registers on string proposed catenary wires across new structures. Transfer wires from existing registers and cut over to new registers. Remove old registers and demolish existing OCS cantilevers and any overhead spans on Tracks 1 & 2. String wires for Tracks 3 & 4, but do not profile catenary or connect to power source.
P1-5. Move signal bungalows and cabinets as required along the ROW. Install proposed communication and signal cables as required outside the footprint of proposed tracks. Provide power to proposed structures and switch locations.
P1-6. Construct soldier pile and lagging retaining walls along the ROW as required.
P1-7. Relocate utilities as required. Abandon relocated utilities in place for removal in subsequent phases.
P1-8. Remove remainder of existing OCS cantilever and portal structures. Demolish foundations to a depth as required for proposed corridor improvements. Bury remaining foundations.

2. Phase 2



Phase 2 consists of lowering Track 1 approximately 15” under Route 37 overhead bridge.

P2-2. Under a short-term, single-track outage, begin single track NEC service along Track 2 between “Davisville” and “Cranston” interlockings. Suspend MBTA service to T.F. Green Airport stop. Service on Track 2 will be slow-order, and construction operations must stand down as trains pass on Track 2.

P2-3. Cut and remove track lowering segment of Track 1 in the vicinity of Route 37 overhead bridge. Place skeleton track along edge of ROW without disassembling. Excavate ballast, subballast, and subgrade as required.

P2-4. Prepare subgrade for lowered Track 1. Lay subballast and ballast. Lift the track sections back into place and weld into place. Place final ballast, line track, and regulate the ballast.

P2-5. Adjust OCS system, replacing registers and reprofiling the wire as required.

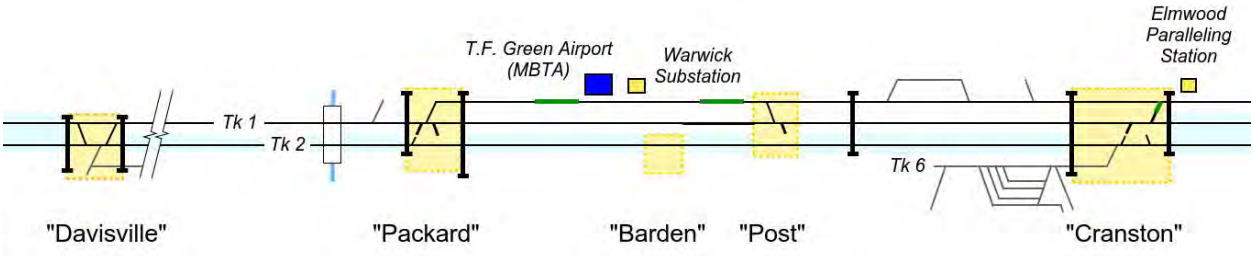
P2-6. Return Tracks 1 & 3 to revenue service.

P2-7. Under 55-hour weekend outages, cut and remove existing track and/or turnouts from Track 1. Install single turnout each weekend outage. Crossovers to be left incomplete until subsequent phase, and switches to be locked in tangential route. Return Track 1 to revenue service after the installation of each turnout.

P2-8. Under limited outages, connect new turnouts to communications and signals infrastructure installed in Phase 1. Perform testing on C&S system.

P2-9. Switch Track 1 to proposed signal aspects. Remove remaining existing aspects. Remove any existing signal structures adjacent to Track 1 where possible.

3. Phase 3



Phase 3 includes the lowering of Track 3 approximately 15” under Route 37 overhead bridge, lowering Track 3 approximately 3.5” under T.F. Green Connector Rd, realigning Track 3 for 80-mph, and finally electrifying Track 3 for use by Amtrak’s Northeast Regionals.

P3-1. Suspend MBTA service to T.F. Green Airport stop. Service on Track 1 will be slow-order, and construction operations must stand down as trains pass on Track 1.

P3-2. Cut and remove track lowering segments of Track 3 in the vicinity of Route 37 and T.F. Green Airport Connector Road overhead bridges. Place skeleton track along edge of ROW without disassembling. Excavate ballast, subballast, and subgrade as required.

P3-3. Prepare subgrade for lowered Track 3. Lay subballast and ballast. Lift the track sections back into place and weld into place. Place final ballast, line track, and regulate the ballast.

P3-4. Return Track 3 to revenue service.

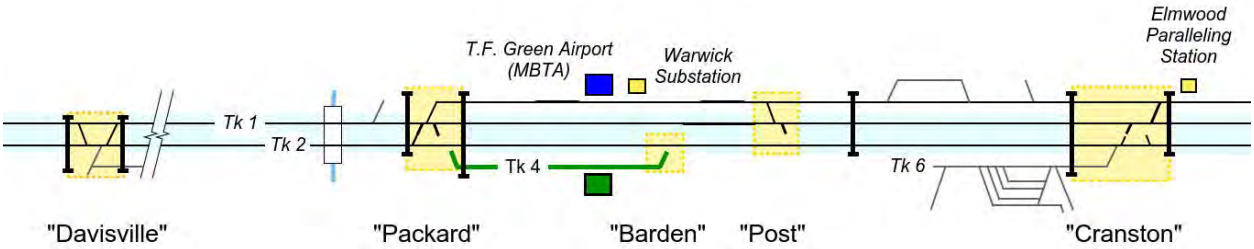
P3-5. Under limited outages, excavate adjacent to existing Track 3 to prepare subgrade for the proposed track shifts. Lay subballast and ballast sections as required.

P3-6. Shift track and line track to proposed 80-mph alignment.

P3-7. Install OCS registers and wires along Track 3. Tie into exiting catenary feeders, and profile wires for proposed Track 3 alignment.

P3-8. Open Track 3 to Amtrak revenue service.

4. Phase 4



Phase 4 begins the construction of the station and platform along proposed Track 4. Clearing, grading, and track bed preparation to occur between existing OCS poles still in use.

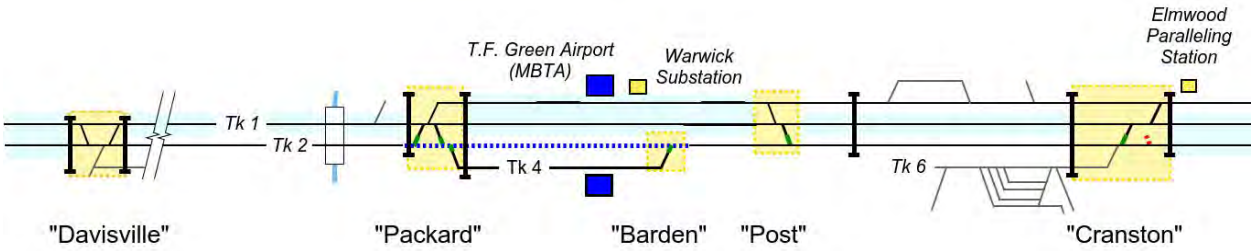
P4-1. Excavate and prepare subgrade for Track 4. Install proposed track drainage.

P4-2. Under limited outages, excavate adjacent to existing Track 2 to prepare subgrade for the proposed track shift. Layback slope according to Amtrak standards before returning track to service.

P4-3. Prepare Track 4 subballast and ballast sections. Complete grading adjacent to ballast sections. Construct Track 4 from last long tie on the western turnout to last long tie on the eastern turnout.

P4-4. Hang registers and catenary for sections of Track 4 completed.

5. Phase 5



Phase 5 shifts Track 2 and completes crossovers started in Phase 2 and Track 4 started in Phase 4.

P5-1. Under a short-term, single-track outage, begin single track NEC service along Track 1 between “Davisville” and “Cranston” interlockings. Service on Track 1 will be slow-order, and construction operations must stand down as trains pass on Track 1.

P5-2. Cut existing LH #20 crossover in “Packard” Interlocking. Shift Track 2 to achieve proposed track centers. Line track to proposed geometry.

P5-3. Adjust OCS registers and profile wires for proposed Track 2 alignment.

P5-4. Return Track 2 to revenue service.

P5-5. Construct proposed Track 2 turnouts for “Packard”, “Barden”, and “Post” interlockings in panels off-site, and stage alongside permanent location at the edge of the ROW.

P5-6. Under 55-hour weekend outages, cut and remove existing track and/or turnouts from Track 2. Install single turnout each weekend outage to complete crossovers installed in the previous phase. Make final connections to tie Track 4 into turnouts. Lock switches to tangential route. Return Track 2 to revenue service after the installation of each turnout.

P5-7. Under limited outages, install catenary equipment required for proposed turnouts and crossovers. Complete electrification of Track 4.

P5-8. Under limited outages, connect new turnouts to communications and signals infrastructure installed in Phase 1. Perform testing on C&S system.

P5-9. Under limited outages, install catenary equipment required for proposed crossovers. Complete electrification of all crossovers.

P5-10. Switch Track 2 to proposed signal aspects. Cover or remove existing aspects. Remove remaining existing signal structures.

P5-11. Unlock switches from Tracks 1 & 2. Return corridor to full revenue service.

C. Schedule

While the key aspect of this project is the development of an eastbound station stop at T F Green Airport for Amtrak Northeast Regional service the critical path is railroad operations and the construction of new Track 4 and the alignment and grading of existing tracks. Based on Alternates 1 and 4 concept designs, construction schedules have been developed to account for access, outages and interaction with all disciplines of work.

The critical work items for development of the schedules for both Alternates includes:

- Electrification of all tracks
- Track lowering of existing Track 1 and 3 in certain locations
- Reconstruction of three (3) interlockings
- Addition of one new interlocking
- Relocation of approximately four (4) miles of Fiber Optic Line
- Reconstruction of approximately four (4) miles of OCS

As discussed in the previous section, both Alternate 1and 4 have a similar construction sequence, therefore the schedule is similar as well. The schedules have been developed based on utilizing daylight as well as overnight and weekend work schedules with lower productivity rates. The critical path for all work in both Alternates is track and OCS construction. The schedules have been developed assuming significant overlap in phases of construction, along with taking advantage of multiple work crews. It is critical to note that the schedule while developed for a Design Bid Build Concept with an early or advance material procurement package for long lead track items could be readily approached as a Design-Build Concept where in the Design Builder procures the long lead items while advancing the design from a bridging document level and working on initial tasks such as grading and utility relocation. The following summary schedule shows the **basic order** of activities for both Alternates. Detailed schedules can be found in Appendix IV.

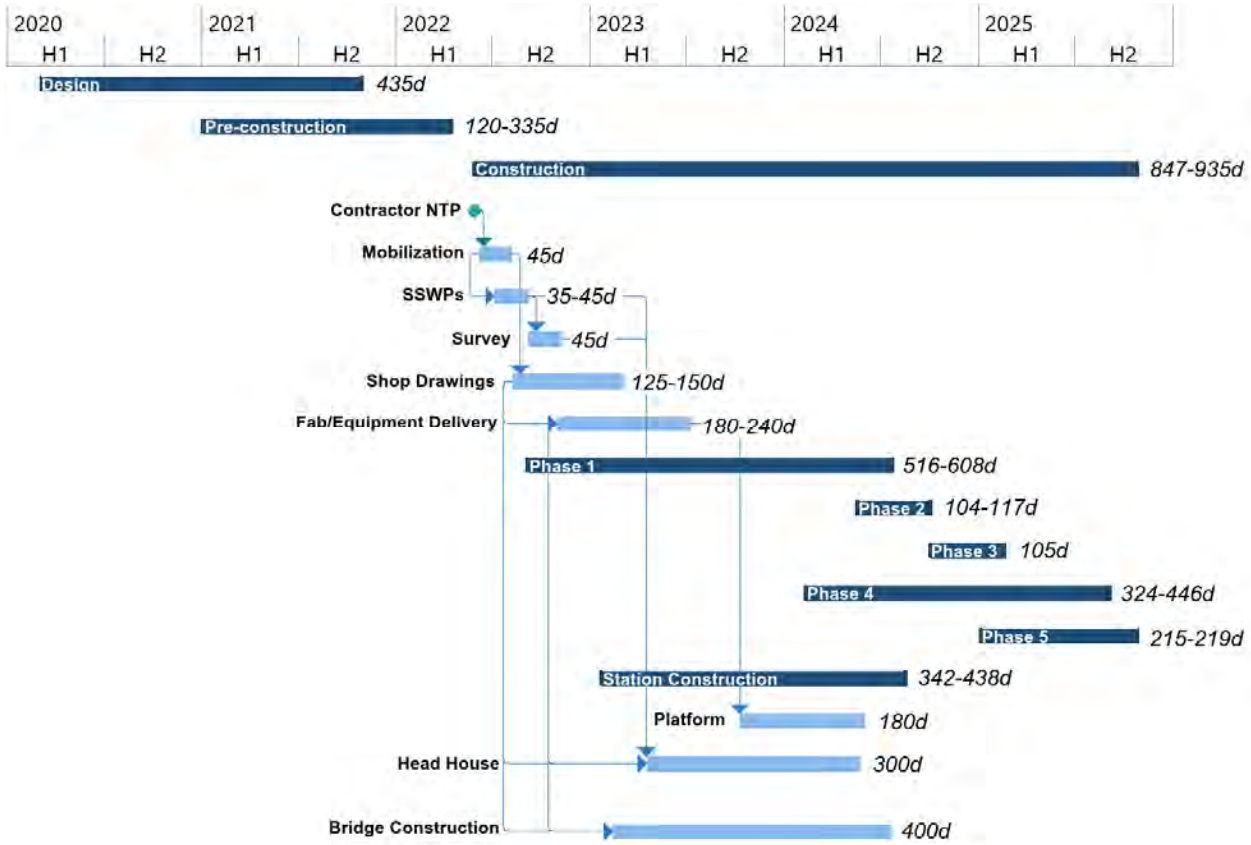


Figure 10 - Project Summary Schedule

The following table compares dates and durations for Alternates 1 and 4. This comparison of the schedules indicates Alternate 4 has an advantage from a schedule perspective due to the shorter duration and impact to operations; therefore Alterative 4 is the recommended alternate per the schedule analysis.

Schedule Comparison	Alternate 1	Alternate 4
Preliminary Engineering Completion	August 2020	August 2020
Final Engineering Completion	October 2021	October 2021
Contractor NTP	May 2022	May 2022
Phase 1 Completion	*July 2024*	*November 2024*
Phase 2 Completion	*October 2024*	*May 2024*
Phase 3 Completion	*February 2025*	*September 2024*
Phase 4 Completion	*September 2025*	*May 2025*
Phase 5 Completion	*October 2025*	*July 2025*
Station Completion	*August 2024*	*June 2024*
Construction Completion	October 2025	July 2025
Total Duration (Days)	**1520**	**1432**
Total Duration (Years)	**5.2**	**4.9**

D. Cost Estimate

The conceptual cost estimate for the two alternates was developed considering the level of design completed for the concepts and factoring in a contingency to cover the unknowns in the project. The quantification of each item depends highly on effort to-date in design for that item. The design for the track, station, and OCS elements of the project are substantially defined; while the work on the right-of-way, structures, drainage, and communications and signals systems have had much less detailed design performed.

While the quantities have varying amounts of conservatism, the unit prices used in the estimate are all based on experience in the industry and incorporate little built-in contingencies. Rather than building in allocating contingencies directly to each item, these estimates incorporate a 35% unallocated contingency, which AECOM feels is an appropriate level of contingency at the current level of design.

Both Alternates 1 and 4 have been estimated for comparison purposes. The estimates consider the following scope items, as described throughout this report:

- Option A Station with Amtrak owned and maintained elevators and stairs.
- Construction of electrified Track 4 with a MAS of 80-mph.
- Electrification of Track 3 from “Packard” to “Post” and track shifts to adjust the MAS to 80-mph.
- Structural improvements as described in the sections above.
- Systems, OCS, and Civil infrastructure improvements along the existing Railroad right-of-way as described in the sections above.

The estimates focus the costs into six (6) main categories or disciplines. These categories are broken out into more detail in the full estimates, found in Appendix V.

The Professional Services category consists of the following items, each priced by an assumed percentage of the final construction cost, with the total sum of the services arriving at 30% of the final construction cost.

- Engineering – 8% of Construction Cost
- Project Management for Design & Construction – 6% of Construction Cost
- Construction Administration & Management – 6% of Construction Cost
- Liability and Insurance – 3% of Construction Cost
- Permitting and Legal Fees – 4% of Construction Cost
- Surveys, Testing, Investigation, Inspection – 2% of Construction Cost
- Contractor Mobilization – 1% of Construction Cost

Finally, in order to adjust the estimate from the current 2020 prices to an estimate more closely resembling the costs of the project when it is constructed, the estimate has been escalated to the mid-point of construction with a 3% escalation every year. The schedule suggests this mid-point is the year 2024.

There are two sets of estimates presented in the following sections, differing only in how Route 37 Overhead Bridges are addressed. The first set of estimates assumes track lowering at Route 37 in order to achieve the required overhead clearance to electrify Track 3, and also assumes lateral clearances to the existing pier and/or pier foundation is sufficient to maintain as-is. The second set of estimates assumes the full reconstruction of the Route 37 Overhead Bridges, complete with roadway reprofiling, in order to achieve overhead and lateral clearances.

1. Track Lowering at Route 37 (no Bridge Reconstruction)

ITEM DESCRIPTION	ALTERNATE 1 Total Cost	ALTERNATE 4 Total Cost
TRACK	$22,554,650	$22,544,050
STRUCTURES	$22,400,000	$5,075,000
OCS	$30,299,870	$28,250,120
CIVIL/ROW	$16,914,100	$16,846,000
SIGNALS	$29,621,880	$26,978,880
STATION	$10,623,170	$10,623,170
CONSTRUCTION COST =	$39,724,100	$33,095,160
CONTINGENCY (35%) =	$132,413,670	$110,317,220
PROFESSIONAL SERVICES =	$46,344,800	$38,611,100
TOTAL (2020) =	$39,724,100	$33,095,160
YOE (MIDPOINT OF CONSTRUCTION 2024) =	$218,482,570	$182,023,480

From the table above, the cost drivers from the project are evenly distributed between Track, Structures, OCS, and Signals. These items make up 79% ($104.5M) and 75% ($82.5M) of the construction costs of Alternate 1 and 4 respectively. The amount of work required within the Northeast Corridor, and the complexity of performing this work while maintaining revenue operations are all significant factors in these costs.

2. Route 37 Reconstruction

ITEM DESCRIPTION	ALTERNATE 1 Total Cost	ALTERNATE 4 Total Cost
TRACK	$20,376,650	$20,366,050
STRUCTURES	$48,400,000	$31,075,000
OCS	$30,299,870	$28,250,120
CIVIL/ROW	$15,561,200	$15,493,100
SIGNALS	$29,621,880	$26,978,880
STATION	$10,623,170	$10,623,170
CONSTRUCTION COST =	$46,464,840	$39,835,900
CONTINGENCY (35%) =	$154,882,770	$132,786,320
PROFESSIONAL SERVICES =	$54,209,000	$46,475,300
TOTAL (2020) =	$46,464,840	$39,835,900
YOE (MIDPOINT OF CONSTRUCTION 2024) =	$255,556,610	$219,097,520

Incorporating the reconstruction of Route 37 significantly raises the cost of the Structures, while minimally reducing the cost of the Track. Track lowering would still be required in both Alternates, but not as extensively in Alternate 4. Similar to the last set of estimates, the cost drivers are Track, Structures, OCS, and Signals. These items now make up 83% ($126.3M) and 80% ($106.3M) of the construction costs of Alternate 1 and 4 respectively, however the structures costs have increased to account for 31% and 23% of the total construction costs. The amount of work required along the Northeast Corridor, and the complexity of performing this work while maintaining revenue operations are all significant factors in these costs.

As shown in the Appendix, the construction costs for the reconstruction of Route 37 Overhead Bridges is approximately $26-million, compared to the approximate cost to lower the tracks in the first estimate at approximately $2.3-million. This increase in project cost accounts for the $41.7-million increase in the bottom line price of both Alternates once contingency, professional services, and escalation are incorporated. This Route 37 project cost information is shown to give an order of magnitude for a capital cost investment should this level of construction be deemed necessary. Alternate 4 is still the lower cost option regardless if Route 37 reconstruction is needed.

3. Alternate Recommendation

A comparison of the estimates shows that Alternate 4 is approximately 17% lower in cost than Alternate 1 due mainly to the reduction in overhead bridge reconstruction. The reconstruction of Route 37 reduces this savings to 14%. Though further site investigation and coordination between stakeholders is required to understand whether Route 37 reconstruction is required, it is clear that Alternate 4 is the preferred alternate with respect to cost.

XI. Recommendations

The proposed T.F. Green Station Expansion calls for the construction of a new platform and track and electrification of both platform tracks in order to provide for Amtrak *Northeast* Regional service; however, due to limited clearances horizontally and vertically throughout the corridor, extensive reconstruction of Track, OCS and C&S structures, facilities, and infrastructure is required along an approximately 4-mile segment of Amtrak's Northeast Corridor. These additional construction activities, though not directly related to the station itself, are all required in order to support revenue train operations and provide operational flexibility in this segment. It should be noted, an operational analysis of Amtrak and the MBTA service impacted by the proposed construction or resulting station was not evaluated as part of this study.

This report discussed the standards and design requirements driving each of the two finalized Alternates, 1 and 4.

In order to summarize and provide a platform to compare the corridor alternates against each other, a quick review of several key elements is provided here. The evaluation of these different elements of the concept design are as follows:

1. Station Configuration

   In both Alternates the station will consist of 2 side boarding platforms 12 foot wide. On the west bound platform, a small shelter waiting and vertical circulation to the Skywalk bridge currently exist. The proposed eastbound platform will need a standalone (independent) shelter/waiting to be meet Amtrak Station compliance. Additional accessible Vertical Circulation Elements (VCE) will be required to meet ADA requirements, along with a minimum of 3 emergency egress points required to meet NFPA 130. Utilization of the existing underutilized garage space was also determined to be incompatible with Amtrak's Station Planning and Programming Guidelines. There is no difference in Station Configuration between Alternate 1 or 4.

2. Track Alignment

   In Alternate 1 the proposed track alignment through the project limits would be compliant with Amtrak Specification No. 63 although reconstruction of several overhead bridges and potentially the parking garage would be required to meet all vertical and lateral clearance requirements. Alternate 4 would improve on existing track centers, maintain existing lateral clearances and improve vertical underclearance while avoiding the reconstruction of the parking garage and several of the overhead bridges with the possible exception of Route 37. Alternate 4 as such would be the preferred or recommended Alternate.

3. Catenary/Electric Traction

   While both Alternates require the reconstruction of cantilever catenary with portal structures and cantilevers and the use of low clearance supports, Alternate 4 eliminates the requirement to reconstruct a portion of the Warwick Paralleling Station. As such Alternate 4, minimizes reconstruction of the electric traction system and is recommended for advancement.

4. Cost/Constructibility

   Constructibility was a key consideration in evaluating both Alternate 1 and 4 to minimize the impact to revenue service during the construction of this project. Alternate 1 would have considerable impact to railroad operations and the overall program costs with the significant reconstruction of the parking garage and Coronado Road overhead bridge, as well as reconfiguration of Warwick Paralleling Station. In evaluating the construction staging, service impacts, and capital costs, it was determined that Alternate 4 was more cost effective by approximately $40MM, by avoiding the previously mentioned reconstruction costs, and of a shorter construction duration, therefore is the recommended alternative with respect to cost/constructability.

To summarize, AECOM has provided the following table as a visual comparison of the key design elements evaluated for Alternate 1 and 4.

Project Alternates Comparison

Project Alternate Evaluation Criteria	Alt 1	Alt 4
Meets Required Track Centers		
Meets Lateral Clearance at All locations		
Meets Vertical Clearance		
Provides Plate J Clearance (Track 3)		
Meets Amtrak Station/Waiting Area Requirements		
Maintains Existing OCS Feeder Facility		
Mitigates Coronado Rd OHB Reconstruction		
Maintains Existing Wayside C&S Equipment		
Cost		
Constructability		

Green – Acceptable/Preferred

Orange – Meets minimums with exceptions

Red – Non-compliant or Undesirable

Based on a comparison of Alternates 1 and 4 developed during the conceptual design, **Alternate 4 is the most cost effective and potentially least disruptive (shortest duration) alternative, therefore Alternate 4 is the recommended alternative**. While both Alternates would require acceptance of substandard lateral clearance at, or reconstruction of Route 37, Alternate 1 also requires the reconstruction of Coronado Road Bridge to meet minimum lateral clearance requirements and acceptance of substandard lateral clearances beneath the TF Green Airport Garage. AECOM recommends advancing Alternate 4 to a 30% design level in order to further explore the analysis and evaluation presented in this report. It should be noted that Alternative 4 requires Amtrak acceptance of several Design Exception Request (DER's) to preferred lateral and vertical clearance, as well as identification of the location of crash walls which could potentially require maintenance and operational

agreements with outside stakeholders. These decision points are critical in the design stage to be in compliance with statutory regulations and mitigate reconstruction of existing acceptable structures.

Upon progressing Alternate 4 to the next phase, the following are recommended next steps for Amtrak and the all other project stakeholders to undertake:

1. Perform a complete topographic survey of the entire project limits in accordance with Amtrak Land Surveying Standards and Procedures Manual, Ver 2.0, dated December 1, 2014.
2. Perform a ridership analysis and evaluate impacts on revenue and operations.
3. Develop a project specific set of design criteria with a goal of compliance with Specification 63 and Amtrak's Stations & Facilities Guidelines.
4. Establish engineering guidelines for all criteria which cannot be fully complied with due to physical constraints, e.g. "necessitates complete reconstruction of garage structure"
5. Evaluate the operational assumptions for track outages and other restrictions as part of the overall project constructability analysis.
6. Develop a disposal plan of all excavated spoils currently anticipated to remain on railroad property
7. Initiate a full draft environmental review and coordination with the sponsoring agency for complete compliance and confirmation of Categorical Exclusion or Environmental Assessment.

APPENDIX I - NEPA PLANNING ASSESSMENT

AECOM's Analysis of the 1999 Warwick Intermodal Station EA/FONSI's Applicability to the Intercity Rail Passenger Service at TF Green Airport Station Project

The Federal Highway Administration (FHWA) issued a conditioned Finding of No Significant Impact (FONSI) on July 6, 1999 for the Warwick Intermodal Station Environmental Assessment (EA) dated May 1999. The EA addressed a stand-alone multi-level station and adjacent surface parking lot. On March 29, 2001, the Rhode Island Department of Transportation (RIDOT) submitted a reevaluation of the EA to the FHWA addressing a proposed consolidated car rental facility with an integrated station. The facility would accommodate commuter/Amtrak passenger parking and a consolidated rental car facility. The FHWA accepted the reevaluation as submitted and concurred that the additional environmental impacts could be mitigated with the actions described in the reevaluation. Additional redesign from a value engineering exercise necessitated submittal of a second reevaluation to FHWA on March 20, 2002. This reevaluation was performed to address shifting the station location to the south and reconfiguring the location of the people mover and rental car garage, which necessitated three additional full property acquisitions.

As part of the TF Green Airport Station Concept Design, AECOM has reviewed the 1999 FONSI, EA, and the reevaluations to determine whether these documents are applicable to the current proposed capital project. Based on a review of the environmental impact categories assessed in 1999, the proposed scope of the current capital project does not fall within the original scope of preferred build alternative approved in the FONSI, nor was it evaluated at a later date as part of the two reevaluations that were performed. In addition, twenty years (20) have passed since the impact categories were evaluated, and any potential reevaluation would have to consider that timeframe in determining the applicability of the data to current conditions. A summary of AECOM's analysis is provided below.

Technical Analysis Assessment

The environmental information utilized in evaluating the original Amtrak/commuter rail station and the automated people mover project FONSI is twenty (20) years old. The purpose and need did discuss installation of an Amtrak station as part of the preferred build alternative but the analysis considered many baseline environmental conditions which have changed. While the addition of a new Amtrak platform and improvements to the parking garage may still comply with the original purpose and need stated in the EA, consultation with FHWA would have to occur to determine if a reevaluation would be sufficient to cover these improvements under the original FONSI. In addition the EA specifically states in section 2.4 that "the electrified rail shuttle between Providence and Warwick proposed by RIDOT has not been evaluated in this EA. If advanced by RIDOT in the future, it will be subject of a separate environmental analysis and documentation." The EA further reiterates this point in section 2.4.3 that "the proposed electric shuttle train service between Warwick Station and Providence Station is not part of the Preferred Build Alternative in this EA". It is described here since the planning for it should be considered in the design of the Warwick Station.

FHWA requires that consultation is performed prior to taking any significant action (major project approvals or authorizations) on a project with a previously approved environmental document to

determine if that document is still valid. This process is known as a reevaluation and is generally performed any time a significant action has been delayed longer than three years from the last approval or when a significant change to the original project scope has occurred.

Any reevaluation would need to take into consideration specific information on development patterns of the last 20 years and the completion status of the mitigation measures which were detailed in the FONSI. It is anticipated that due to the length of time that has passed since the last significant action, a reevaluation would require updates and revisions to all twenty five (25) environmental impact categories that were presented in the original EA. It is anticipated that significant changes may have occurred to the following categories:

- Social/Environmental Justice –

  The EA utilized 1990 census data to evaluate the potential for impacts to minority and low-income populations. This information would need to be reviewed for any shifts in population density or make-up. The most up to date census data would need to be reviewed. Currently the 2010 census would be utilized unless a delay in the future project development extended the next federal action past completion of the 2020 census. In which case that data would be utilized.

- Pedestrian and Bicycle Movement –

  There were no independent bicycle paths or designated bicycle lanes within the project area in 1999. At the time of the EA, the City of Warwick was developing a bicycle network plan and RIDOT was considering establishing bicycle lanes on state roadways within the project area. The outcome of these studies and final construction of any improvements would need to be reviewed and updated. This analysis should also consider any improvements realized from installation of the people mover.

- Air Quality –

  Emissions were analyzed for the original project based on existing traffic conditions with a project completion date of the year 2000 and projections for a 2020 design year. In conjunction with revised traffic estimates, new baseline existing conditions would need to be developed along with future design year projections.

- Noise –

  There were 11 residences and 5 sensitive receptors identified in the “Noise Analysis and Impact Assessment Technical Report” dated January 1999 utilized

to document the noise conditions anticipated as part of the original Intermodal Station project. This analysis compared the 1999 no-build scenario with the projected conditions created as a result of completing construction of the preferred alternative. A reevaluation would need to determine any population and development changes that might decrease or increase the number and/or type of receptors in the area while considering current noise conditions and projecting any increases or decreases that may result from changes in train movement or traffic projections.

- Traffic –

  The original traffic analysis considered existing traffic volumes and projections for the project completion date of 2000 and design year 2020 both with and without the proposed intermodal station. The current proposed project would need to determine existing traffic volumes, create projections for build and no build scenarios, and determine whether the required FONSI mitigation of signalizing two intersections and modifying two others has been completed. In addition a comparison between existing conditions and original 2020 project would be useful as baseline to establish whether the assumptions in the original EA still hold true.

- Ridership –

  Ridership predictions for the original EA were developed for both the 2000 build year and 2020 design year. Current ridership would need to be reviewed and design year ridership extrapolated for the current proposed project.

- Water Quality –

  The water quality status for the two drainage basins affected by the original project (Pawtuxet River Basin and Narragansett Bay Basin) were considered degraded at the time of review for the 1999 EA which necessitated higher suspended solid removal from any proposed drainage systems that might be constructed. Both basins continue to have degraded water quality with impaired water bodies present in both. Current standards such as EPA's Phase II stormwater rule which was established on December 8, 1999 need to be incorporated into any analysis and design scenarios.

- Permitting –

  The original EA anticipated needing a Rhode Island Pollutant Discharge Elimination System Storm Water Discharge Associated with Construction

Activity permit and a State Water Quality Certificate. The proposed project will likely require coordination and permitting through these programs as well but revisions to federal and state regulations have occurred since the original EA. Future design progressions will need to take into consideration any requirements stipulated by current regulations.

- Threatened Species –

  There were no known State listed threatened or endangered species identified through the Rhode Island Natural Heritage program at the time of the original EA. Current mapping shows that the southerly portion of the proposed project does fall within an area identified by the Rhode Island Natural Heritage program as having a known species of concern. Coordination with the Rhode Island Department of Environmental Management (RIDEM) will be required to determine if any impacts are anticipated.

- Historic and Archaeological Preservation –

  Significant Historic and Archaeological concerns were identified in the original EA. The 1999 FONSI required continued coordination with the Rhode Island Historical Preservation & Heritage Commission (RIHP&HC) on all future designs to insure preservation of the Hill's Grove historic district as part of a mitigation measure. Additional archaeological studies were performed on the project site and no significant artifacts were discovered. Any future design elements will need to be coordinated with the RIHP&HC to determine if they are in conformance with preservation requirements and if any additional archaeological studies are required for below ground resources in areas outside of those already surveyed and documented.

- Hazardous Waste Sites –

  A brownfield assessment was performed for the T.H. Baylis property in February 1998. This assessment was incorporated into the original EA and the FONSI required remediation of contaminated soil and groundwater at the Baylis property. It also required remediation of the groundwater plumes beneath the Leviton and D'Ambra properties as mitigation measures. A reevaluation would need to identify the status of these remediation efforts and identify any additional properties within the project area that may have contamination issues by performing a new Phase 1 Environmental Site Assessment.

- Visual –

Impacts resulting from construction of a new station and people mover were evaluated as part of the original EA. Any changes to the design of the station's exterior or significant changes to the character of the rail corridor would need to be reevaluated for conformance to current development conditions and potential impacts to historic districts and resources.

- Energy –

  The energy consumption of the station and people mover was assessed in the original EA. Energy efficient lighting and latest energy saving features were specified for use at the station to minimize impacts. The EA also stated that reduction in gasoline powered vehicle use in the area was expected to offset any increase in electrical power. A discussion on current efficiency standards would need to be incorporated into any reevaluation as well as any additional offsets from revised traffic and ridership projects or increases as a result of current and proposed track electrification.

- Construction –

  Impacts were described as minimal during evaluation for the original EA. Residential impacts were not expected and local traffic disruptions were anticipated to be minimal. The assumptions would need to be reevaluated for the revised project area as well the potential for significant night work needed to minimize disruptions to the existing service.

- Access –

  The original EA stated that the project would be planned to meet all American with Disabilities Act (ADA) requirements. A reevaluation would need to consider current standards and revisions that have occurred to the regulations. The proposed design should also consider upgrades to any elements constructed as part of the existing station that may not meet current regulations.

NEPA Compliance Recommendation

Consultation with FHWA, the Federal Railroad Administration (FRA) and RIDOT will be required to determine the applicability of the 1999 FONSI to the current proposed project. This consultation will identify whether the proposed upgrades described in Alternative 4 can be implemented after a written re-evaluation or if a new NEPA document will be required. While the purpose and need of the original

EA remain viable for components of the current project (new platform and station improvements), the scope of the original EA appears to have been explicitly narrowed to evaluate only impacts from construction of the intermodal station and people mover and exclude electrification and track construction. The EA does describe a third non-electrified freight rail track west of the mainline tracks and a fourth electrified track on the eastern side of the mainline tracks, but the analysis does not include these components as part of the scope of the station and people mover construction.

Based on the age of the existing EA, AECOM recommends that the next steps would be gain acceptance with Amtrak and RIDOT on the recommended design concept, Alternate 4, then move forward with a new NEPA analysis based on the scope presented in the Design Concept Report for Alternate 4. This scope is presumed to be outside of the scope of the original EA scope.

It is presumed that Alternate 4 would be presented to have independent utility from the work covered by the 1999 FONSI. Once independent utility has been established, the project sponsor will need to identify a federal funding source to establish the lead federal agency. The funding entity, presumably FHWA or FRA, would drive the NEPA approval process. For example, assuming this project is a RIDOT undertaking and funded by the FHWA, the FHWA would be the lead funding agency and the Categorical Exclusion (CE) process will follow FHWA guidelines and a FHWA CE worksheet will be completed. This worksheet is meant to provide FHWA with a sufficient level of documentation and analysis to help inform FHWA's determination that a CE is the appropriate NEPA class of action. Documentation and analysis may include background research, results of record searches, field investigations, field surveys, and any past planning or studies. In conjunction with a more detailed environmental analysis of current concerns which were not identified or known at the time of the 1999 assessment, components of the original FONSI could then be utilized to support a finding that the current project has no significant cumulative environmental impacts, has independent utility, and may therefore be covered under a FHWA CE. FHWA recommends approximately four (4) weeks to compile the necessary documentation to complete the worksheet.

If FHWA determines that the proposed project may have significant individual or cumulative impacts beyond those typically expected from this type of project, a new EA will be required. The EA process involves a more detailed review of the project impacts and has to meet the following goals:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a FONSI.
- Aid FHWA's compliance with NEPA when no EIS is necessary.
- Include brief discussions of the need for the proposal, of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.
- Facilitate preparation of an EIS if deemed necessary.

This process can become significantly more complicated resulting in an estimated timeframe of twelve (12) months to compile the necessary documentation and perform the agency coordination.

In conclusion, once the conceptual design process for the TF Green Warwick Station has progressed sufficiently to an agreed upon apparent preferred alternative with all stakeholders, the scope of this project should be presented to FHWA to determine if the project elements fall within the scope of the original EA. Depending on the outcome of this coordination the above mentioned original EA categories should be analyzed for significant changes according to the scope of Alternate 4 as the currently proposed preferred alternative, and a reevaluation submitted or a new NEPA analysis will commence to determine if a CE, EA or EIS will be required to advance NEPA approval. Given the scope of Alternate 4, and the assumption of minimal environmental impact, it is AECOM's professional opinion a CE would be required as a new undertaking to meet the reevaluation process. This is subject to lead federal agency concurrence.

APPENDIX II - PLANS

TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
WARWICK, RI
CONCEPT DESIGN SUBMISSION
JANUARY 21, 2020

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deployed on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
COVER SHEET

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

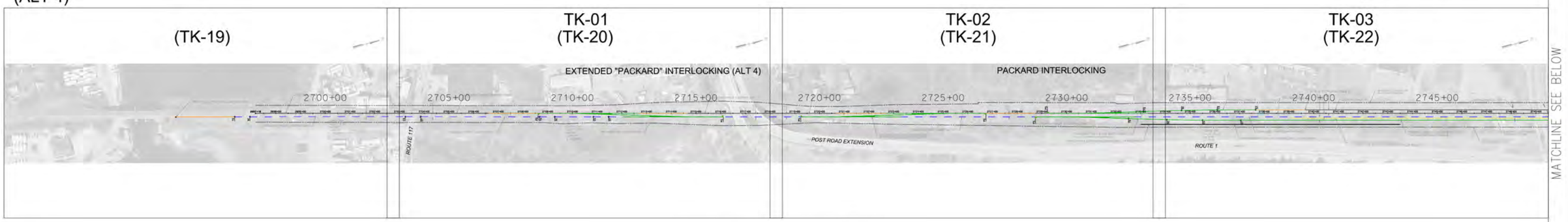
File No.:
Ref No.:
Sheet No.: 1 OF 73
Dwg. No.: G-00

SHEET NO.	DWG NO.	DRAWING TITLE	SHEET NO.	DWG NO.	DRAWING TITLE
TRACK			OCS		
1	G-00	COVER SHEET	63	ET-1	OCS SCHEMATICS
2	KM-01	INDEX & TRACK PLAN KEY MAPS 1 OF 2	64	ET-2	TYPICAL PORTAL STRUCTURE IN 4-TRACK TERRITORY
3	KM-02	TRACK PLAN KEY MAPS 2 OF 2	65	ET-3	TYPICAL TRACK 3 OCS STRUCTURES AT OVERHEAD BRIDGES
4	GN-01	GENERAL NOTES	66	ET-4	TYPICAL TRACK 3 OCS STRUCTURES IN 3-TRACK TERRITORY
5	SC-01	TRACK SCHEMATIC - ALTERNATIVE 1	67	ET-5	TYPICAL STATION ARRANGEMENT ALTERNATIVE 1&2
6 - 14	TS-01 - TS-09	TYPICAL SECTIONS - ALTERNATIVE 1	ARCHITECTURE		
15 - 29	TK-01 - TK-15	TRACK PLANS - ALTERNATIVE 1	68	A-100	EXISTING STATION / SITE PLAN
30 - 32	TK-16 - TK-18	TRACK 4 PROPOSED PROFILES - ALTERNATIVE 1	69	A-101	STATION LAYOUT
33	SC-02	TRACK SCHEMATIC - ALTERNATIVE 4	70	A-102	STATION HEADHOUSE - OPTION A
34 - 42	TS-10 - TS-18	TYPICAL SECTIONS - ALTERNATIVE 4	71	A-103	STATION HEADHOUSE - OPTION B
43 - 58	TK-19 - TK34	TRACK PLANS - ALTERNATIVE 4	72	A-104	HEADHOUSE OPTIONS - ELEVATION
59 - 61	TK-35 - TK-37	TRACK 4 PROPOSED PROFILES - ALTERNATIVE 4	73	A-105	CANOPY DETAILS
62	TK-38	TRACK 1 PROPOSED PROFILE			

LEGEND

- EXISTING TURNOUT
- PROPOSED TURNOUT
- EXISTING TRACK CENTERLINE
- PROPOSED TRACK CENTERLINE
- REALIGNED TRACK CENTERLINE
- RAISE, LINE AND SURFACE
- RIGHT OF WAY (ROW)
- EXISTING MCI FIBER OPTIC CABLE
- EXISTING UTILITIES
- RETAINING WALL

ALT 1
(ALT 4)



ALTERNATIVE 1 AND 4
TRACK KEY MAP
SCALE: 1" = 200'-0"

ALTERNATIVE 1 AND 4
TRACK KEY MAP
SCALE: 1" = 200'-0"

200' 0' 200' 400'

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

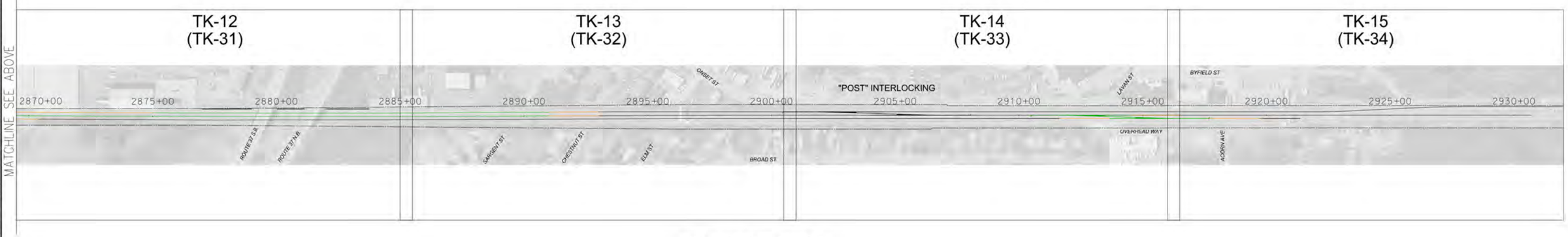
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN STATION - Proposed Alternative 1 & 4 Preliminary Design & EA

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: WAR-KM1
Ref No.:
Sheet No.: 2 OF 73
Dwg No.: KM-01

P:\60605010 Amtrak Warwick Station 10% Design\900-CAD-GIS\910-CAD\20-SHEETS\TRACK\Final Concept Design\WAR-INDEX.dgn
2/21/2020 9:34:38 AM

ALTERNATIVE 1 AND 4
TRACK KEY MAP
SCALE: 1" = 200'-0"



ALTERNATIVE 1 AND 4
TRACK KEY MAP
SCALE: 1" = 200'-0"

200' 0' 200' 400'
SCALE: 1" = 200'

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TRACK KEY MAP SHEET 2

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: WAR-KM2
Ref No.:
Sheet No.: 3 OF 73
Dwg. No.: KM-02

T.F. Green Airport Station - Proposed Interim Track Service Preliminary Design & EA

\\uspnt1fp002\uata\Projects\60605010 Amtrak Warwick Station 10% Design\900-CAD-05\910-CAD\20-SHEETS\TRACK\Final Concept Design\WAR-INDEX-2_KEY MAPS.dgn
7/21/2020 9:27:23 AM

GENERAL NOTES:

1. DESIGN BASED ON AMTRAK SPECIFICATION NO. 63 - JUNE 1, 2015, AMTRAK MW1000, AMTRAK STANDARD DRAWING DWG. NO.: 70050.001.08 AND AMTRAK STANDARD SIGNAL PLAN SP603.
2. AMTRAK PROVIDED FLIMAP LIDAR CREATED MAY 8, 2019. AMTRAK PROVIDED ROW AND UTILITY INFORMATION BASED ON THE 1915 VALUATION MAPS FOR "THE NEW YORK NEW HAVEN AND HARTFORD R.R. CO".
3. A SITE VISIT WAS CONDUCTED ON MAY 22, 2019.
4. ALL STATIONING IS BASED ON TRACK 1 STATIONING FROM THE AMTRAK 1980 AS BUILT PLANS.
5. STATION EQUALITIES ARE BASED ON 1980 AS BUILT PLANS AND MILEPOST 178 TO 179 LENGTH WAS OBTAINED FROM AMTRAK'S AB-SHORE LINE TRACK CHART.
6. DIMENSIONS ARE BASED ON THE FLIMAP, BEST FIT TRACK CENTERLINES AND WILL NEED TO BE VERIFED WITH TOP OF RAIL SURVEY.
7. THE DESIGN SPEEN FOR TRACKS 1 AND 2 IS 160MPH. THE DESIGN SPEED FOR TRACKS 3 AND 4 IS 80MPH.
8. FOUR EXISTING #15 CROSSOVERS AT CRANSTON TO BE REPLACED WITH #20 CROSSOVERS.
9. TRACK 3 LOWERING TO PROVIDE ASSOCIATION OF AMERICAN RAILROADS PLATE J CLEARANCE UNDERNEATH THE PROPOSED CATENARY INFRASTRUCTURE, AS WELL AS AN ADDITIONAL 18" OFFSET BETWEEN THE PLATE J AND ELECTRIFIED WIRE.
10. TRACK 1 TO MAINTAIN EXISTING ALIGNMENT HORIZONTALLY AND VERTICALLY WITH THE EXCEPTION OF A TRACK LOWERING AT ROUTE 37 OVERHEAD BRIDGE.
11. TRACK 2 SHIFTED HORIZONTALLY ONLY. VERTICAL PROFILE TO REMAIN AS EXISTING. TRACK 4 PROFILE TO MATCH THE EXISTING PROFILE OF TRACK 2.
12. IN ACCORDANCE WITH THE AMTRAK STANDARD SIGNAL PLAN, THE STANDARD SAFE STOPPING DISTANCE FOR TRACK 4 IS 7,122' BETWEEN THE OPPOSING EXITING SIGNALS.
13. SIGNAL LOCATIONS HAVE NOT BEEN IDENTIFIED AT THIS TIME.
14. SEE OCS PLANS FOR OCS RELOCATION INFORMATION.
15. SEE ARCHITECTURE PLANS FOR STATION INFORMATION.

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

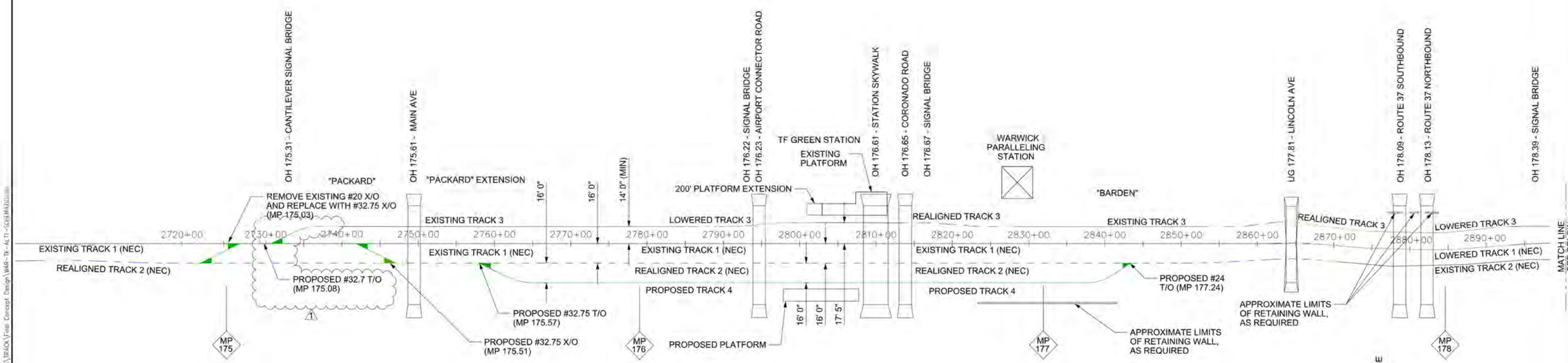
Approved: Date:

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
GENERAL NOTES

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.:
Ref No.:
Sheet No.: 4 OF 73
Dwg. No.: GN-01



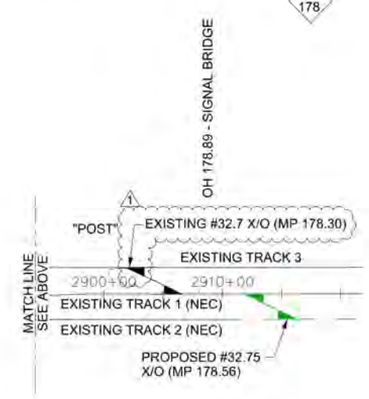
SCHEMATIC ALTERNATIVE 1

NTS

APPROXIMATE STATION EQUALITIES	
MILEPOST	STATION
175	2726+25
176	2779+02
177	2831+71
178	2884+65
179	2937+52

LEGEND

- EXISTING TRACK CENTERLINE
- PROPOSED TRACK CENTERLINE
- REALIGNED TRACK CENTERLINE
- RAISE AND SURFACE



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a proprietary basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

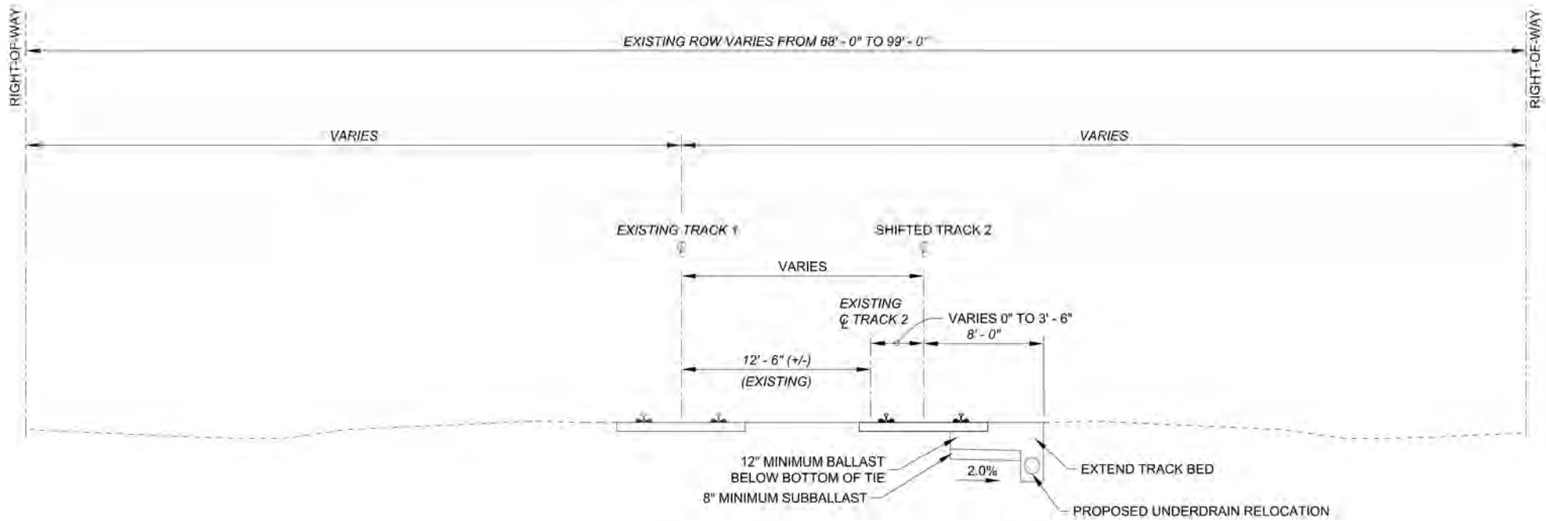
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED SCHEMATIC - ALTERNATIVE 1

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

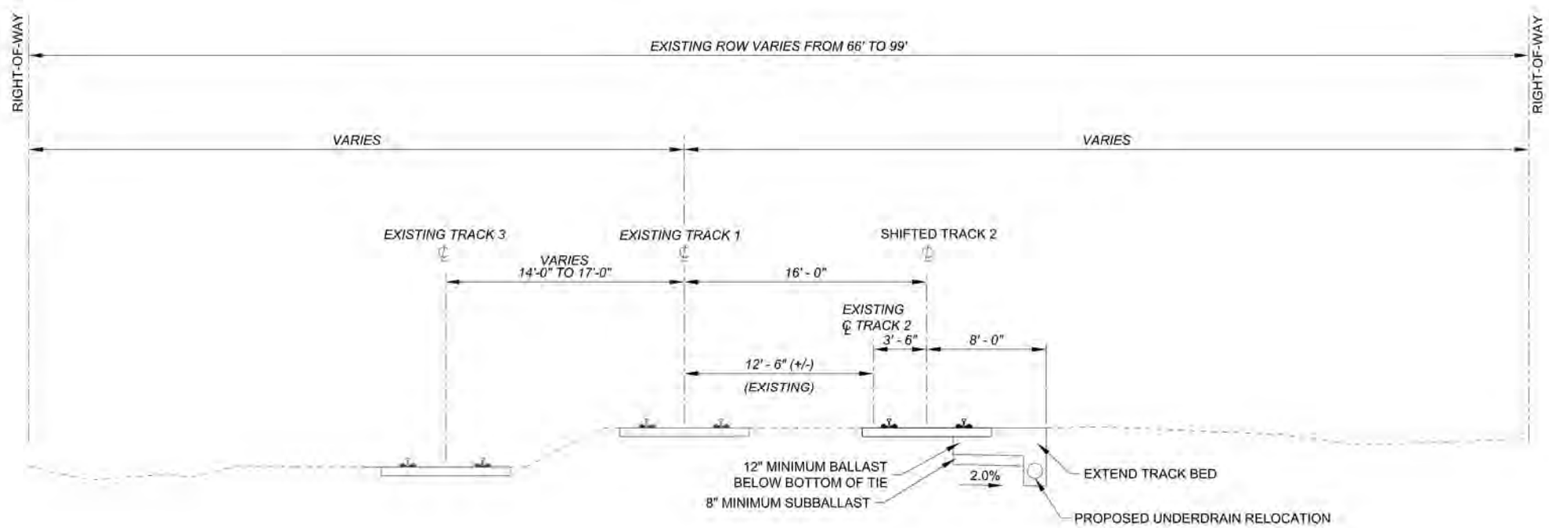
File No.: ALT1-SC
Ref No.:
Sheet No.: 5 OF 73
Dwg No.: SC-01

TF Green Airport Station - Prospect Rail Service Preliminary Design & EA



EXISTING TRACK 1, SHIFTED TRACK 2

STA 2704+89.75 to 2729+77.56
NTS



EXISTING TRACK 1, SHIFTED TRACK 2, EXISTING TRACK 3

STA 2729+77.56 to 2756+53.70
STA 2844+36.65 to 2855+64.58
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

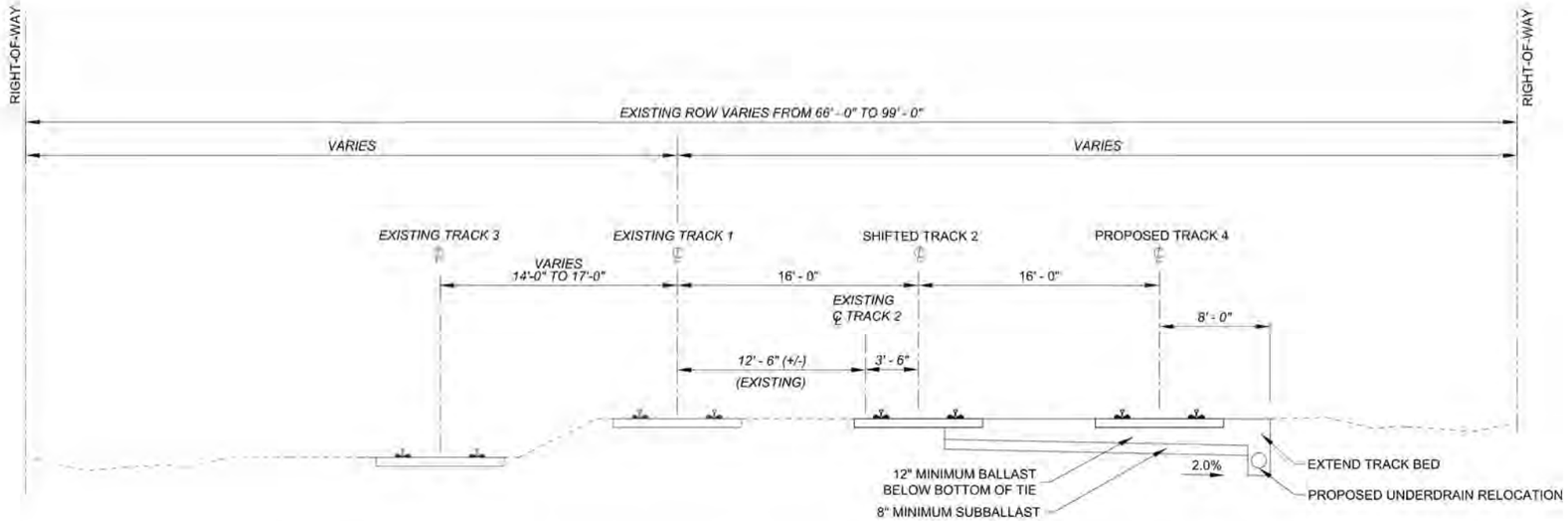
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0532

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TRACK ALTERNATIVES - ALTERNATIVE 2

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

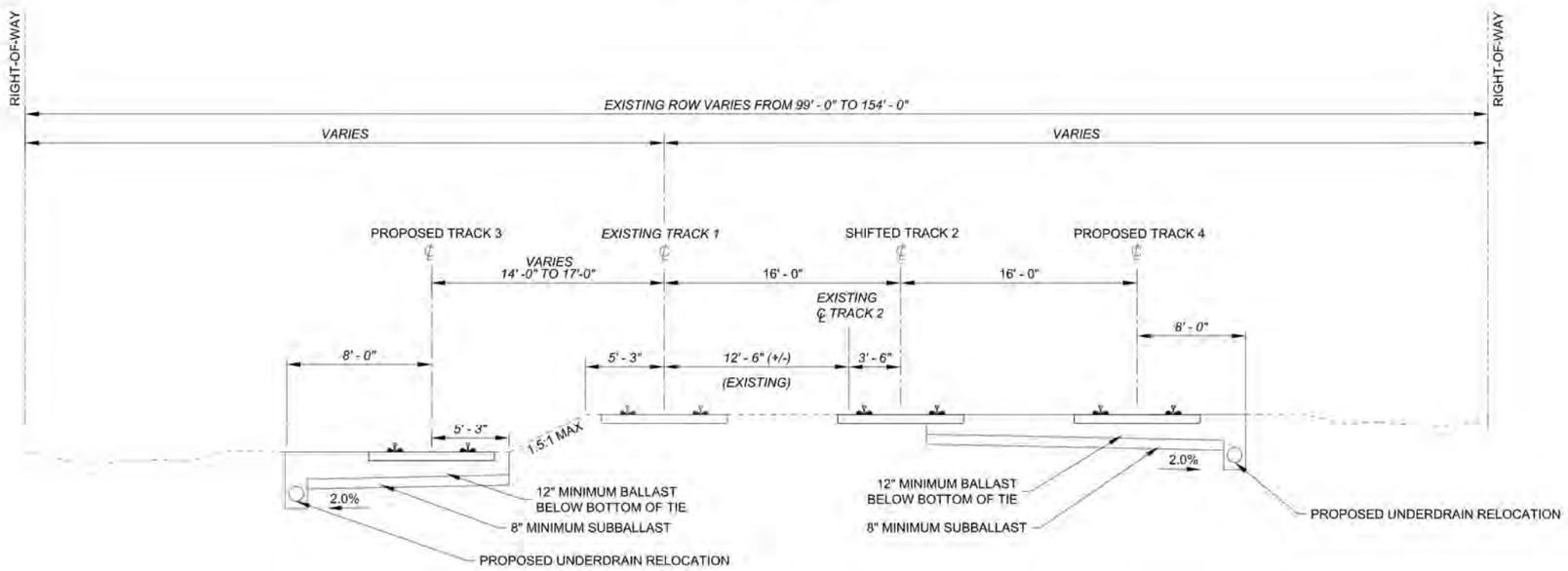
File No.: ALT1-TS01
Ref No.:
Sheet No.: 6 OF 73
Dwg No.: TS-01

TF Green Airport Station - Proposed Alternatives Service Feasibility Design & EA



EXISTING TRACK 1, SHIFTED TRACK 2, EXISTING TRACK 3, PROPOSED TRACK 4

STA 2756+53.70 to 2788+71.42
STA 2825+99.73 to 2844+36.65
NTS



EXISTING TRACK 1, SHIFTED TRACK 2, PROPOSED TRACK 3, PROPOSED TRACK 4

STA 2788+71.42 to 2799+87.14
STA 2815+65.88 to 2825+99.73
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a proprietary basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC–ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

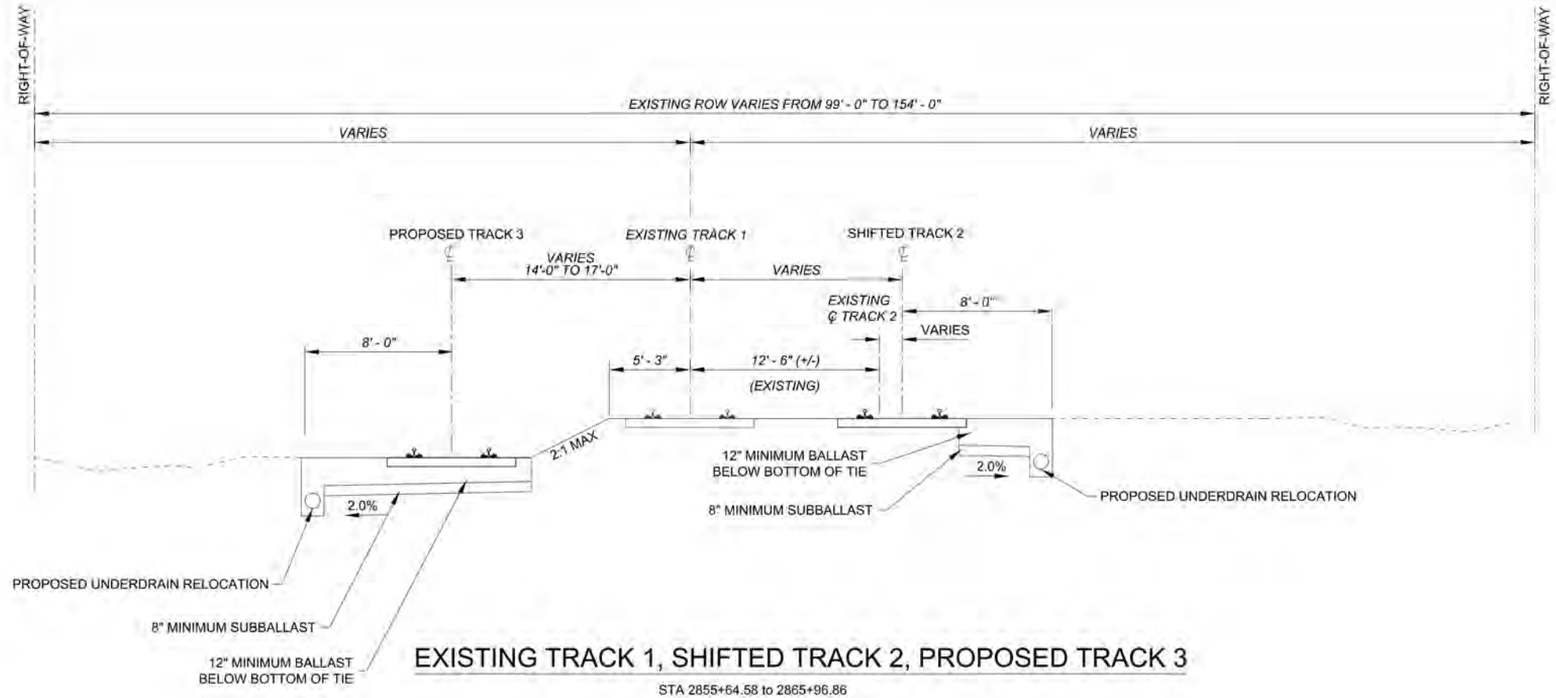
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

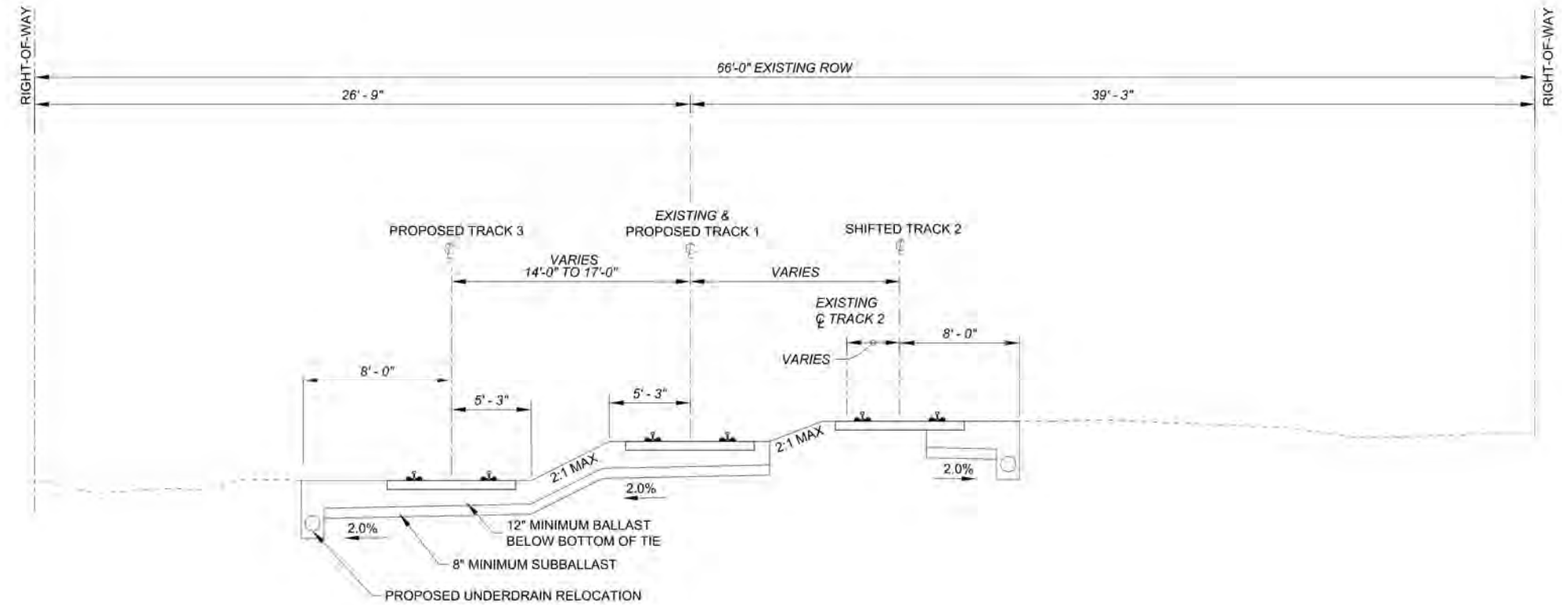
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT1-TS02
Ref No.:
Sheet No.: 7 OF 73
Drg. No.: TS-02



EXISTING TRACK 1, SHIFTED TRACK 2, PROPOSED TRACK 3

STA 2855+64.58 to 2865+96.86
NTS



PROPOSED TRACK 1, SHIFTED TRACK 2, PROPOSED TRACK 3

STA 2865+96.86 to 2868+37.23
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-I2 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

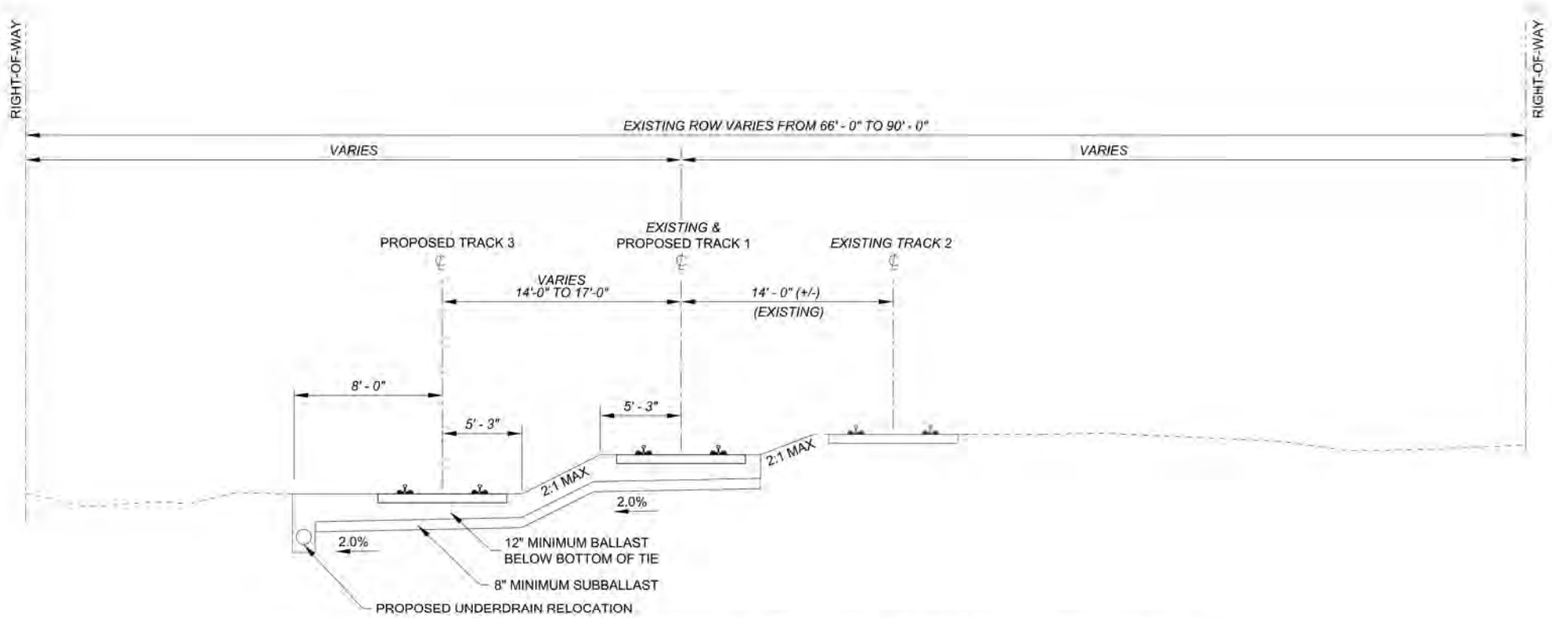
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED ALTERNATIVE

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

File No.: ALT1-TS03
Ref No.:
Sheet No.: 8 OF 73
Dwg. No.: TS-03

TF Green Airport Station - Proposed Alternatives Service Preliminary Design & EA



PROPOSED TRACK 1, EXISTING TRACK 2, PROPOSED TRACK 3

STA 2868+37.23 to 2891+00.00
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-I2I is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

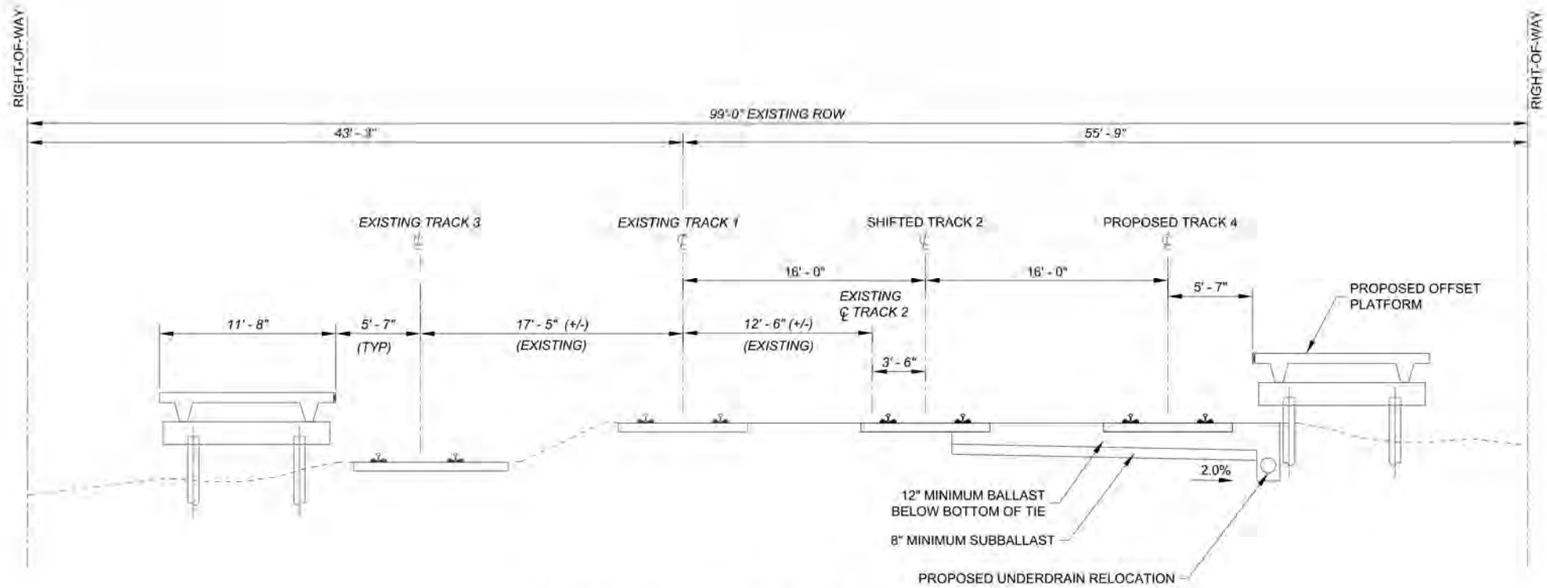
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

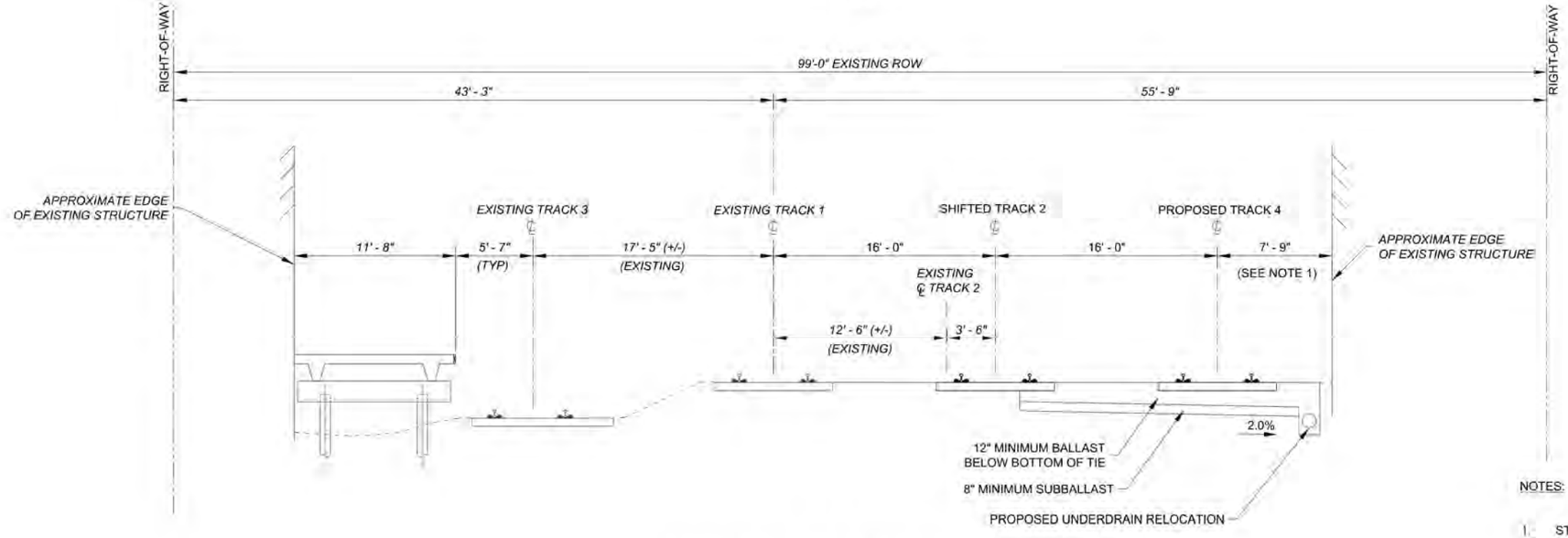
File No.: ALT1-TS04
Ref No.:
Sheet No.: 9 OF 73
Dwg No.: TS-04

TF Green Airport Station - Proposed Intercity Passenger Rail Service Preliminary Design & EA



TRACK 3 PLATFORM & TRACK 4 PLATFORM

STA 2802+95.22 to 2808+30.04
NTS



SECTION AT PARKING STRUCTURE

STA 2808+30.04 to 2811+35.70
NTS

NOTES:

1. STRUCTURAL MODIFICATIONS TO EXISTING PARKING STRUCTURE MAY BE REQUIRED
2. RIGHT OF WAY OBTAINED FROM VALUATION MAPS.

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC—ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

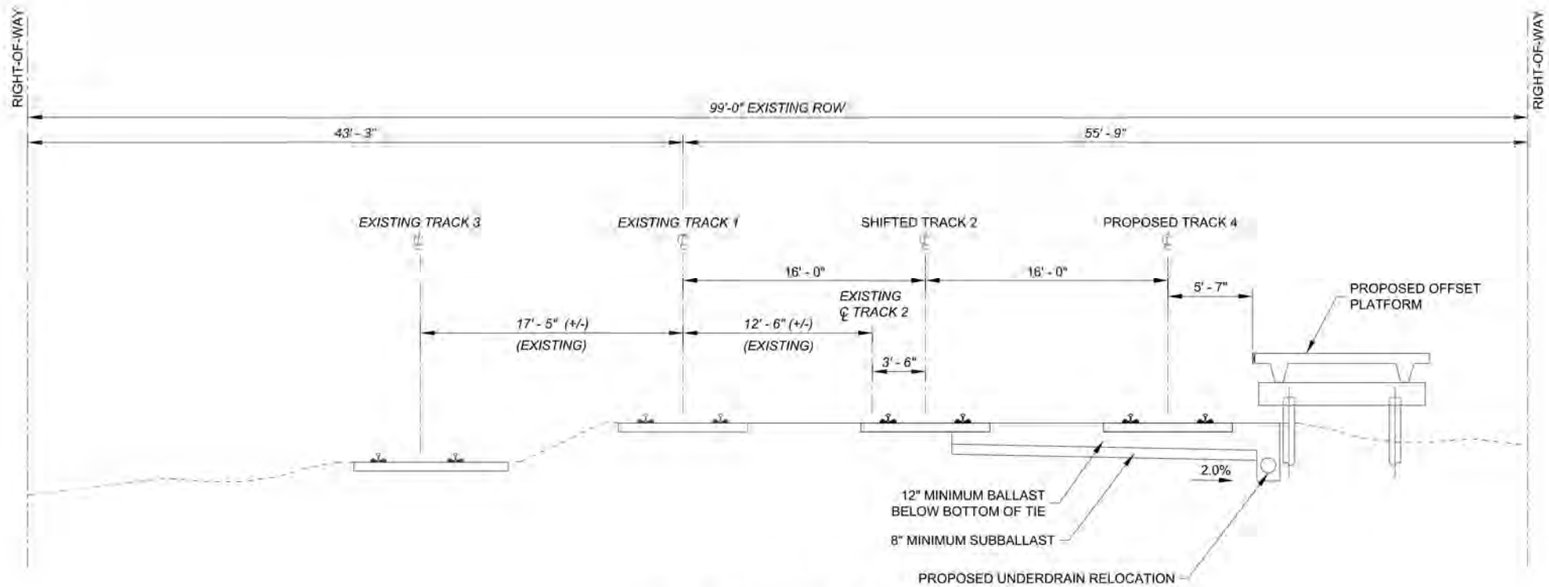
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

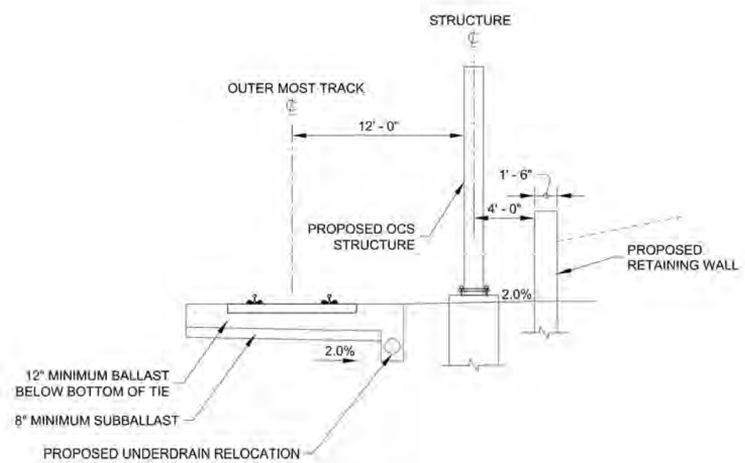
File No.: ALT1-TS05
Ref No.:
Sheet No.: 10 OF 73
Dwg. No.: TS-05

Amtrak Green Airport Station - Proposed Inter-City Rail Service Preliminary Design & EA



TRACK 4 PLATFORM

STA 2797+84.22 to 2802+95.22
NTS



RETAINING WALL

AS REQUIRED
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deposited on a confidential basis solely for use in connection with the design and manufacture of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

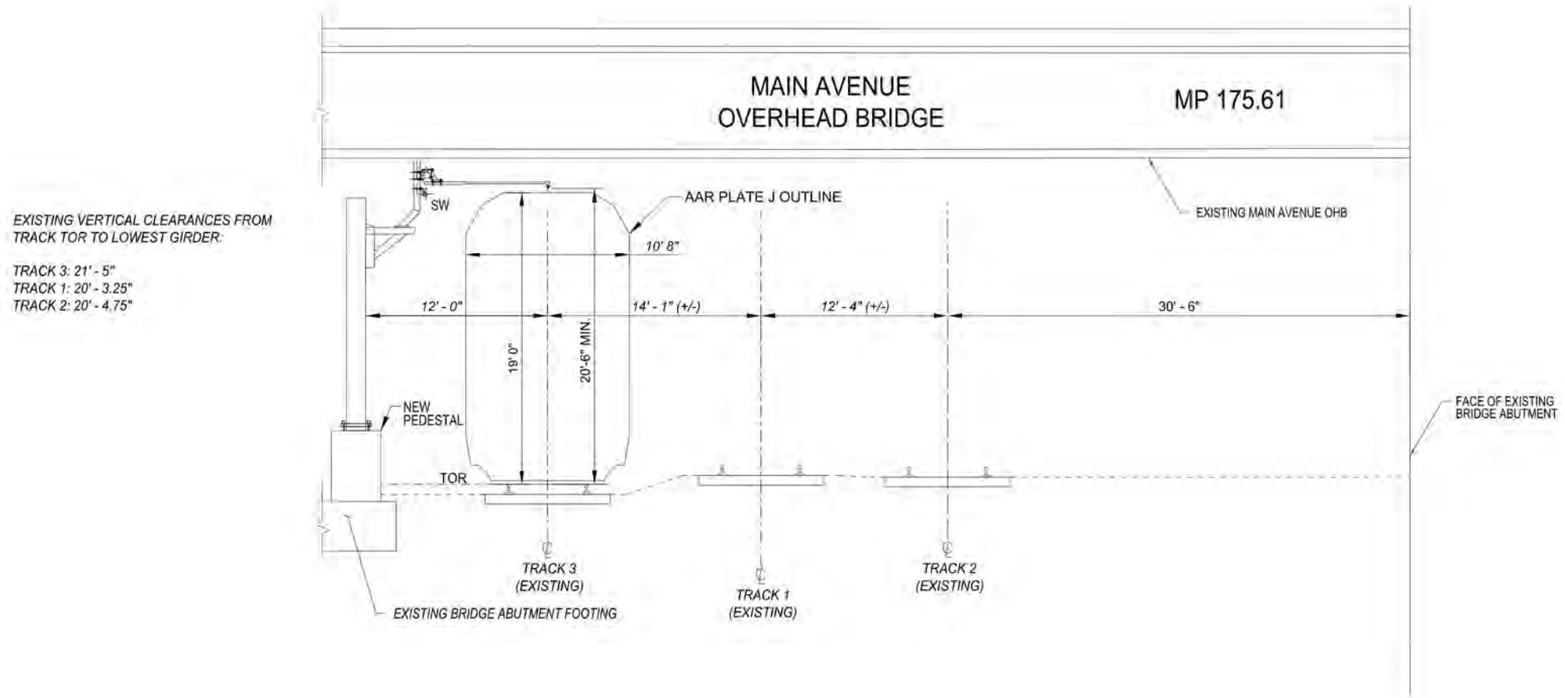
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL | Drawn: TC | Checked: ZG | Date: 01/21/2020

File No.: ALT1-TS06
Ref No.:
Sheet No.: 11 OF 73
Dwg No.: TS-06

Green Airport Station - Proposed Intercity Passenger Rail Service Alternatives Design & EA



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 2

Designed: AL | Drawn: TC | Checked: ZG | Date: 01/21/2020

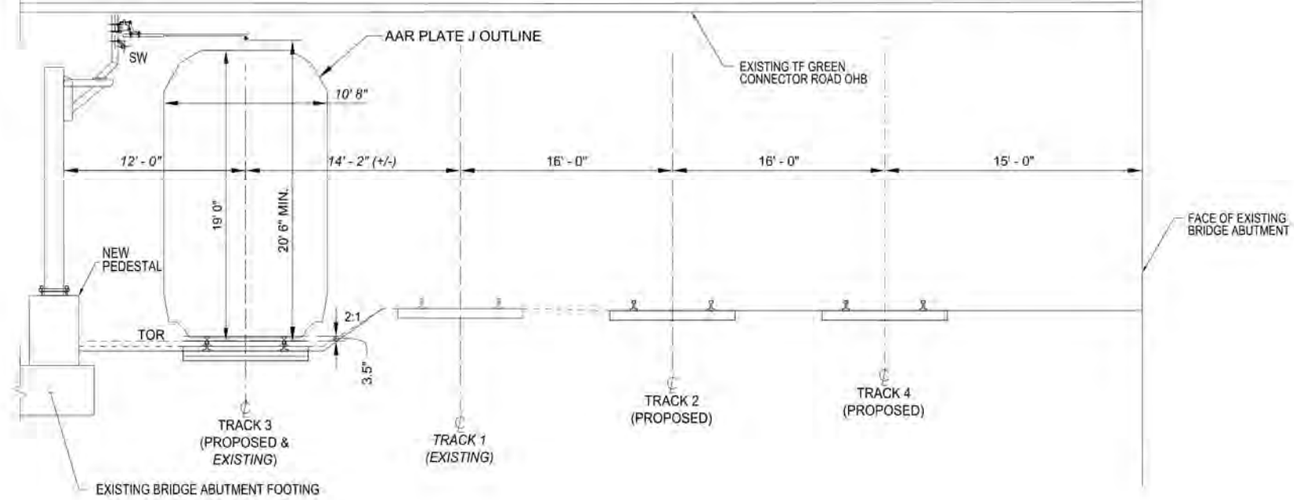
File No.: ALT1-TS07
Ref No.:
Sheet No.: 12 OF 73
Dwg No.: TS-07

TF GREEN CONNECTOR ROAD OVERHEAD BRIDGE

MP 176.23

EXISTING VERTICAL CLEARANCES FROM TRACK TOR TO LOWEST GIRDER:

TRACK 3: 21' - 3"
TRACK 1: 18' - 11.5"
TRACK 2: 19' - 1"

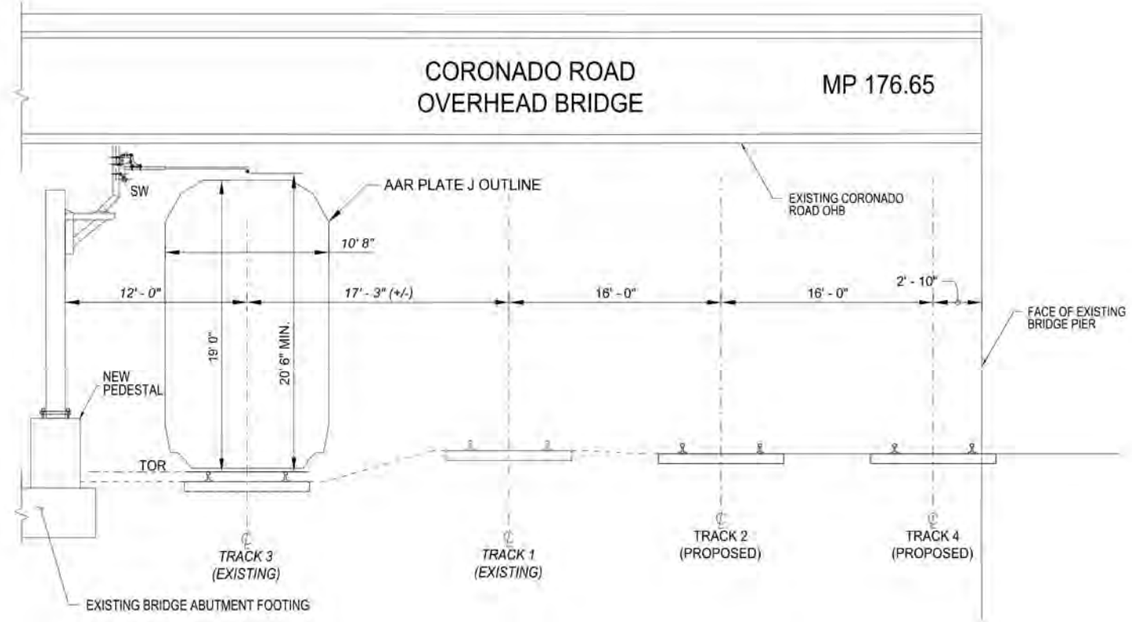


CORONADO ROAD OVERHEAD BRIDGE

MP 176.65

EXISTING VERTICAL CLEARANCES FROM TRACK TOR TO LOWEST GIRDER:

TRACK 3: 21' - 8"
TRACK 1: 20' - 0.5"
TRACK 2: 19' - 10"



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT1-TS08
Ref No.:
Sheet No.: 13 OF 73
Dwg. No.: TS-08

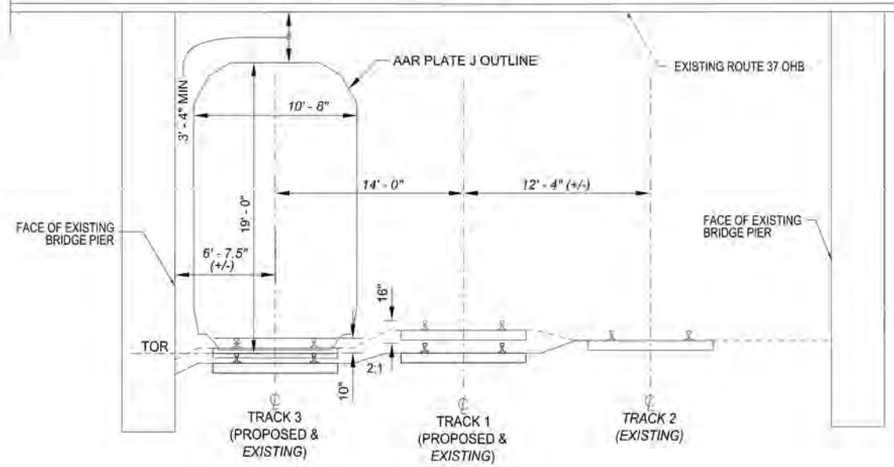
TF Green Airport Station - Proposed Interim Rail Service Alternative Design & EA

ROUTE 37 SOUTHBOUND OVERHEAD BRIDGE

MP 178.09

EXISTING VERTICAL CLEARANCES FROM TRACK TOR TO LOWEST GIRDER:

TRACK 3: 21' - 7"
TRACK 1: 20' - 8.5"
TRACK 2: 21' - 1"

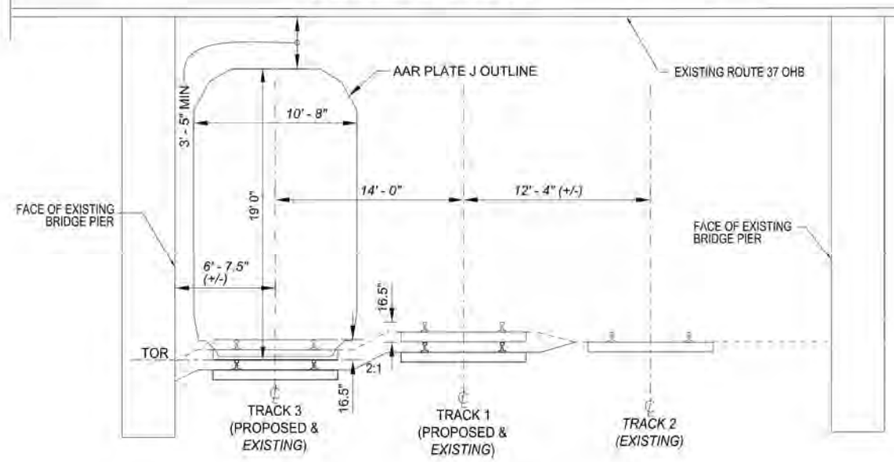


ROUTE 37 NORTHBOUND OVERHEAD BRIDGE

MP 178.13

EXISTING VERTICAL CLEARANCES FROM TRACK TOR TO LOWEST GIRDER:

TRACK 3: 21' - 3.625"
TRACK 1: 20' - 1.6"
TRACK 2: 20' - 9.5"



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deposited on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, publication, or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

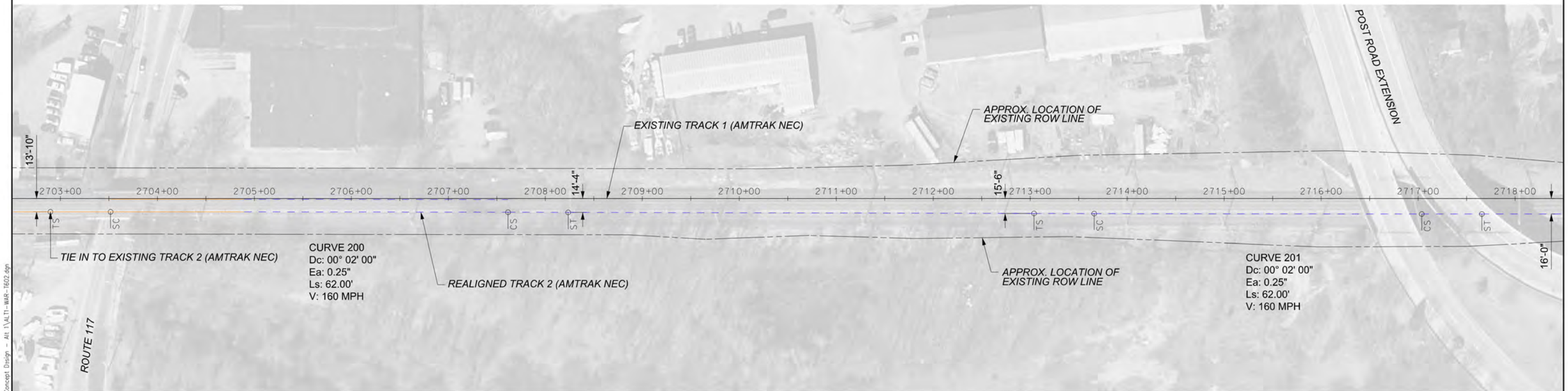
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL Drawn: TC Checked: ZG Date: 01/21/2020

File No.: ALT1-TS09
Ref No.:
Sheet No.: 14 OF 73
Dwg. No.: TS-09

Green Airport Station - Proposed Interim Service Alternatives Design & EA



HORIZONTAL 50' 0' 50' 100'

PLAN

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROFILE
STA 2702+50TO STA 2718+50

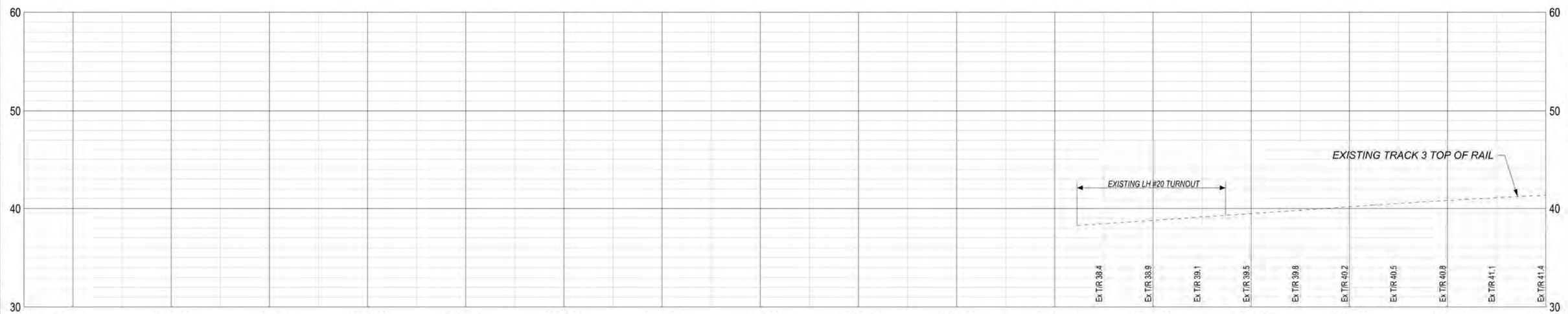
Designed: AL Drawn: TG Checked: ZG Date: 01/15/2020

File No.: ALT1-T602
Ref No.:
Sheet No.: 15 OF 72
Dwg No.: TK-01

Green Airport Station - Proposed Transportation Improvements Preliminary Design & EA

HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

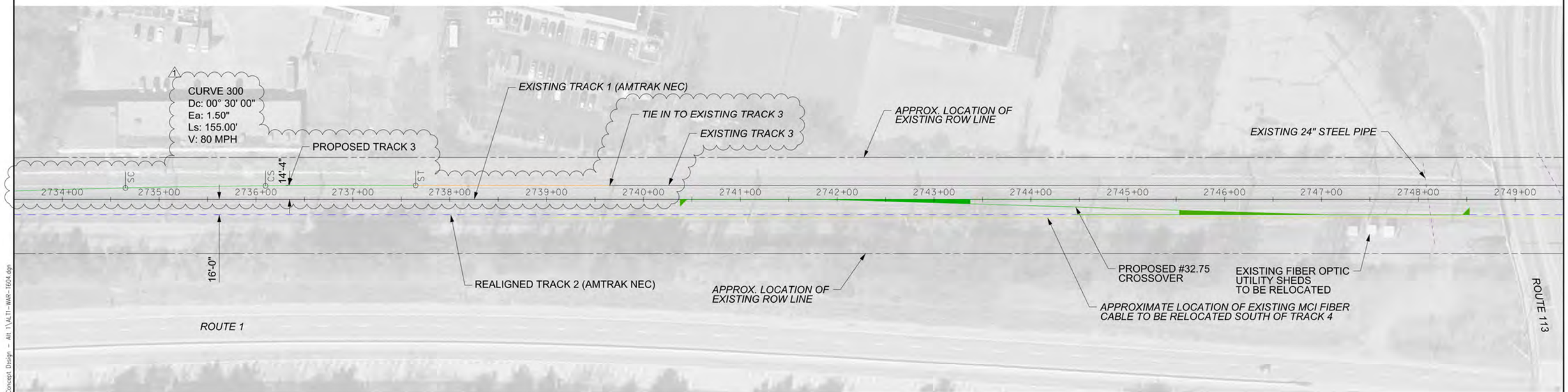
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 PROFILE
STA 2718+00 TO STA 2734+00

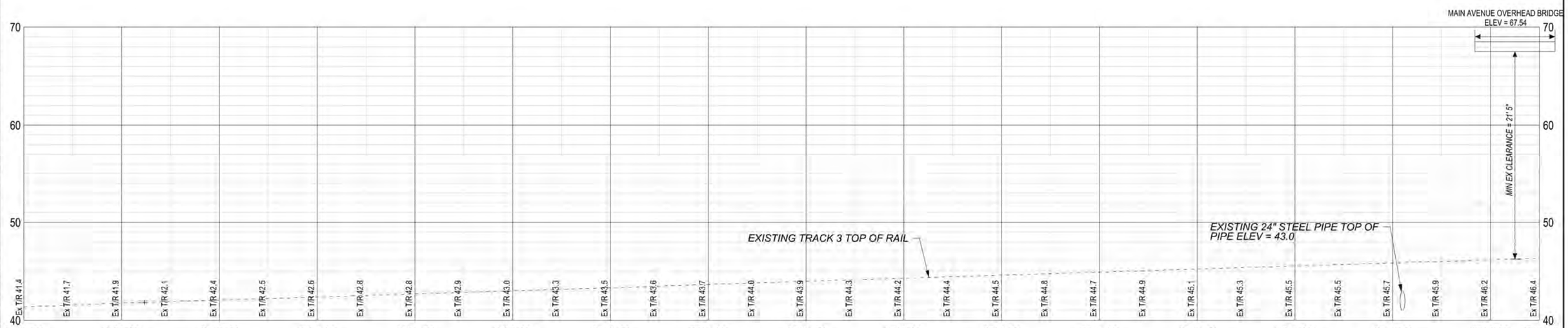
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T603
Ref No.:
Sheet No.: 16 OF 72
Dwg No.: TK-02



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

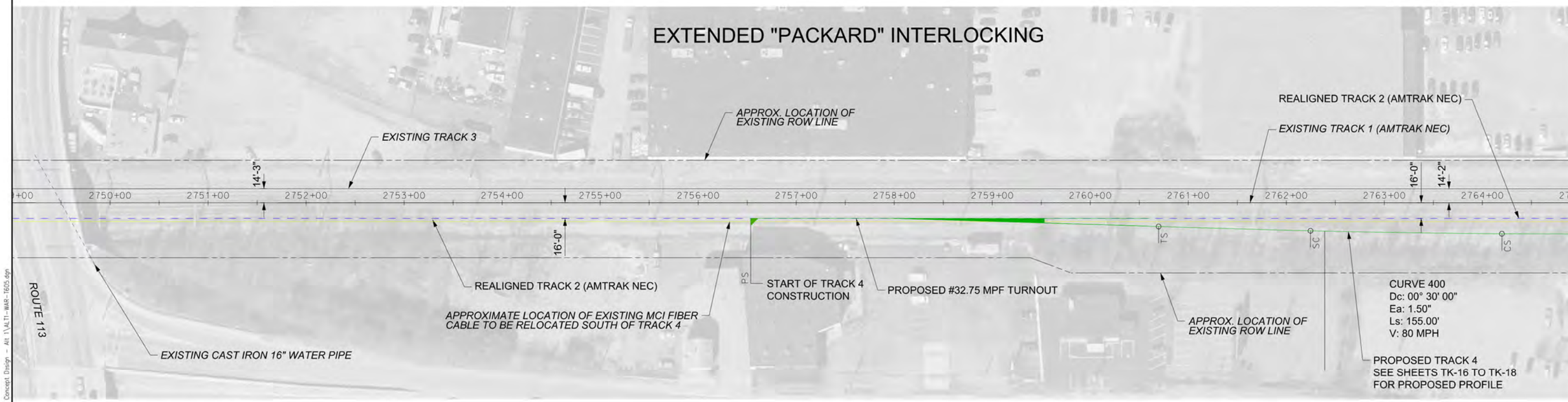
AECOM
1700 MARKET STREET, SUITE 1500
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 - PRELIMINARY
STA 2733+50 TO 2749+50

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

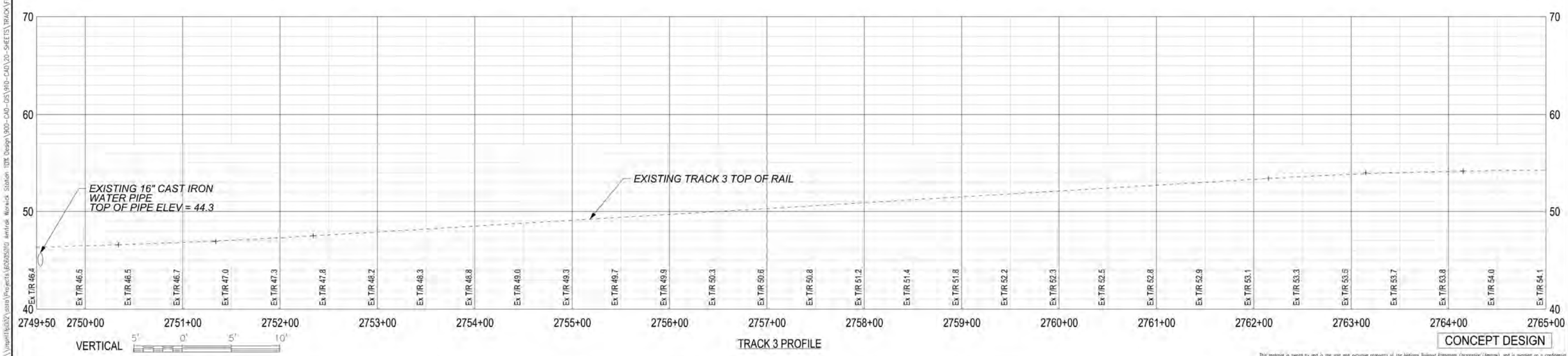
File No.: ALT1-T604
Ref No.:
Sheet No.: 17 OF 72
Dwg No.: TK-03

EXTENDED "PACKARD" INTERLOCKING



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and manufacture of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

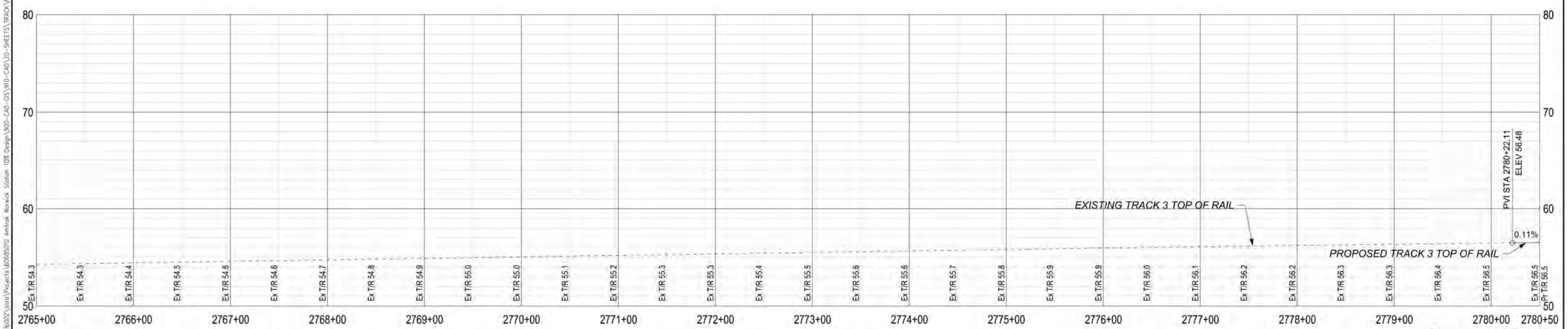
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 PROFILE
STA 2749+00 TO 2765+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T605
Ref No.:
Sheet No.: 18 OF 72
Dwg No.: TK-04

HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-I2 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

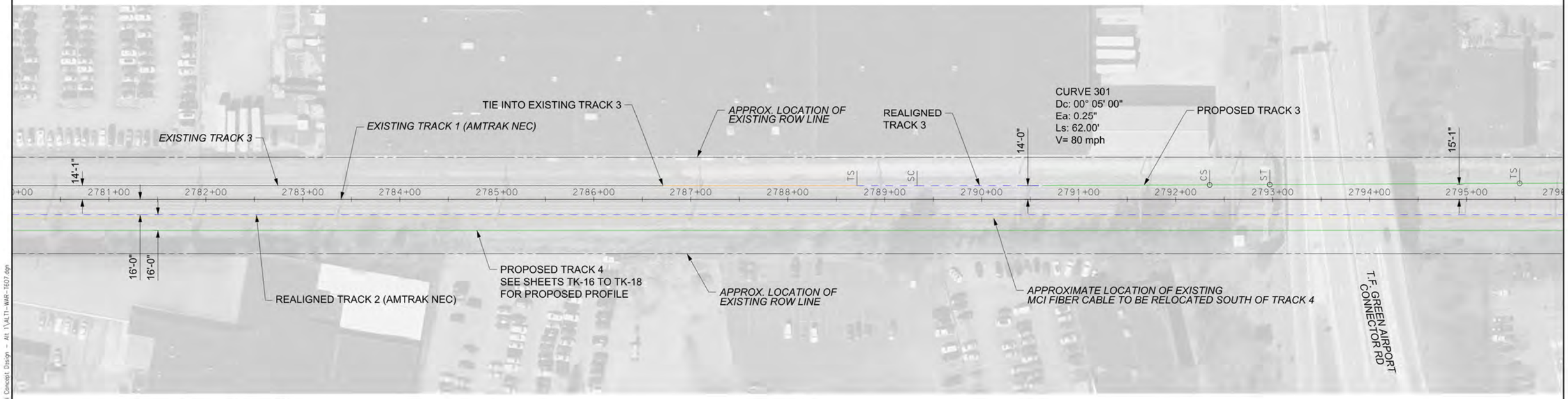
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 PROFILE
STA 2764+50 TO 2780+50

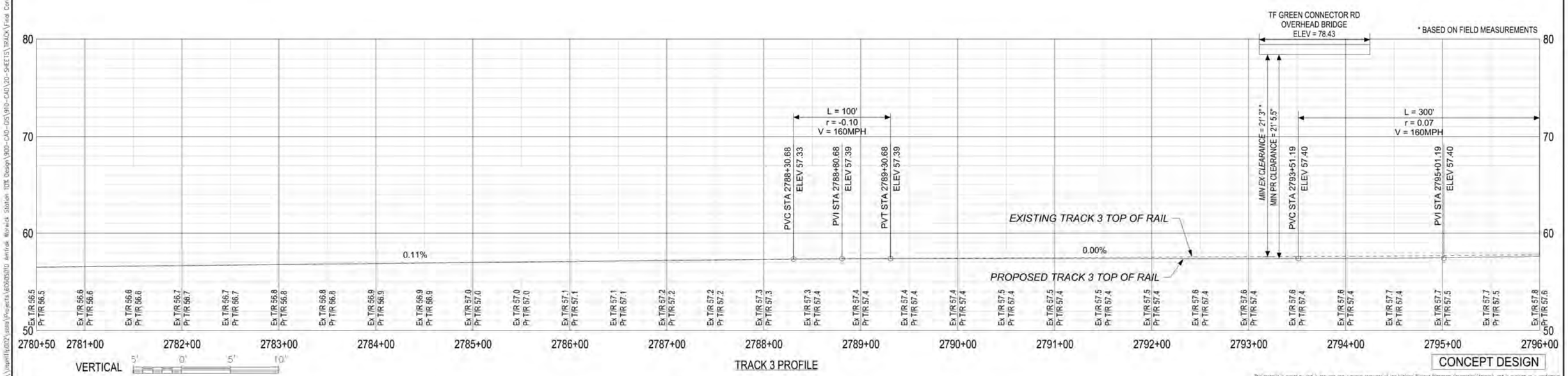
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T606
Ref No.:
Sheet No.: 19 OF 72
Dwg No.: TK-05



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is loaned on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

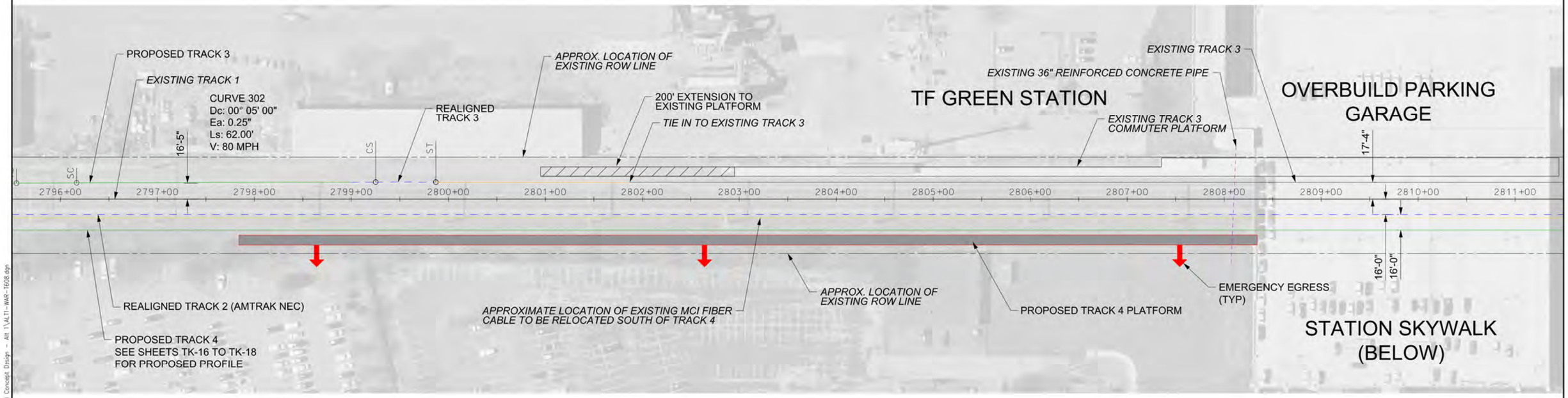
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK & PROFILE
STA 2780+00 TO 2796+00

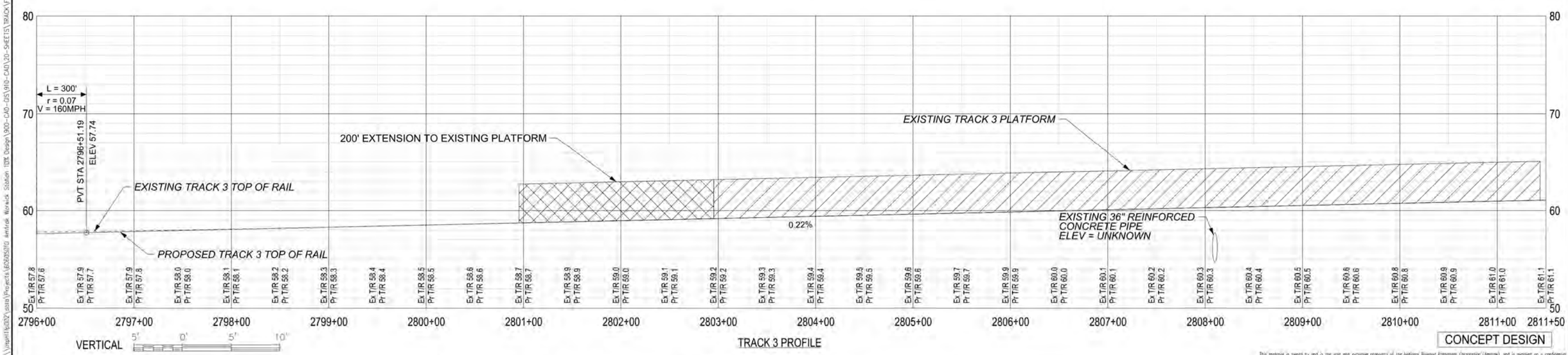
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T607
Ref No.:
Sheet No.: 20 OF 72
Dwg No.: TK-06



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

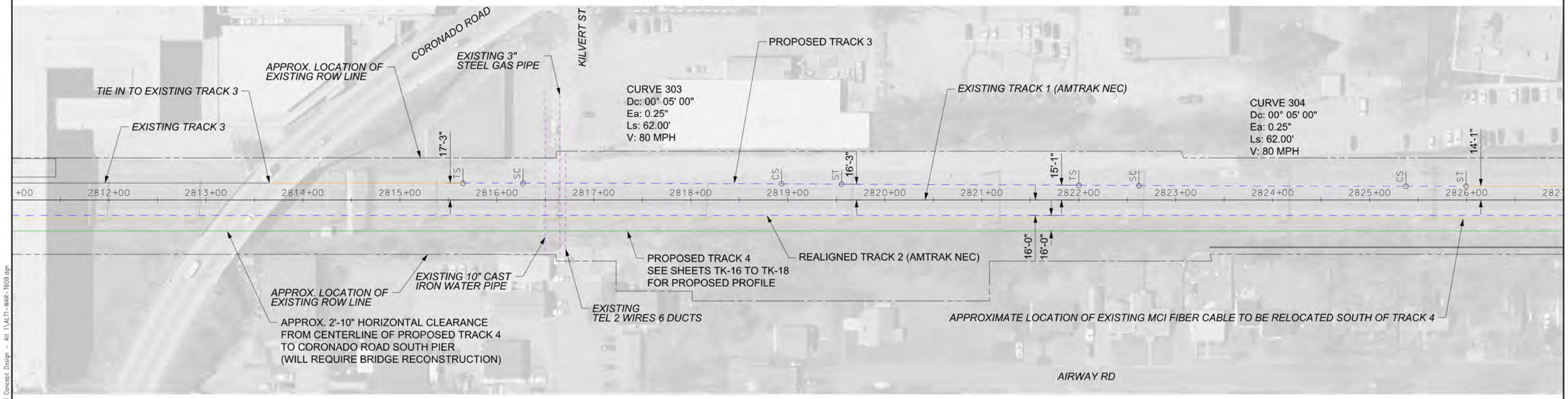
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 & 4 PROFILE
STA 2795+50 TO 2811+50

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

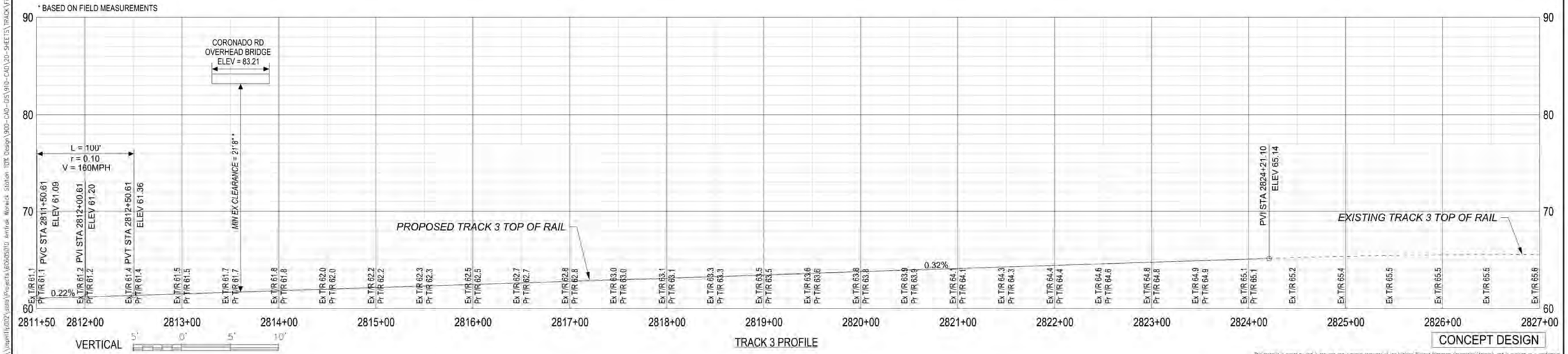
File No.: ALT1-T608
Ref No.:
Sheet No.: 21 OF 72
Dwg No.: TK-07



HORIZONTAL 50' 0' 50' 100'

PLAN

* BASED ON FIELD MEASUREMENTS



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

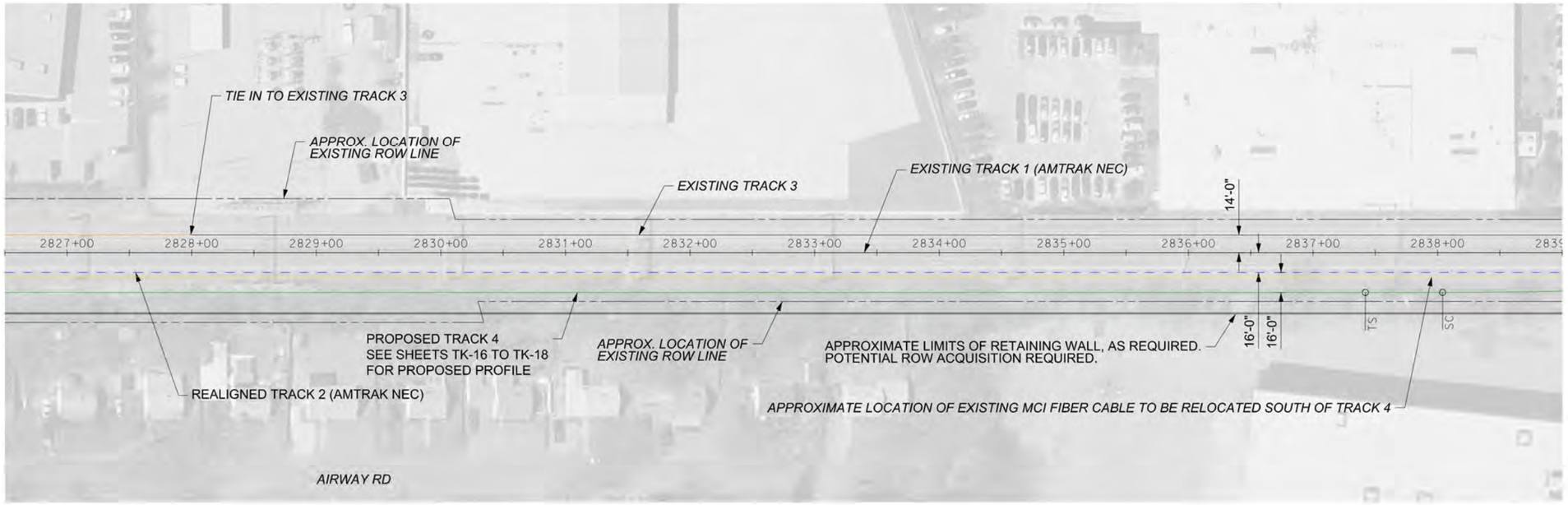
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1500
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 PROFILE
STA 2811+00 TO 2827+00

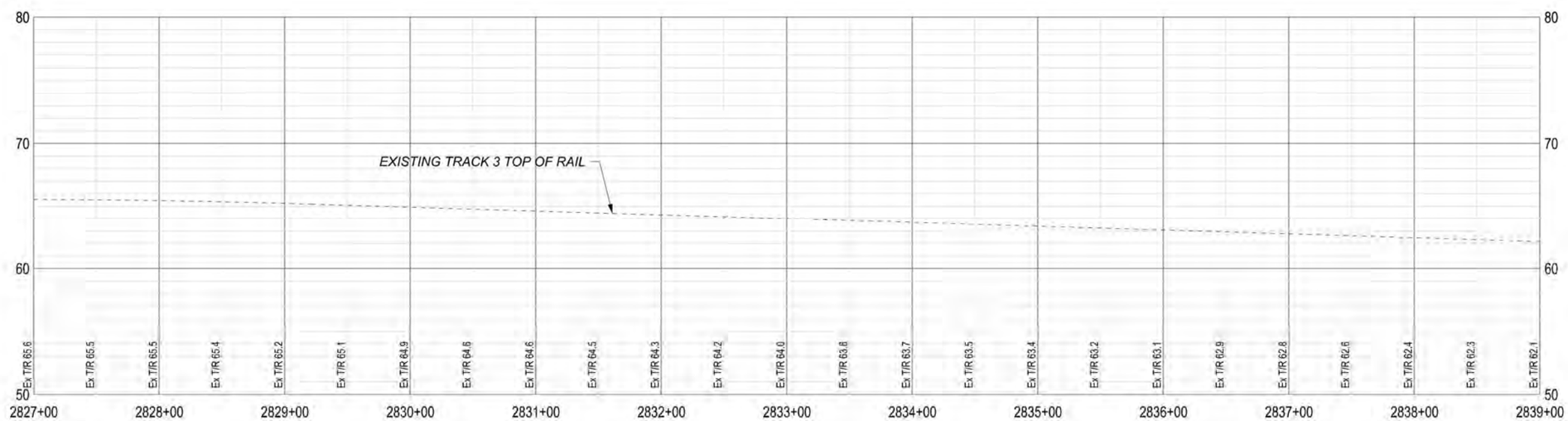
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T609
Ref No.:
Sheet No.: 22 OF 72
Dwg No.: TK-08



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

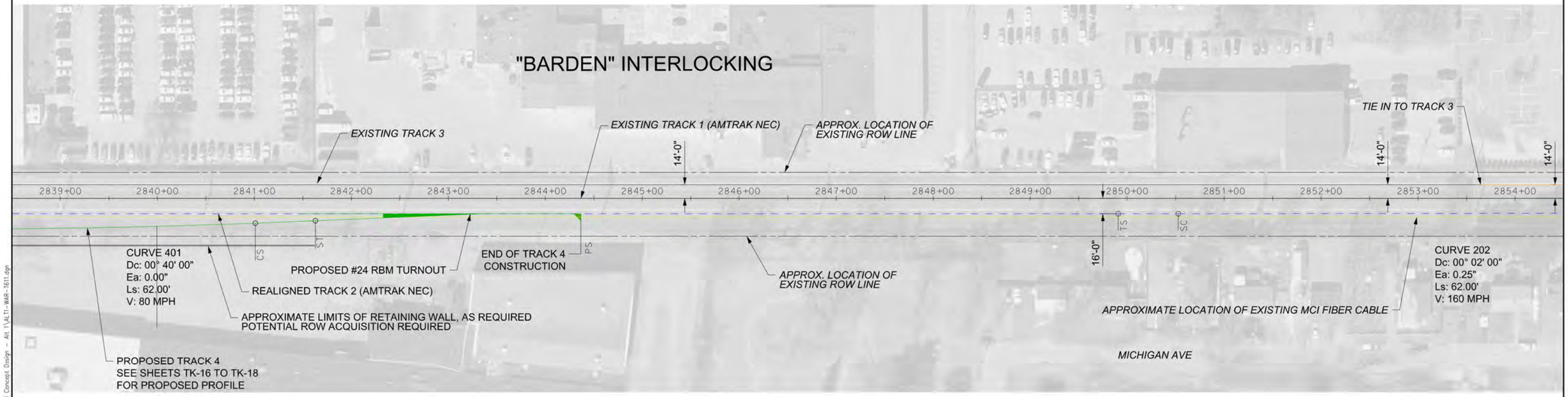
Approved | Date

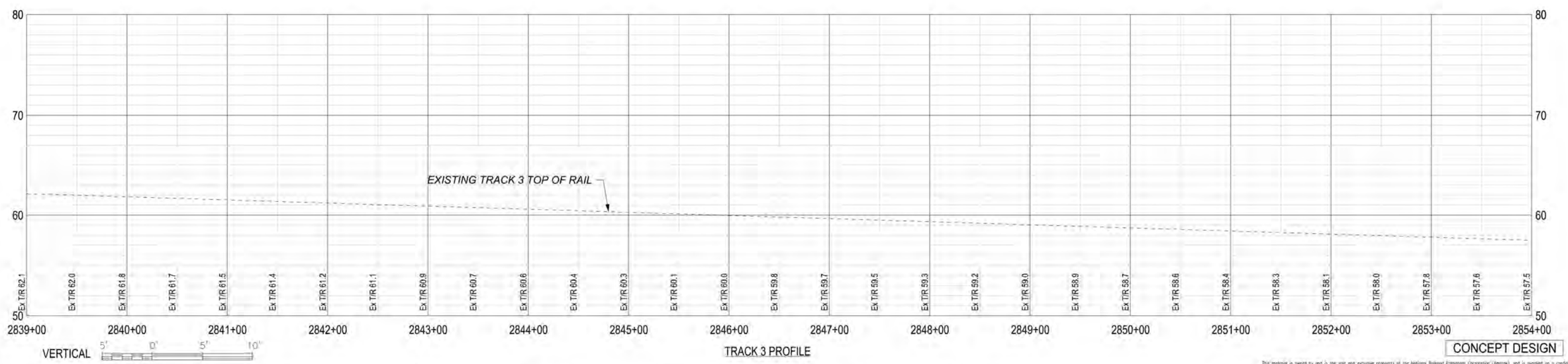
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 PROFILE
STA 2826+50 TO 2839+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T610
Ref No.:
Sheet No.: 23 OF 72
Dwg No.: TK-09





CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

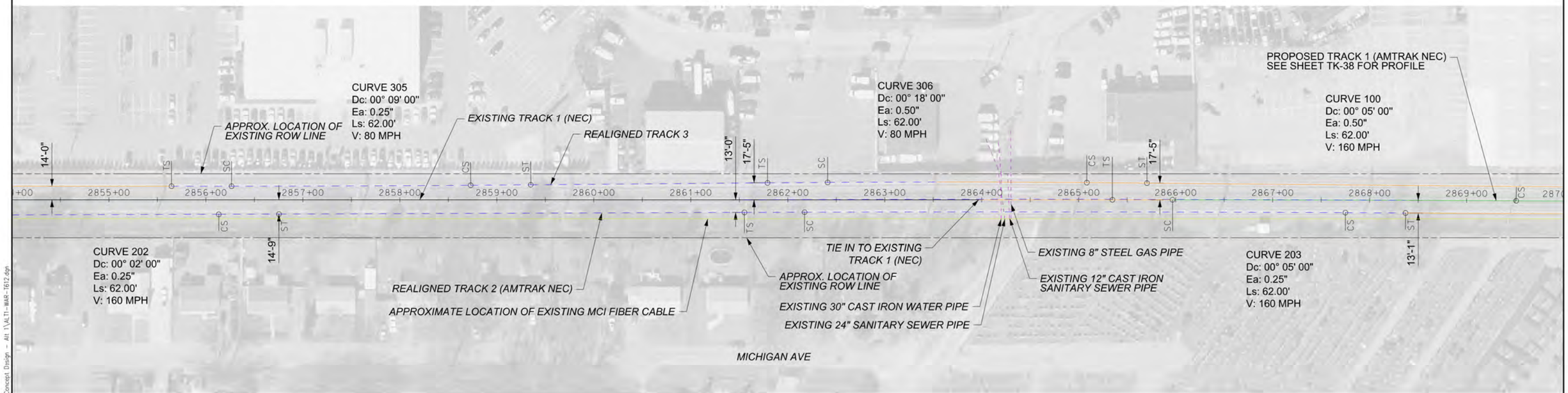
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 - PROFILE
STA 2838+50 TO 2854+50

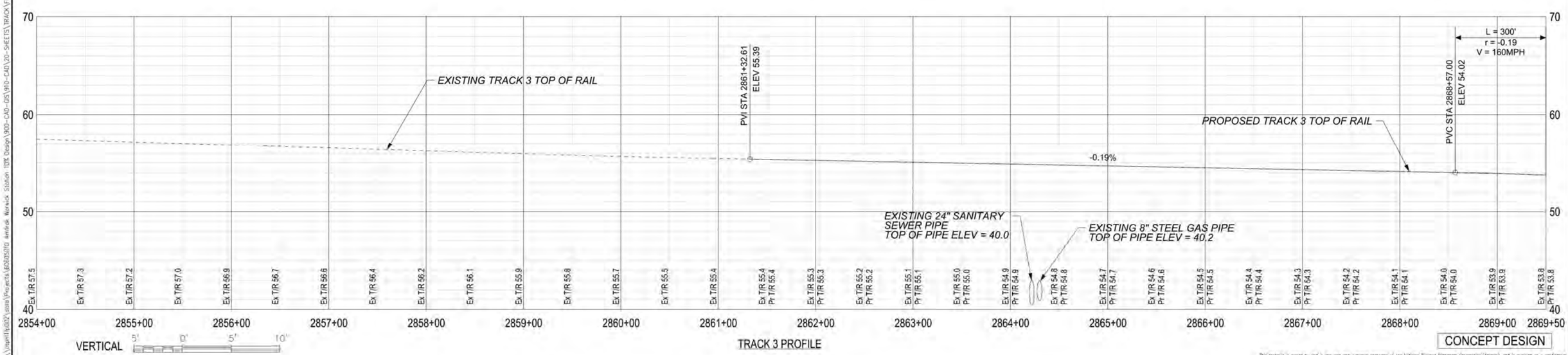
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T611
Ref No.:
Sheet No.: 24 OF 72
Dwg No.: TK-10



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-I2 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

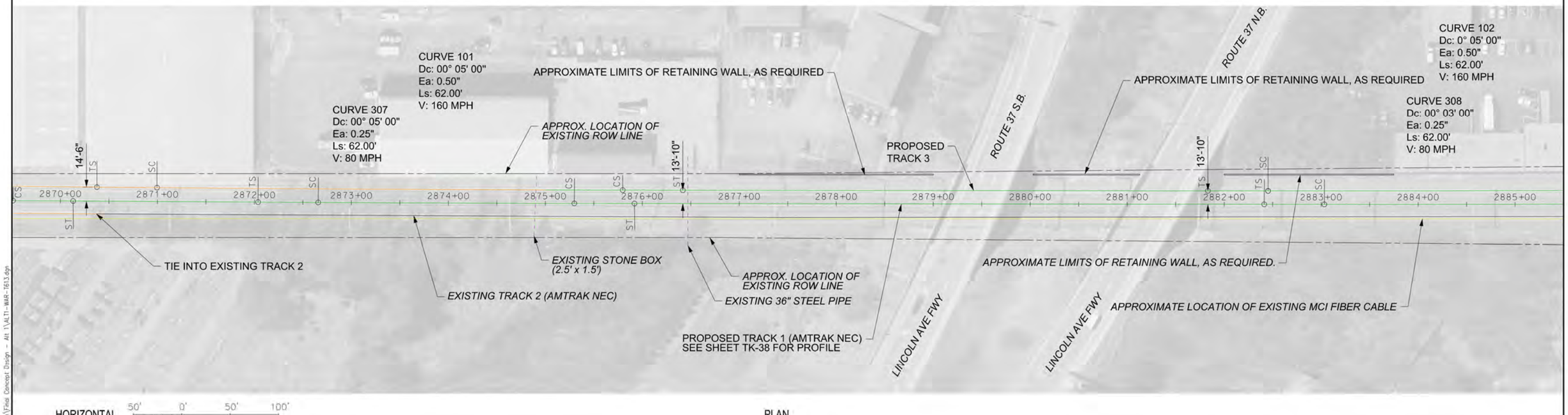
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 1 (NEC) PROFILE
STA 2854+00 TO 2870+00

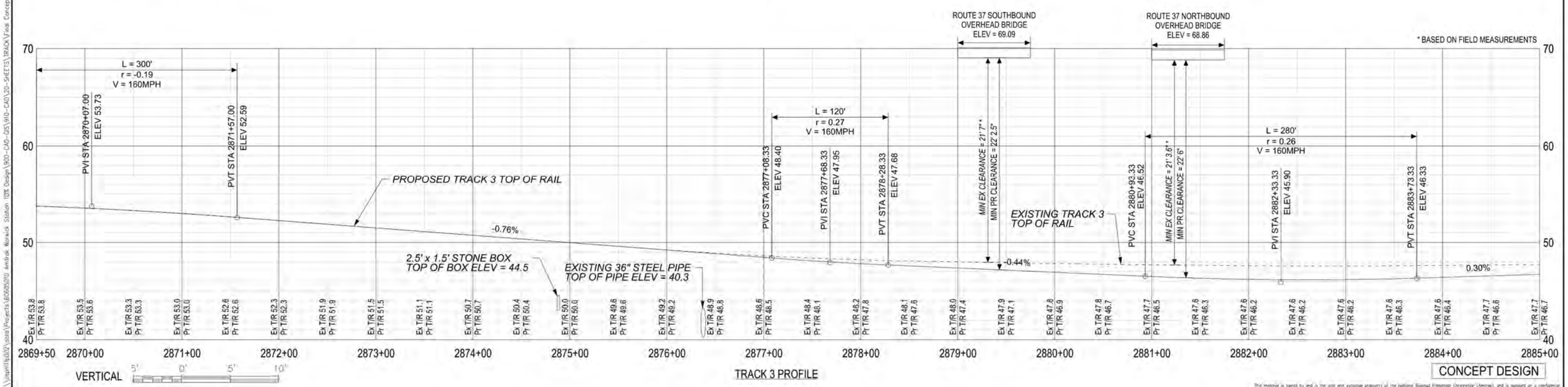
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T612
Ref No.:
Sheet No.: 25 OF 72
Dwg No.: TK-11



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AEC-NE is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

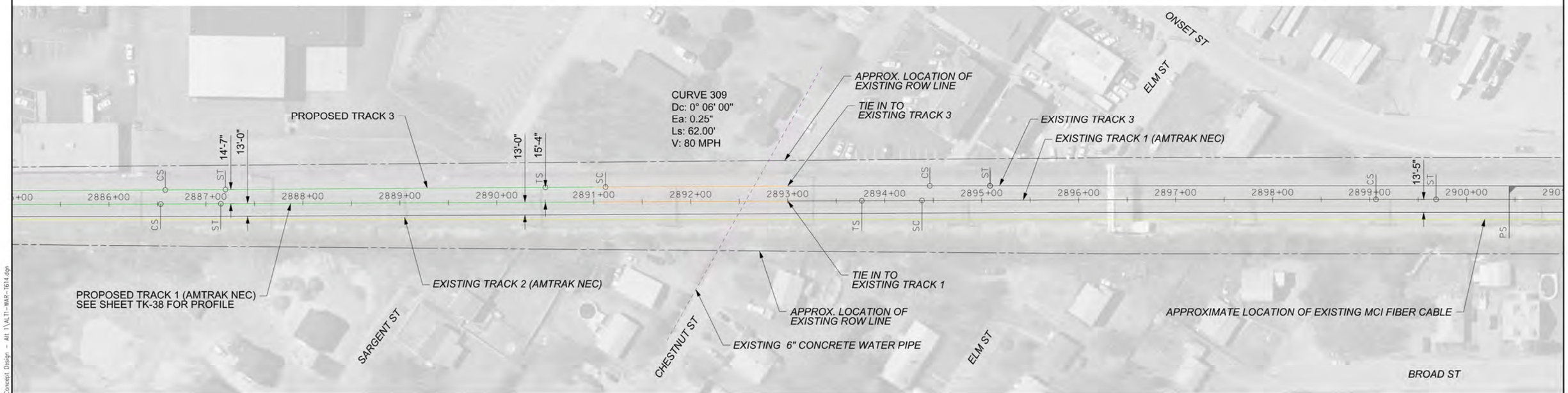
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 PLAN & PROFILE
STA 2869+50 TO STA 2885+50

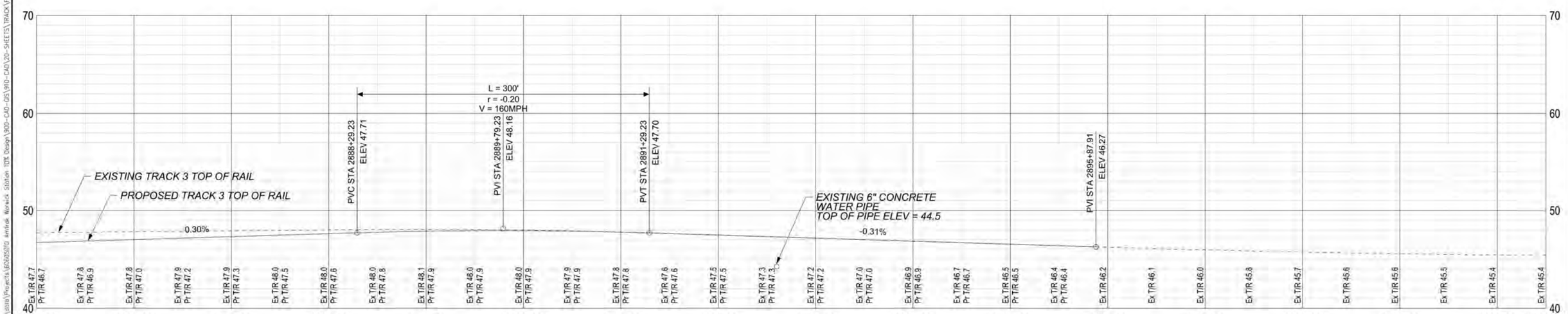
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T613
Ref No.:
Sheet No.: 26 OF 72
Dwg No.: TK-12



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-I2 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

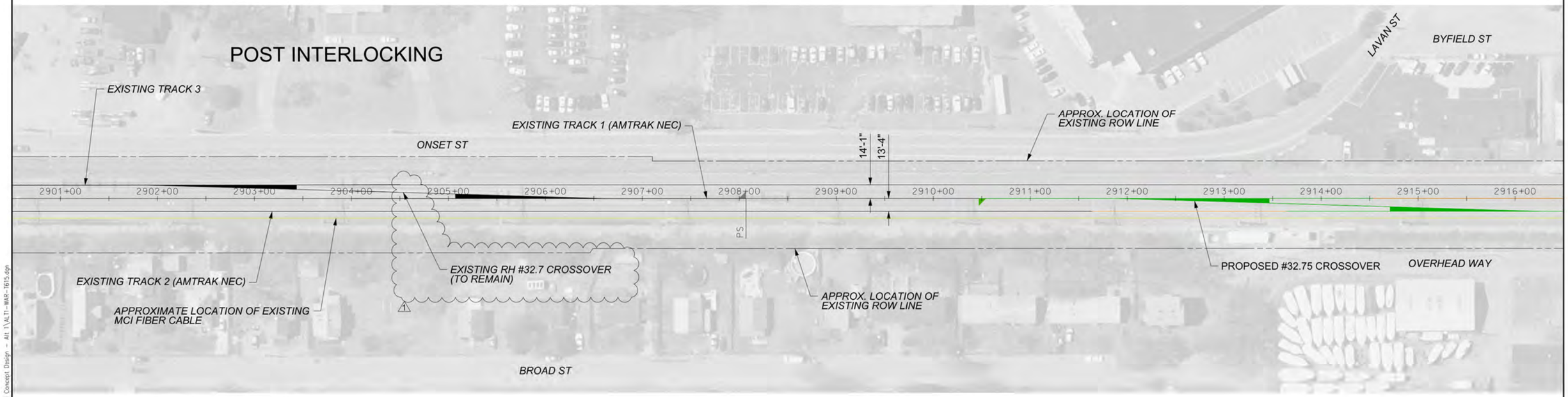
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

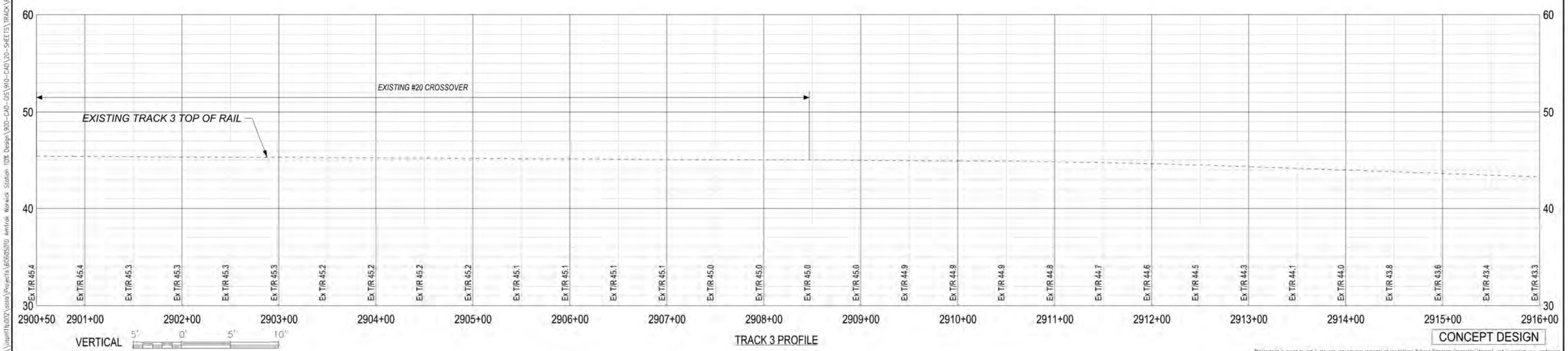
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 PROFILE
STA 2885+00 TO STA 2901+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T614
Ref No.:
Sheet No.: 27 OF 72
Dwg No.: TK-13

TF Green Airport Station - Proposed Track 3 Preliminary Design & EA





CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved	Date

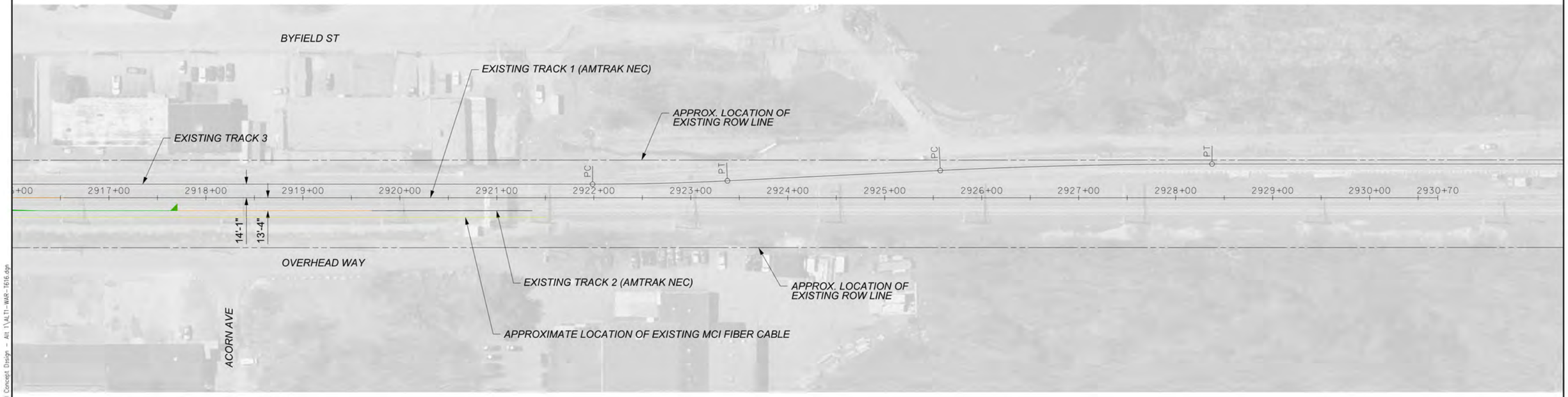
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

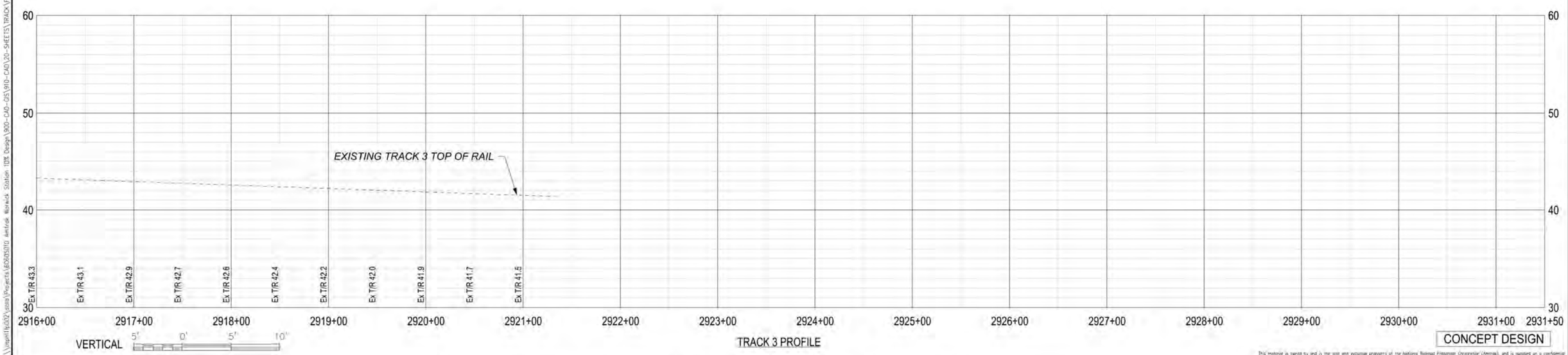
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 3 PROFILE
STA 2900+50 TO STA 2916+50

Designed: AL Drawn: TG Checked: ZG Date: 01/15/2020

File No.: ALT1-T615
Ref No.:
Sheet No.: 28 OF 72
Dwg No.: TK-14

\\usphil1p0012\data\Projects\60605010 Amtrak Warwick Station TDM Design\900-CAD-GIS\910-CAD\20-SHEETS\TRACK\Final Concept Design\Final Concept Design - Alt 1\ALT1-WAR-T615.dgn
2/21/2020 11:41:09 AM





CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NE-10, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

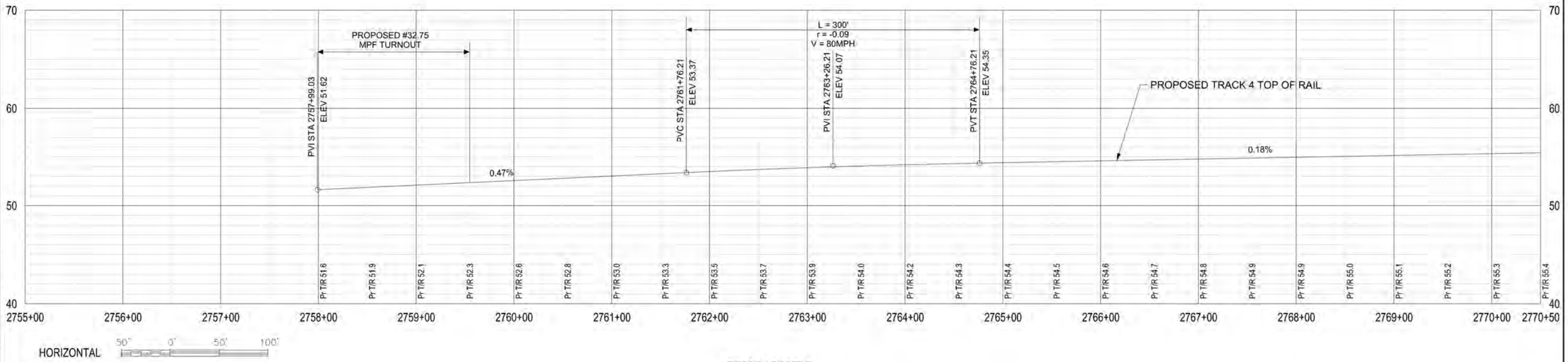
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1500
PHILADELPHIA, PENNSYLVANIA 19103
TEL.: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROFILE OF TRACK 3 - PRELIMINARY
STA 2916+00 TO STA 2921+37

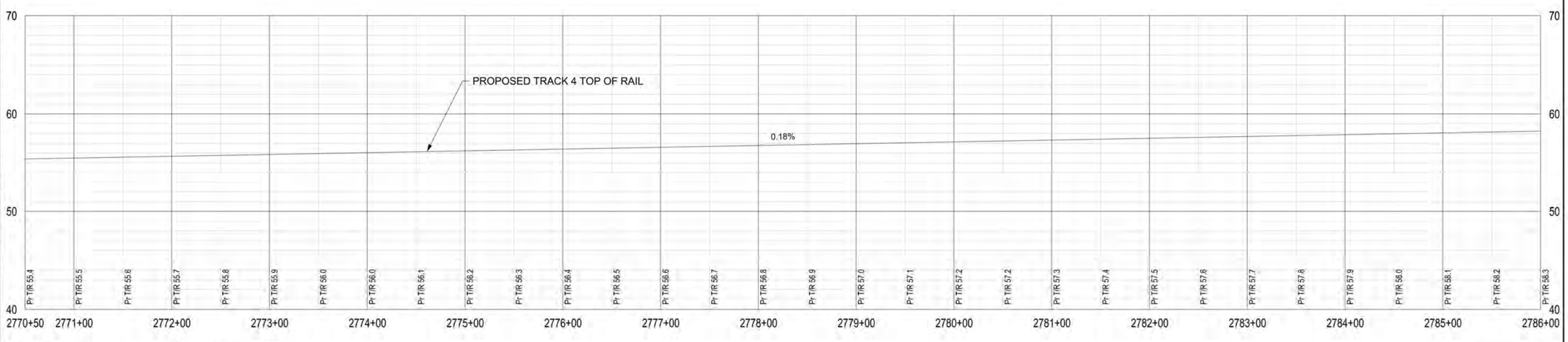
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T616
Ref No.:
Sheet No.: 29 OF 72
Dwg No.: TK-15



HORIZONTAL 50' 0' 50' 100'

TRACK 4 PROFILE



VERTICAL 50' 0' 50' 100'

TRACK 4 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

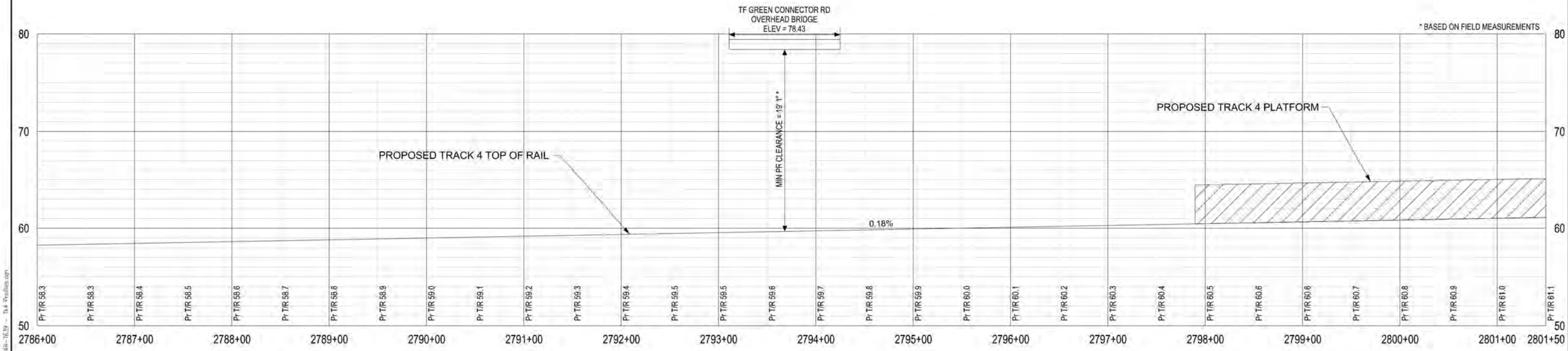
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 PROFILE - ALTERNATIVE
STA 2755+00 TO STA 2786+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

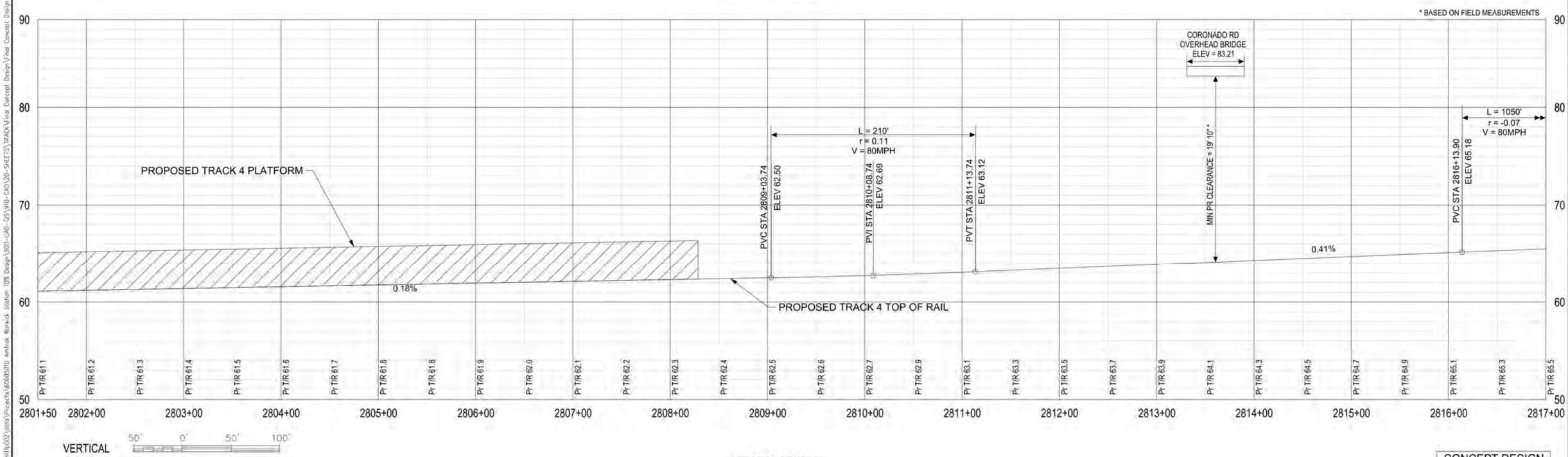
File No.: ALT1-T638
Ref No.:
Sheet No.: 30 OF 73
Dwg. No.: TK-16

Green Airport Station Improvements Preliminary Design & EA

\\usphil1p002\data\Projects\60605010 Amtrak Warwick Station 10% Design\900-CAD-DS\910-CAD\20-SHEETS\TRACK\Final Concept Design\Final Concept Design - Alt 1\ALT1-W49-T638 - Tk4 Profile.dgn
1/21/2020 - 10:24:43 AM



TRACK 4 PROFILE



TRACK 4 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

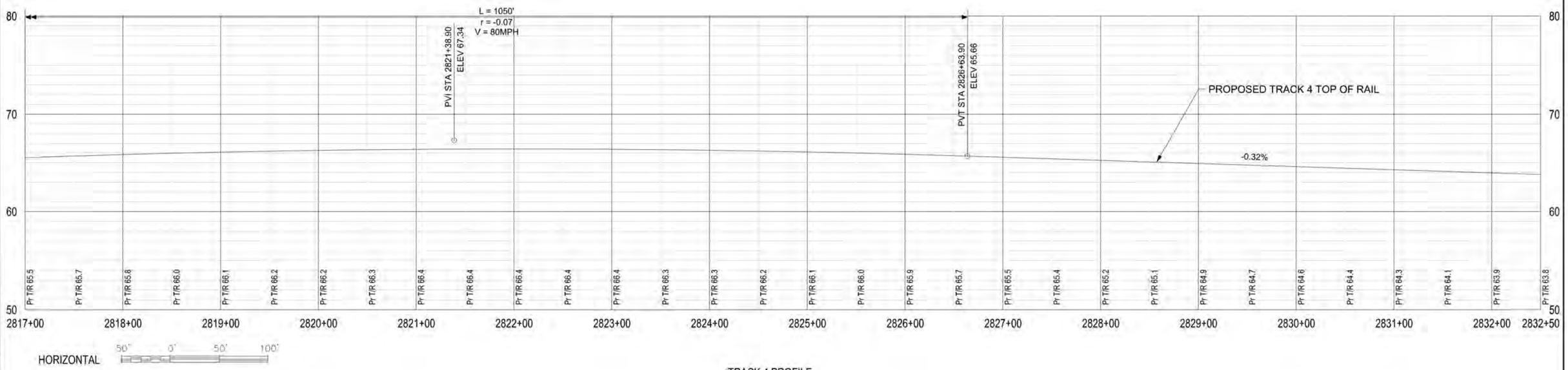
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

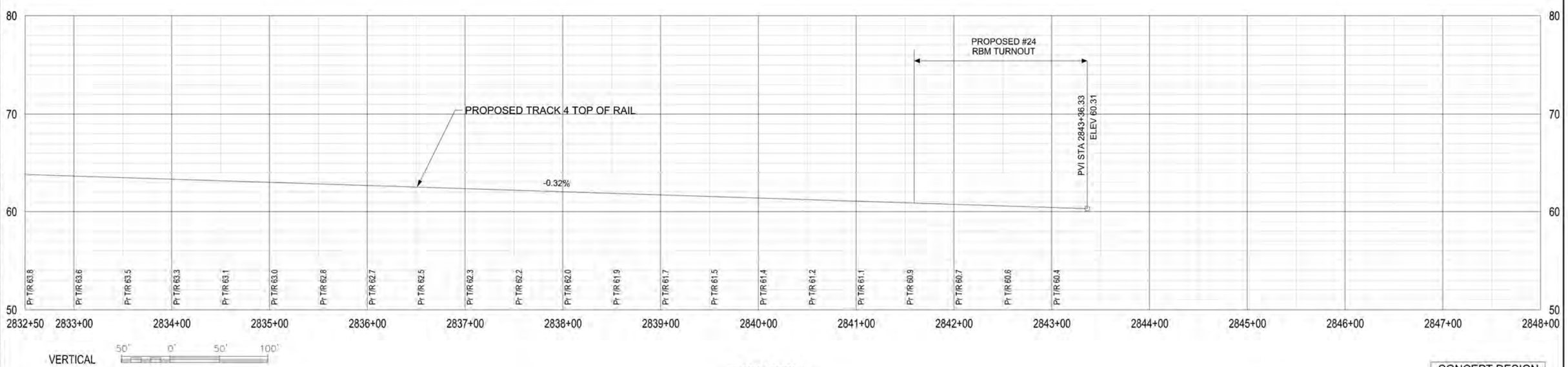
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 PLATFORM ALTERNATIVE
STA 2786+00 TO STA 2817+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT1-T639
Ref No.:
Sheet No.: 31 OF 73
Dwg. No.: TK-17



TRACK 4 PROFILE



TRACK 4 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deemed to be a confidential trade secret for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

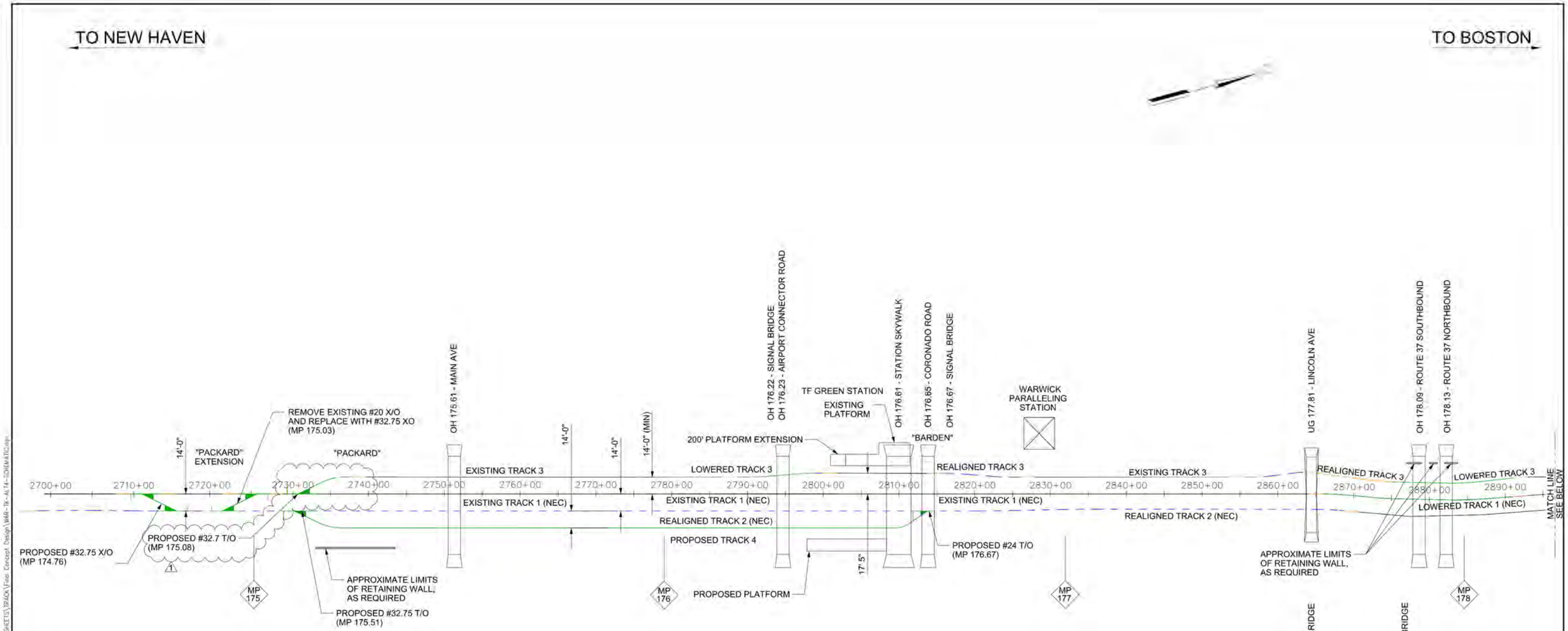
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 PROFILE - ALTERNATIVE 1
STA 2817+00 TO STA 2848+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT1-T640
Ref No.:
Sheet No.: 32 OF 73
Dwg No: TK-18



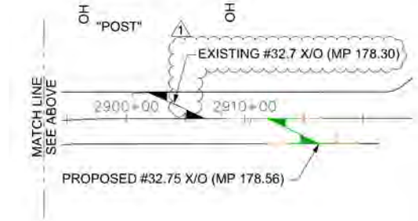
SCHEMATIC ALTERNATIVE 4

NTS

APPROXIMATE STATION EQUALITIES	
MILEPOST	STATION
175	2726+25
176	2779+02
177	2831+71
178	2884+65
179	2937+52

LEGEND

- EXISTING TRACK CENTERLINE
- PROPOSED TRACK CENTERLINE
- REALIGNED TRACK CENTERLINE
- RAISE AND SURFACE



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

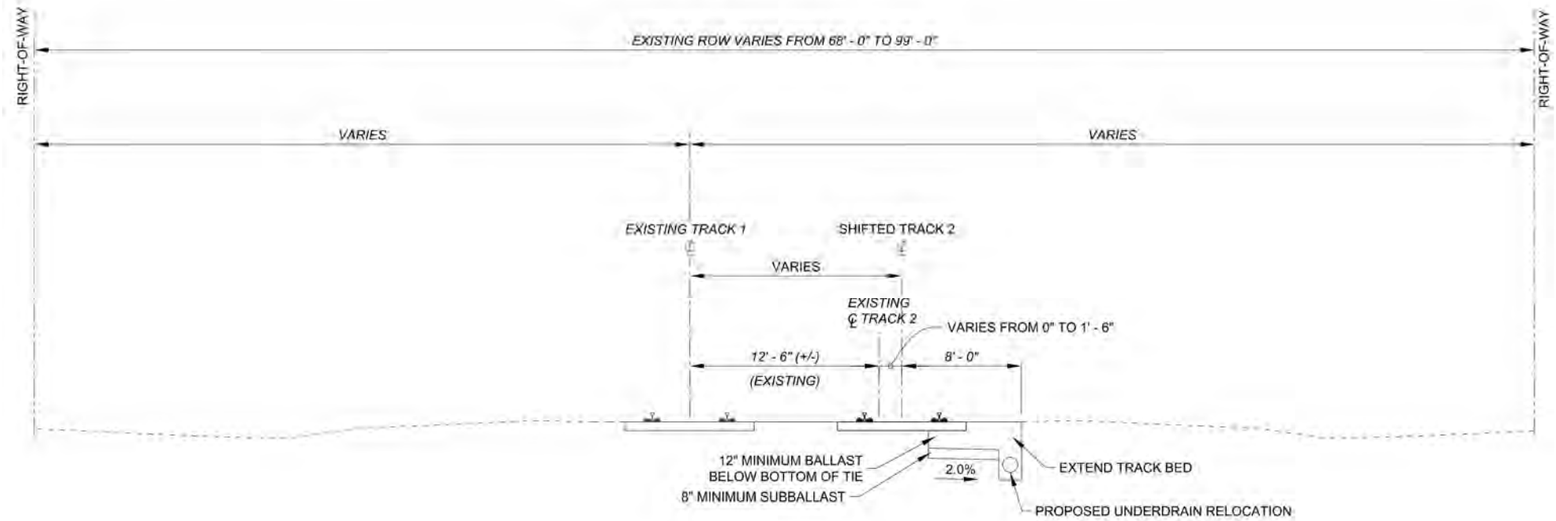
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TRACK SCHEMATIC - ALTERNATIVE 4

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

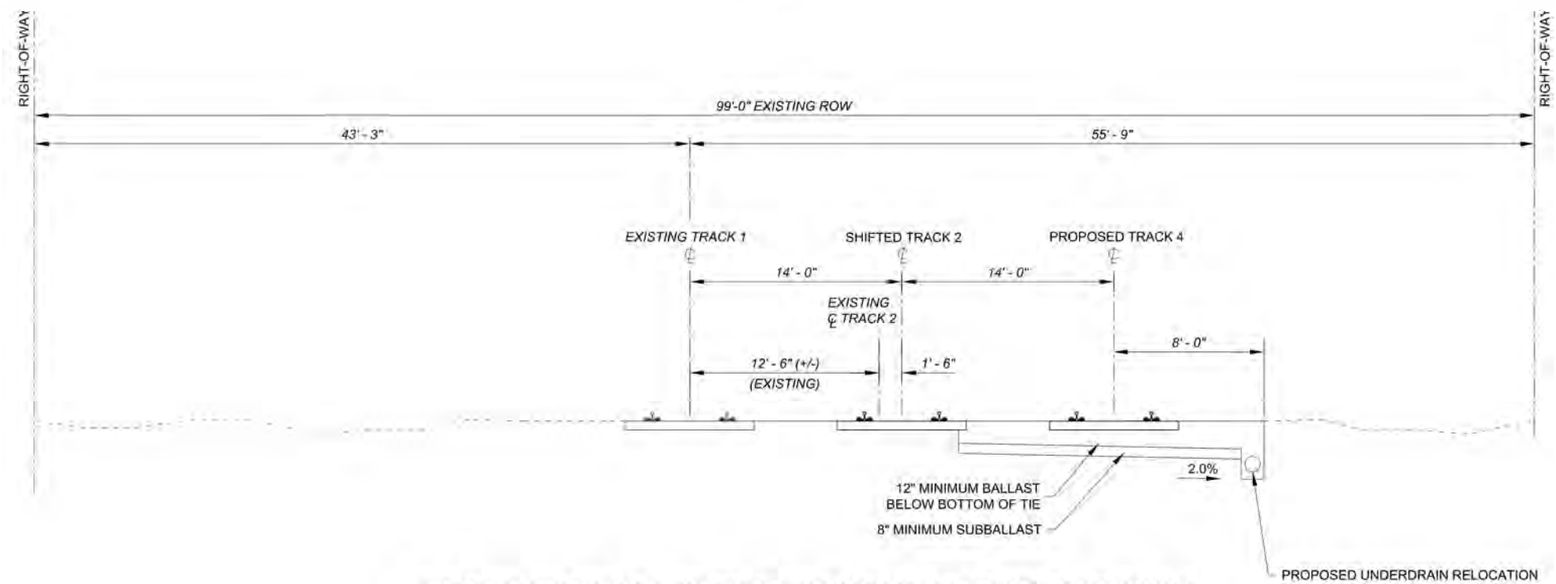
File No.: ALT4-SC
Ref No.:
Sheet No.: 33 OF 73
Dwg No.: SC-02

NTS



EXISTING TRACK 1, SHIFTED TRACK 2

STA 2697+18.00 to 2728+73.64
NTS



EXISTING TRACK 1, SHIFTED TRACK 2, PROPOSED TRACK 4

STA 2728+73.64 to 2729+22.67
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deployed on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

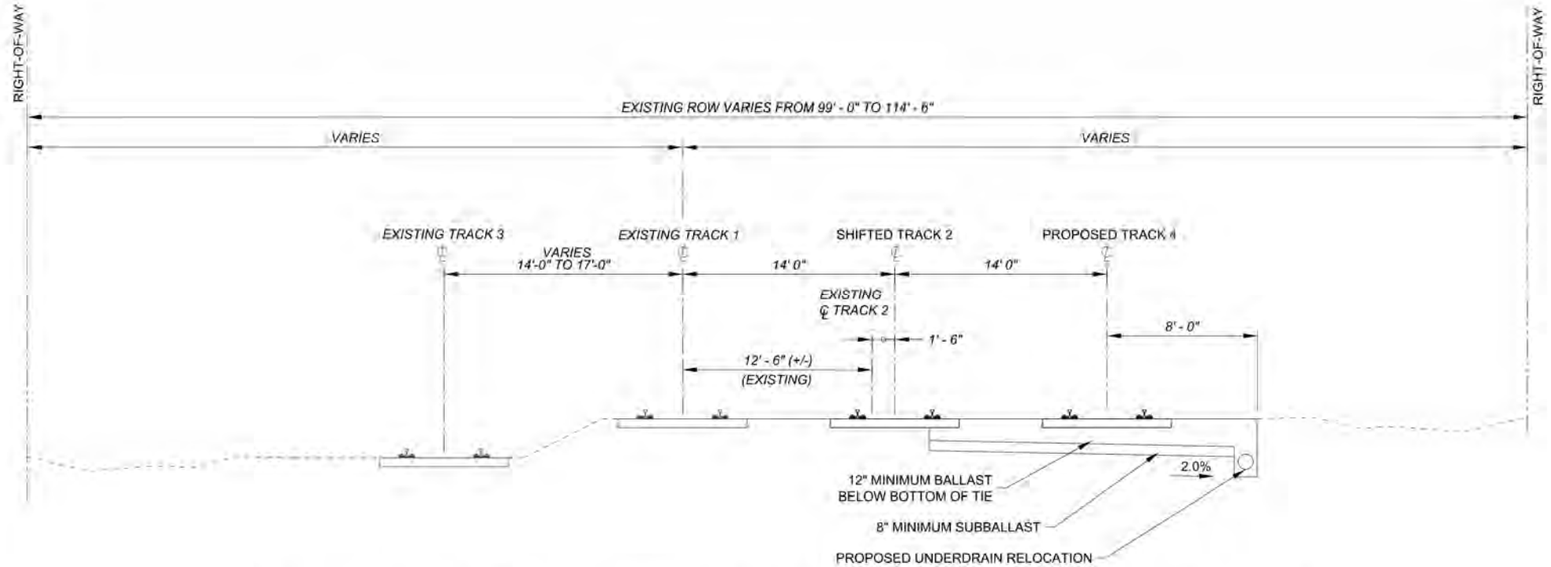
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

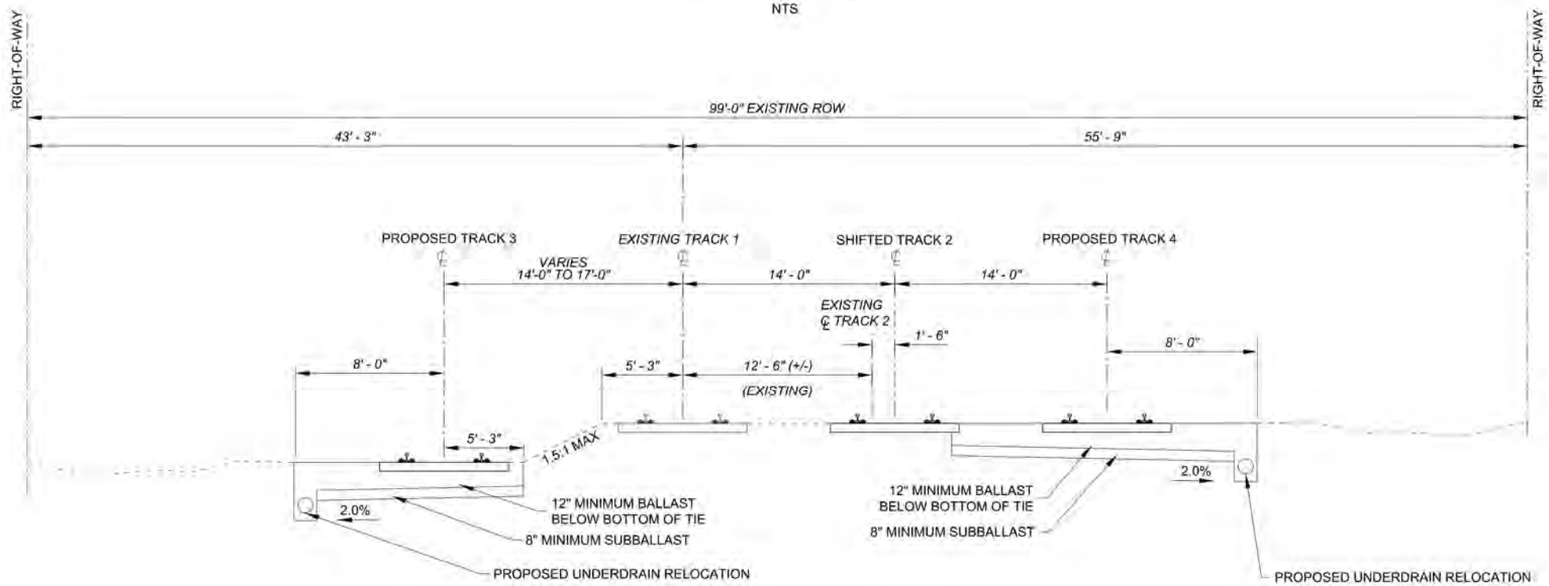
File No.: ALT4-TS11
Ref No.:
Sheet No.: 34 OF 73
Dwg. No.: TS-10

TF Green Airport Station - Proposed Intercity Passenger Rail Service Alternatives Design & EA



EXISTING TRACK 1, SHIFTED TRACK 2, EXISTING TRACK 3, PROPOSED TRACK 4

STA 2729+22.67 to 2788+71.42
STA 2807+76.60 to 2814+72.35
NTS



EXISTING TRACK 1, SHIFTED TRACK 2, PROPOSED TRACK 3, PROPOSED TRACK 4

STA 2788+71.42 to 2799+87.14
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

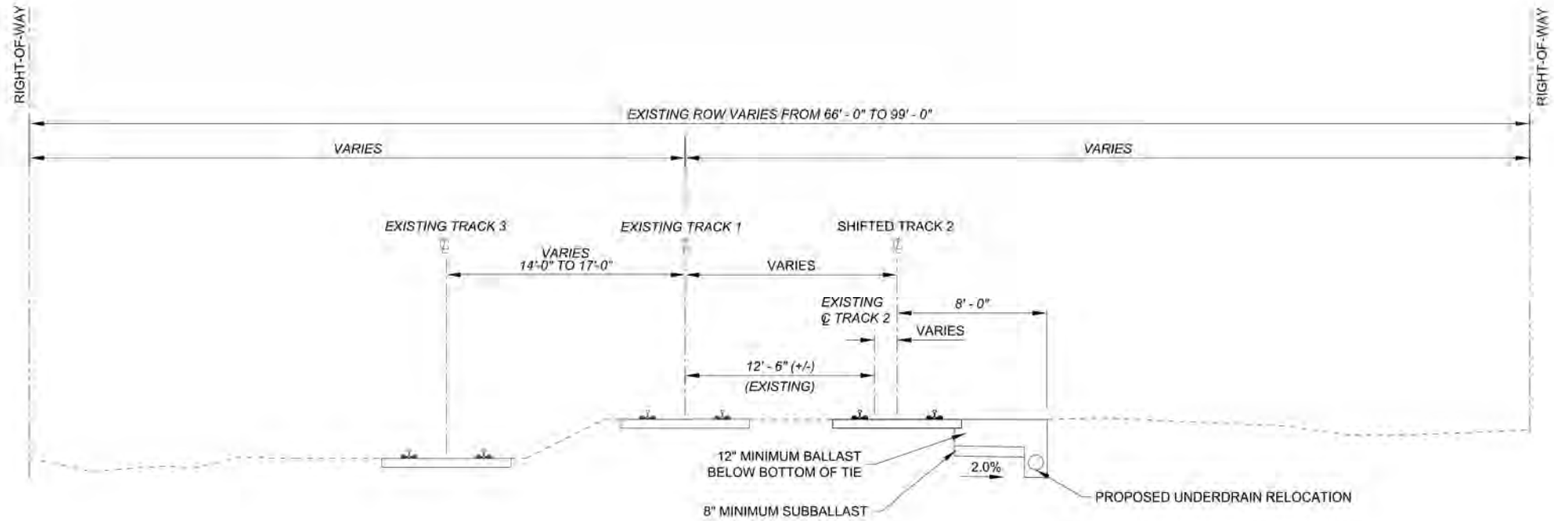
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED ALTERNATIVE - ALT PRELIMINARY Design 8 EA

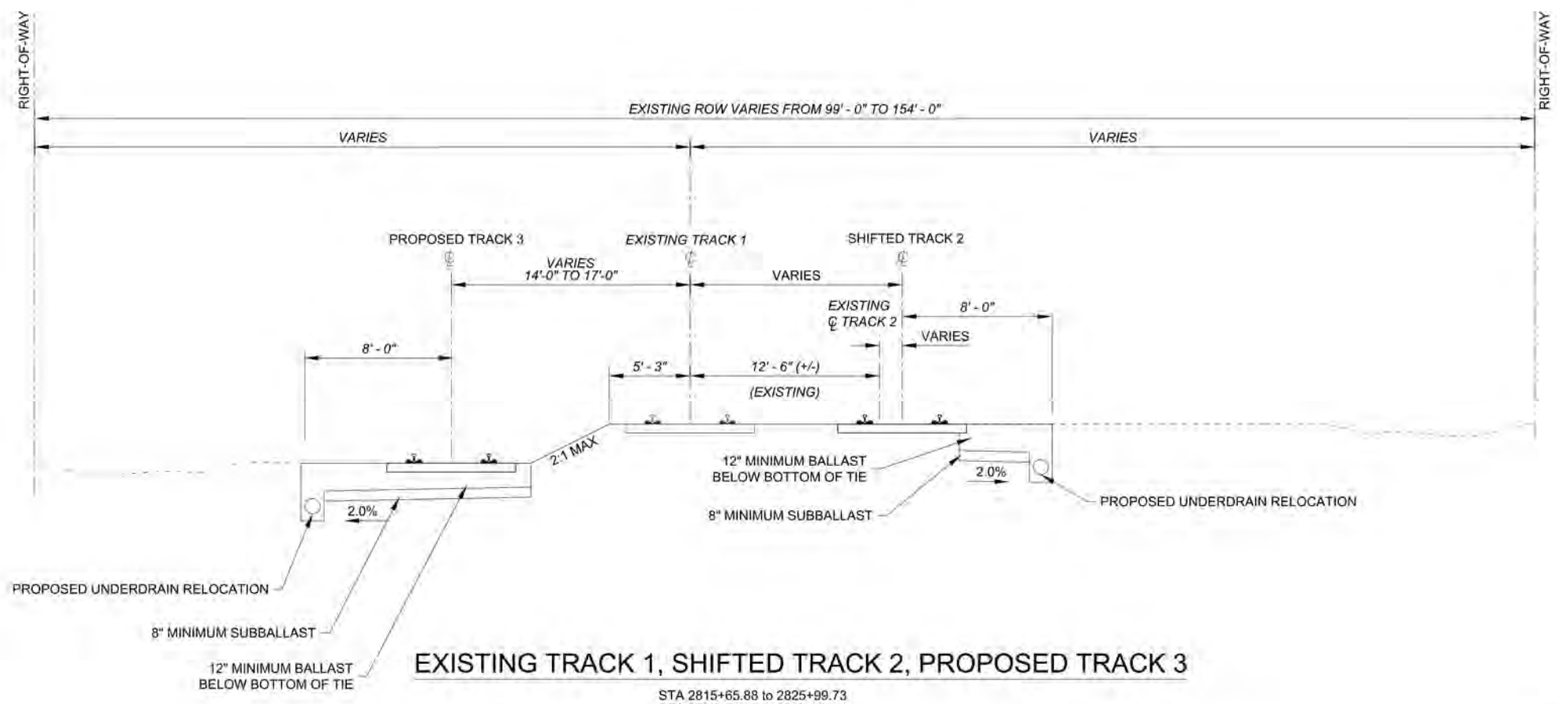
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT4-TS12
Ref No.:
Sheet No.: 35 OF 73
Dwg No.: TS-11



EXISTING TRACK 1, SHIFTED TRACK 2, EXISTING TRACK 3

STA 2814+72.35 to 2815+65.88
STA 2825+99.73 to 2855+64.58
NTS



EXISTING TRACK 1, SHIFTED TRACK 2, PROPOSED TRACK 3

STA 2815+65.88 to 2825+99.73
STA 2855+64.58 to 2865+95.84
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deployed on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

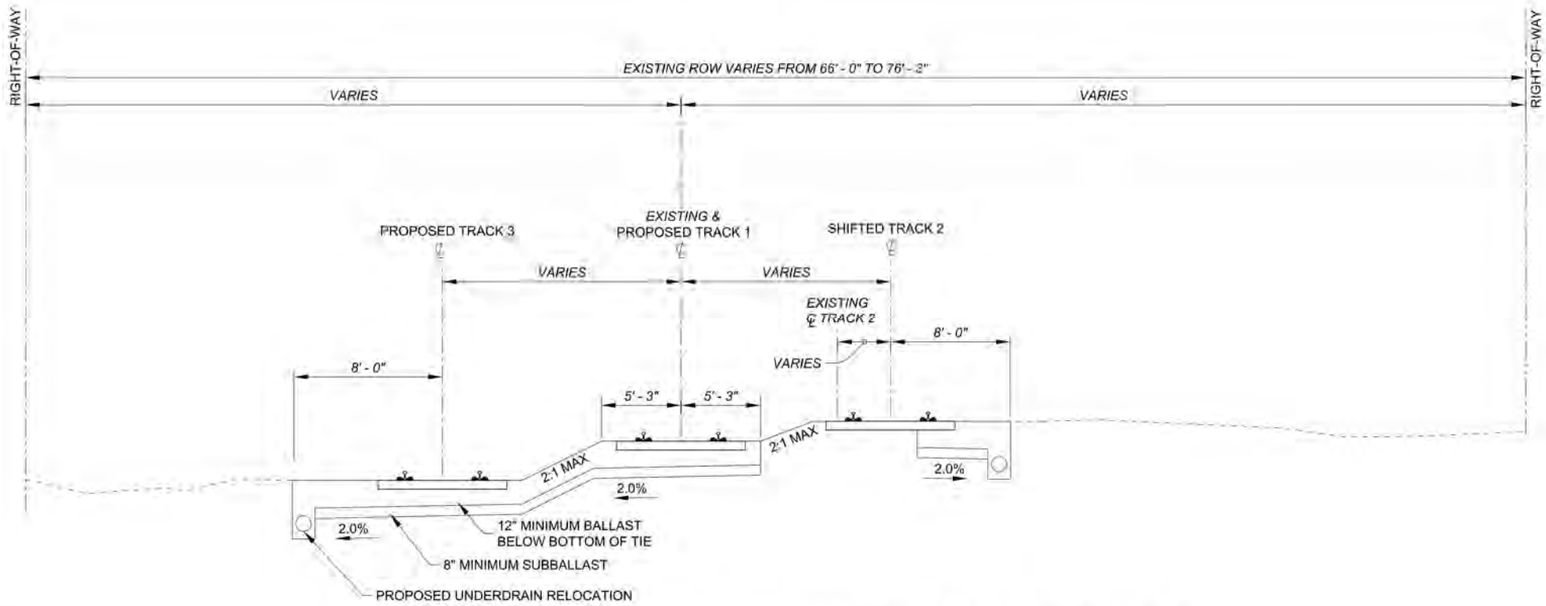
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

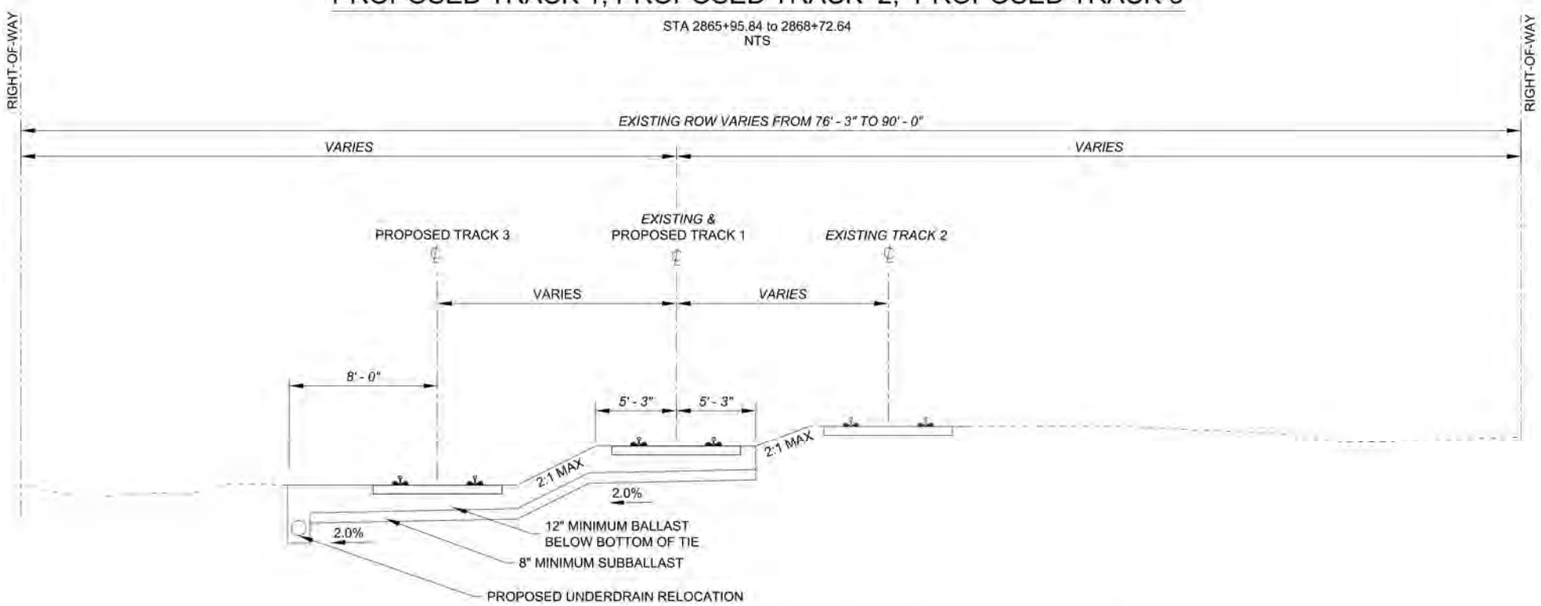
File No.: ALT4-TS13
Ref No.:
Sheet No.: 36 OF 73
Dwg. No.: TS-12

TF Green Airport Station - Proposed Amtrak Service Preliminary Design & EA



PROPOSED TRACK 1, PROPOSED TRACK 2, PROPOSED TRACK 3

STA 2865+95.84 to 2868+72.64
NTS



PROPOSED TRACK 1, EXISTING TRACK 2, PROPOSED TRACK 3

STA 2868+72.64 to 2891+00.00
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deposited on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

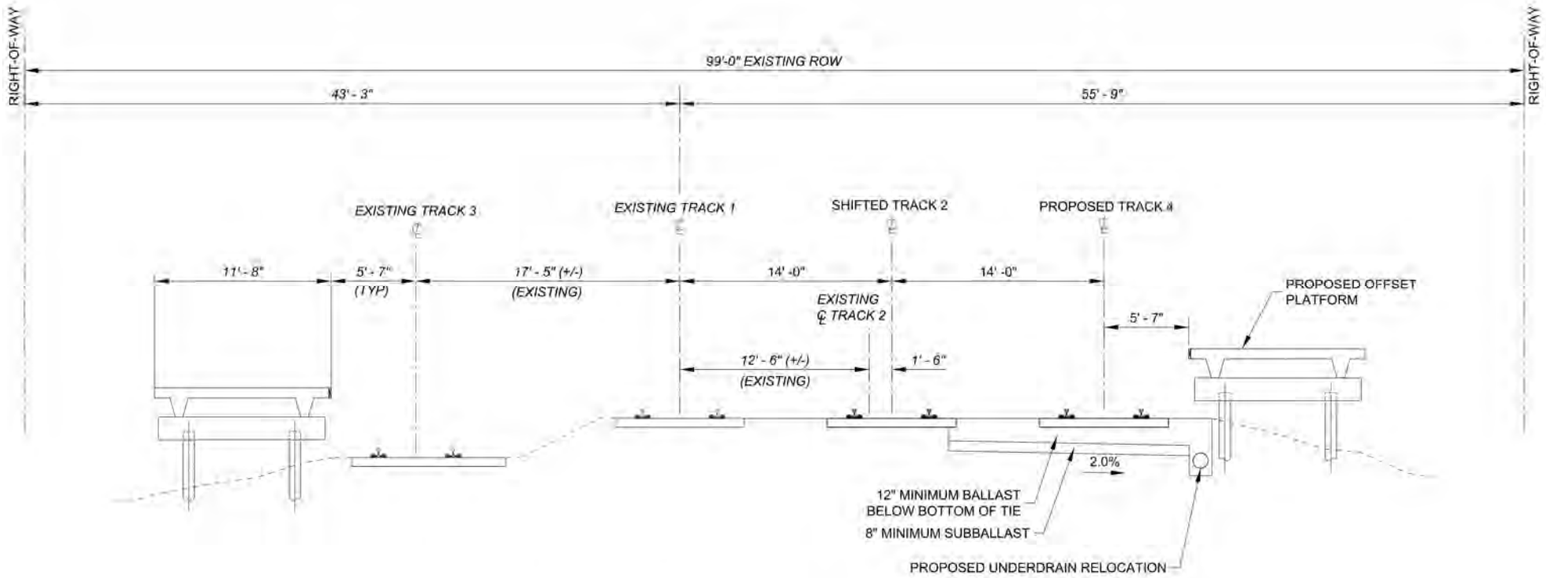
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED ALTERNATIVE 2 - ALTERNATIVE 1

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

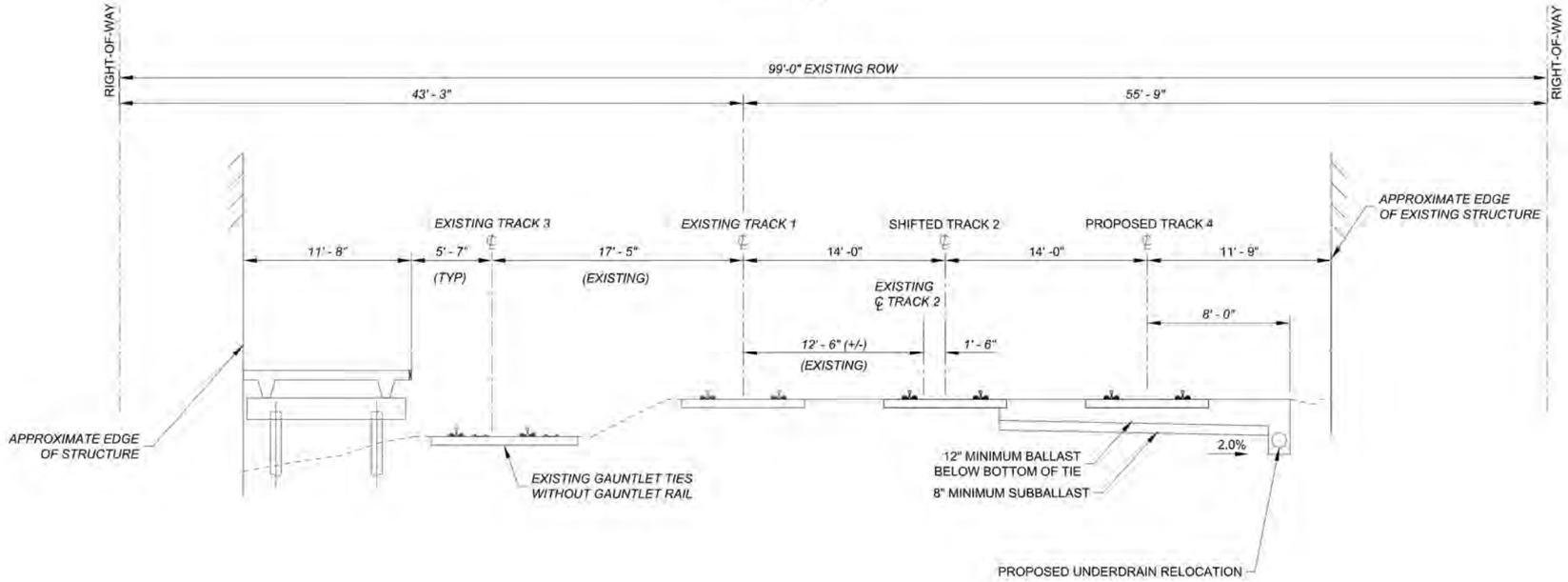
File No.: ALT4-TS14
Ref No.:
Sheet No.: 37 OF 73
Dwg. No.: TS-13

Green Airport Station - Proposed Interim Service Alternatives Design & EA



TRACK 3 PLATFORM & TRACK 4 PLATFORM

STA 2802+95.22 to 2808+30.04
NTS



SECTION AT PARKING STRUCTURE

STA 2808+30.04 to 2811+35.70
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC—ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved	Date

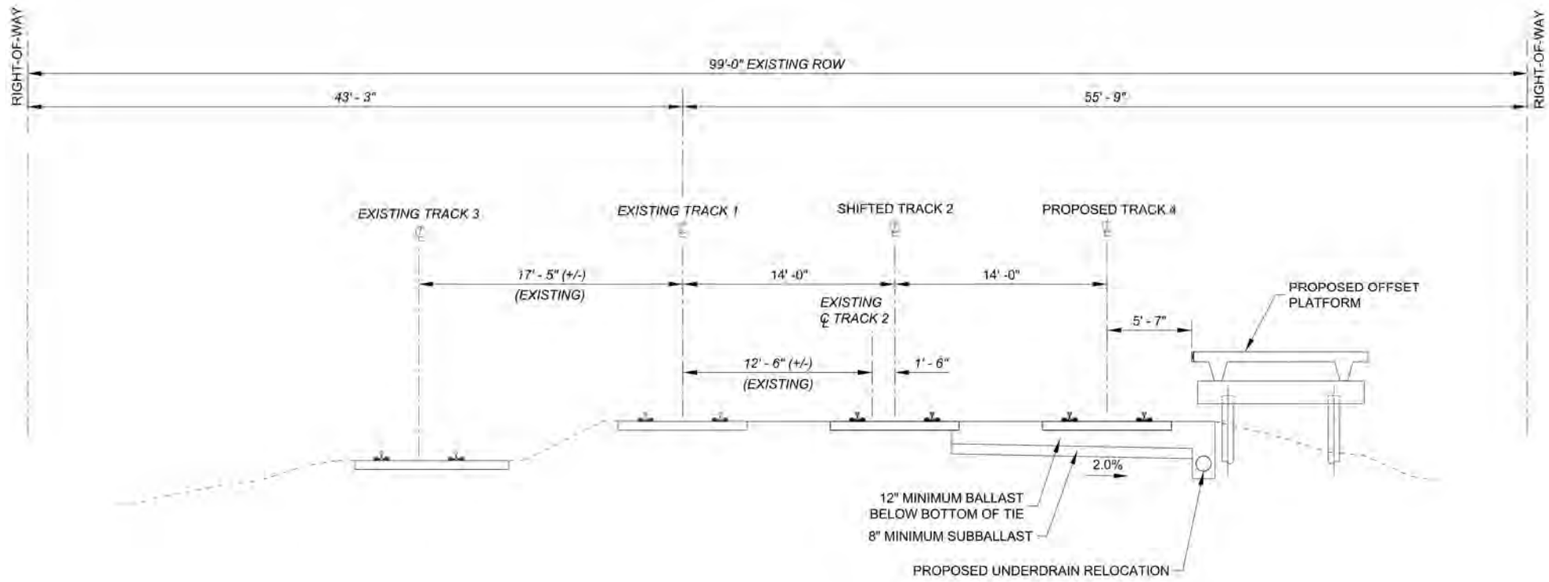
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL SECTIONS - ALTERNATIVE 1

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

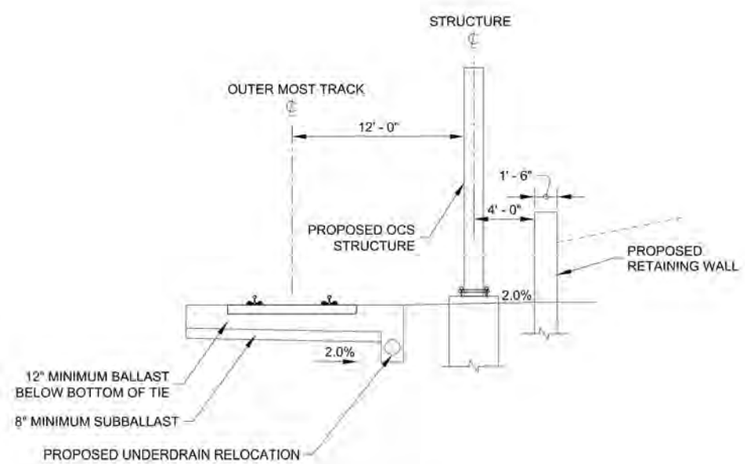
File No.: ALT4-TS15
Ref No.:
Sheet No.: 38 OF 73
Dwg. No.: TS-14

Amtrak TF Green Airport Station - Proposed Alternative 1 Service Permanent Design & EA



TRACK 4 PLATFORM

STA 2797+84.22 to 2802+95.22
NTS



RETAINING WALL

AS REQUIRED
NTS

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

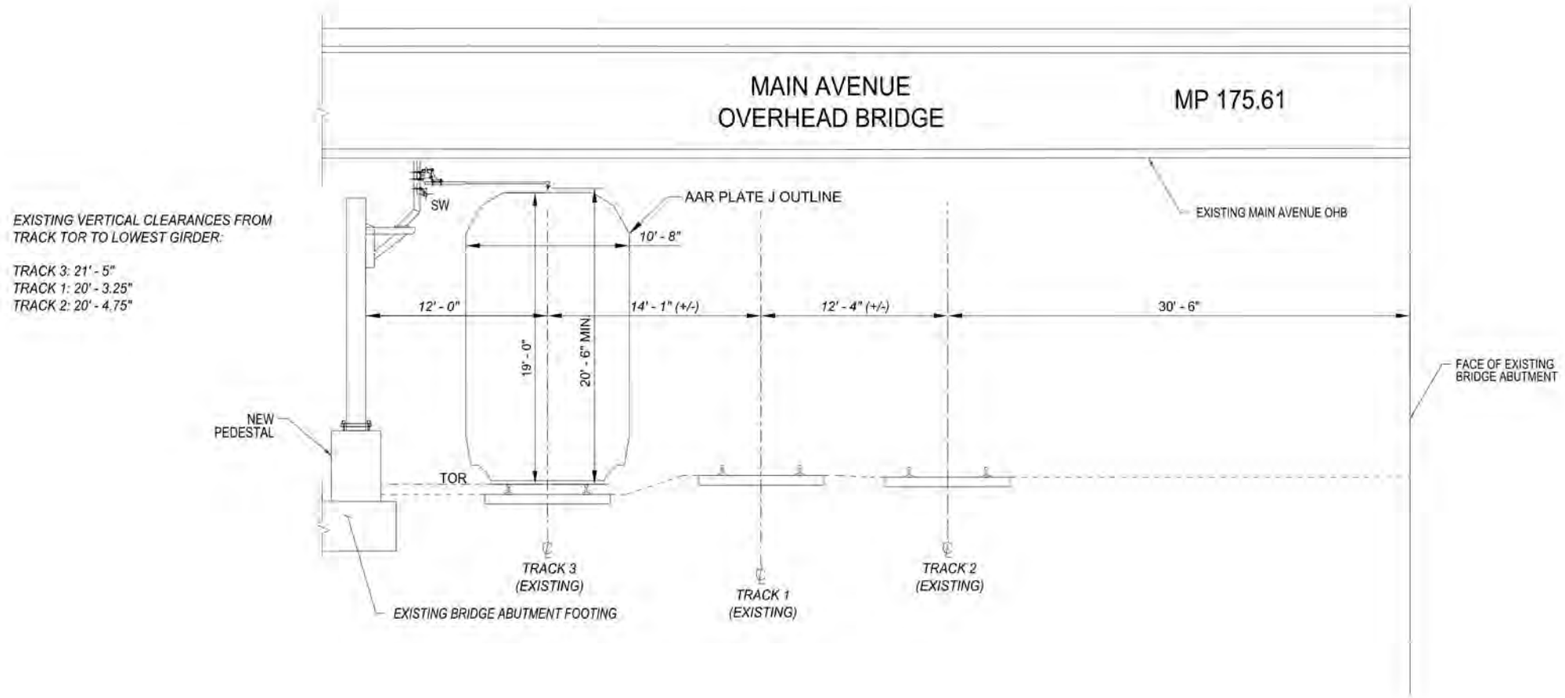
Approved: Date:

AECOM
1700 MARKET STREET, SUITE 1500
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED ALTERNATIVE SERVICE PRELIMINARY DESIGN

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

File No.: ALT4-TS16
Ref No.:
Sheet No.: 39 OF 73
Dwg No.: TS-15



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

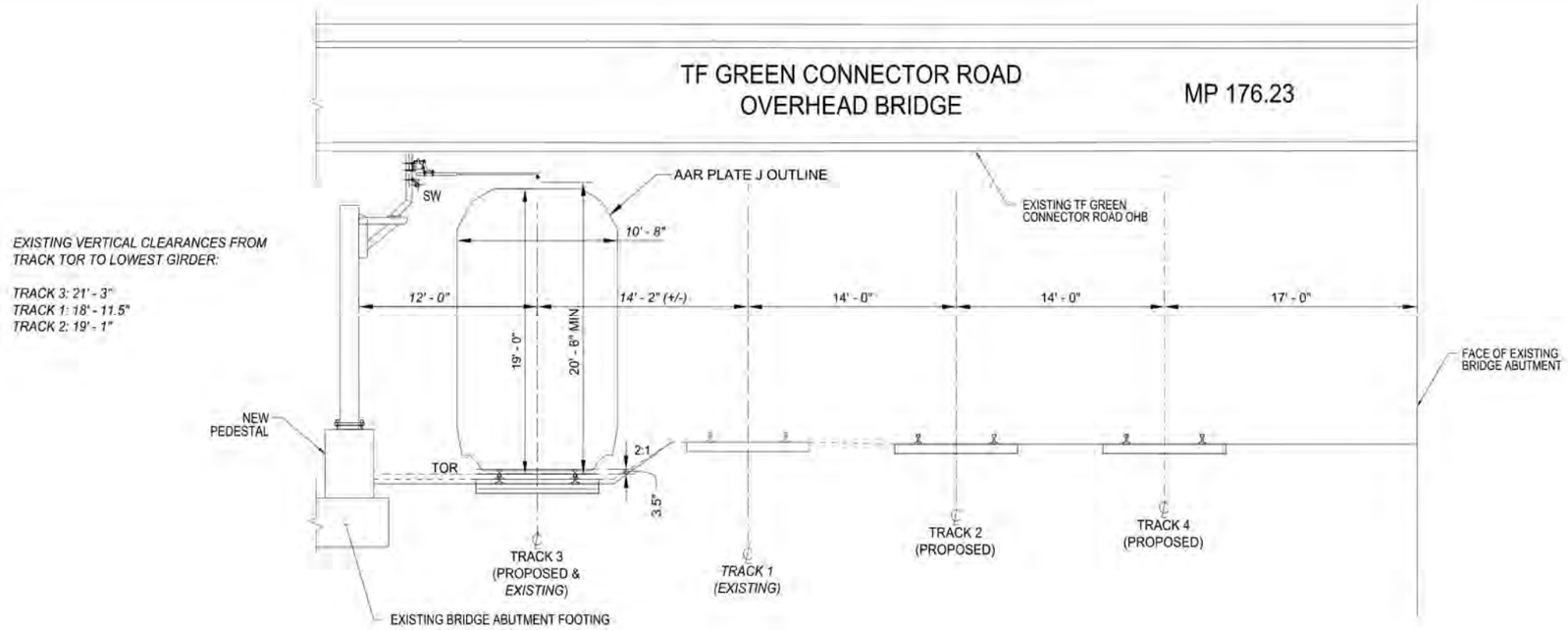
Approved | Date

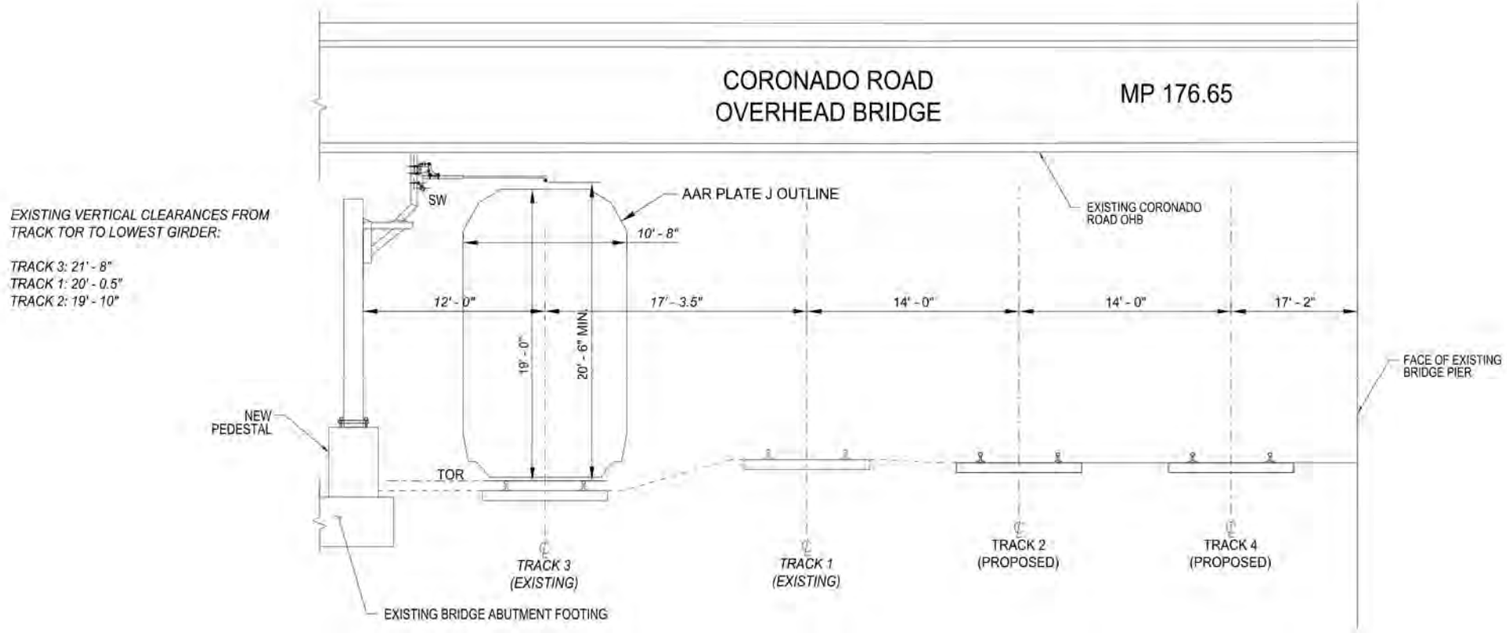
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TOPIC ALTERNATIVES ANALYSIS - ALTERNATIVE 2

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT4-TS17
Ref No.:
Sheet No.: 40 OF 73
Dwg No.: TS-16





CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other distribution of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure
and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TRACK ALTERNATIVES - ALTERNATIVE 2

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT4-TS18
Ref No.:
Sheet No.: 41 OF 73
Dwg No.: TS-17

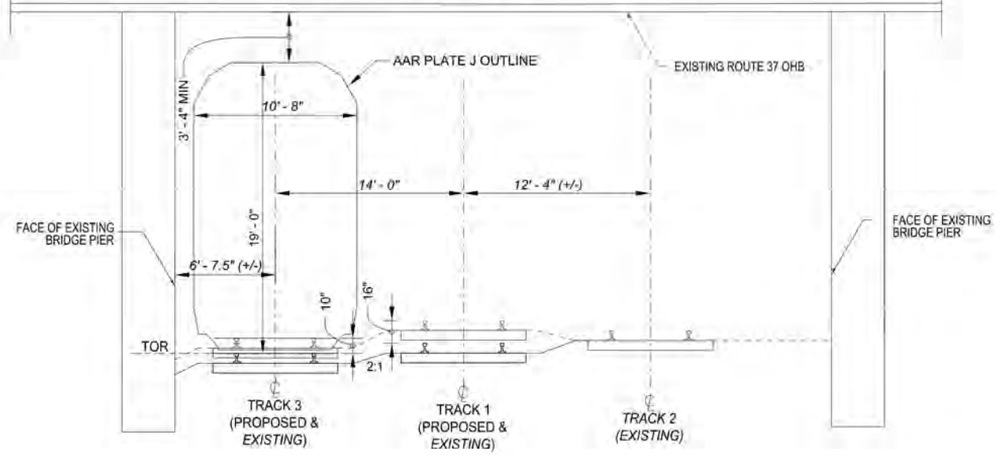
TF Green Airport Station - Proposed Alternative Track Design & EA

ROUTE 37 SOUTHBOUND OVERHEAD BRIDGE

MP 178.09

EXISTING VERTICAL CLEARANCES FROM TRACK TOR TO LOWEST GIRDER:

TRACK 3: 21' - 7"
TRACK 1: 20' - 8.5"
TRACK 2: 21' - 1"

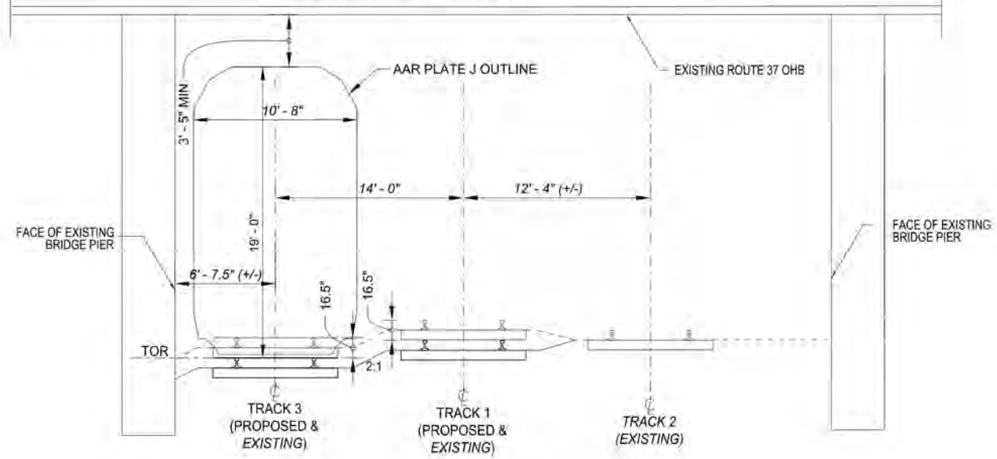


ROUTE 37 NORTHBOUND OVERHEAD BRIDGE

MP 178.13

EXISTING VERTICAL CLEARANCES FROM TRACK TOR TO LOWEST GIRDER:

TRACK 3: 21' - 3.625"
TRACK 1: 20' - 1.6"
TRACK 2: 20' - 9.5"



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deposited on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, publication, or other dissemination of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

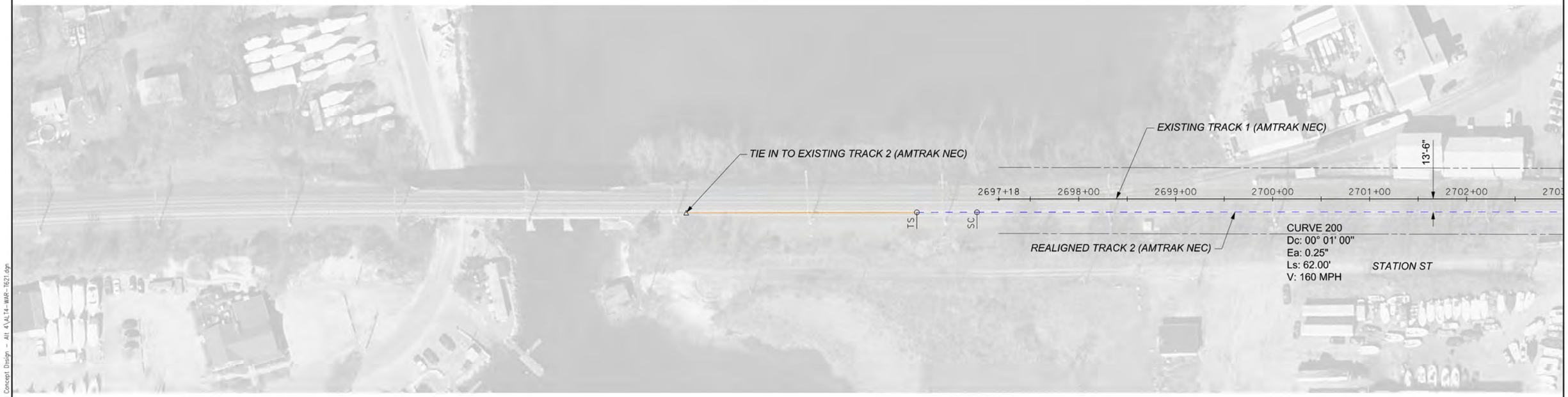
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROFILE SECTIONS - ALTERNATIVE 1

Designed: AL Drawn: TG Checked: ZG Date: 01/21/2020

File No.: ALT4-TS19
Ref No.:
Sheet No.: 42 OF 73
Dwg. No.: TS-18

Bid # 7611810 - Green Airport Station - Proposed Intercity Passenger Rail Service Preliminary Design & EA



PLAN

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

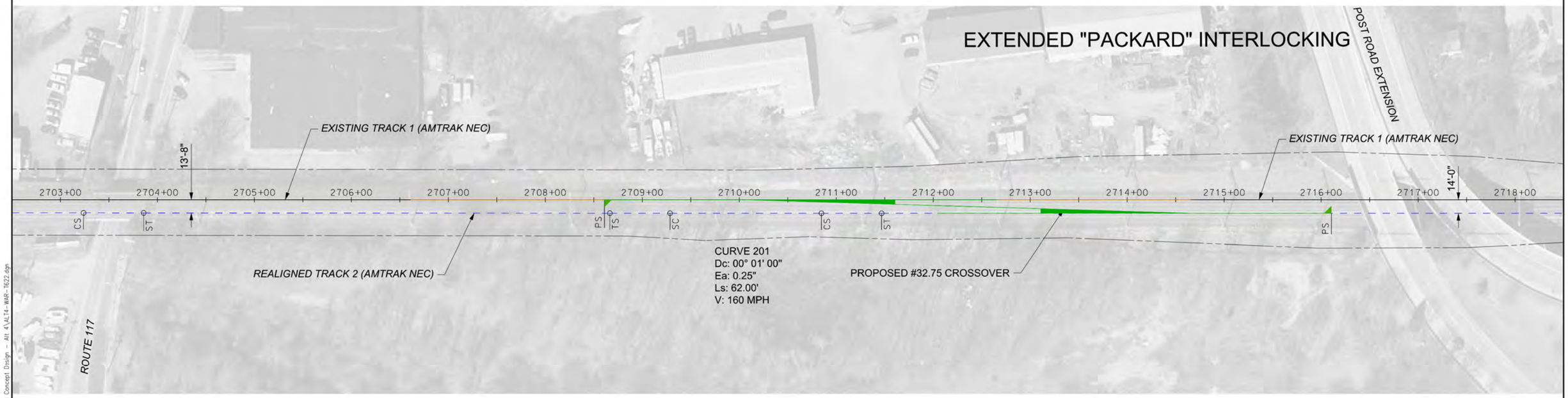
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN OVERVIEW - ALTERNATIVE 4
STA 2697+17.55 TO STA 2703+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T621
Ref No.:
Sheet No.: 43 OF 73
Dwg No.: TK-19

TF Green Airport Station - Proposed Rail Service Preliminary Design & EA



HORIZONTAL 50' 0' 50' 100'

PLAN

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deployed on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved: Date:

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

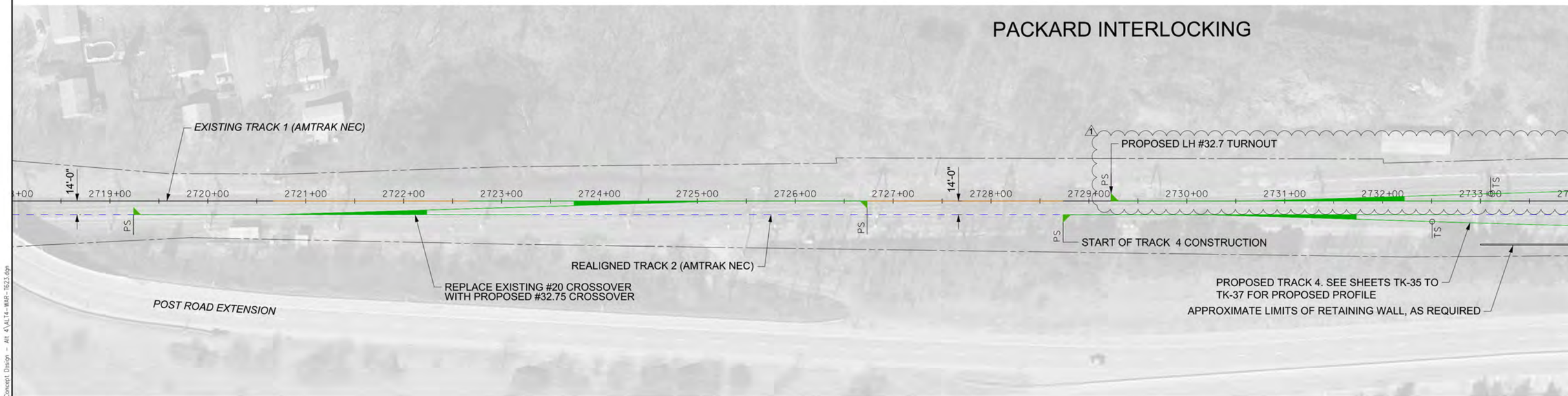
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN OVERVIEW - AERIAL SUPERIMPOSED
STA 2697+17.55 TO STA 2703+00

Designed: AL Drawn: TG Checked: ZG Date: 01/15/2020

File No.: ALT4-T622
Ref No.:
Sheet No.: 44 OF 73
Dwg No.: TK-20

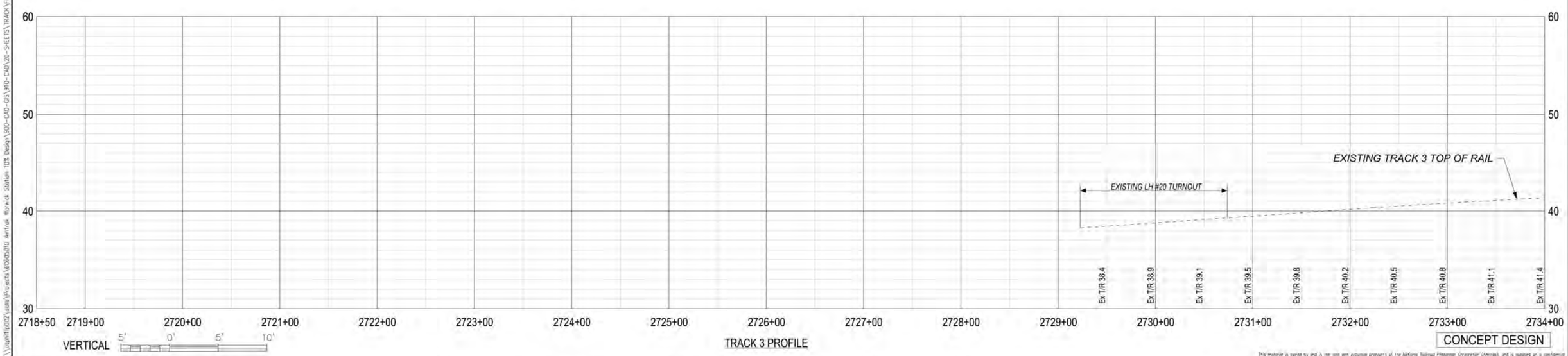
TF Green Airport Station - Proposed Rail Service Preliminary Design & EA

PACKARD INTERLOCKING



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

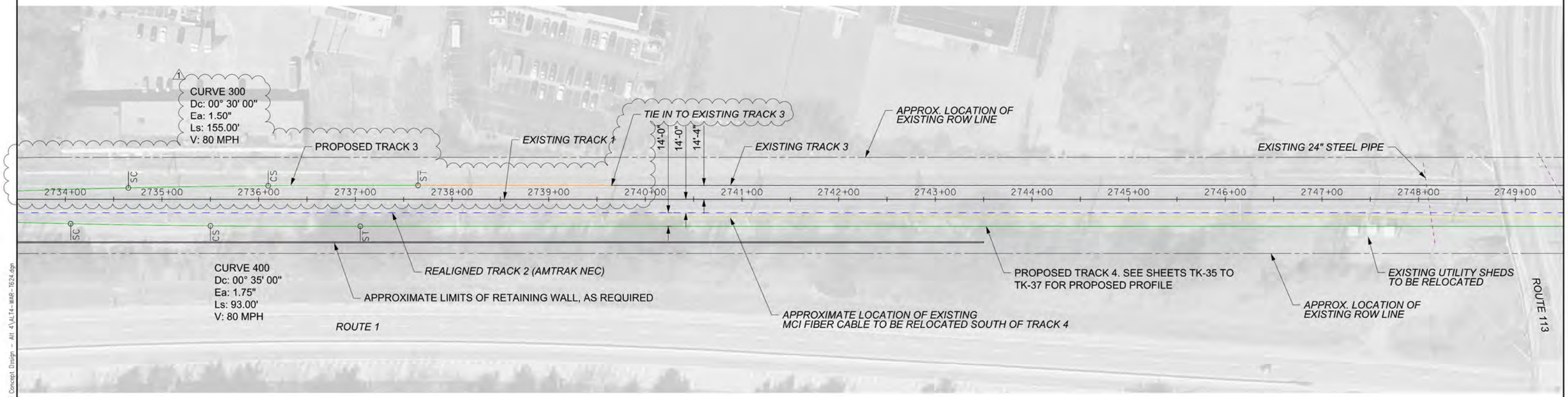
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL.: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN AIRPORT STATION
STA 2730+90 TO STA 2734+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T623
Ref No.:
Sheet No.: 45 OF 73
Dwg No.: TK-21

2/21/2020 - 10:29:57 AM \\aspn11p0012\data\Projects\60605010 Amtrak Warwick Station TDX Design\900-CAD-GIS\910-CAD\20-SHEETS\TRACK\Final Concept Design\Final Concept Design - Alt 4\ALT4-WAR-1623.dgn



CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

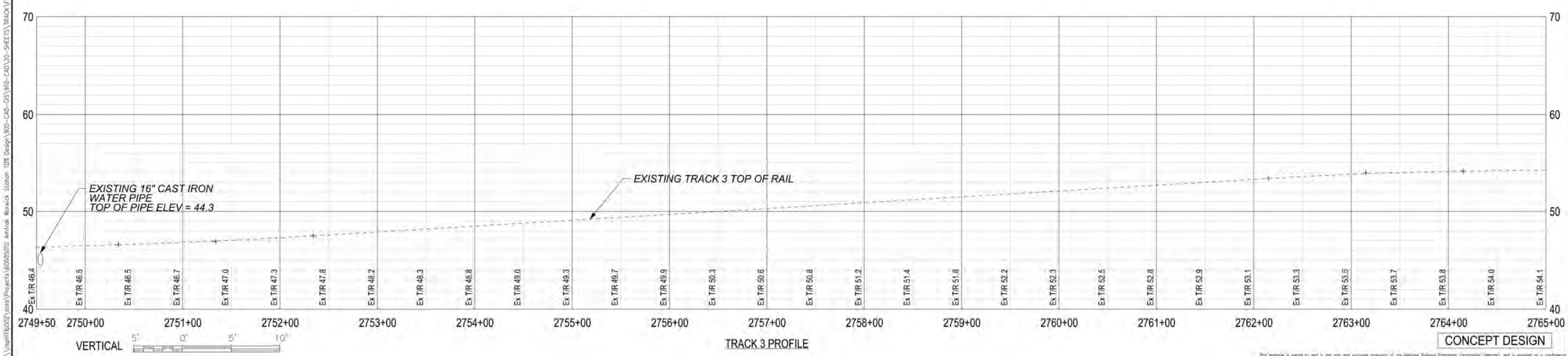
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN AIRPORT RAIL STATION PRELIMINARY DESIGN
STA 2733+50 TO 2749+50

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T624
Ref No.:
Sheet No.: 46 OF 73
Dwg No.: TK-22

HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

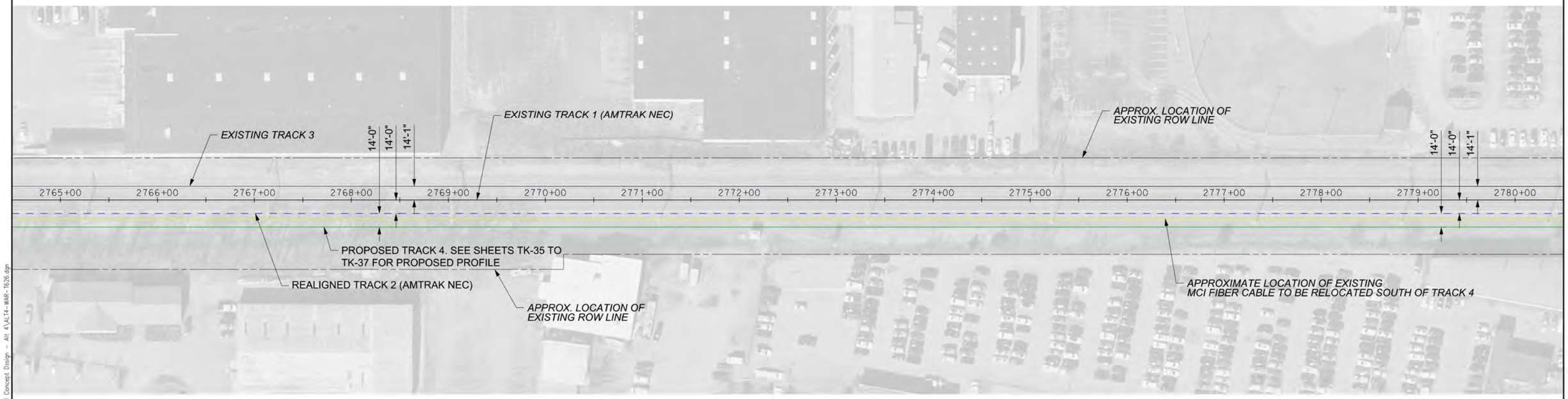
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TRACK 1/2/3 - ALTERNATIVE 4
STA 2749+00 TO 2765+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

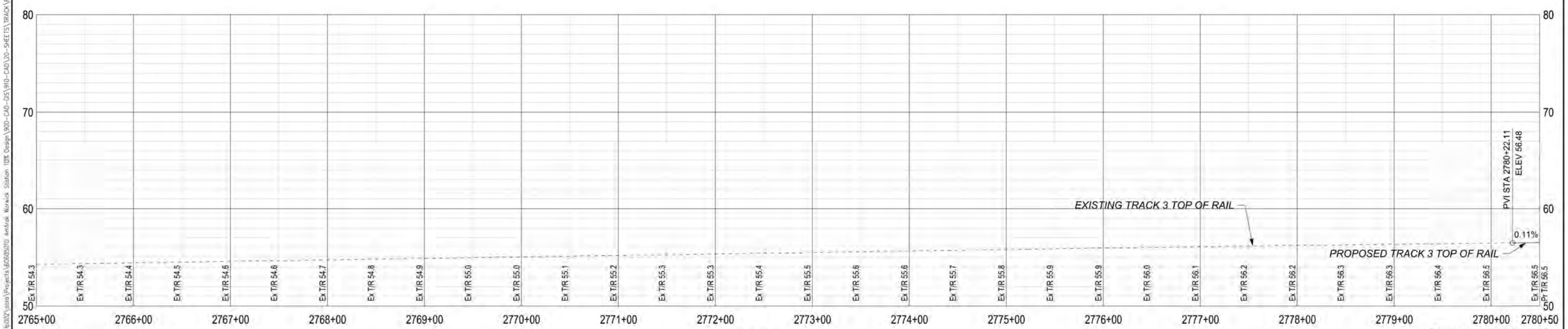
File No.: ALT4-T625
Ref No.:
Sheet No.: 47 OF 73
Dwg No.: TK-23

TF Green Airport Station - Proposed Interim Rail Service Preliminary Design & EA



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

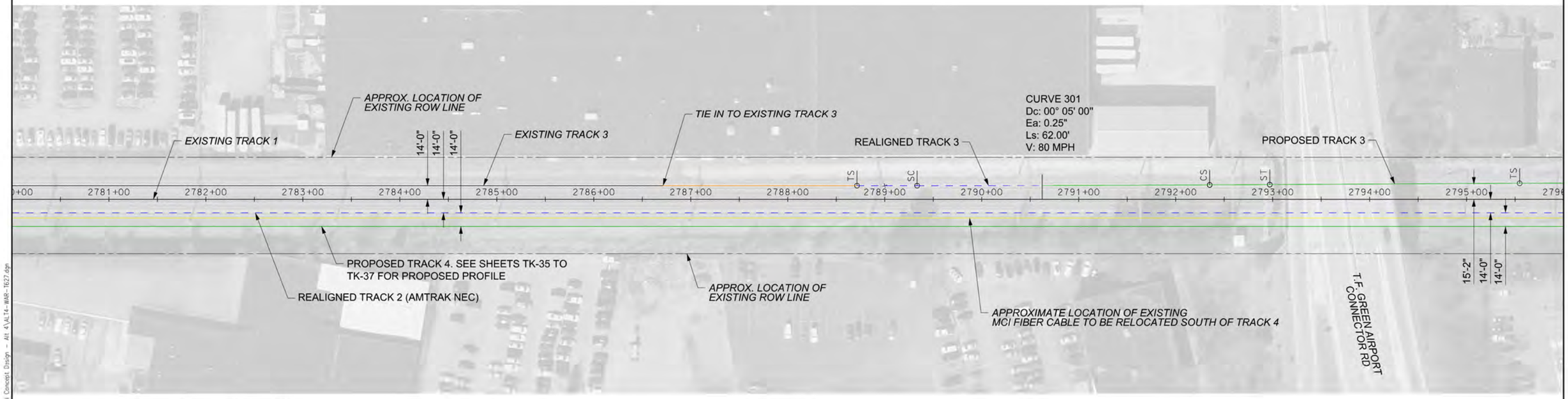
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN AIRPORT STATION
STA 2764+50 TO 2780+50

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

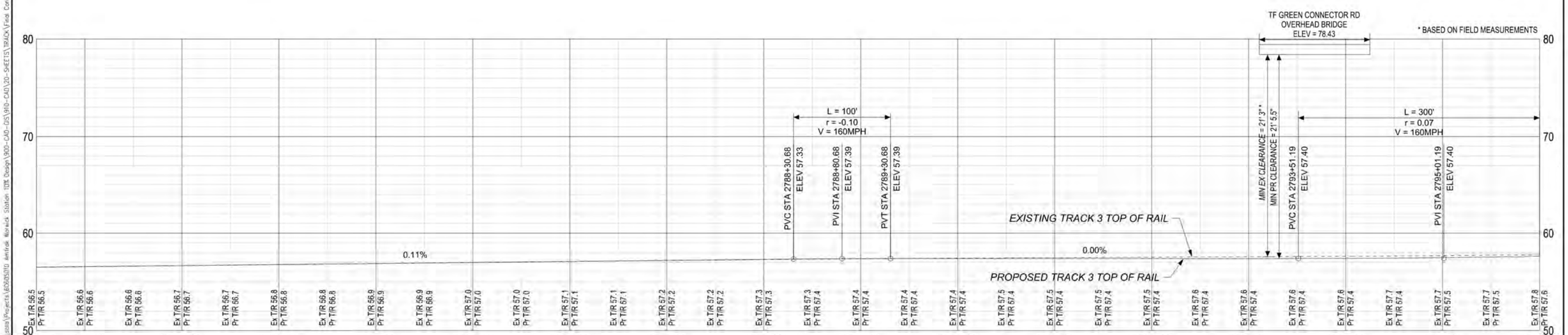
File No.: ALT4-T626
Ref No.:
Sheet No.: 48 OF 73
Dwg No.: TK-24

TF Green Airport Station - Proposed Amtrak Rail Service Preliminary Design & EA



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is lodged on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date:

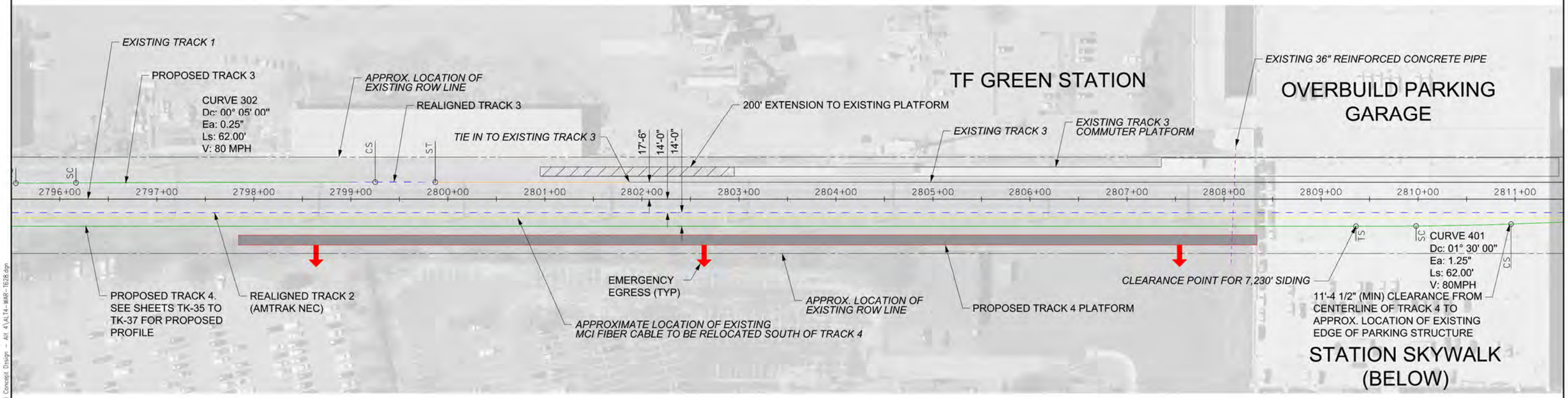
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

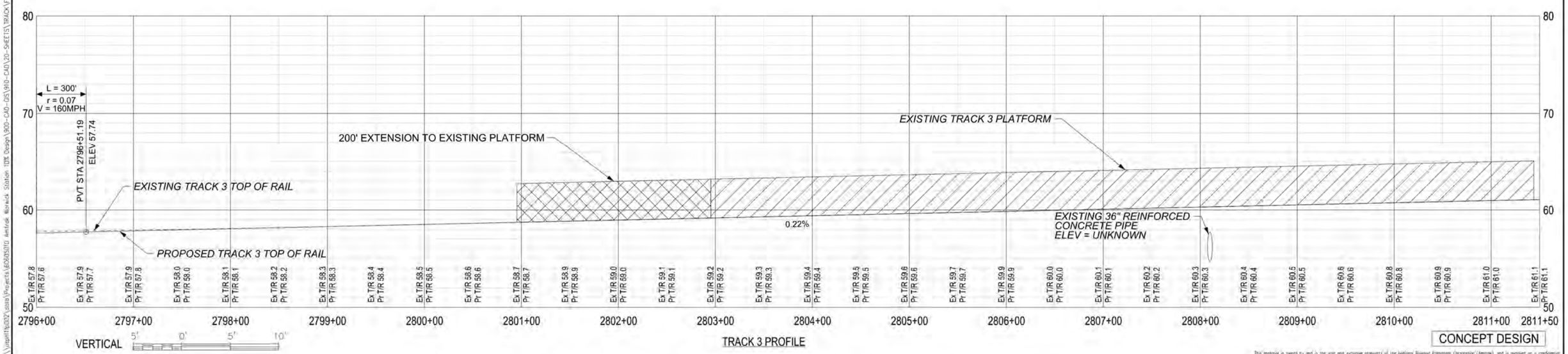
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN OF TRACK 3 - ALTERNATIVE 4
STA 2780+00 TO 2796+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T627
Ref No.:
Sheet No.: 49 OF 73
Dwg No.: TK-25

TF Green Airport Station - Proposed Track Plan - Preliminary Design & EA





CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

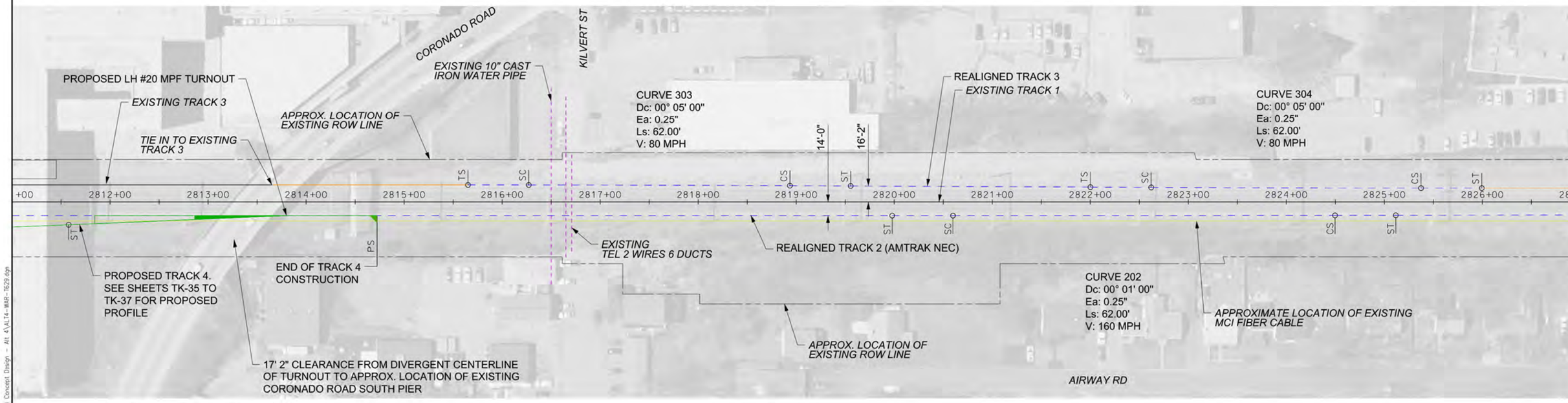
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN AND PROFILE - AETC-NAE-NE-4
STA 2795+50 TO 2811+50

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T628
Ref No.:
Sheet No.: 50 OF 73
Dwg No.: TK-26

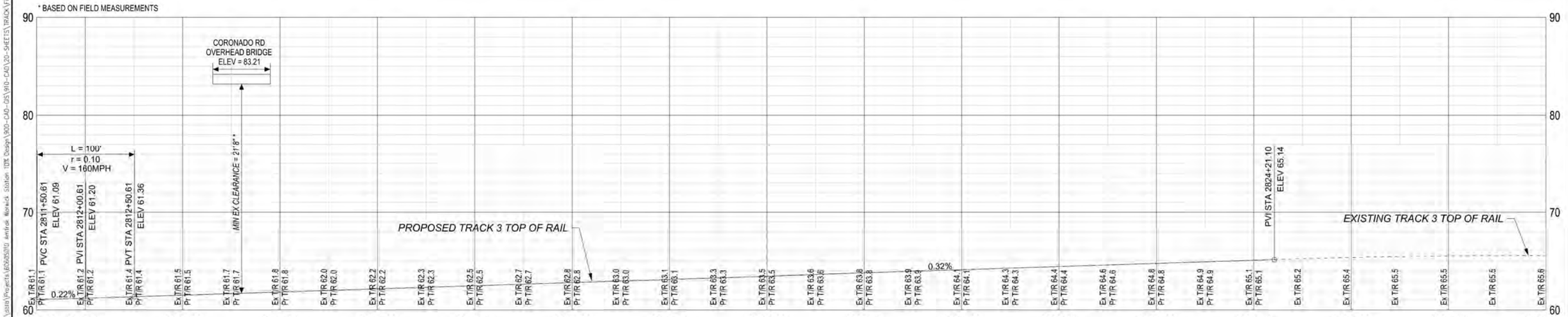
Page 50 of 73 - TF Green Airport Station - Proposed Alternative Detail Schematic Plan and Preliminary Design & EA



HORIZONTAL 50' 0' 50' 100'

PLAN

* BASED ON FIELD MEASUREMENTS



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AEC-NE is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date:

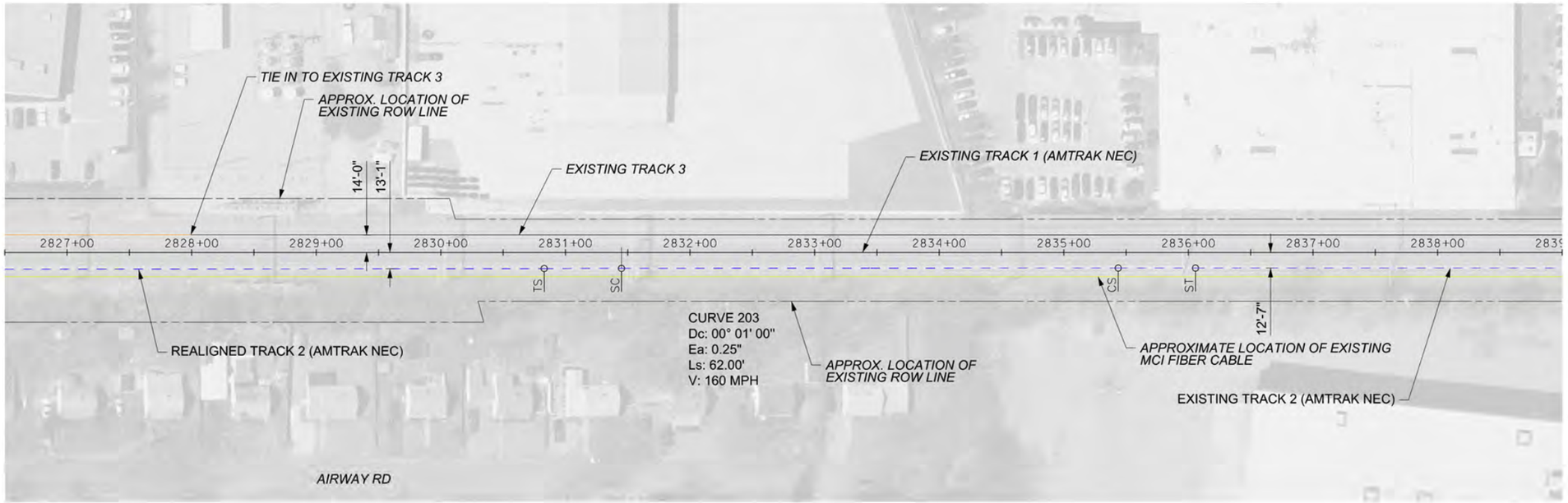
AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROJECT NAME: AETC/NAE/NEC
STA 2811+00 TO 2827+00

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

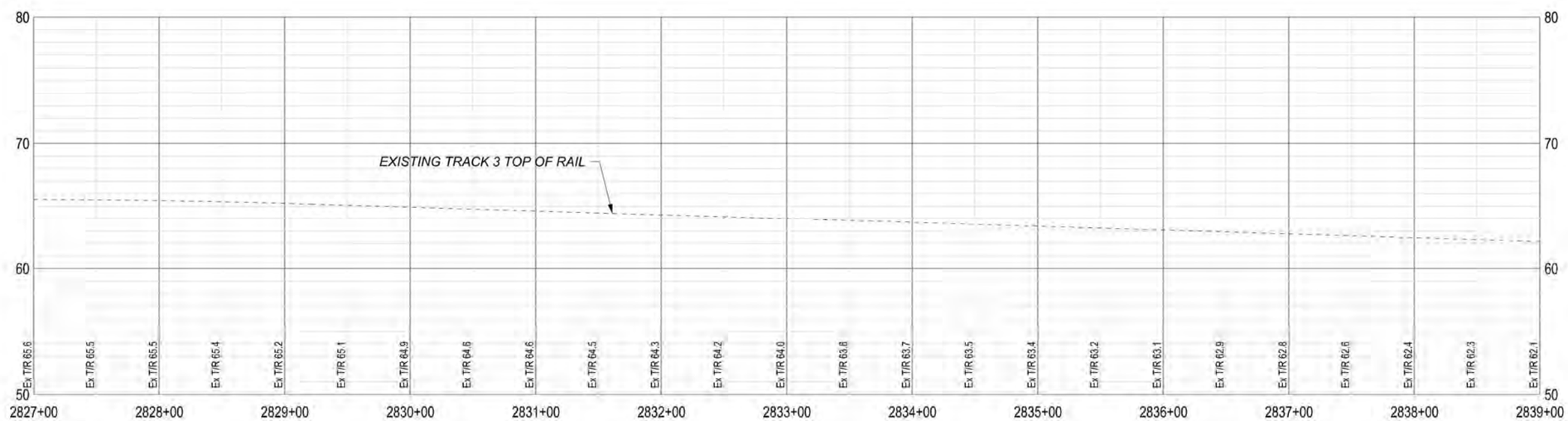
File No.: ALT4-T629
Ref No.:
Sheet No.: 51 OF 73
Dwg No.: TK-27

TF Green Airport Station - Proposed Track & Platform Preliminary Design & EA



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

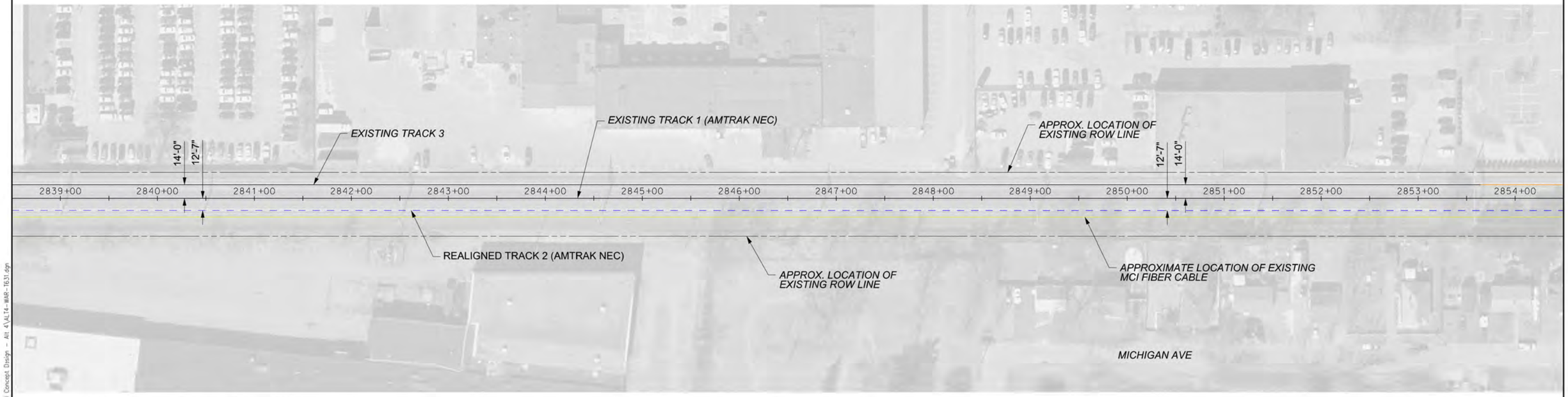
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN AIRPORT STATION
STA 2826+50 TO 2839+00

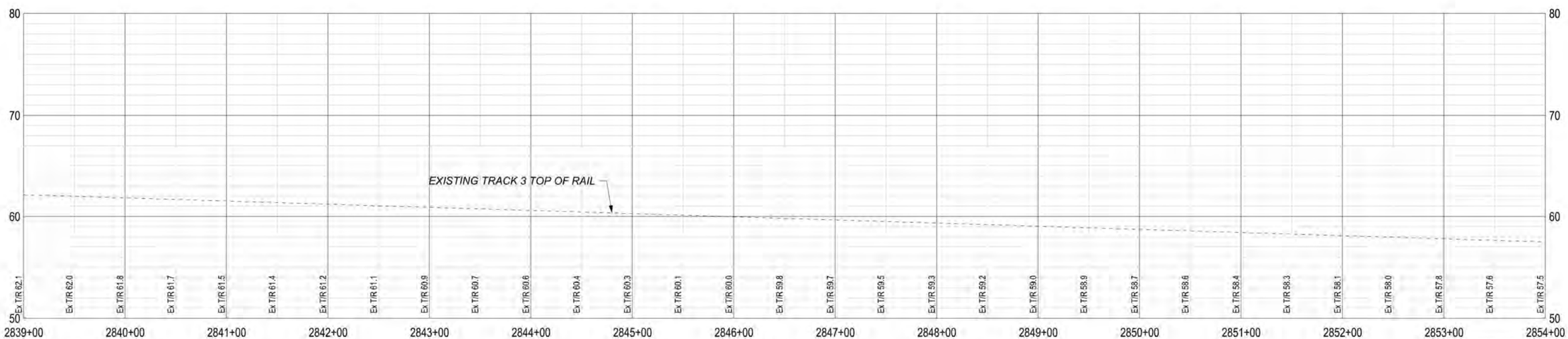
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T630
Ref No.:
Sheet No.: 52 OF 73
Dwg No.: TK-28



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

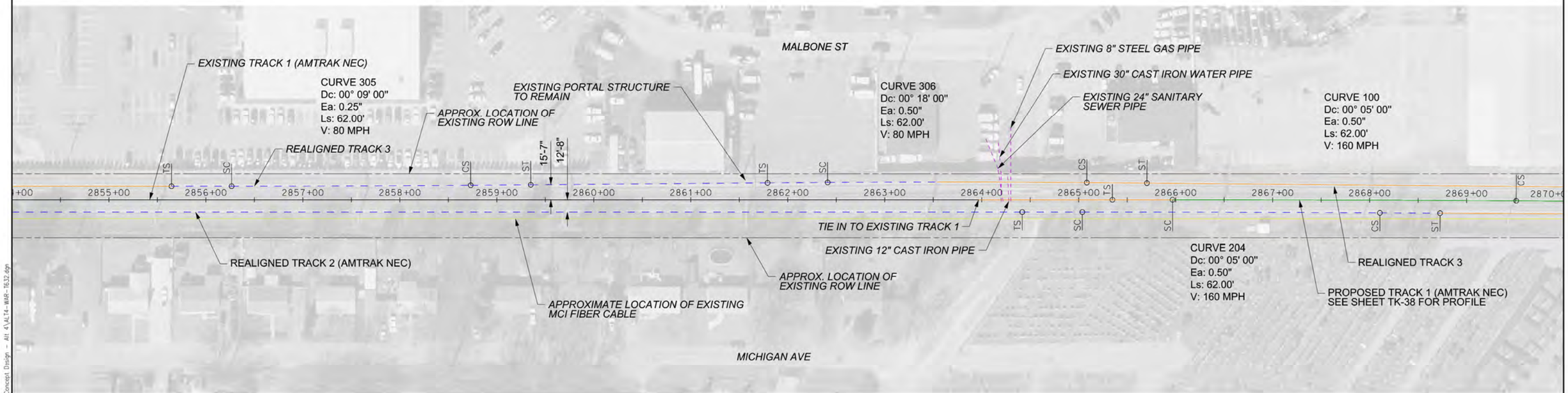
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN OF TRACK 3 - ALTERNATIVE 4
STA 2838+50 TO 2854+50

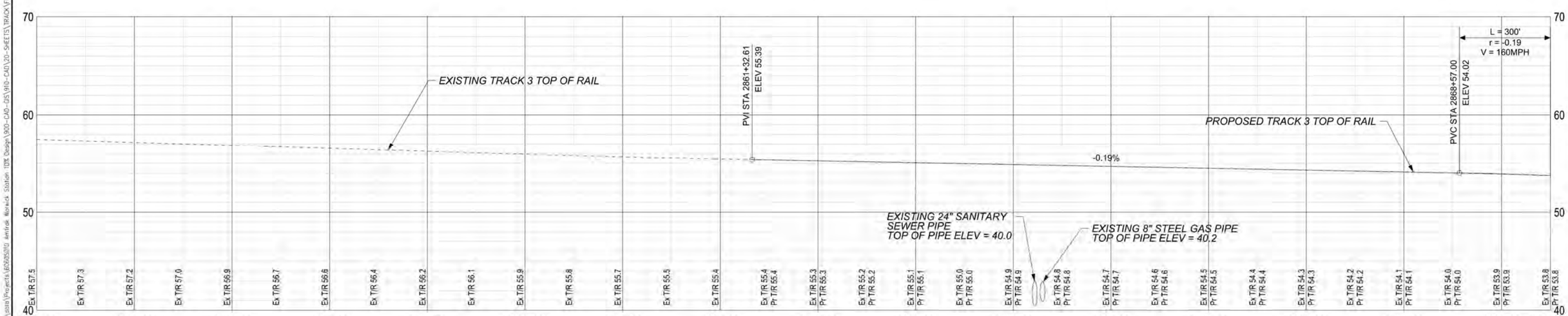
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T631
Ref No.:
Sheet No.: 53 OF 73
Dwg No.: TK-29



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

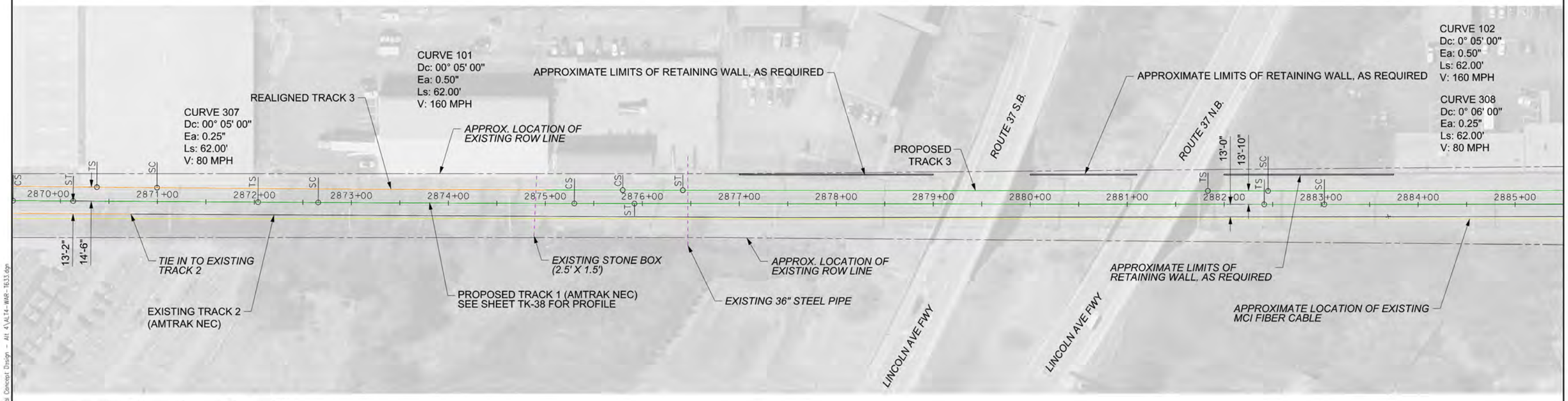
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN OF TRACK 3 AND RAIL SECTION PROFILE
STA 2854+00 TO 2870+00

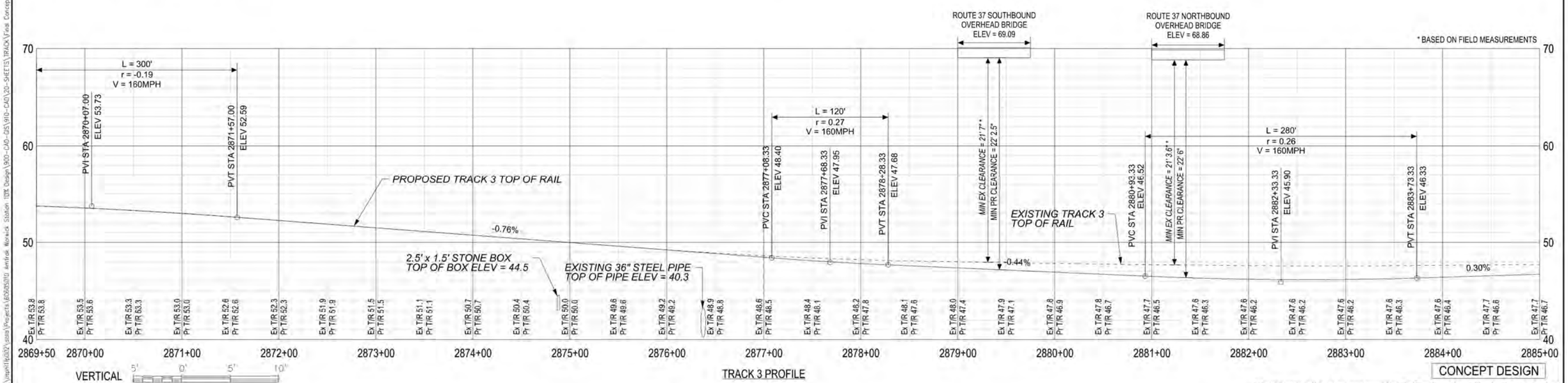
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T632
Ref No.:
Sheet No.: 54 OF 73
Dwg No.: TK-30



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-I2 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

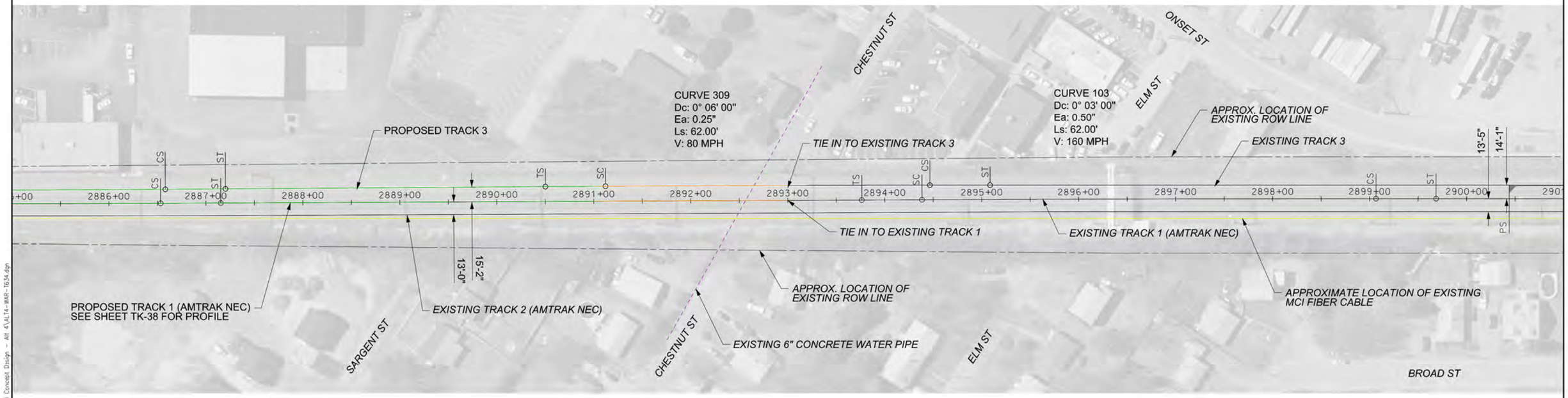
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN AIRPORT RAIL STATION PRELIMINARY DESIGN & EA
STA 2869+50 TO STA 2885+50

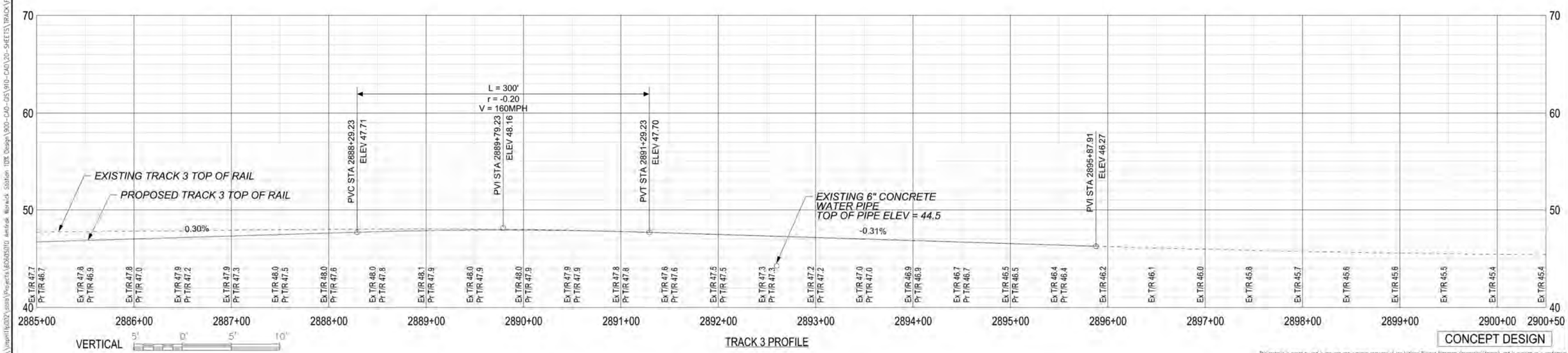
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T633
Ref No.:
Sheet No.: 55 OF 73
Dwg No.: TK-31



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AEC-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

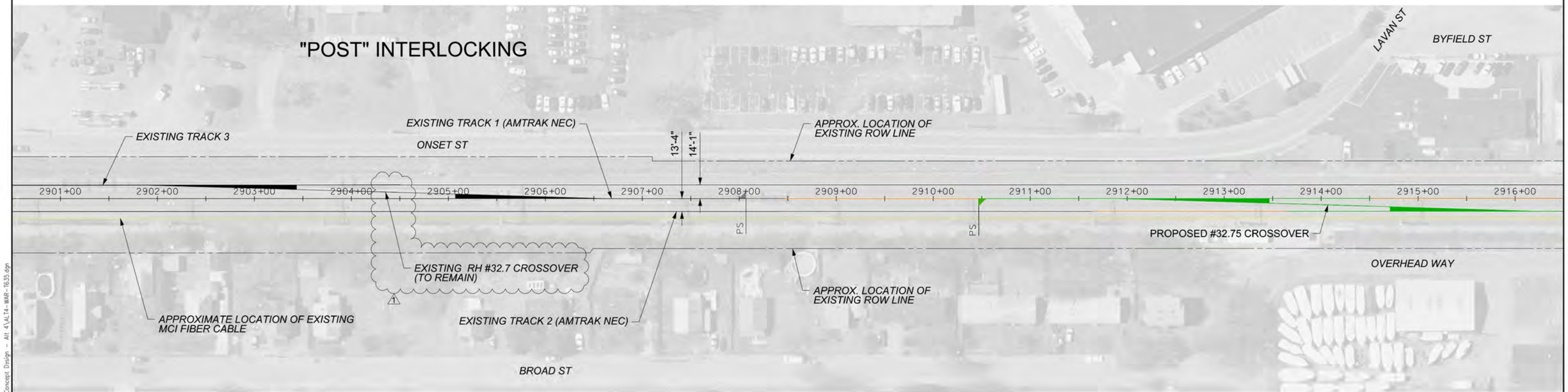
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
FRA/CRP/NRPC RAIL SECTION PRELIMINARY DESIGN
STA 2885+00 TO STA 2901+00

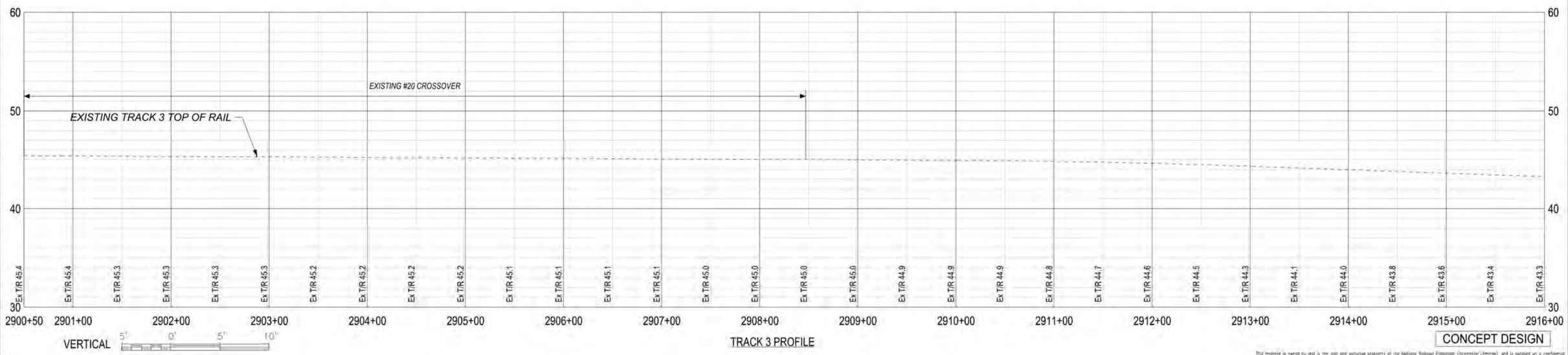
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T634
Ref No.:
Sheet No.: 56 OF 73
Dwg No.: TK-32



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of AE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
1	REVISION 1	2/24/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

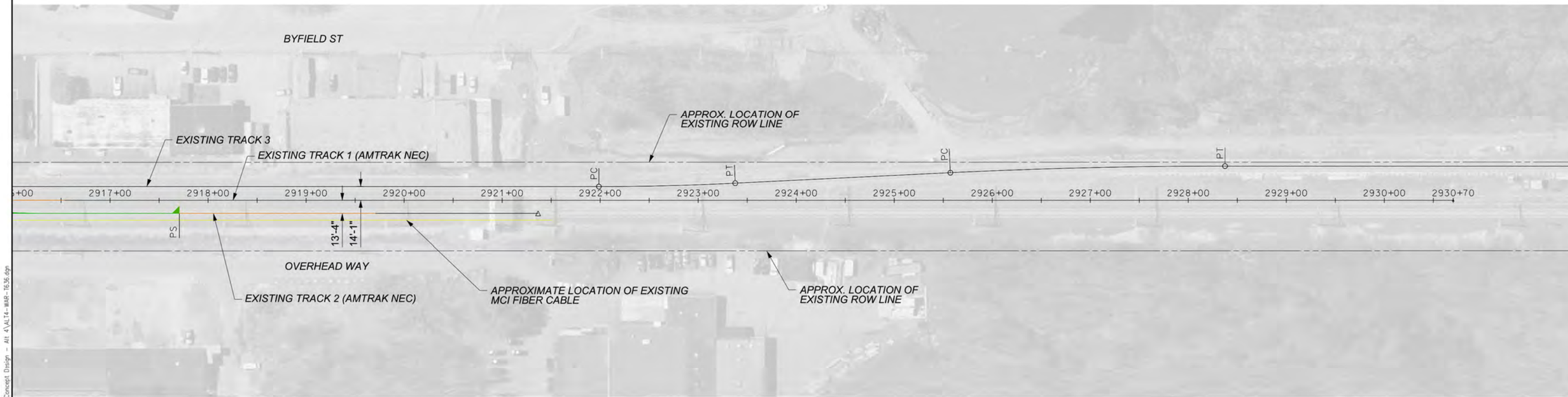
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TF GREEN AIRPORT STATION
STA 2900+50 TO STA 2916+50

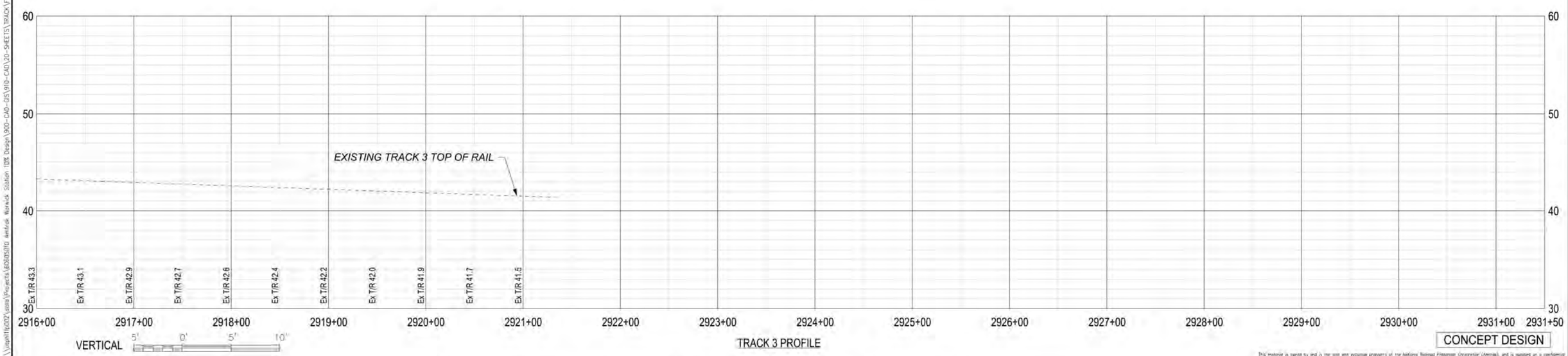
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T635
Ref No.:
Sheet No.: 57 OF 73
Dwg No.: TK-33



HORIZONTAL 50' 0' 50' 100'

PLAN



VERTICAL 5' 0' 5' 10'

TRACK 3 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NE-10 is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

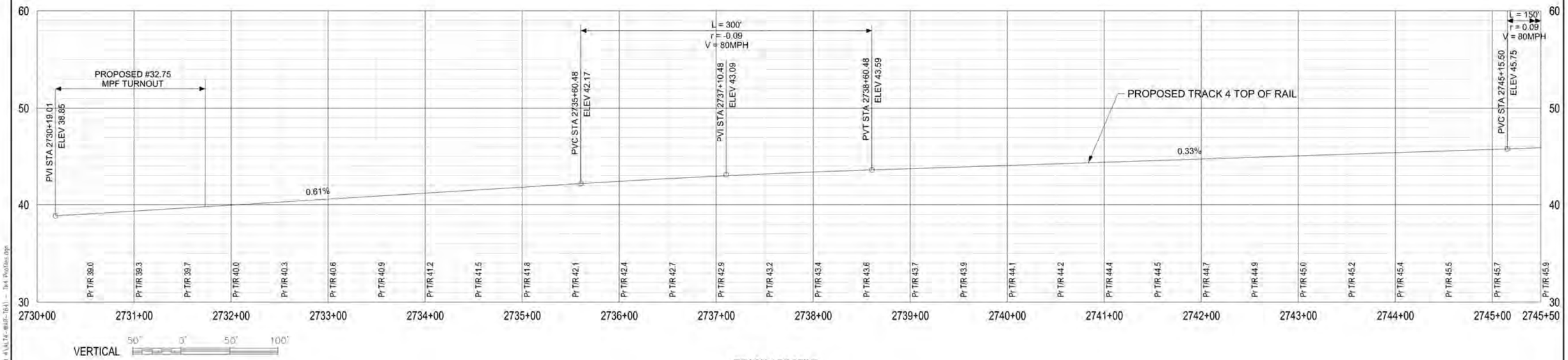
Approved | Date

AECOM
1700 MARKET STREET, SUITE 1900
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

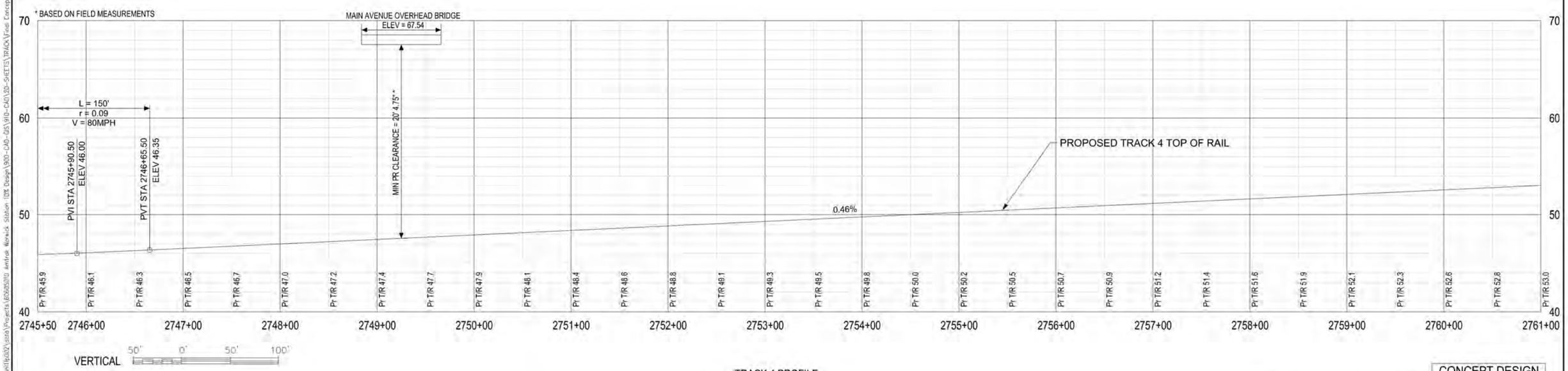
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PLAN OF TRACK AND RAIL SECTION
STA 2916+00 TO STA 2921+37

Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT4-T636
Ref No.:
Sheet No.: 58 OF 73
Dwg No.: TK-34



TRACK 4 PROFILE



TRACK 4 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

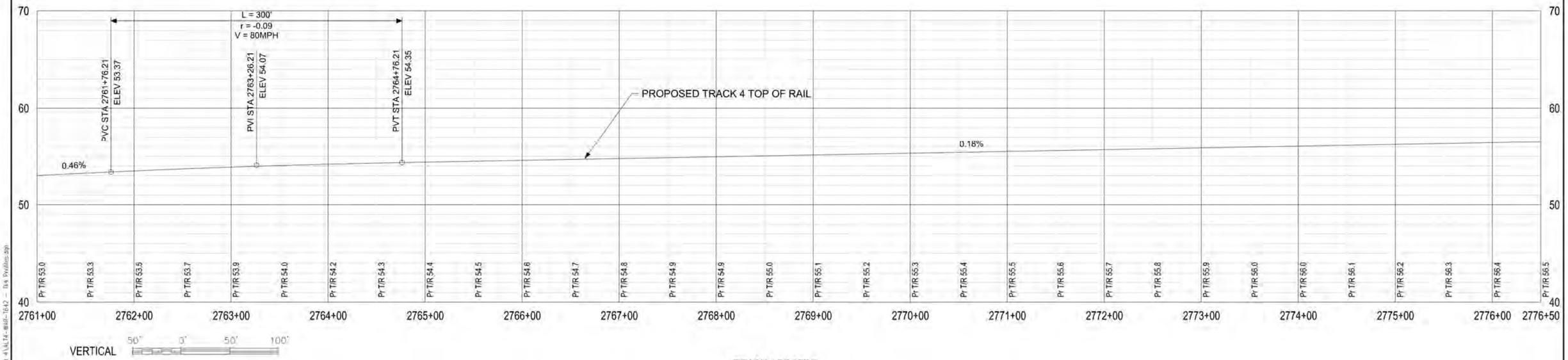
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 TO RICE - ALTERNATIVE 4
STA 2730+00 TO STA 2761+00

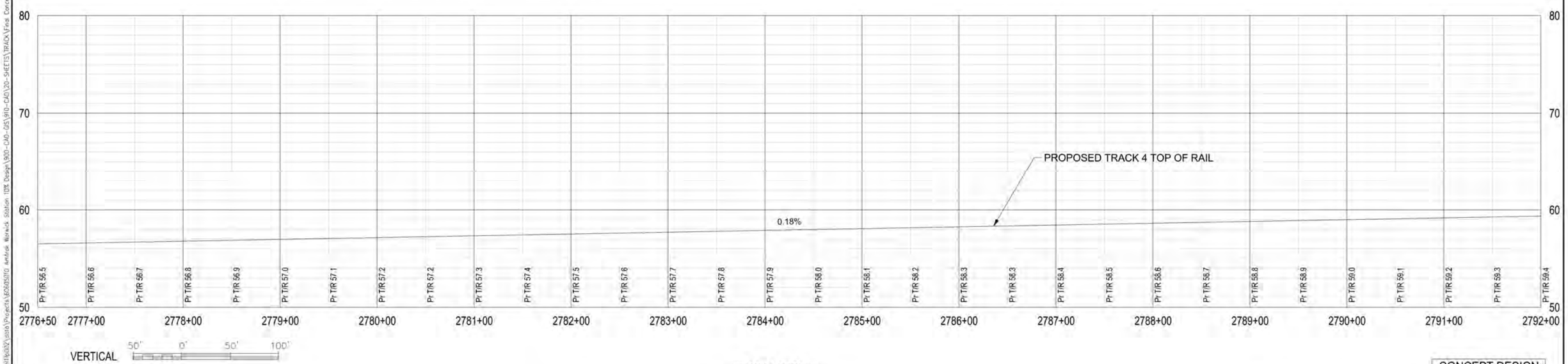
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT4-T641
Ref No.:
Sheet No.: 59 OF 73
Dwg No.: TK-35

Green Airport Station Preliminary Design & EA



TRACK 4 PROFILE



TRACK 4 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is deemed to be a confidential trade secret for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, distribution, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

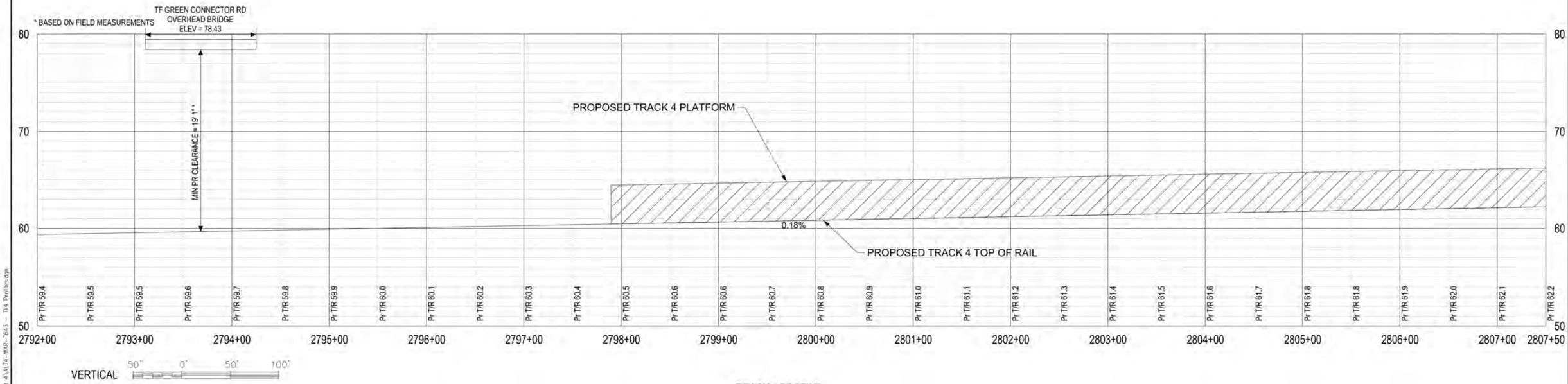
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 TO RICE - ALTERNATIVE 4
STA 2761+00 TO STA 2792+00

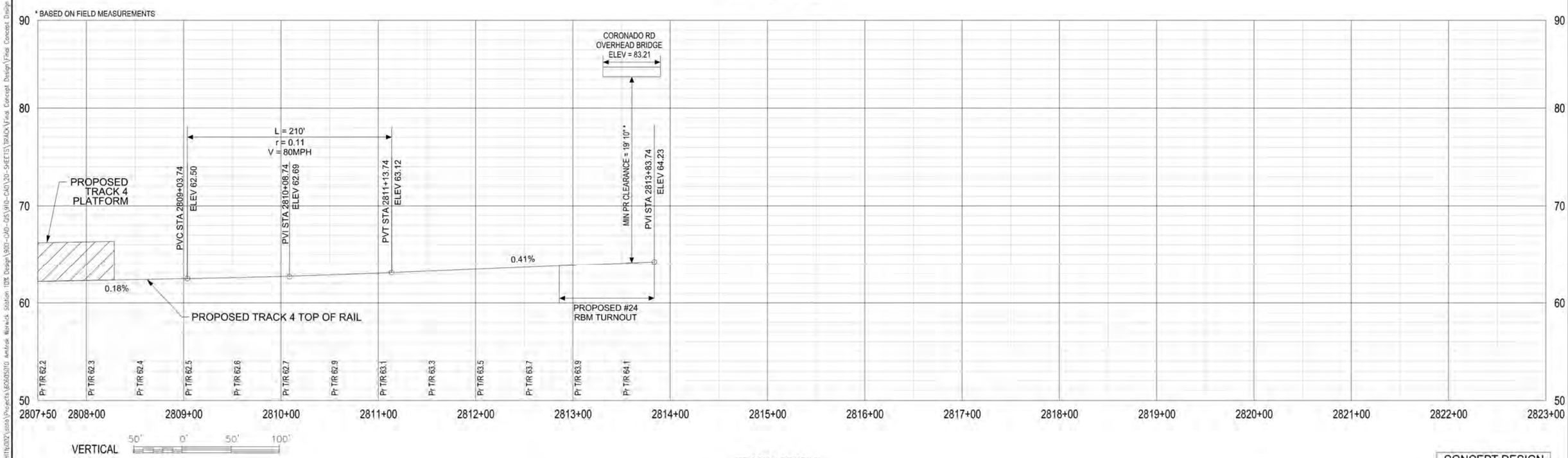
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT4-T642
Ref No.:
Sheet No.: 60 OF 73
Dwg No.: TK-36

Green Airport Station Preliminary Design & EA



TRACK 4 PROFILE



TRACK 4 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

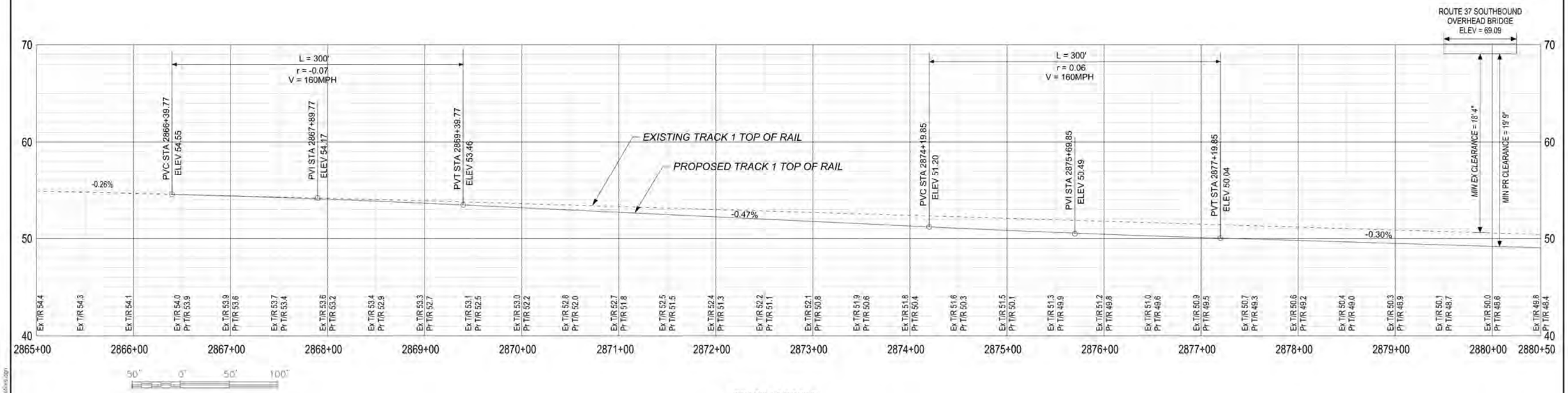
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 4 PROFILE - ALTERNATIVE 4
STA 2792+00 TO STA 2823+00

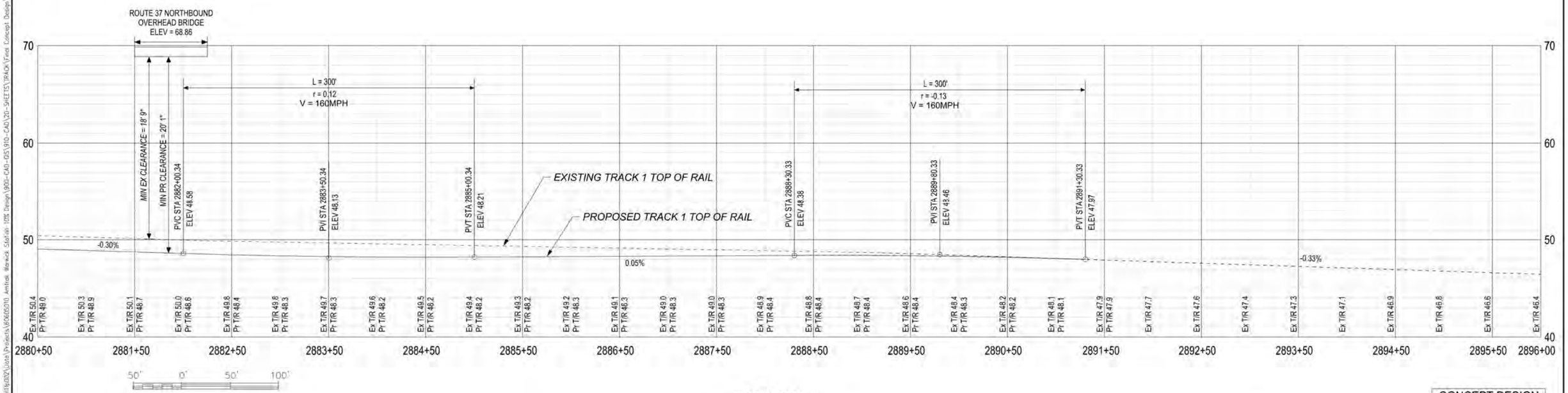
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/21/2020

File No.: ALT1-T643
Ref No.:
Sheet No.: 61 OF 73
Dwg. No.: TK-37

Green Airport Station Preliminary Design & EA



TRACK 1 PROFILE



TRACK 1 PROFILE

CONCEPT DESIGN

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. Any reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-NI is prohibited.

No.	Revisions	Date	By
	CONCEPT DESIGN SUBMISSION	1/21/20	SP

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved | Date

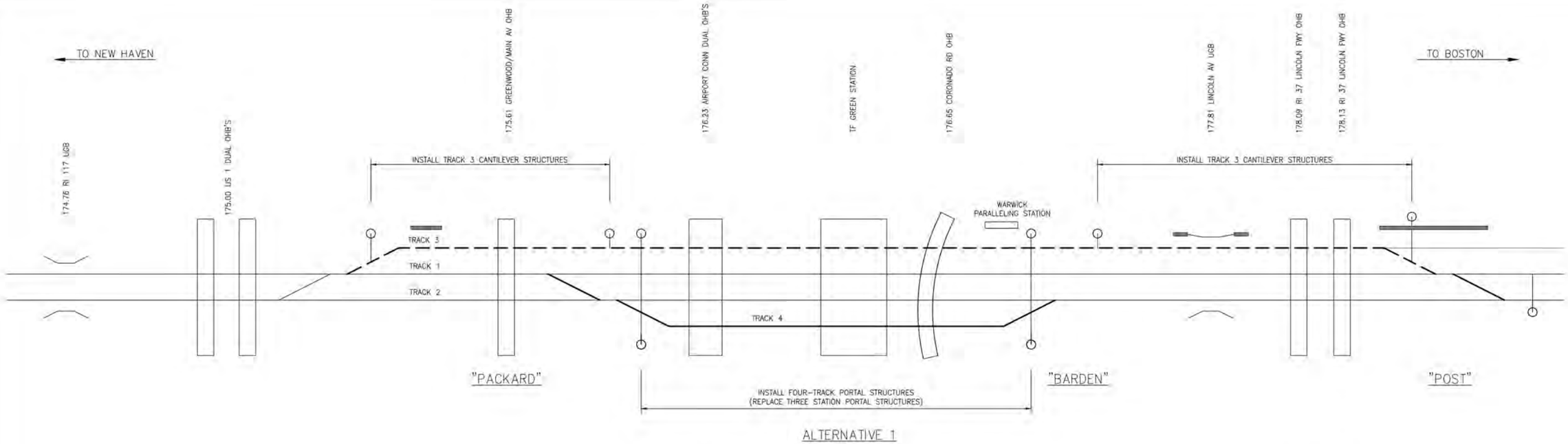
AECOM
1700 MARKET STREET, SUITE 1500
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
PROPOSED TRACK 1 PROFILE
STA 2865+00 TO STA 2896+00

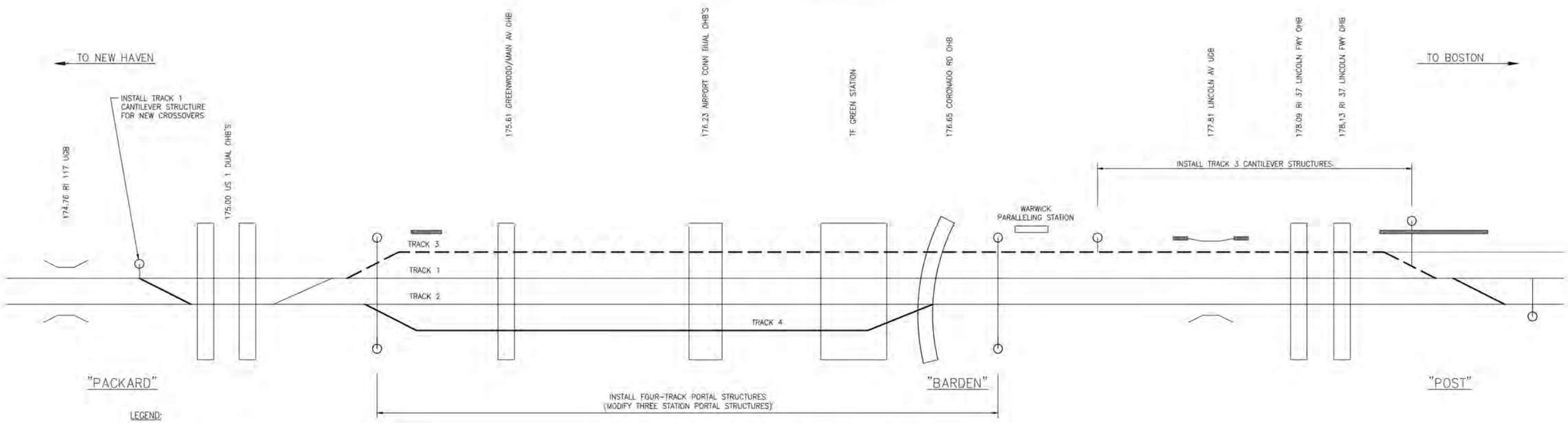
Designed: AL | Drawn: TG | Checked: ZG | Date: 01/15/2020

File No.: ALT1-T637
Ref No.:
Sheet No.: 62 OF 72
Dwg No.: TK-38

TF Green Airport Station - Proposed Track & Platform Preliminary Design & EA



ALTERNATIVE 1



ALTERNATIVE 4

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation, (Amtrak), Office Of Engineering, and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak Electric Traction facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of V.P., Chief Engineer, is prohibited.

No	Revisions	Date	By
		11/26/2019	

Bid # 7611810

AMTRAK

OFFICE OF
V.P., Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL. 215-735-0832

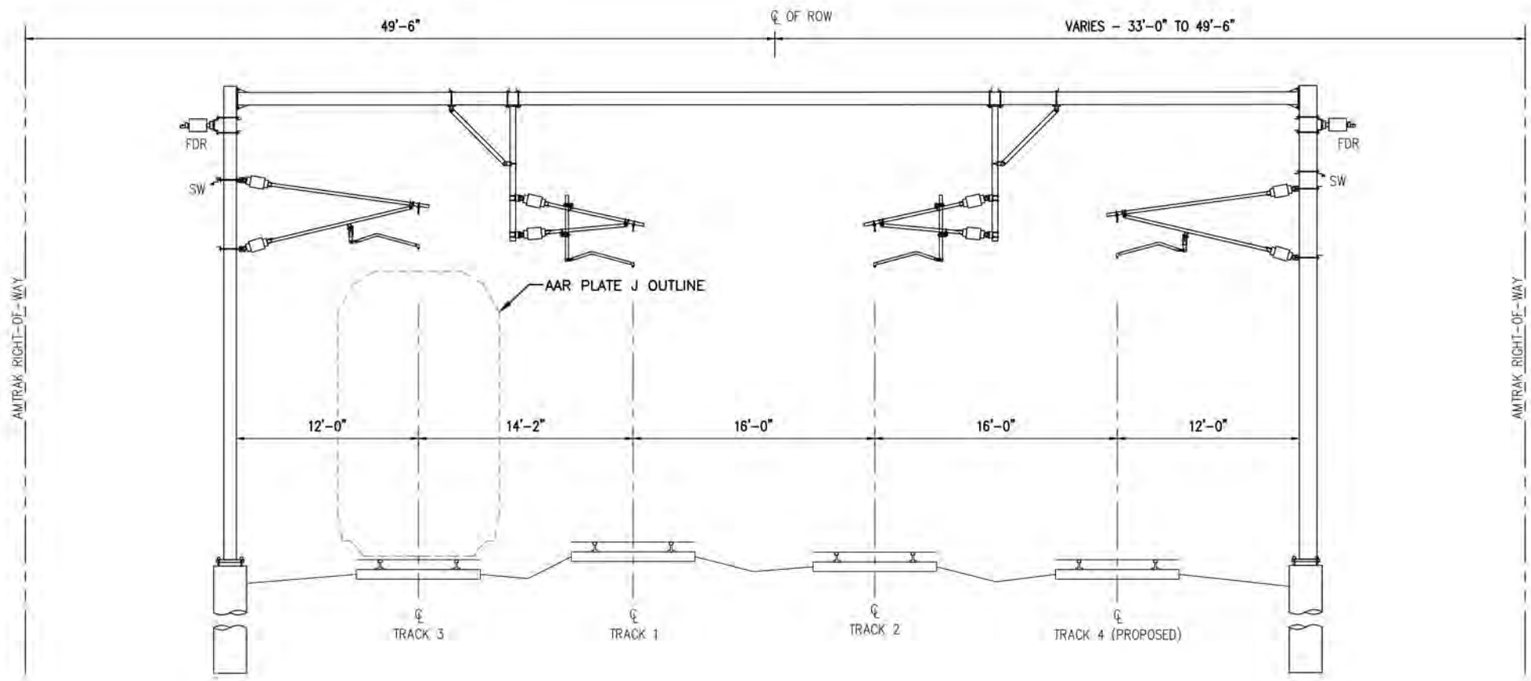
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
OCS SCHEMATICS

Designed: RJR | Drawn: CSM | Checked: MJM | Date: 01/21/2020

File No.:	WAR-ET1
Ref. No.:	
Sheet No:	63 OF 73

ET-1

Jan, 15 2020 12:33 pm \\usphl1fp002\data\Projects\60605010 amtrak warwick station 10% design\900-cad-gis\910-CAD\20-sheets\OCS\TF Green OCS Schematic.dwg By: RookR



TYPICAL PORTAL STRUCTURE
BETWEEN PACKARD EXTENSION AND BARDEN
(ALTERNATIVE 1 SHOWN)
LOOKING TOWARDS BOSTON
SCALE: 1" = 1'-0"

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation, (Amtrak), Office Of Engineering, and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak Electric Traction facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of V.P., Chief Engineer, is prohibited.

No	Revisions	Date	By
		11/26/2019	
	Bid # 7611810		

AMTRAK

OFFICE OF
V.P., Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
IN 4-TRACK TERRITORY

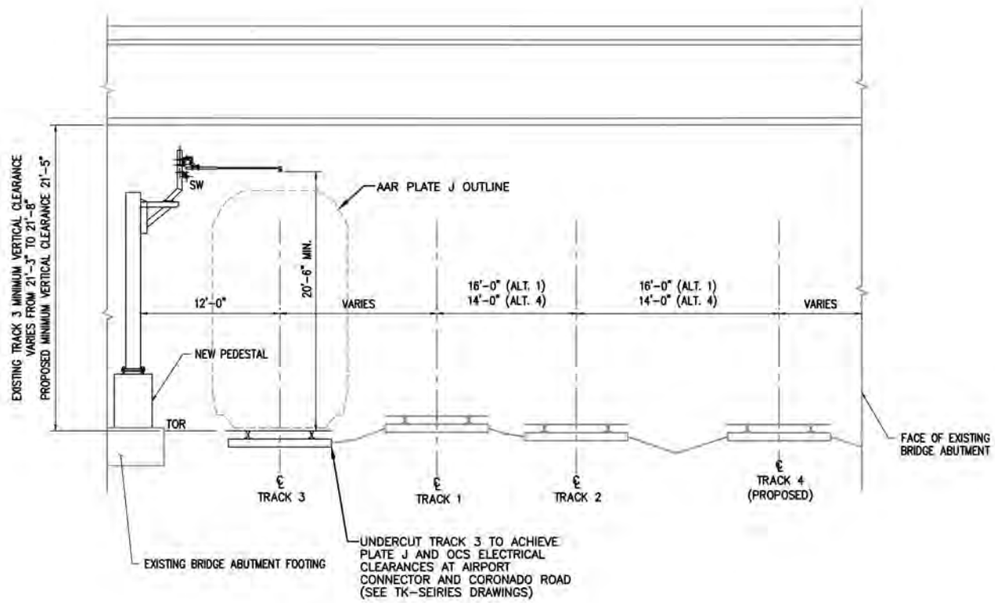
TF Green Airport Station - Proposed Intercity Rail Service Preliminary Design & EA

Designed: RJR	Drawn: CSM	Checked: MJM	Date: 01/21/2020

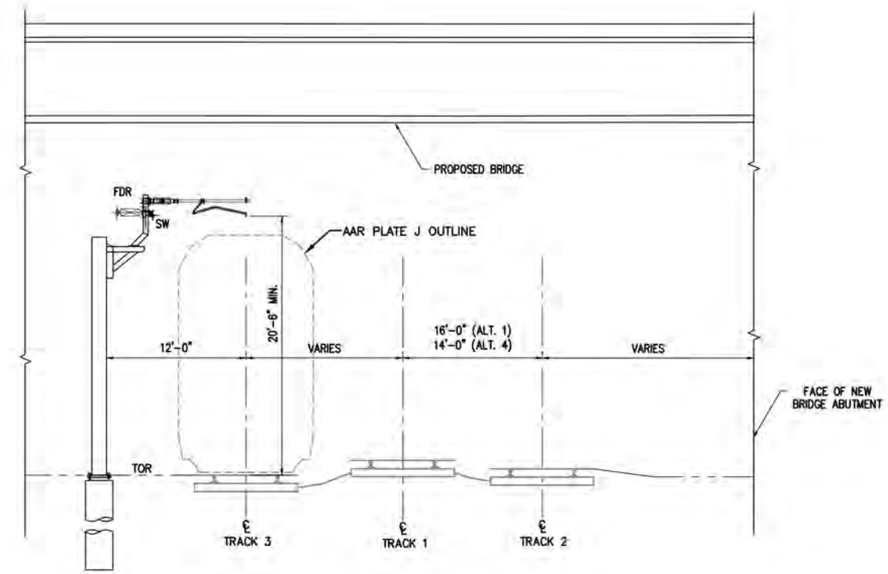
File No.:	WAR-ET2
Ref. No.:	
Sheet No:	64 OF 73

ET-2

Jan, 15 2020 12:33 pm \\usphl1fp002\data\Projects\60605010 amtrak warwick station 10% design\900-cad-gis\910-CAD\20-sheets\OCS\Typical Section - Portal.dwg By: RockR



STUB POLE UNDER OVERHEAD BRIDGES WEST OF BARDEN INTERLOCKING
LOOKING TOWARDS BOSTON
SCALE: NTS



STUB POLE UNDER TYPICAL OVERHEAD BRIDGE REPLACEMENT
LOOKING TOWARDS BOSTON
SCALE: NTS

NOTE:

EXISTING OCS AND ANCILLARY CONDUCTOR BRIDGE ATTACHMENTS NOT SHOWN.

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation, (Amtrak), Office Of Engineering, and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak Electric Traction facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of V.P., Chief Engineer, is prohibited.

No	Revisions	Date	By
		11/26/2019	
	Bid # 7611810		

AMTRAK

OFFICE OF
V.P., Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

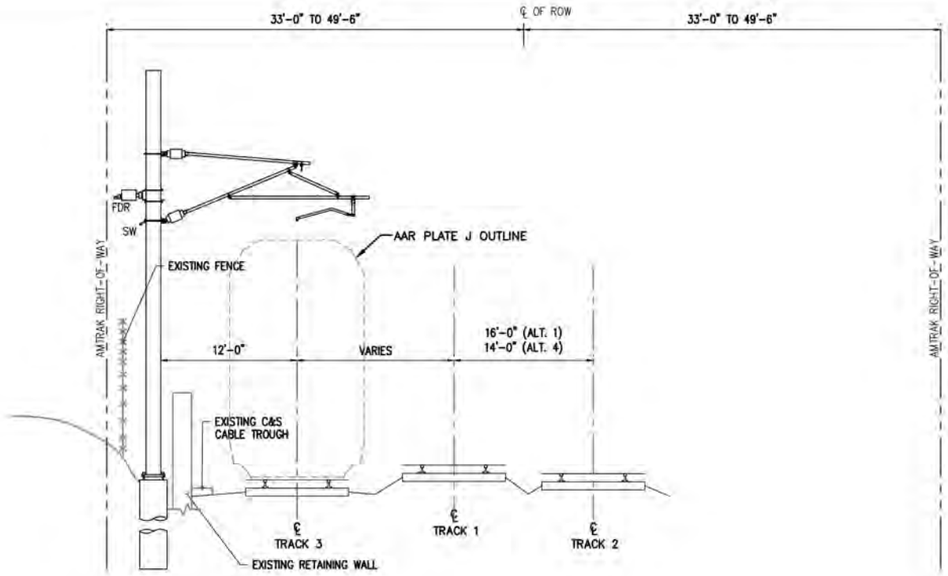
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL TRACK 3 SECTIONS
AT OVERHEAD BRIDGES

Designed: RJR | Drawn: CSM | Checked: MJM | Date: 01/21/2020

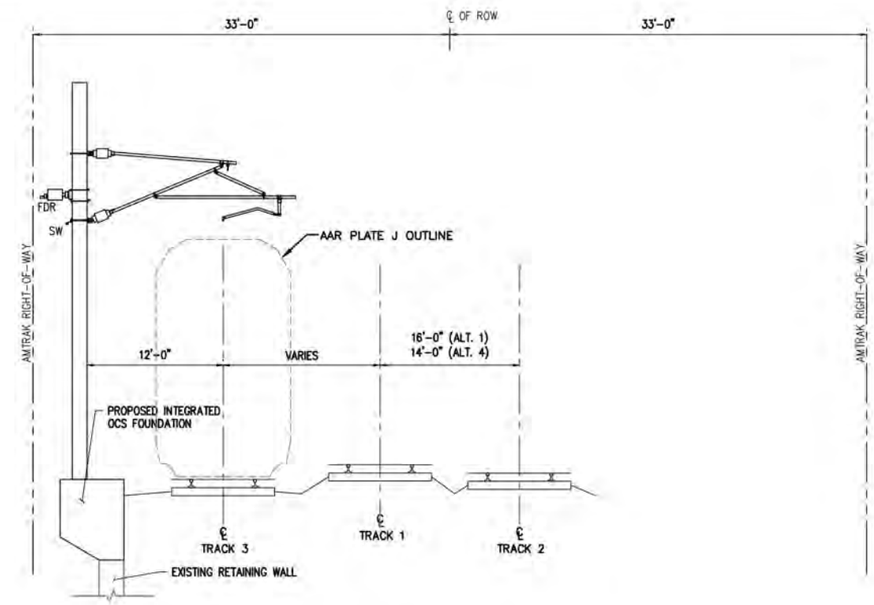
File No.: WAR-ET3
Ref. No.:
Sheet No: 65 OF 73

ET-3

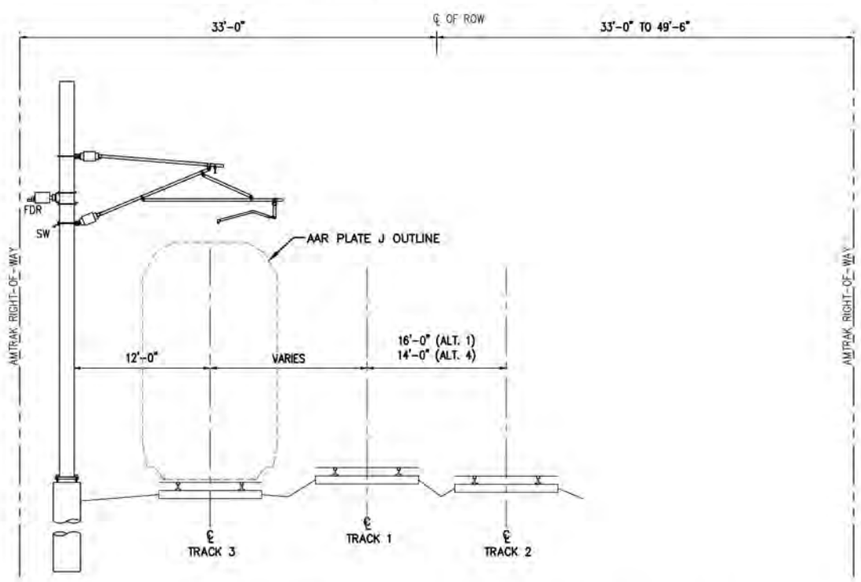
Green Airport Station - Proposed Intercity Rail Service Preliminary Design & EA



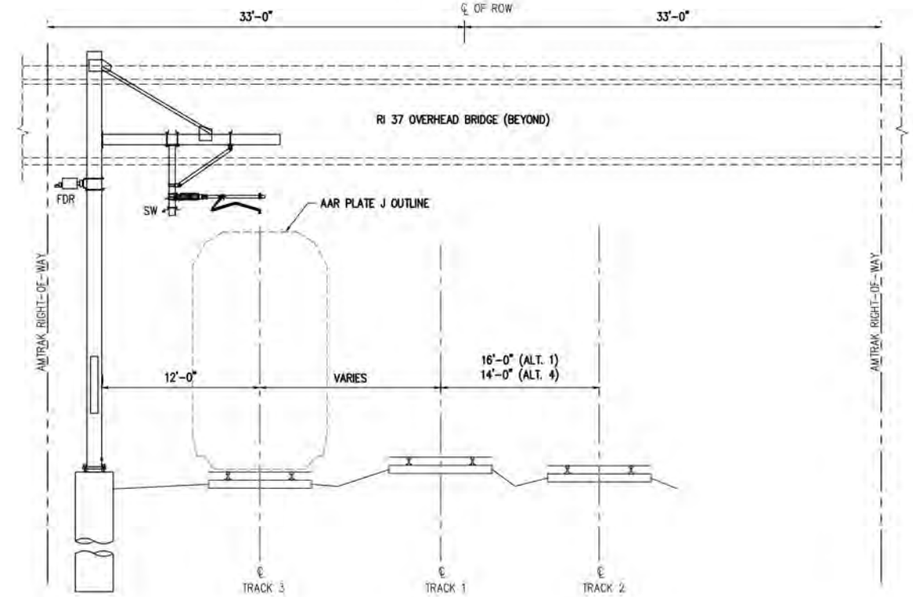
STRUCTURE AT POST INTERLOCKING
LOOKING TOWARDS BOSTON
SCALE: NTS



RETAINING WALL AT LINCOLN AVE. UNDERGRADE BRIDGE
LOOKING TOWARDS BOSTON
SCALE: NTS



TYPICAL TRACK 3 CANTILEVER STRUCTURE
BETWEEN PACKARD AND PACKARD EXTENSION AND BETWEEN BARDEN AND POST
LOOKING TOWARDS BOSTON
SCALE: NTS



STRUCTURE ADJACENT TO RI 37 DUAL OVERHEAD BRIDGES
LOOKING TOWARDS BOSTON
SCALE: NTS

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation, (Amtrak), Office Of Engineering, and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak Electric Traction facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of V.P., Chief Engineer, is prohibited.

No	Revisions	Date	By
		11/26/2019	

Bid # 7611810

AMTRAK

OFFICE OF
V.P., Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

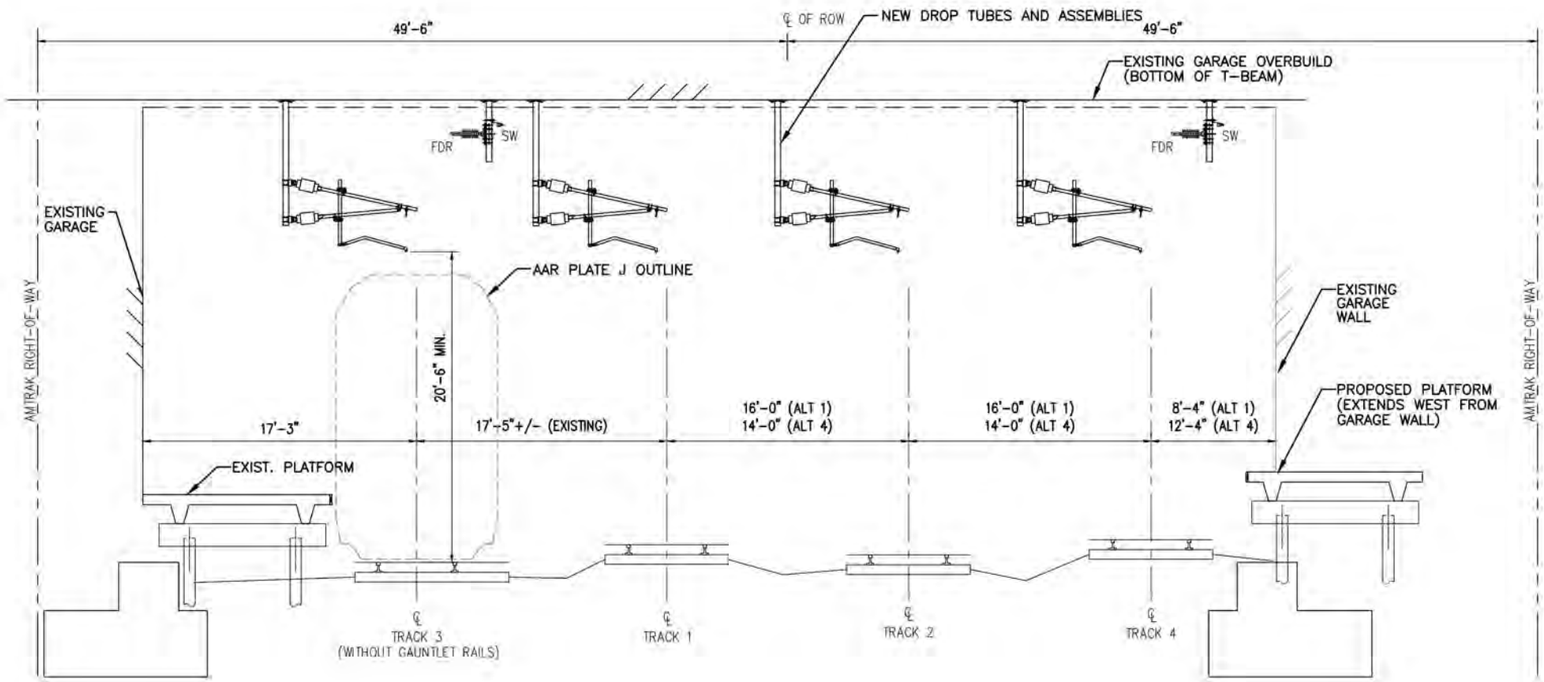
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL TRACK 3 STRUCTURES
IN 3-TRACK TERRITORY

Designed: RJR | Drawn: CSM | Checked: MJM | Date: 01/21/2020

File No.:	WAR-ET4
Ref. No.:	
Sheet No:	66 OF 73

ET-4

TF Green Airport Station - Proposed Intercity Rail Service Preliminary Design & EA



TYPICAL STATION ARRANGEMENT
(ALTERNATIVE 1 & 4 SHOWN)
LOOKING TOWARDS BOSTON
SCALE: 1" = 1'-0"

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation, (Amtrak), Office Of Engineering, and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak Electric Traction facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of V.P., Chief Engineer, is prohibited.

No	Revisions	Date	By
		11/26/2019	
	Bid # 7611810		

AMTRAK

OFFICE OF
V.P., Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
TYPICAL STATION ARRANGEMENT
ALTERNATIVE 1 & 4

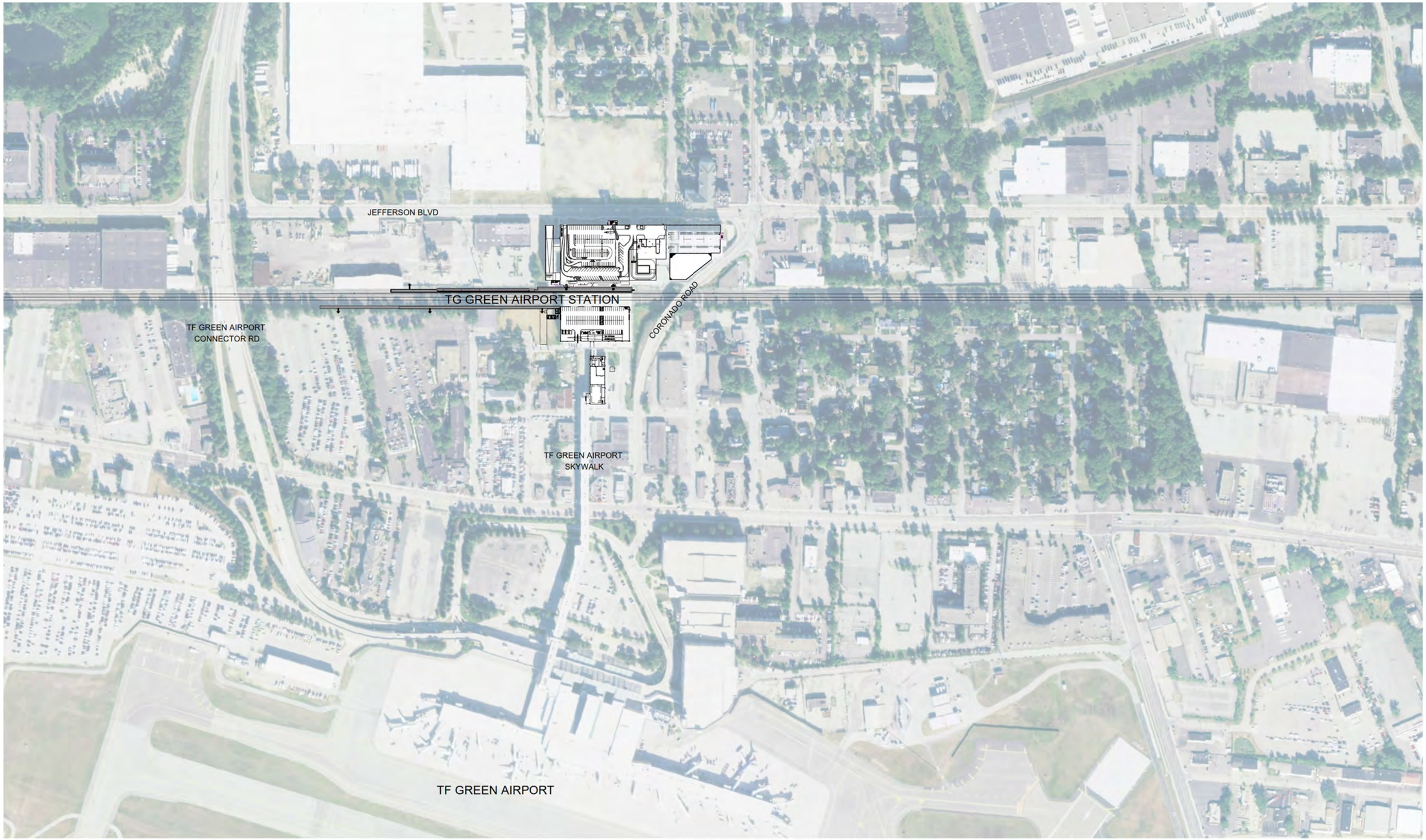
File No.:	WAR-ET5
Ref. No.:	
Sheet No:	67 OF 73

ET-5

Designed: RJR | Drawn: RJR | Checked: MJM | Date: 01/21/2020

TF Green Airport Station - Proposed Intercity Rail Service Preliminary Design & EA

Jan, 15 2020 12:34 pm \\usphl1fp002\data\Projects\60605010 amtrak warwick station 10% design\900-cad-gis\910-CAD\20-sheets\OCS\Typical Section - Station.dwg By: RookR



0 100' 200' 400'

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

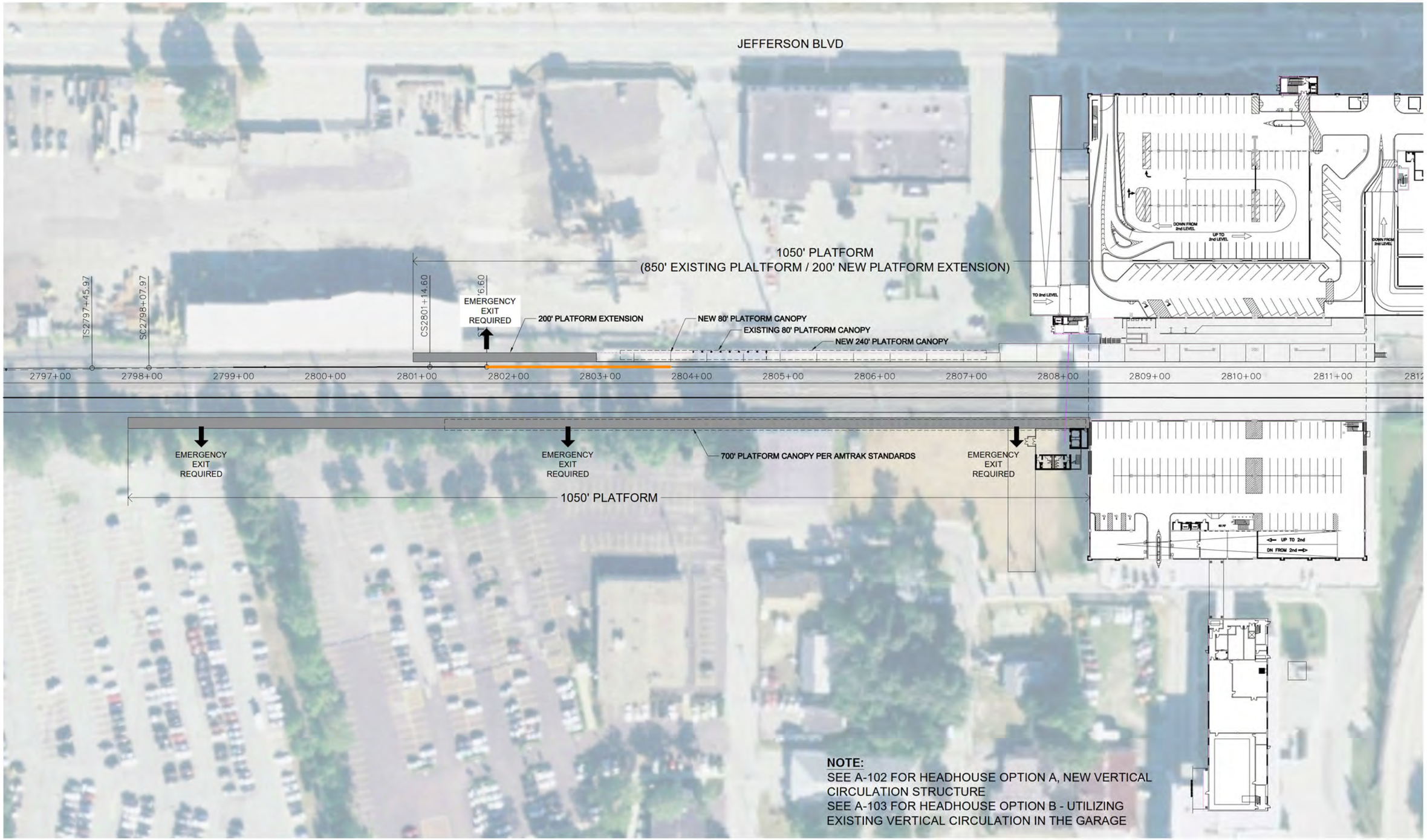
Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
EXISTING CONDITIONS SITE PLAN

Designed: MM/MH | Drawn: MM | Checked: MH | Date: 01/21/2020

File No.:
Ref No.:
Sheet No.: 68 OF 73
Dwg. No.: A-100



0 25' 50' 100'

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By
	Bid # 7611810		

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved	Date

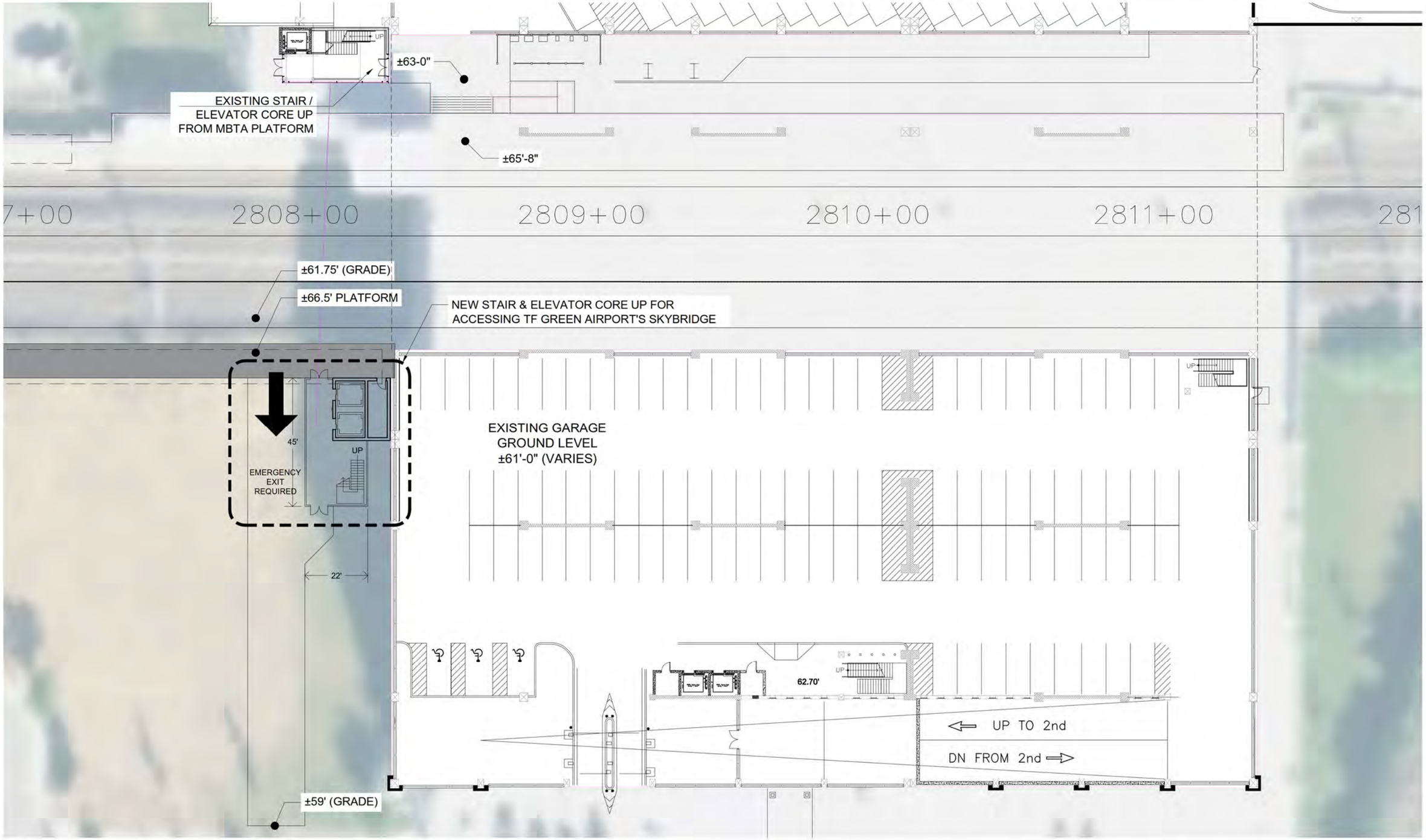
AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
ALTERNATIVE RAIL SERVICE PRELIMINARY Design & EA
Proposed Intercity Rail Service - Providence Station

Designed: MM/MH | Drawn: MM | Checked: MH | Date: 01/21/2020

File No.:
Ref No.:
Sheet No.: 69 OF 73
Dwg. No.: A-101

$FILE$
$TIME$
$DATE$



0 8' 16' 32'

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

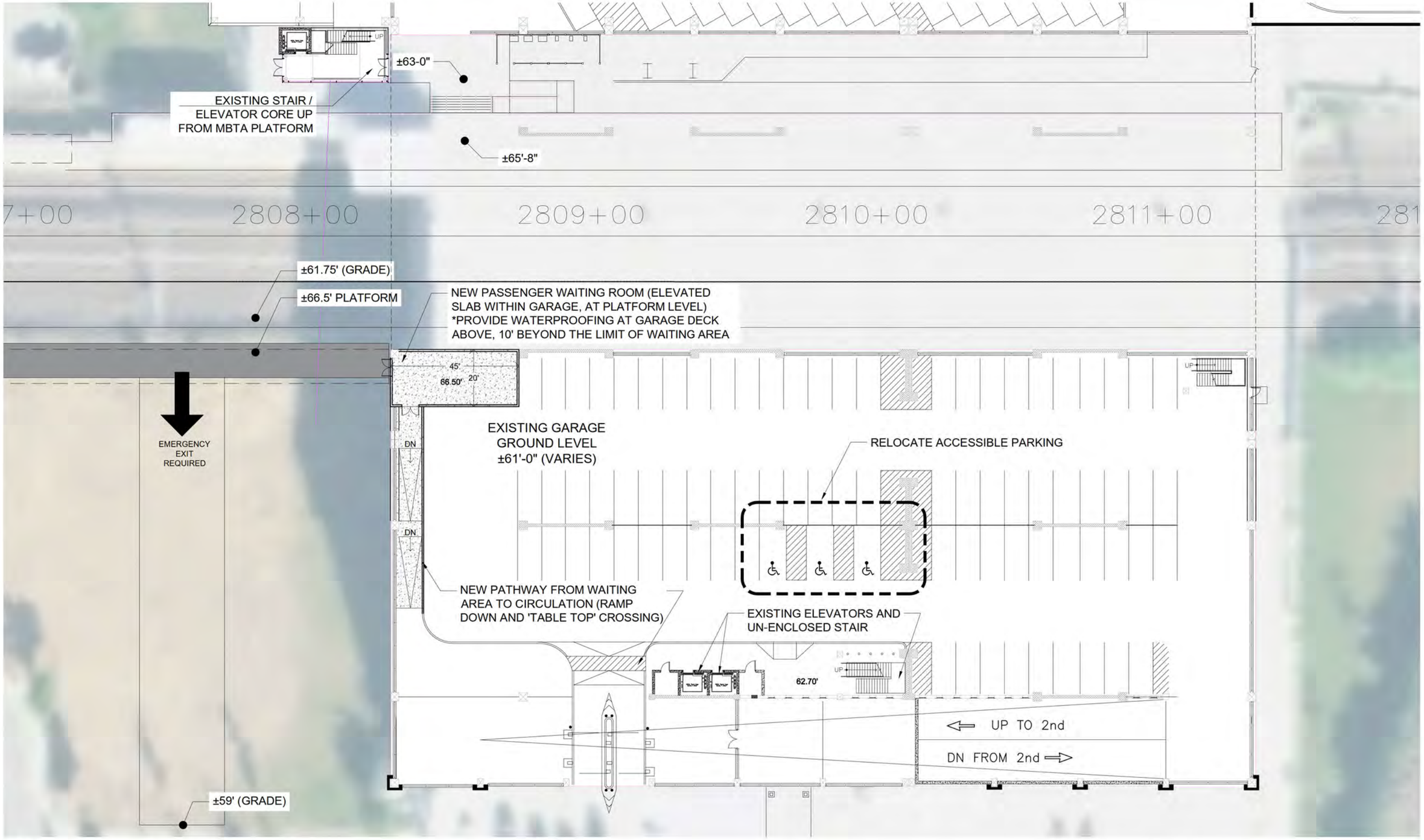
Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PA 19103
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
STATION HEADHOUSE OPTION A
Proposed Intercity Rail Service Preliminary Design & EA

Designed: MM/MH | Drawn: MM | Checked: MH | Date: 02/28/2020

File No.:
Ref No.:
Sheet No.: 70 OF 73
Dwg. No.: A-102



0 8' 16' 32'

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-ID, is prohibited.

No.	Revisions	Date	By

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

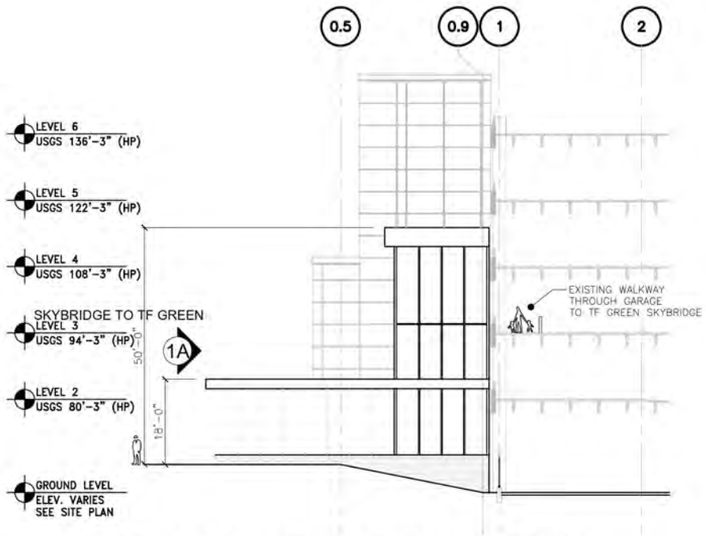
Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA
TEL: 215-735-0832

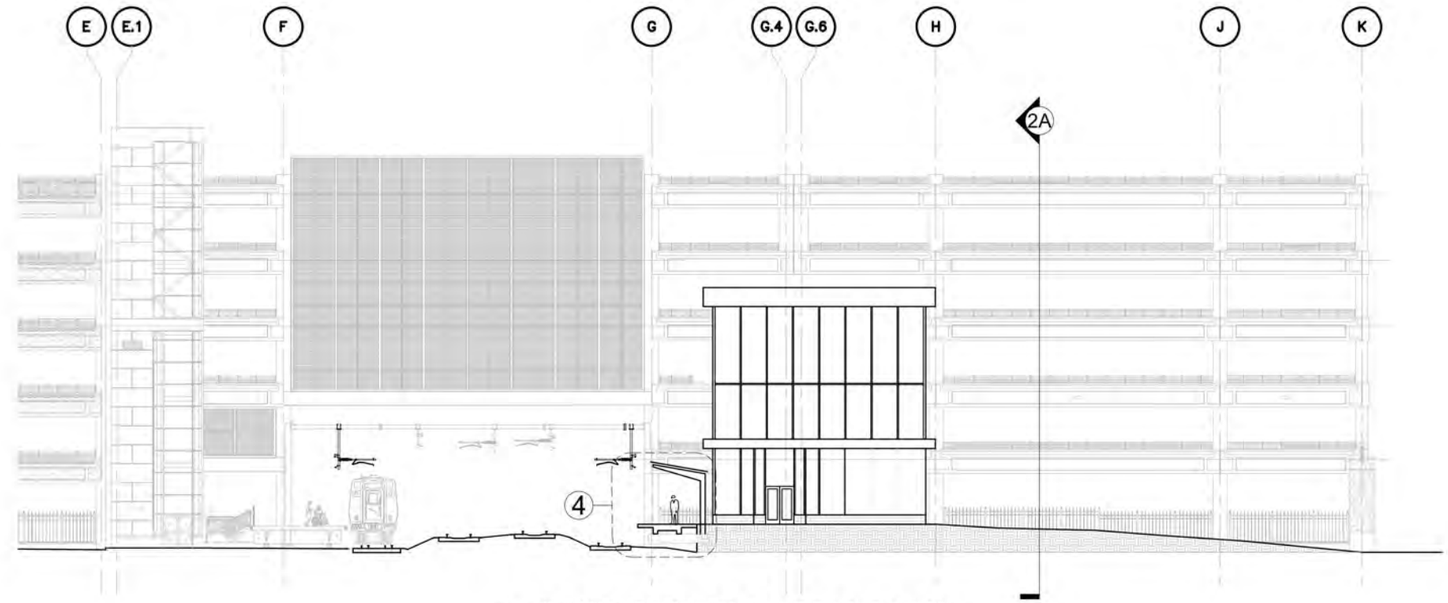
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
Space Currently Not Used - Proposed Interim Use

Designed: MM/MH | Drawn: MM | Checked: MH | Date: 01/21/2020

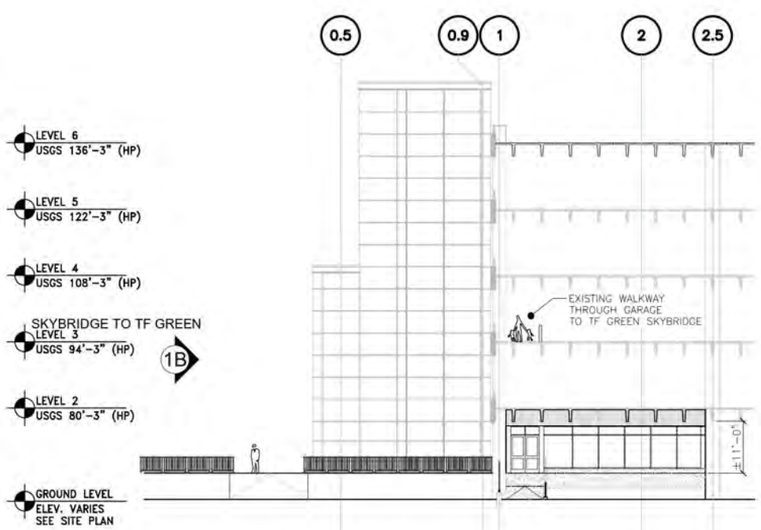
File No.:
Ref No.:
Sheet No.: 71 OF 73
Dwg. No.: A-103



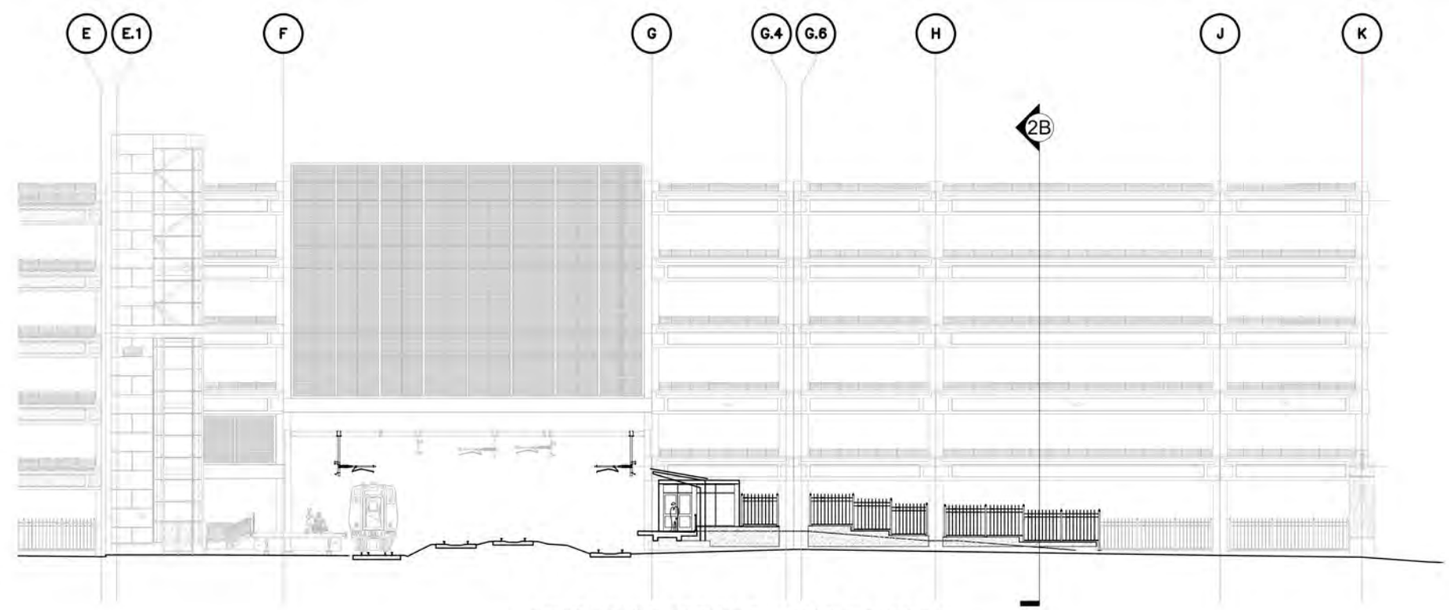
2A HEADHOUSE OPTION A - SOUTH ELEVATION



1A HEADHOUSE OPTION A - WEST ELEVATION



2B HEADHOUSE OPTION B - SOUTH ELEVATION



1B HEADHOUSE OPTION B - WEST ELEVATION

0 8' 16' 32'

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10, is prohibited.

No.	Revisions	Date	By

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

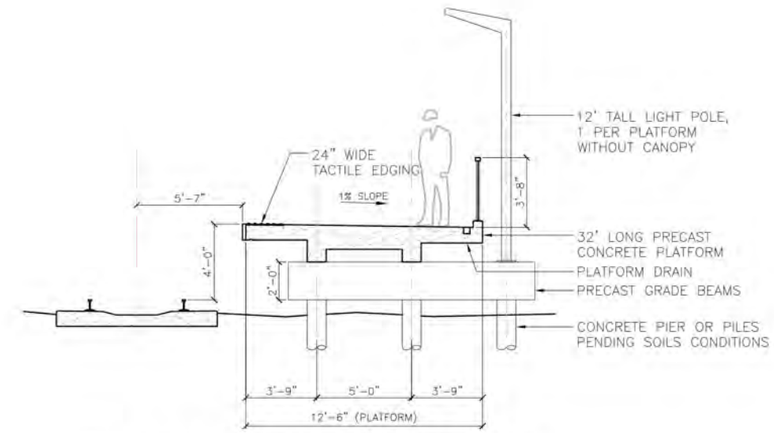
Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA
TEL: 215-735-0832

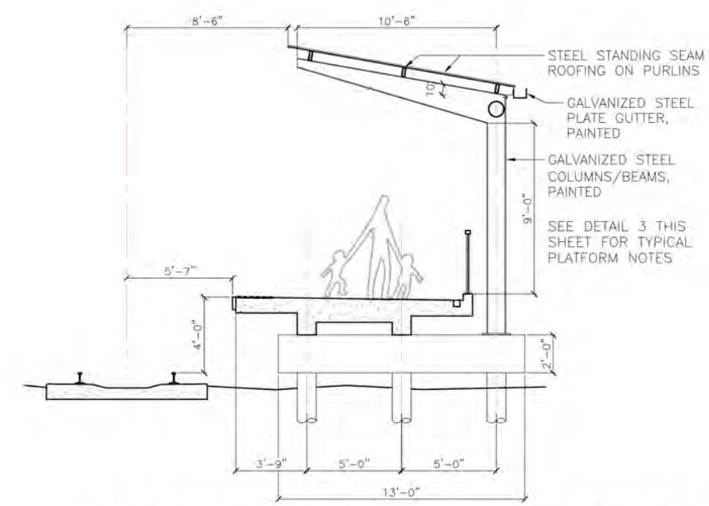
AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
HEADHOUSE OPTIONS - ELEVATIONS
Proposed Quality Rail Service - Preliminary Design & EA

Designed: MM/MH | Drawn: MM | Checked: MH | Date: 01/21/2020

File No.:
Ref No.:
Sheet No.: 72 OF 73
Dwg. No.: A-104



3 TRACK 4 PLATFORM SECTION - NO CANOPY



4 TRACK 4 PLATFORM SECTION - AT CANOPY (60% OF PLATFORM)

0 8' 16' 32'

This material is owned by and is the sole and exclusive property of the National Railroad Passenger Corporation (Amtrak), and is supplied on a confidential basis solely for use in connection with the design and construction of Amtrak facilities and equipment. The reproduction, display, sale or other disposition of this document without the express written consent of the National Railroad Passenger Corporation, Office of NEC-10, is prohibited.

No.	Revisions	Date	By

Bid # 7611810

AMTRAK

Office of
Northeast Corridor - Infrastructure and Investment Development
National Railroad Passenger Corporation
30th Street Station - Philadelphia, Pennsylvania 19104

Approved	Date

AECOM
1700 MARKET STREET, SUITE 1600
PHILADELPHIA, PENNSYLVANIA
TEL: 215-735-0832

AMTRAK TF GREEN AIRPORT STATION
TRACK AND PLATFORM CONCEPTUAL DESIGN
CANOPY SECTIONS

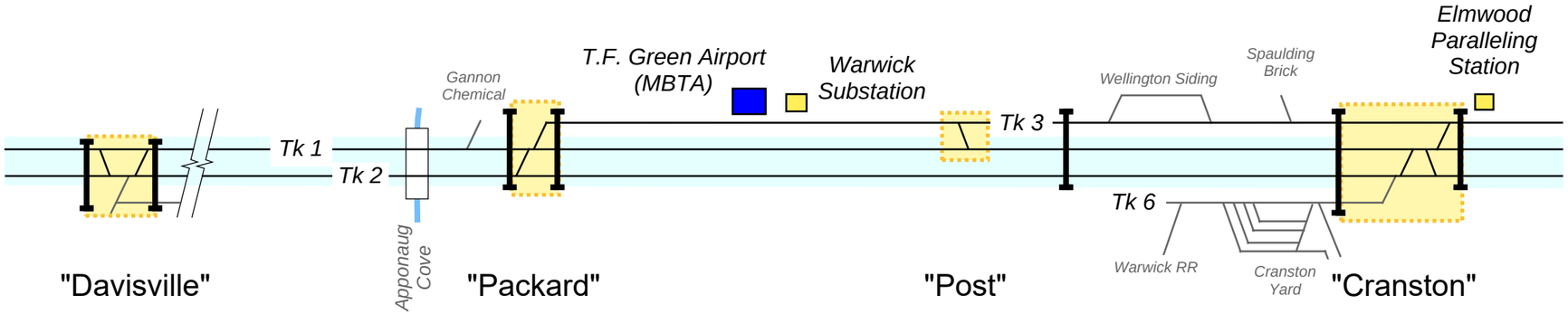
Designed: MM/MH | Drawn: MM | Checked: MH | Date: 01/21/2020

File No.:
Ref No.:
Sheet No.: 73 OF 73
Dwg. No.: A-105

Contract 7611810 - Amtrak Rail Service Preliminary Design & EA
Rhode Island Station - Proposed Interim Rail Service Facilities

APPENDIX III - STAGING DIAGRAMS

EXISTING

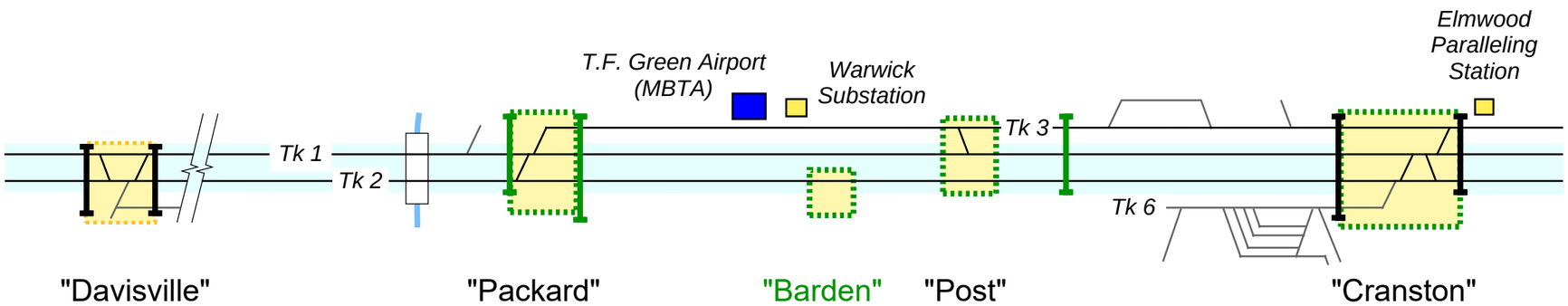


Phase 6
Remove LH T/O at "Packard". Construct LH & RH T/Os along Track 1 to complete X/Os.

Construct LH at "Post" along Track 1 to complete X/O

X/O work at "Cranston" NIC

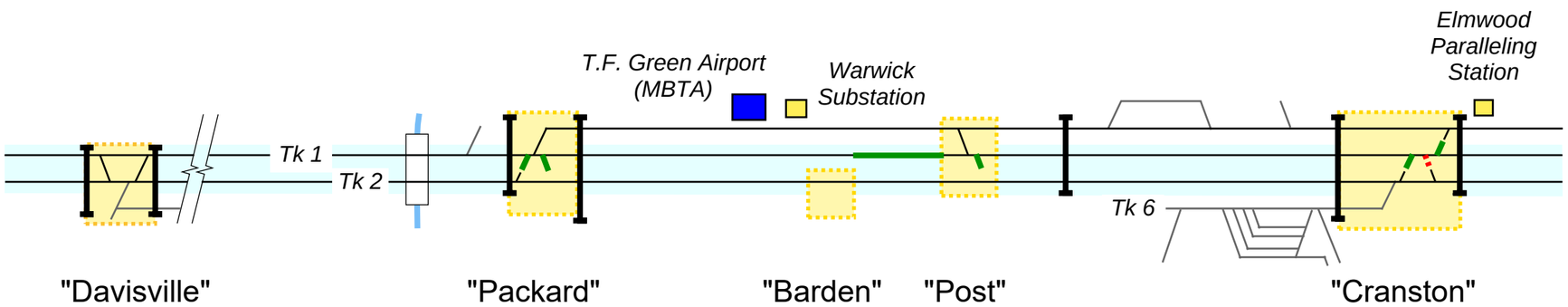
OCS/C&S



Phase 1
Construct proposed OCS structures and remove existing.

Perform various interlocking C&S modifications, including relocating infrastructure, signals, and cabinets as required.

TRACK 1 LOWERING



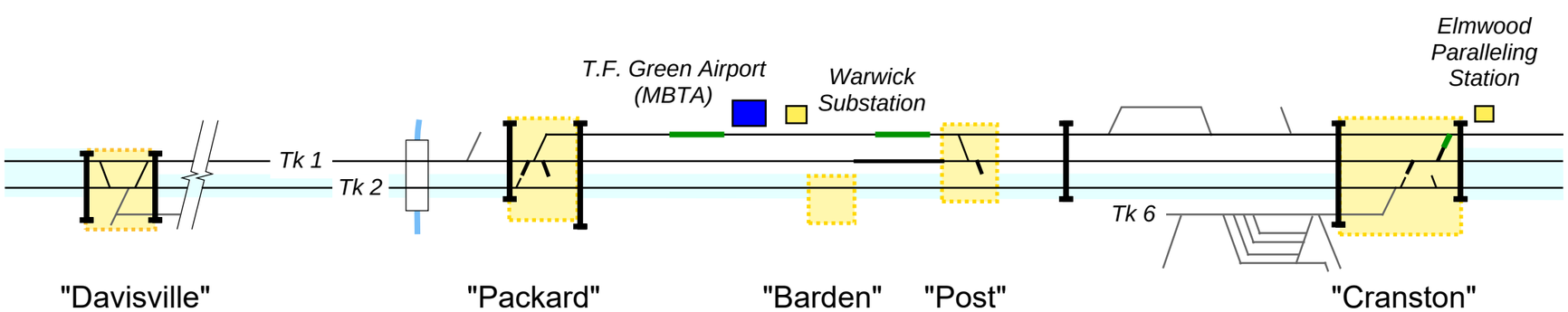
Phase 2
Excavate and reconstruct at a lower elevation segment of Track 1 in the vicinity of Rte 37 OH bridges to increase overhead clearances.

Remove LH T/O at "Packard". Construct LH & RH T/Os along Track 1 to begin proposed X/Os.

Construct LH at "Post" along Track 1 to begin proposed X/O

X/O work at "Cranston" NIC

TRACK 3 ELECTRIFICATION

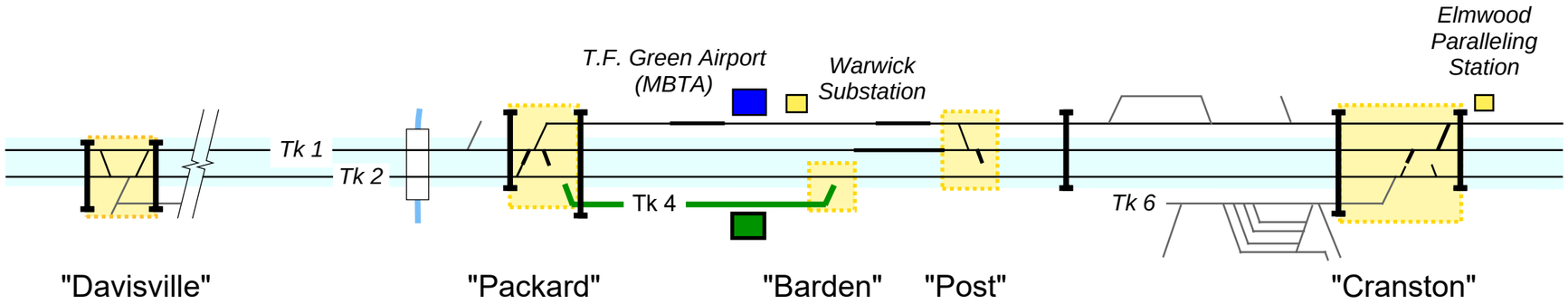


Phase 4
Excavate and reconstruct at a lower elevation two segments of Track 3 in the vicinity of TF Green Connector Rd and Rte 37 OH bridges to increase overhead clearances.

Electrify Track 3

X/O work at "Cranston" NIC

TRACK 4



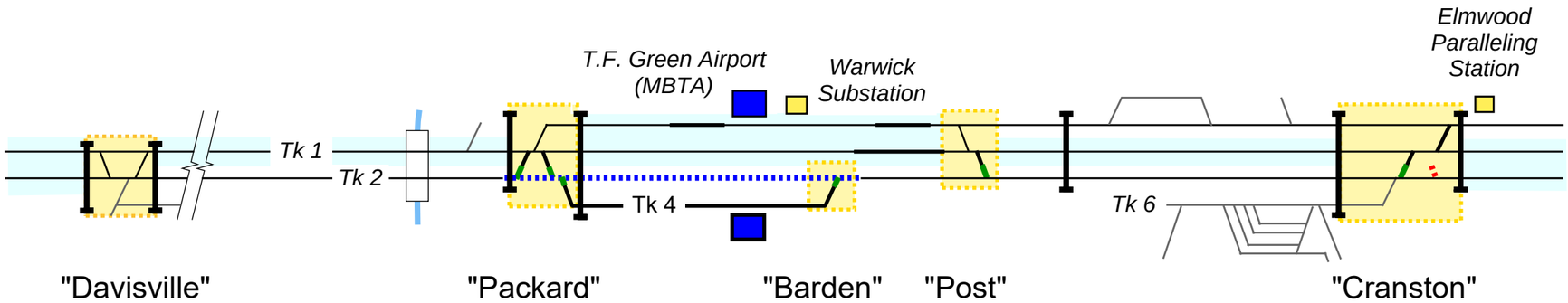
Phase 4
Excavate and prepare bedding for Track 4 and Track 2 shift.

Construct Track 4 up to last long timber of proposed turnouts

Construct EB Platform and Station Enclosure

Stage #32.7 MPF T/O's for both ends of Track 4 to the south side of Track 2

TRACK 2 SHIFT



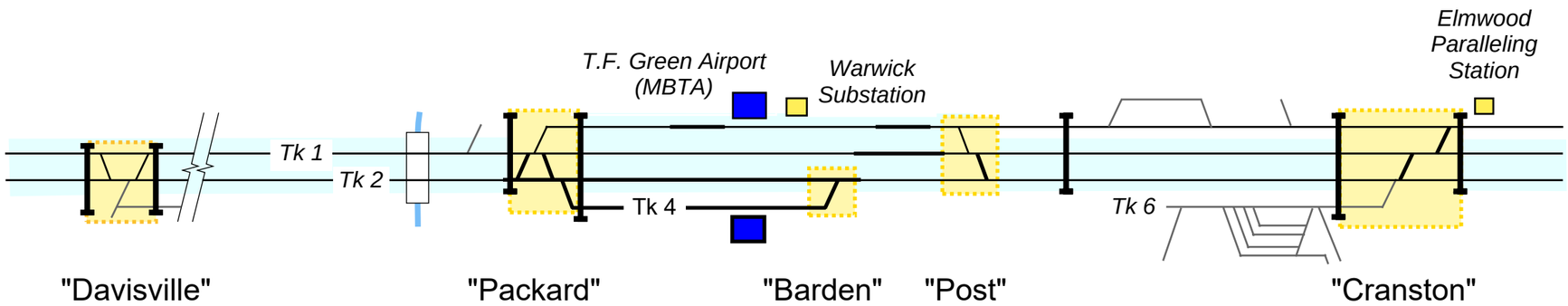
Phase 5
Cut LH X/O at "Packard". Remove T/O and construct track to fill gap.

Shift Track 2 from "Packard" to "Barden"

Construct LH and 2 RH T/Os at "Packard", LH T/O at "Barden", and RH T/O at "Post", all along Track 2 to complete X/Os and tie in Track 4 to Track 2

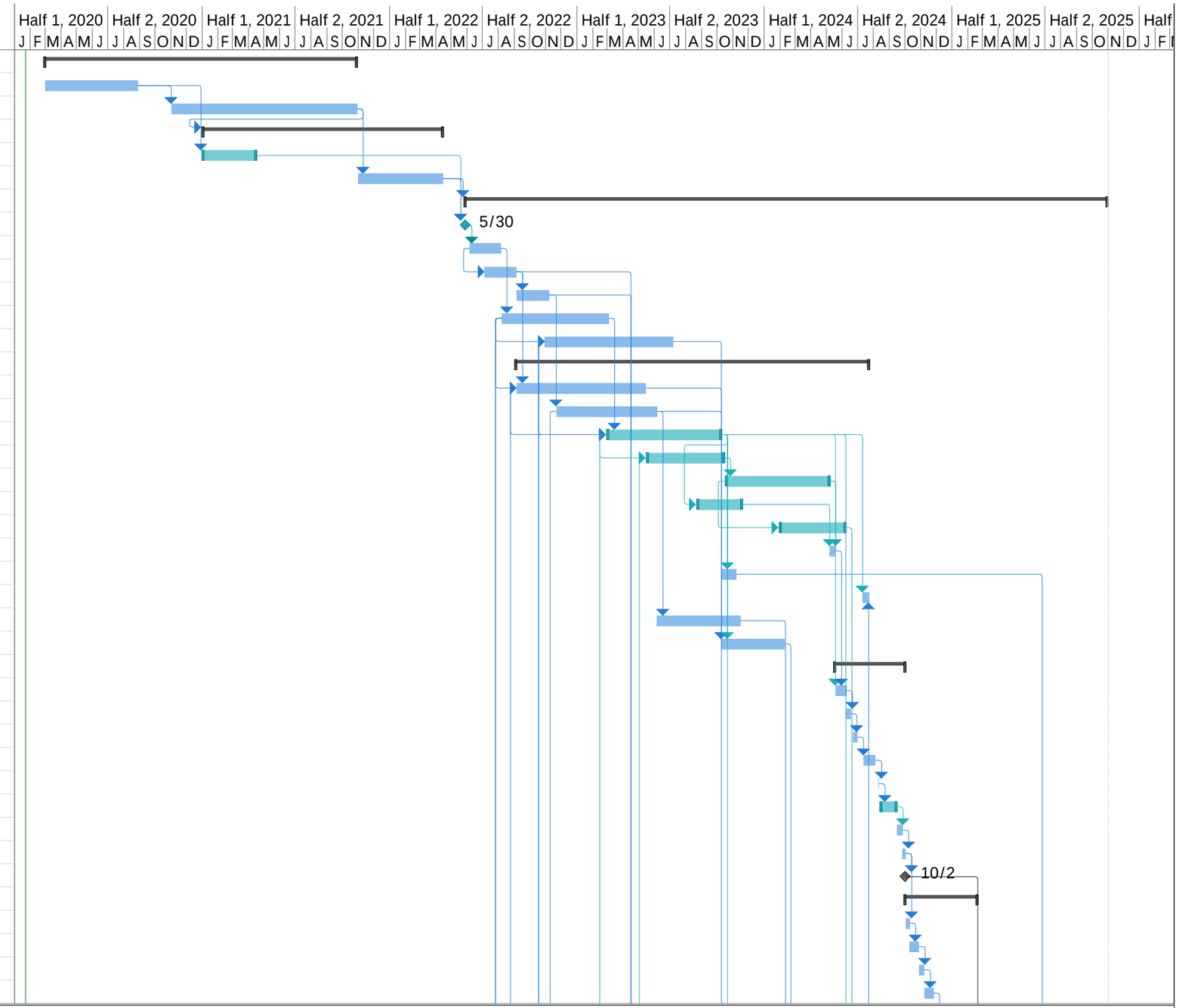
X/O work at "Cranston" NIC

PROPOSED



APPENDIX IV - PROJECT SCHEDULE

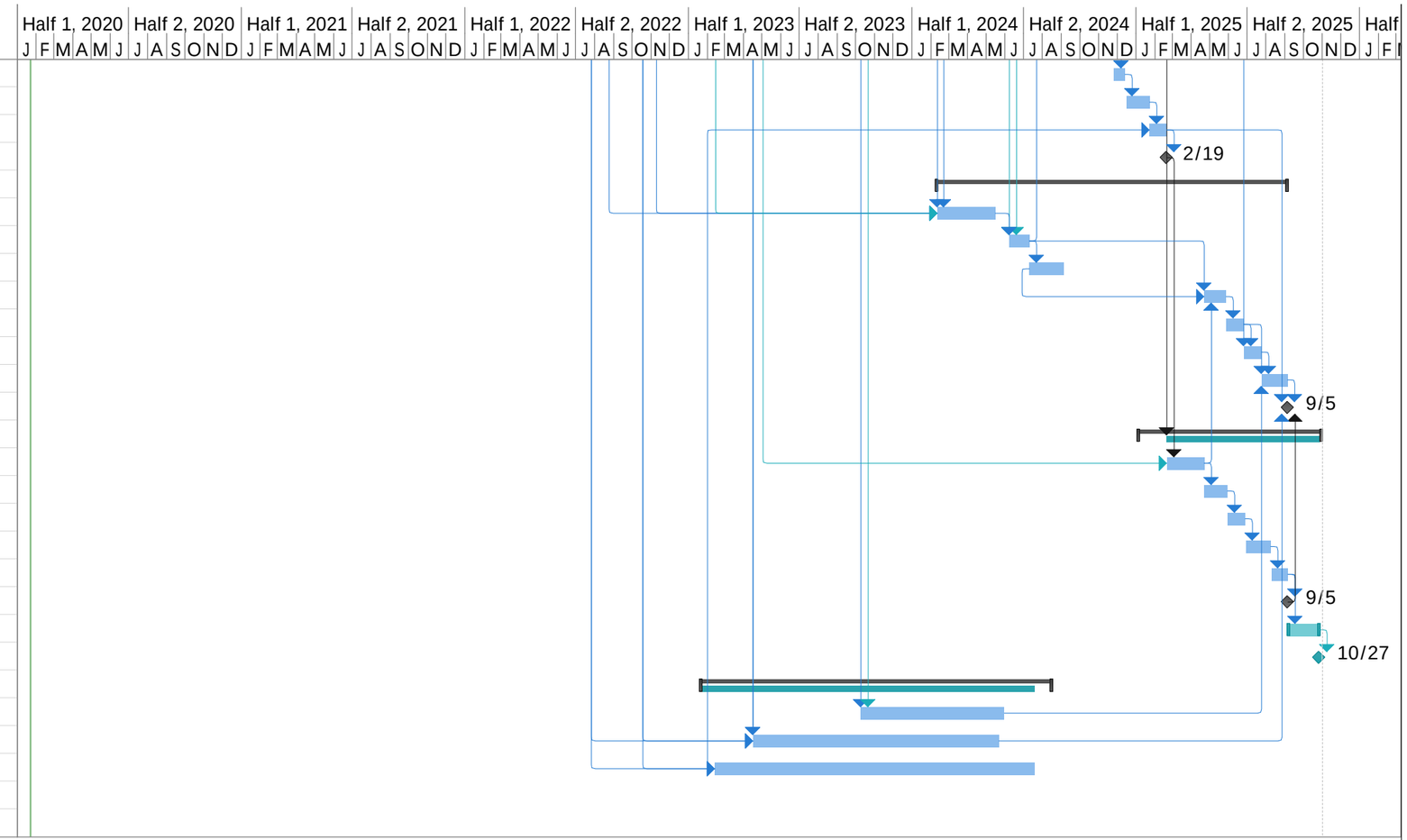
ID	Task Name	Duration	Start
1	Design	435 days	Mon 3/2/20
2	30% Design	130 days	Mon 3/2/20
3	Final Design/PS&E	260 days	Mon 11/2/20
4	Pre-construction	335 days	Mon 1/4/21
5	Relocate Fiber Optic Longitudinal Line 5 miles	75 days	Mon 1/4/21
6	Bid Cycle	120 days	Mon 11/1/21
7	Construction	935 days	Mon 5/30/22
8	<Milestone> Contractor Notice to Proceed	0 days	Mon 5/30/22
9	Mobilization	45 days	Mon 6/6/22
10	Project SSWP's	45 days	Tue 7/5/22
11	Field Survey Stake/Verification	45 days	Tue 9/6/22
12	Shop Drawing Review	150 days	Mon 8/8/22
13	Fab/Equipment delivery	180 days	Mon 10/31/22
14	Phase 1 New Catenary, C&S and Station Platform Work	516 days	Tue 9/6/22
15	OCS/C&S - Structures Foundation	180 days	Tue 9/6/22
16	Track 4 West End Retaining Walls	140 days	Tue 11/22/22
17	OCS/C&S - Structure Erection	160 days	Sat 3/4/23
18	OCS - Hang New Brackets Track 1 & 2	110 days	Sat 5/20/23
19	OCS - Transfer Wires Track 1 & 2 to new Structures	150 days	Sat 10/21/23
20	OCS/ET - New Paralleling Station Feeders and tie-ins	62 days	Sat 8/26/23
21	OCS - Demo Existing Support Cantilevers	104 days	Sat 2/3/24
22	OCS - Commissioning and cutover to new service	10 days	Wed 5/8/24
23	C&S - hang new signal aspects & cover	21 days	Tue 10/10/23
24	C&S - bury signal cables	10 days	Thu 7/11/24
25	Civil - utility relocations	120 days	Tue 6/6/23
26	Civil - new drainage outfall	90 days	Tue 10/10/23
27	Phase 2 (Track 1)	117 days	Sun 5/19/24
28	Track - Undercut in Weekend Phases 5 weekend at Rt 37	22 days	Sun 5/19/24
29	Track 1 surface to align and grade at Rt 37 2 weekends	7 days	Mon 6/10/24
30	Track - prepare Tk1 subgrade & ballast at Cross-over	8 days	Sat 6/22/24
31	Track - install Cross-overs (weekends)	17 days	Sat 7/13/24
32	Track - Align & surface Track 1	1 day	Sun 8/11/24
33	OCS - Adjust alignment of wires and cutover as required	23 days	Sat 8/17/24
34	C&S - make required adjustments to bring Tk1 into service	10 days	Mon 9/16/24
35	Commission track, OCS, & C&S	5 days	Fri 9/27/24
36	<Milestone> Tk1 in service	0 days	Wed 10/2/24
37	Phase 3 (Track 3) Track out of Service	105 days	Thu 10/3/24
38	Track - Dismantle and store existing Tk3 1200 east end at	5 days	Thu 10/3/24
39	Track - Excavate material (80 cy/d)	14 days	Thu 10/10/24
40	Track - prepare Tk3 subgrade, install drainage, & lay	10 days	Tue 10/29/24
41	Track - Lay ballast and proposed or reconstructed Tk1	14 days	Fri 11/8/24



T.F. Green Airport Station
Alternative 1
Date: Thu 1/23/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

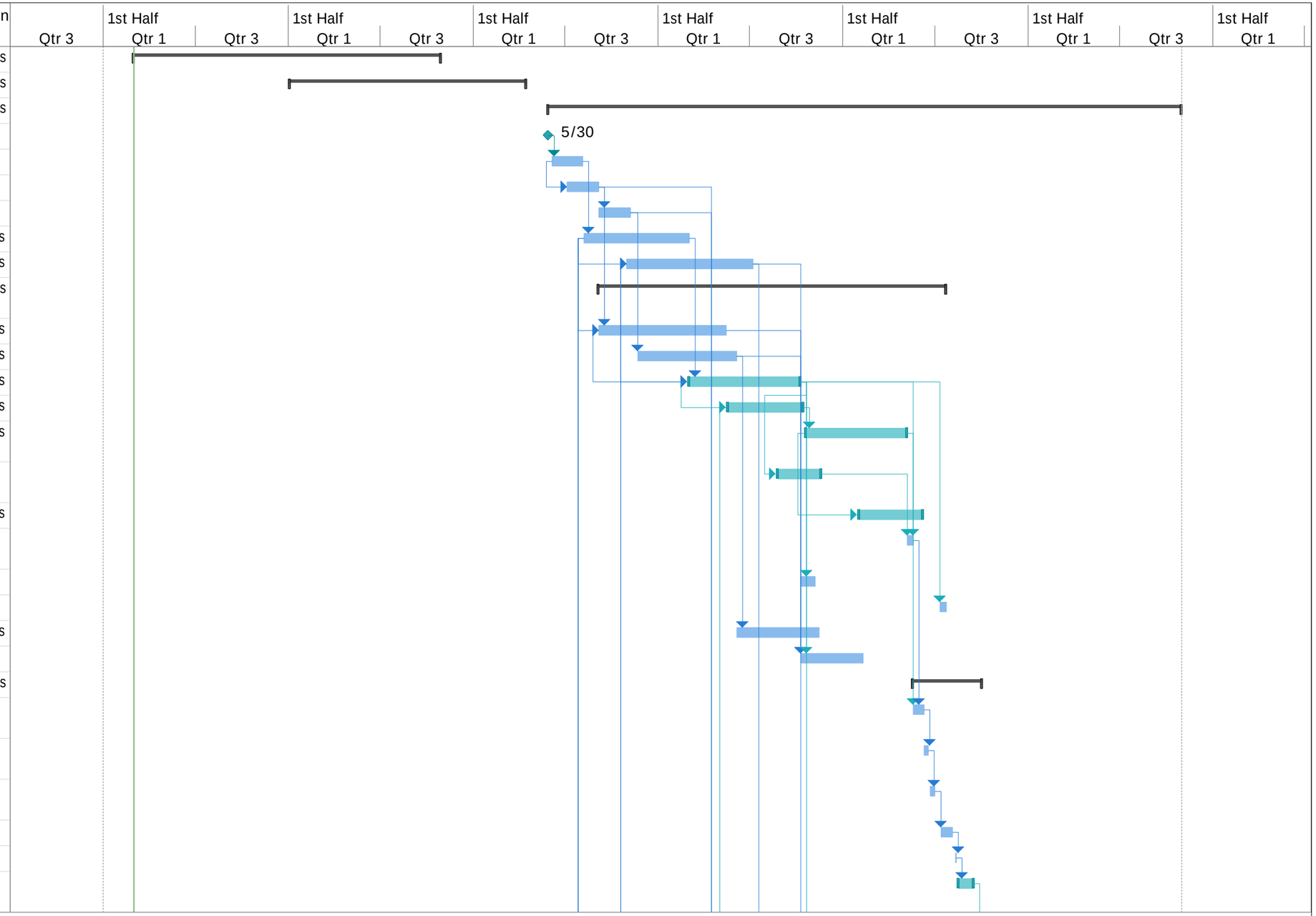
ID	Task Name	Duration	Start
42	OCS - Hang wires, align, and cutover as required	14 days	Tue 11/26/24
43	C&S - make required adjustments to bring Tk3 into service	28 days	Mon 12/16/24
44	Commission track, OCS, & C&S	20 days	Thu 1/23/25
45	<Milestone> Tk 3 in service	0 days	Wed 2/19/25
46	Phase 4 (Track 4)	446 days	Mon 2/12/24
47	Track - Excavate and prepare Tk4 subgrade, install	75 days	Mon 2/12/24
48	Track - Lay ballast and proposed Tk4 track - line	30 days	Sat 6/8/24
49	OCS - Hang new wires Track 4	45 days	Thu 7/11/24
50	Track construct T/Os (1turnout/weekend)	28 days	Tue 4/22/25
51	OCS - Adjust alignment of wires and cutover as required	21 days	Wed 5/28/25
52	C&S - make required adjustments to bring Tk4 into service	21 days	Thu 6/26/25
53	Commission track, OCS, & C&S	30 days	Fri 7/25/25
54	<Milestone> Tk 4 in service	0 days	Fri 9/5/25
55	Phase 5 (Track 2) Track out of Service	219 days	Mon 1/6/25
56	Track - Shift and Line existing Tk2 in segments	45 days	Thu 2/20/25
57	Track - Cross-over turn out cut ins line (includes	30 days	Tue 4/22/25
58	OCS - Adjust alignment of wires and cutover as required	21 days	Fri 5/30/25
59	C&S - make required adjustments to bring Tk2 into service	30 days	Mon 6/30/25
60	Commission track, OCS, & C&S	20 days	Mon 8/11/25
61	<Milestone> Tk 2 in service	0 days	Fri 9/5/25
62	Project Punchlist	36 days	Mon 9/8/25
63	<New Milestone>Project Completion	0 days	Mon 10/27/25
64	Station Construction	438 days	Mon 1/23/23
65	Platform Construction	180 days	Tue 10/10/23
66	Station Head house (includes New Headhouse with VCE)	300 days	Mon 4/17/23
67	Bridge Construction - Coranado Road	400 days	Mon 2/13/23
68			
69			



T.F. Green Airport Station
Alternative 1
Date: Thu 1/23/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

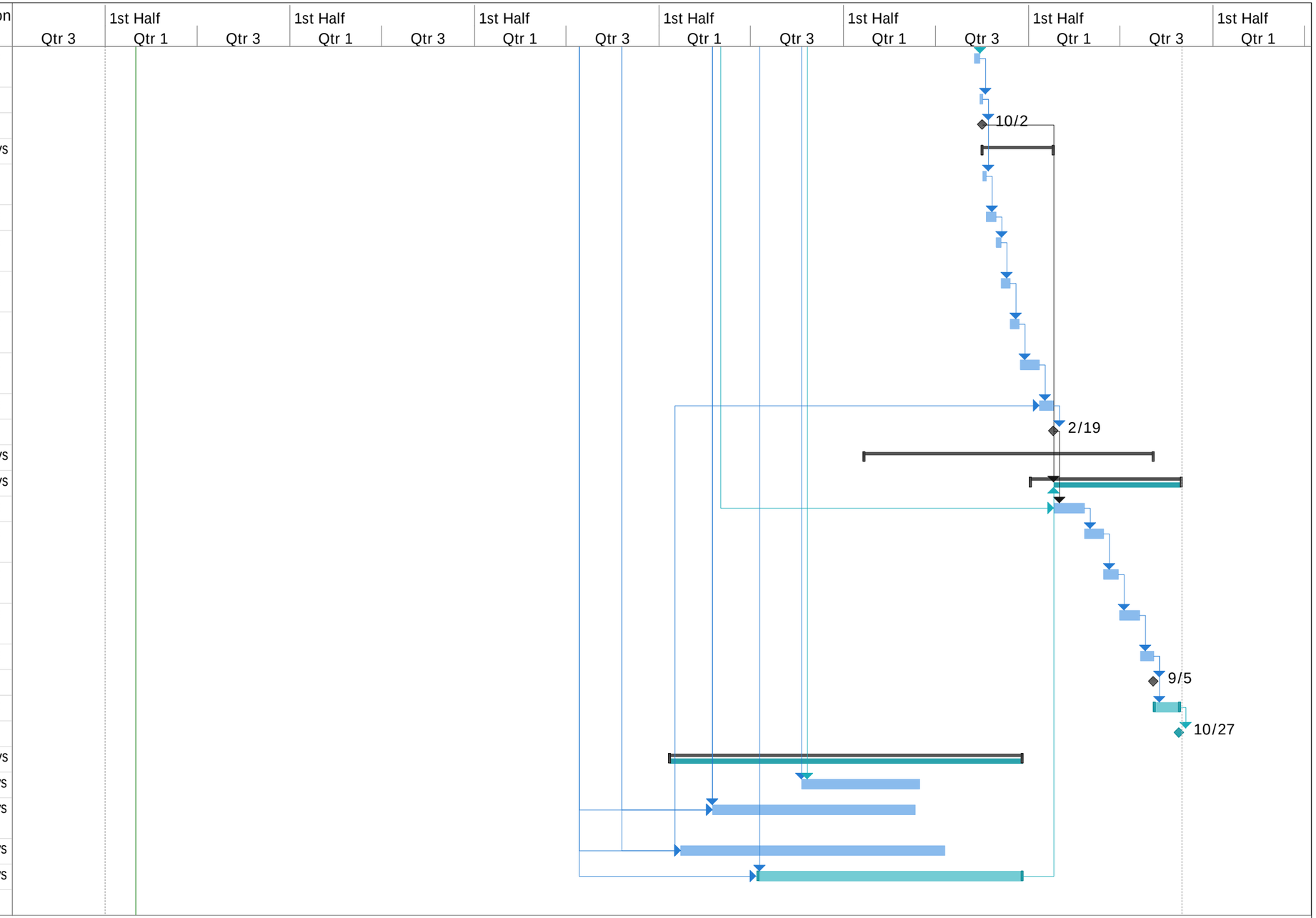
ID	Task Name	Duration
1	Design	435 days
4	Pre-construction	335 days
7	Construction	935 days
8	<Milestone> Contractor Notice to Proceed	0 days
9	Mobilization	45 days
10	Project SSWP's	45 days
11	Field Survey Stake/Verification	45 days
12	Shop Drawing Review	150 days
13	Fab/Equipment delivery	180 days
14	Phase 1 New Catenary, C&S and Station Platform Work	516 days
15	OCS/C&S - Structures Foundation	180 days
16	Track 4 West End Retaining Walls	140 days
17	OCS/C&S - Structure Erection	160 days
18	OCS - Hang New Brackets Track 1 & 2	110 days
19	OCS - Transfer Wires Track 1 & 2 to new Structures	150 days
20	OCS/ET - New Paralleling Station Feeders and tie-ins	62 days
21	OCS - Demo Existing Support Cantilevers	104 days
22	OCS - Commissioning and cutover to new service	10 days
23	C&S - hang new signal aspects & cover	21 days
24	C&S - bury signal cables	10 days
25	Civil - utility relocations	120 days
26	Civil - new drainage outfall	90 days
27	Phase 2 (Track 1)	117 days
28	Track - Undercut in Weekend Phases 5 weekend at Rt 37	22 days
29	Track 1 surface to align and grade at Rt 37 2 weekends	7 days
30	Track - prepare Tk1 subgrade & ballast at Cross-over turnout adjustments	8 days
31	Track - install Cross-overs (weekends)	17 days
32	Track - Align & surface Track 1	1 day
33	OCS - Adjust alignment of wires and cutover as required	23 days



T.F. Green Airport Station
Alternative 1
Date: Mon 3/2/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

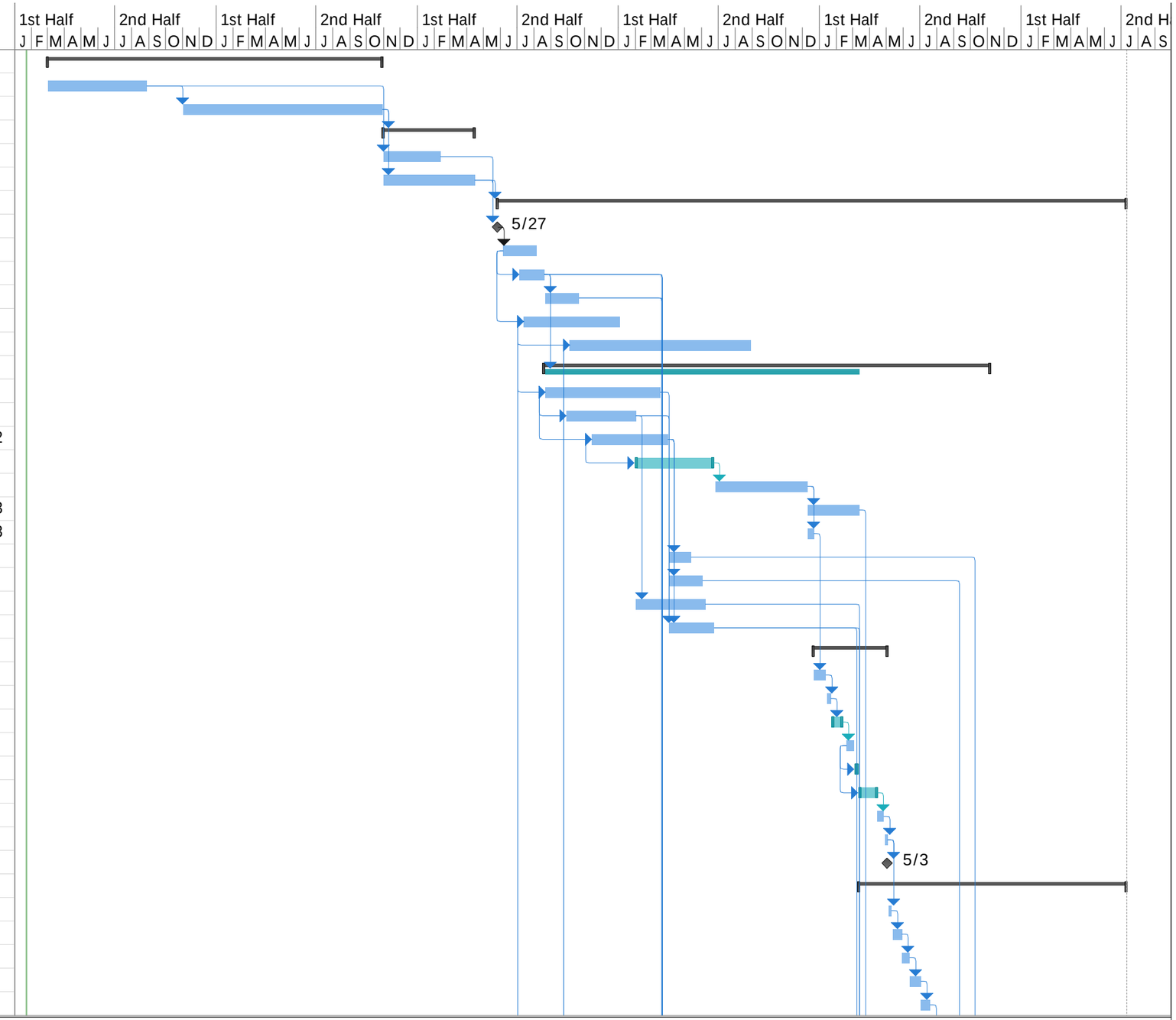
ID	Task Name	Duration
34	C&S - make required adjustments to bring Tk1 into service	10 days
35	Commission track, OCS, & C&S	5 days
36	<Milestone> Tk1 in service	0 days
37	Phase 3 (Track 3) Track out of Service	105 days
38	Track - Dismantle and store existing Tk3 1200 east end at Rt 37	5 days
39	Track - Excavate material (80 cy/d)	14 days
40	Track - prepare Tk3 subgrade, install drainage, & lay subballast	10 days
41	Track - Lay ballast and proposed or reconstructed Tk1 track - line	14 days
42	OCS - Hang wires, align, and cutover as required	14 days
43	C&S - make required adjustments to bring Tk3 into service	28 days
44	Commission track, OCS, & C&S	20 days
45	<Milestone> Tk 3 in service	0 days
46	Phase 4 (Track 4)	446 days
55	Phase 5 (Track 2) Track out of Service	219 days
56	Track - Shift and Line existing Tk2 in segment	45 days
57	Track - Cross-over turn out cut ins line (includes weekends)	30 days
58	OCS - Adjust alignment of wires and cutover as required	21 days
59	C&S - make required adjustments to bring Tk2 into service	30 days
60	Commission track, OCS, & C&S	20 days
61	<Milestone> Tk 2 in service	0 days
62	Project Punchlist	36 days
63	<New Milestone>Project Completion	0 days
64	Station Construction	536 days
65	Platform Construction	180 days
66	Station Head house (includes New Headhouse with VCE)	300 days
67	Bridge Construction - Coranado Road	400 days
68	RT 37 bridges	409 days
69		



T.F. Green Airport Station
Alternative 1
Date: Mon 3/2/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

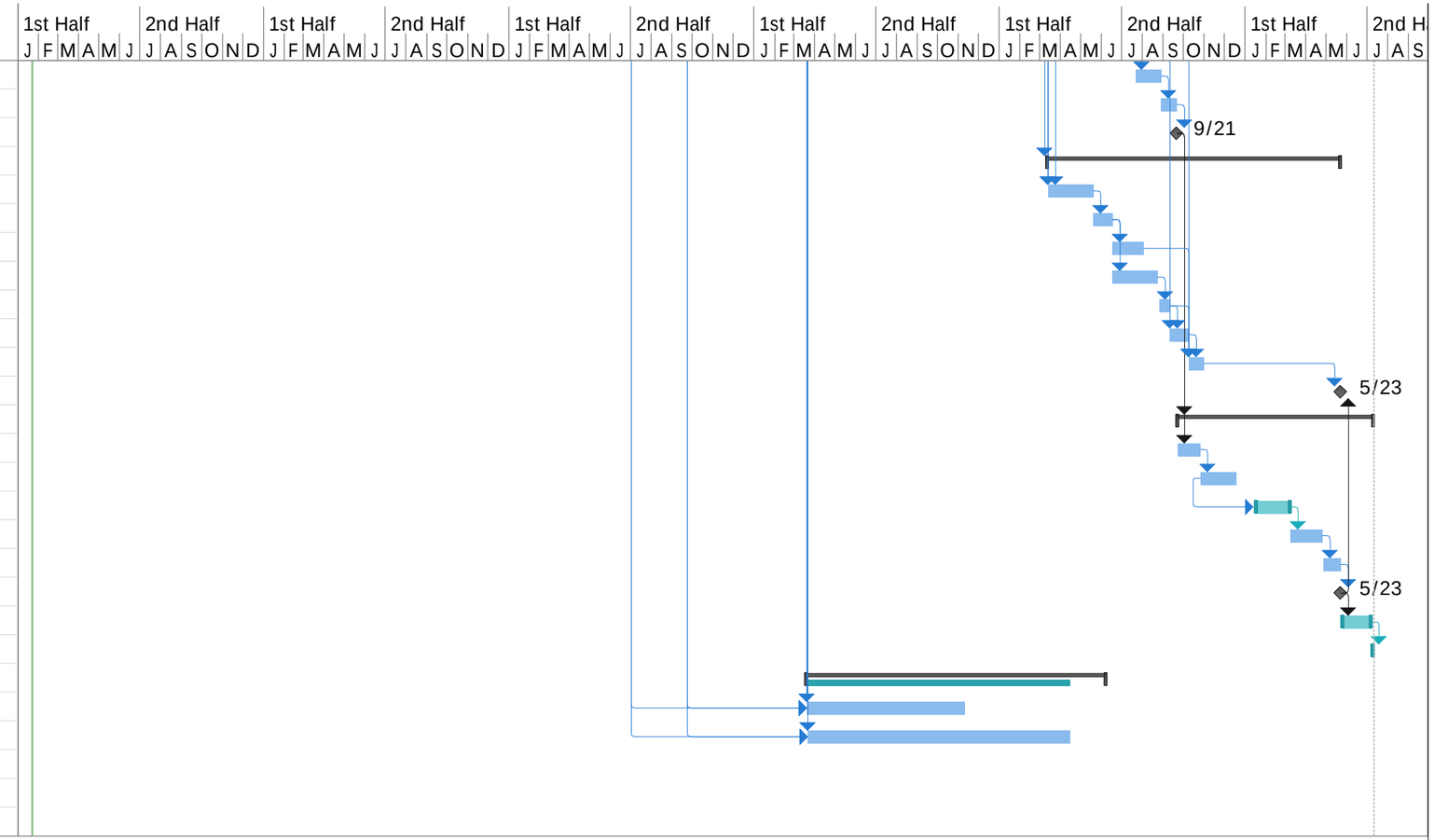
ID	Task Name	Duration	Start
1	Design	435 days	Mon 3/2/20
2	30% Design	130 days	Mon 3/2/20
3	Final Design/PS&E	260 days	Mon 11/2/20
4	Pre-construction	120 days	Mon 11/1/21
5	Relocate Fiber Optic Longitudinal Line 5 miles	75 days	Mon 11/1/21
6	Bid Cycle	120 days	Mon 11/1/21
7	Construction	847 days	Fri 5/27/22
8	<Milestone> Contractor Notice to Proceed	0 days	Fri 5/27/22
9	Mobilization	45 days	Mon 6/6/22
10	Project SSWP's	35 days	Tue 7/5/22
11	Field Survey Stake/Verification	45 days	Mon 8/22/22
12	Shop Drawing Review	125 days	Thu 7/14/22
13	Fab/Equipment delivery	240 days	Wed 10/5/22
14	Phase 1 New Catenary, C&S	608 days	Sat 8/20/22
15	OCS - Structures Foundation	150 days	Mon 8/22/22
16	Track 4 - West End Retaining walls	90 days	Thu 9/29/22
17	OCS - Structure Erection	100 days	Mon 11/14/22
18	OCS - Hang New Brackets Track 1 & 2	100 days	Sat 2/4/23
19	OCS - Transfer Wires Track 1& 2	131 days	Mon 6/26/23
20	OCS - Demo Existing Cantilevers Supports	75 days	Mon 12/11/23
21	OCS - Commissioning and cutover to new service Track 1 & 2	10 days	Mon 12/11/23
22	C&S - hang new signal aspects & Cover	30 days	Mon 4/3/23
23	C&S - bury signal cables	45 days	Mon 4/3/23
24	Civil - utility relocations	90 days	Thu 2/2/23
25	Civil - new drainage outfall	60 days	Mon 4/3/23
26	Phase 2 (Track 1)	104 days	Fri 12/22/23
27	Track - Undercut in Weekend Phases 5 weekend at Rt 37	17 days	Fri 12/22/23
28	Track 1 surface to align and grade at Rt 37 2 weekends	6 days	Mon 1/15/24
29	Track - prepare Tk1 subgrade & ballast at Cross-over turnout	13 days	Sat 1/27/24
30	Track - install Cross-overs (Weekend)	11 days	Mon 2/19/24
31	Track - Align and surface Track 1	2 days	Sat 3/9/24
32	OCS - Adjust alignment of wires and cutover as required	23 days	Sat 3/16/24
33	C&S - make required adjustments to bring Tk1 into service	10 days	Mon 4/15/24
34	Commission track, OCS, & C&S	5 days	Mon 4/29/24
35	<Milestone> Tk1 in service	0 days	Fri 5/3/24
36	Phase 3 (Track 3) Track out of Service	359 days	Thu 3/14/24
37	Track - Dismantle and store existing Tk3 1200 east end at Rt 37	5 days	Mon 5/6/24
38	Track - Excavate material (80 cy/d)	14 days	Mon 5/13/24
39	Track - prepare Tk3 subgrade, install drainage, & lay subballast	10 days	Thu 5/30/24
40	Track - Lay ballast and proposed or reconstructed Tk1 track	14 days	Thu 6/13/24
41	OCS - Hang wires, align, and cutover as required	14 days	Wed 7/3/24



T.F. Green Airport Station
Alternative 4
Date: Thu 1/23/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

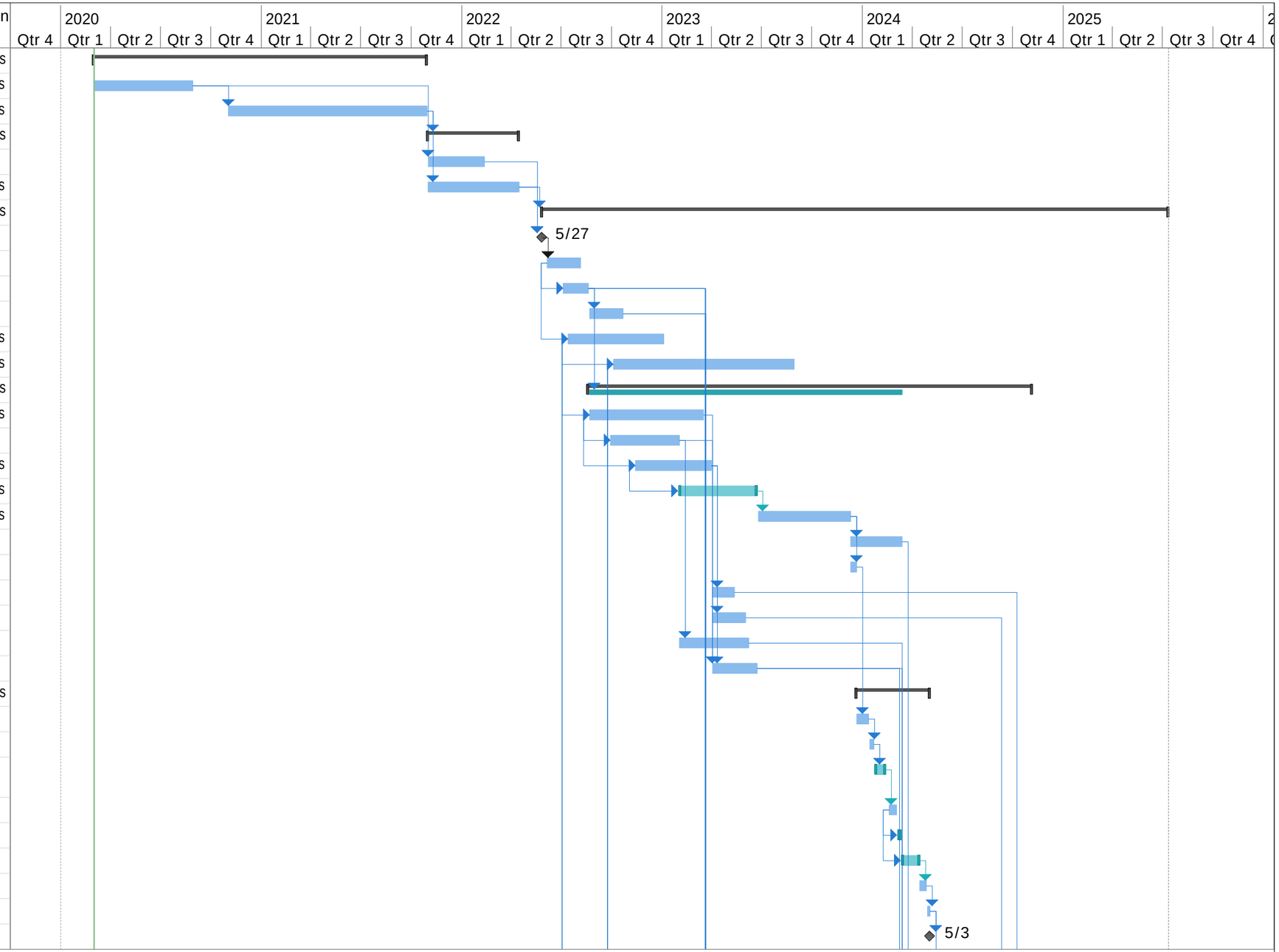
ID	Task Name	Duration	Start
42	C&S - make required adjustments to bring Tk3 into service	28 days	Mon 7/22/24
43	Commission track, OCS, & C&S	20 days	Thu 8/29/24
44	<Milestone> Tk 3 in service	0 days	Sat 9/21/24
45	Phase 4 (Track 4)	324 days	Thu 3/14/24
46	Track - Excavate and prepare Tk4 subgrade, install drainage,	50 days	Thu 3/14/24
47	Track - Lay ballast and proposed Tk4 track - line	21 days	Mon 5/20/24
48	OCS - Hang new wires Track 4	35 days	Tue 6/18/24
49	Track construct T/Os (1turnout/weekend)	50 days	Tue 6/18/24
50	OCS - Adjust alignment of wires and cutover as required	14 days	Mon 8/26/24
51	C&S - make required adjustments to bring Tk4 into service	21 days	Wed 9/11/24
52	Commission track, OCS, & C&S	21 days	Wed 10/9/24
53	<Milestone> Tk 4 in service Project Complete	0 days	Fri 5/23/25
54	Phase 5 (Track 2) Track out of Service Track 1 and 3 active	215 days	Mon 9/23/24
55	Track - Shift and Line existing Tk2 in segments	28 days	Mon 9/23/24
56	Track - Cross-over turn out cut ins line (weekends)	40 days	Sun 10/27/24
57	OCS - Adjust alignment of wires and cutover as required	37 days	Sat 1/18/25
58	C&S - make required adjustments to bring Tk2 into service	35 days	Mon 3/10/25
59	Commission track, OCS, & C&S	20 days	Mon 4/28/25
60	<Milestone> Tk 2 in service	0 days	Fri 5/23/25
61	Punch List Project	30 days	Tue 5/27/25
62	<New Milestone>Project Completion	1 day	Fri 7/11/25
63	Station Construction	342 days	Tue 3/21/23
64	Platform Construction	180 days	Tue 3/21/23
65	Station Head house	300 days	Wed 3/22/23
66			
67			
68			



T.F. Green Airport Station
Alternative 4
Date: Thu 1/23/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

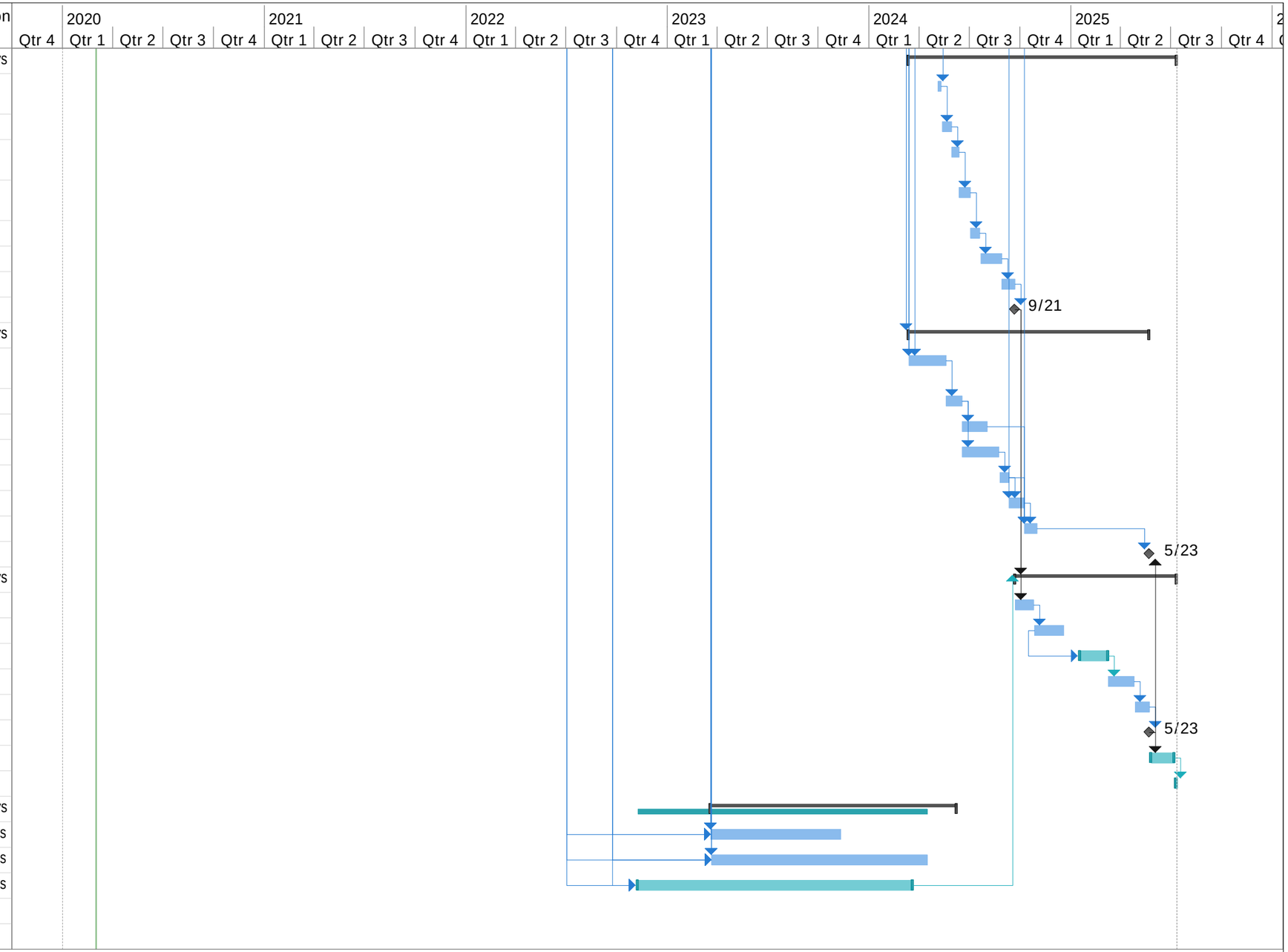
ID	Task Name	Duration
1	Design	435 days
2	30% Design	130 days
3	Final Design/PS&E	260 days
4	Pre-construction	120 days
5	Relocate Fiber Optic Longitudinal Line 5 miles	75 days
6	Bid Cycle	120 days
7	Construction	847 days
8	<Milestone> Contractor Notice to Proceed	0 days
9	Mobilization	45 days
10	Project SSWP's	35 days
11	Field Survey Stake/Verification	45 days
12	Shop Drawing Review	125 days
13	Fab/Equipment delivery	240 days
14	Phase 1 New Catenary, C&S	608 days
15	OCS - Structures Foundation	150 days
16	Track 4 - West End Retaining walls	90 days
17	OCS - Structure Erection	100 days
18	OCS - Hang New Brackets Track 1 & 2	100 days
19	OCS - Transfer Wires Track 1& 2	131 days
20	OCS - Demo Existing Cantilevers Supports	75 days
21	OCS - Commissioning and cutover to new service Track 1	10 days
22	C&S - hang new signal aspects & Cover	30 days
23	C&S - bury signal cables	45 days
24	Civil - utility relocations	90 days
25	Civil - new drainage outfall	60 days
26	Phase 2 (Track 1)	104 days
27	Track - Undercut in Weekend Phases 5 weekend at Rt 37	17 days
28	Track 1 surface to align and grade at Rt 37 2 weekends	6 days
29	Track - prepare Tk1 subgrade & ballast at Cross-over turnout adjustments	13 days
30	Track - install Cross-overs (Weekend)	11 days
31	Track - Align and surface Track 1	2 days
32	OCS - Adjust alignment of wires and cutover as required	23 days
33	C&S - make required adjustments to bring Tk1 into servic	10 days
34	Commission track, OCS, & C&S	5 days
35	<Milestone> Tk1 in service	0 days



T.F. Green Airport Station
Alternative 4
Date: Mon 3/2/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

ID	Task Name	Duration
36	Phase 3 (Track 3) Track out of Service	359 days
37	Track - Dismantle and store existing Tk3 1200 east end at Rt 37	5 days
38	Track - Excavate material (80 cy/d)	14 days
39	Track - prepare Tk3 subgrade, install drainage, & lay subballast	10 days
40	Track - Lay ballast and proposed or reconstructed Tk1 track and Cross-overs- line	14 days
41	OCS - Hang wires, align, and cutover as required	14 days
42	C&S - make required adjustments to bring Tk3 into servic	28 days
43	Commission track, OCS, & C&S	20 days
44	<Milestone> Tk 3 in service	0 days
45	Phase 4 (Track 4)	324 days
46	Track - Excavate and prepare Tk4 subgrade, install drainage, & lay subballast	50 days
47	Track - Lay ballast and proposed Tk4 track - line	21 days
48	OCS - Hang new wires Track 4	35 days
49	Track construct T/Os (1turnout/weekend)	50 days
50	OCS - Adjust alignment of wires and cutover as require	14 days
51	C&S - make required adjustments to bring Tk4 into ser	21 days
52	Commission track, OCS, & C&S	21 days
53	<Milestone> Tk 4 in service Project Complete	0 days
54	Phase 5 (Track 2) Track out of Service Track 1 and 3 active	215 days
55	Track - Shift and Line existing Tk2 in segments	28 days
56	Track - Cross-over turn out cut ins line (weekends)	40 days
57	OCS - Adjust alignment of wires and cutover as require	37 days
58	C&S - make required adjustments to bring Tk2 into ser	35 days
59	Commission track, OCS, & C&S	20 days
60	<Milestone> Tk 2 in service	0 days
61	Punch List Project	30 days
62	<New Milestone>Project Completion	1 day
63	Station Construction	342 days
64	Platform Construction	180 days
65	Station Head house	300 days
66	Rt 37 Bridge reconstruction	375 days
67		
68		



T.F. Green Airport Station
Alternative 4
Date: Mon 3/2/20

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

APPENDIX V - CONSTRUCTION COST ESTIMATE

CONCEPTUAL CONSTRUCTION COST ESTIMATE - TRACK LOWERINGS

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATIVE 1	
				Unit Cost	Total Cost
	TRACK				$22,554,650
1	PROPOSED TRACK	TF	8,800	$388.00	$3,414,400
	TRACK 4	LF	8,800	$388.00	$3,414,400
2	SHIFT TRACK	TF	18,450	$80.00	$1,476,000
	TRACK 2-SHIFT	TF	16,350	$80.00	$1,308,000
	TRACK 3-SHIFT	TF	2,100	$80.00	$168,000
3	LINE AND SURFACE	TF	3,450	$25.00	$86,250
	TRACK 1-RS&L	TF	400	$25.00	$10,000
	TRACK 2-RS&L	TF	600	$25.00	$15,000
	TRACK 3-RS&L	TF	2,450	$25.00	$61,250
4	TRACK LOWERINGS	TF	4,950	$440.00	$2,178,000
	TRACK 1 -AVG 8"	TF	2,500	$440.00	$1,100,000
	TRACK 3	TF	2,450	$440.00	$1,078,000
5	SPECIAL TRACKWORK	LS	1	$15,400,000.00	$15,400,000.00
	NO.24 RBM CROSSOVER	EA	4	$1,650,000.00	$6,600,000.00
	NO.24 RBM TURNOUT	EA	1	$850,000.00	$850,000.00
	NO.32.7 MPF CROSSOVER	EA	3	$2,200,000.00	$6,600,000.00
	NO.32.7 MPF TURNOUT	EA	1	$1,100,000.00	$1,100,000.00
	REMOVE TURNOUT	EA	10	$25,000.00	$250,000.00
	STRUCTURES				$22,400,000
6	CORONADO BRIDGE RECONSTRUCTION	LS	1	$ 15,080,000.00	$15,080,000.00
	CRASH WALL	LS	1	80,000	$80,000.00
	BRIDGE RECONSTRUCTION	LS	1	15,000,000	$15,000,000.00
7	RT 37 Bridge Reconstruction (NB & SB)	SF	0	$1,000.00	$0.00
8	RT 37 Reconstruction - Roadway Improvements and Traffic Control	LS	0	$10,000,000.00	$0.00
9	PARKING STRUCTURE CRASH WALL	LS	1	$390,000.00	$390,000.00
10	RETAINING WALLS	SF	23,100	$300.00	$6,930,000.00
	OCS				$30,299,870
11	CATENARY	LS	1	$4,423,870.00	$4,423,870.00
	NEW INSTALLATION	LF	29,010	$87.00	$2,523,870.00
	REPROFILE EXISTING CATENARY	LF	19,000	$68.00	$1,292,000.00
	STATIC WIRE INSTALLATION	LF	19,000	$32.00	$608,000.00
12	STRUCTURES	LS	1	$24,094,000.00	$24,094,000.00
	NEW PORTAL STRUCTURES	EA	61	$269,000.00	$16,409,000.00
	NEW CANTILEVER STRUCTURES	EA	49	$125,000.00	$6,125,000.00
	NEW DOWN GUYS	EA	30	$52,000.00	$1,560,000.00
13	NEW FEEDER STRUCTURE	LS	0	$697,000.00	$0.00
14	DEMOLITION OF EXISTING OCS STRUCTURES	LS	1	$1,782,000.00	$1,782,000.00
	EXISTING STRUCTURE DEMO	EA	81	$22,000.00	$1,782,000.00
	CIVIL/ROW				$16,914,100
15	EXCAVATION	CY	18,350	$10.00	$183,500.00
	PROPOSED TRACK	CY	10,650	$10.00	$106,500.00
	TRACK LOWERINGS	CY	7,700	$10.00	$77,000.00
16	SOIL STOCKPILING	TON	25,690	$60.00	$1,541,400.00
17	TRACK SUBGRADE	TF	17,850	$38.00	$678,300.00
	TRACK 1	TF	2,500	$38.00	$95,000.00
	TRACK 2	TF	4,100	$38.00	$155,800.00
	TRACK 3	TF	2,450	$38.00	$93,100.00
	TRACK 4	TF	8,800	$38.00	$334,400.00
18	TRACK DRAINAGE	TF	11,250	$180.00	$2,025,000.00
	TRACK 3	TF	2,450	$180.00	$441,000.00
	TRACK 4	TF	8,800	$180.00	$1,584,000.00
19	ROW FENCE	LF	8,800	$43.00	$378,400.00
20	BROWN FIELDS ROW IMPACT	SF	140,500	$15.00	$2,107,500.00
21	UTILITY RELOCATION & DRAINAGE	LS	1	$10,000,000.00	$10,000,000.00
	SIGNALS				$29,621,880
22	TRAIN CONTROL AND SIGNALS	TF	67,010	$340.00	$22,783,400.00
23	COMMUNICATIONS	LF	48,010	$120.00	$5,761,200.00
24	CENTRAL CONTROL	LS	1	$1,000,000.00	$1,000,000.00
25	DEMOLITION OF TRACK SIGNALS	LS	1	$77,280.00	$77,280.00
	DEMOLISH TRACK SIGNAL BRIDGE	EA	5	$5,240.00	$26,200.00
	DEMOLISH TRACK SIGNAL CANTILEVER	EA	5	$5,240.00	$26,200.00
	DEMOLISH EXISTING WAYSIDE BUNGALOWS	EA	2	$12,440.00	$24,880.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - TRACK LOWERINGS

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATIVE 1	
				Unit Cost	Total Cost
	STATION				$10,623,170
26	PLATFORM	LS	1	$2,667,400	$2,667,400.00
	EB PLATFORM	LF	1,050	$800.00	$840,000.00
	WB PLATFORM	LF	200	$900.00	$180,000.00
	EB CANOPY	LF	735	$500.00	$367,500.00
	WB CANOPY	LF	320	$500.00	$160,000.00
	10" STEEL CASED MICROPILE (ASSUME 40' DEPTH)	VLF	3,870	$170.00	$657,900.00
	ELECTRICAL	SF	11,550	$40.00	$462,000.00
27	STATION BUILDING	LS	1	$6,105,770.00	$6,105,770.00
	STRUCTURE	LS	1	$5,195,500.00	$5,195,500.00
	TOILET FACILITIES	SF	0	$0.00	$0.00
	STAIRCASE	EA	1	$52,500.00	$52,500.00
	FINISHES	LS	1	$115,270.00	$115,270.00
	FIRE LIFE SAFETY	SF	990	$750.00	$742,500.00
28	WAYFINDING	LS	1	$100,000.00	$100,000.00
29	PUBLIC INFORMATION DISPLAY SYSTEM (PIDS)	LS	1	$500,000.00	$500,000.00
30	ELEVATORS/ESCALATORS	LS	1	$1,250,000.00	$1,250,000.00
	ELEVATOR -1 LEVEL	EA	2	$625,000.00	$1,250,000.00
31	FARE COLLECTION SYSTEM AND EQUIPMENT	EA	0	$54,700.00	$0.00
32	PLATFORM LOWERING	LS	0	$0.00	$0.00
	PROFESSIONAL SERVICES				$39,724,100
33	ENGINEERING (8%)	LS	1	$10,593,090.00	$10,593,090.00
34	PROJECT MANAGEMENT FOR DESIGN AND CONSTRUCTION (6%)	LS	1	$7,944,820.00	$7,944,820.00
35	CONSTRUCTION ADMINISTRATION & MANAGEMENT (6%)	LS	1	$7,944,820.00	$7,944,820.00
36	LIABILITY AND INSURANCE (3%)	LS	1	$3,972,410.00	$3,972,410.00
37	PERMITTING AND LEGAL FEES (4%)	LS	1	$5,296,550.00	$5,296,550.00
38	SURVEYS. TESTING, INVESTIGATION, INSPECTION (2%)	LS	1	$2,648,270.00	$2,648,270.00
39	CONTRACTOR MOBILIZATION (1%)	LS	1	$1,324,140.00	$1,324,140.00

CONSTRUCTION COST =	$132,413,670.00
CONTINGENCY (35%) =	$46,344,800.00
PROFESSIONAL SERVICES =	$39,724,100.00
TOTAL (2020) =	$218,482,570.00
YOE (MIDPOINT OF CONSTRUCTION 2024) =	$245,904,100.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - TRACK LOWERINGS

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATIVE 4	
				Unit Cost	Total Cost
	TRACK				$22,544,050
1	PROPOSED TRACK	TF	8,600	$388.00	$3,336,800
	TRACK 4	LF	8,600	$388.00	$3,336,800
2	SHIFT TRACK	TF	19,350	$80.00	$1,548,000
	TRACK 2-SHIFT	TF	17,250	$80.00	$1,380,000
	TRACK 3-SHIFT	TF	2,100	$80.00	$168,000
3	LINE AND SURFACE	TF	3,250	$25.00	$81,250
	TRACK 1-RS&L	TF	400	$25.00	$10,000
	TRACK 2-RS&L	TF	400	$25.00	$10,000
	TRACK 3-RS&L	TF	2,450	$25.00	$61,250
4	TRACK LOWERINGS	TF	4,950	$440.00	$2,178,000
	TRACK 1 -AVG 8"	TF	2,500	$440.00	$1,100,000
	TRACK 3	TF	2,450	$440.00	$1,078,000
5	SPECIAL TRACKWORK	LS	1	$15,400,000.00	$15,400,000
	NO.24 RBM CROSSOVER	EA	4	$1,650,000.00	$6,600,000
	NO.24 RBM TURNOUT	EA	1	$850,000.00	$850,000
	NO.32.7 MPF CROSSOVER	EA	3	$2,200,000.00	$6,600,000
	NO.32.7 MPF TURNOUT	EA	1	$1,100,000.00	$1,100,000
	REMOVE TURNOUT	EA	10	$25,000.00	$250,000
	STRUCTURES				$5,075,000
6	CORONADO BRIDGE RECONSTRUCTION	LS	1	$80,000.00	$80,000
	CRASH WALL	LS	1	80,000	$80,000
	BRIDGE RECONSTRUCTION	LS	0	0	$0
7	RT 37 Bridge Reconstruction (NB & SB)	SF	0	$1,000.00	$0
8	RT 37 Reconstruction - Roadway Improvements and Traffic Control	LS	0	$10,000,000.00	$0
9	PARKING STRUCTURE CRASH WALL	LS	1	$390,000.00	$390,000
10	RETAINING WALLS	SF	15,350	$300.00	$4,605,000.00
	OCS				$28,250,120
11	CATENARY	LS	1	$4,086,120.00	$4,086,120.00
	NEW INSTALLATION	LF	28,760	$87.00	$2,502,120.00
	REPROFILE EXISTING CATENARY	LF	15,840	$68.00	$1,077,120.00
	STATIC WIRE INSTALLATION	LF	15,840	$32.00	$506,880.00
12	STRUCTURES	LS	1	$21,751,000.00	$21,751,000.00
	NEW PORTAL STRUCTURES	EA	55	$269,000.00	$14,795,000.00
	NEW CANTILEVER STRUCTURES	EA	44	$125,000.00	$5,500,000.00
	NEW DOWN GUYS	EA	28	$52,000.00	$1,456,000.00
13	NEW FEEDER STRUCTURE	LS	1	$697,000.00	$697,000.00
14	DEMOLITION OF EXISTING OCS STRUCTURES	LS	1	$1,716,000.00	$1,716,000.00
	EXISTING STRUCTURE DEMO	EA	78	$22,000.00	$1,716,000.00
	CIVIL/ROW				$16,846,000
15	EXCAVATION	CY	18,100	$10.00	$181,000.00
	PROPOSED TRACK	CY	10,400	$10.00	$104,000.00
	TRACK LOWERINGS	CY	7,700	$10.00	$77,000.00
16	SOIL STOCKPILING	TON	25,340	$60.00	$1,520,400.00
17	TRACK SUBGRADE	TF	17,850	$38.00	$678,300.00
	TRACK 1	TF	2,500	$38.00	$95,000.00
	TRACK 2	TF	4,300	$38.00	$163,400.00
	TRACK 3	TF	2,450	$38.00	$93,100.00
	TRACK 4	TF	8,600	$38.00	$326,800.00
18	TRACK DRAINAGE	TF	11,050	$180.00	$1,989,000.00
	TRACK 3	TF	2,450	$180.00	$441,000.00
	TRACK 4	TF	8,600	$180.00	$1,548,000.00
19	ROW FENCE	LF	8,600	$43.00	$369,800.00
20	BROWN FIELDS ROW IMPACT	SF	140,500	$15.00	$2,107,500.00
21	UTILITY RELOCATION & DRAINAGE	LS	1	$10,000,000.00	$10,000,000.00
	SIGNALS				$26,978,880
22	TRAIN CONTROL AND SIGNALS	TF	60,440	$340.00	$20,549,600.00
23	COMMUNICATIONS	LF	44,600	$120.00	$5,352,000.00
24	CENTRAL CONTROL	LS	1	$1,000,000.00	$1,000,000.00
25	DEMOLITION OF TRACK SIGNALS	LS	1	$77,280.00	$77,280.00
	DEMOLISH TRACK SIGNAL BRIDGE	EA	5	$5,240.00	$26,200.00
	DEMOLISH TRACK SIGNAL CANTILEVER	EA	5	$5,240.00	$26,200.00
	DEMOLISH EXISTING WAYSIDE BUNGALOWS	EA	2	$12,440.00	$24,880.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - TRACK LOWERINGS

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATIVE 4	
				Unit Cost	Total Cost
	STATION				$10,623,170
26	PLATFORM	LS	1	$2,667,400.00	$2,667,400.00
	EB PLATFORM	LF	1,050	$800.00	$840,000.00
	WB PLATFORM	LF	200	$900.00	$180,000.00
	EB CANOPY	LF	735	$500.00	$367,500.00
	WB CANOPY	LF	320	$500.00	$160,000.00
	10" STEEL CASED MICROPILE (ASSUME 40' DEPTH)	VLF	3,870	$170.00	$657,900.00
	ELECTRICAL	SF	11,550	$40.00	$462,000.00
27	STATION BUILDING	LS	1	$6,105,770.00	$6,105,770.00
	STRUCTURE	LS	1	$5,195,500.00	$5,195,500.00
	TOILET FACILITIES	SF	0	$0.00	$0.00
	STAIRCASE	EA	1	$52,500.00	$52,500.00
	FINISHES	LS	1	$115,270.00	$115,270.00
	FIRE LIFE SAFETY	SF	990	$750.00	$742,500.00
28	WAYFINDING	LS	1	$100,000.00	$100,000.00
29	PUBLIC INFORMATION DISPLAY SYSTEM (PIDS)	LS	1	$500,000.00	$500,000.00
30	ELEVATORS/ESCALATORS	LS	1	$1,250,000.00	$1,250,000.00
	ELEVATOR -1 LEVEL	EA	2	625,000	$1,250,000.00
31	FARE COLLECTION SYSTEM AND EQUIPMENT	EA	0	$54,700.00	$0.00
32	PLATFORM LOWERING	LS	0	$0.00	$0.00
	PROFESSIONAL SERVICES				$33,095,160
33	ENGINEERING (8%)	LS	1	$8,825,380.00	$8,825,380.00
34	PROJECT MANAGEMENT FOR DESIGN AND CONSTRUCTION (6%)	LS	1	$6,619,030.00	$6,619,030.00
35	CONSTRUCTION ADMINISTRATION & MANAGEMENT (6%)	LS	1	$6,619,030.00	$6,619,030.00
36	LIABILITY AND INSURANCE (3%)	LS	1	$3,309,520.00	$3,309,520.00
37	PERMITTING AND LEGAL FEES (4%)	LS	1	$4,412,690.00	$4,412,690.00
38	SURVEYS. TESTING, INVESTIGATION, INSPECTION (2%)	LS	1	$2,206,340.00	$2,206,340.00
39	CONTRACTOR MOBILIZATION (1%)	LS	1	$1,103,170.00	$1,103,170.00

CONSTRUCTION COST =	$110,317,220.00
CONTINGENCY (35%) =	$38,611,100.00
PROFESSIONAL SERVICES =	$33,095,200.00
TOTAL (2020) =	$182,023,520.00
YOE (MIDPOINT OF CONSTRUCTION 2024) =	$204,869,100.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - ROUTE 37 RECONSTRUCTION

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATFVE 1	
				UnFt Cost	Total Cost
	TRACK				$20,376,650
1	PROPOSED TRACK	TF	8,800	$388.00	$3,414,400
	TRACK 4	LF	8,800	$388.00	$3,414,400
2	SHIFT TRACK	TF	18,450	$80.00	$1,476,000
	TRACK 2-SHIFT	TF	16,350	$80.00	$1,308,000
	TRACK 3-SHIFT	TF	2,100	$80.00	$168,000
3	LINE AND SURFACE	TF	3,450	$25.00	$86,250
	TRACK 1-RS&L	TF	400	$25.00	$10,000
	TRACK 2-RS&L	TF	600	$25.00	$15,000
	TRACK 3-RS&L	TF	2,450	$25.00	$61,250
4	TRACK LOWERINGS	TF	0	$440.00	$0
	TRACK 1 -AVG 8"	TF	0	$440.00	$0
	TRACK 3	TF	0	$440.00	$0
5	SPECIAL TRACKWORK	LS	1	$15,400,000.00	$15,400,000.00
	NO.24 RBM CROSSOVER	EA	4	$1,650,000.00	$6,600,000.00
	NO.24 RBM TURNOUT	EA	1	$850,000.00	$850,000.00
	NO.32.7 MPF CROSSOVER	EA	3	$2,200,000.00	$6,600,000.00
	NO.32.7 MPF TURNOUT	EA	1	$1,100,000.00	$1,100,000.00
	REMOVE TURNOUT	EA	10	$25,000.00	$250,000.00
	STRUCTURES				$48,400,000
6	CORONADO BRIDGE RECONSTRUCTION	LS	1	$ 15,080,000.00	$15,080,000.00
	CRASH WALL	LS	1	80,000	$80,000.00
	BRIDGE RECONSTRUCTION	LS	1	15,000,000	$15,000,000.00
7	RT 37 Bridge Reconstruction (NB & SB)	SF	16,000	$1,000.00	$16,000,000.00
8	RT 37 Reconstruction - Roadway Improvements and Traffic Control	LS	1	$10,000,000.00	$10,000,000.00
9	PARKING STRUCTURE CRASH WALL	LS	1	$390,000.00	$390,000.00
10	RETAINING WALLS	SF	23,100	$300.00	$6,930,000.00
	OCS				$30,299,870
11	CATENARY	LS	1	$4,423,870.00	$4,423,870.00
	NEW INSTALLATION	LF	29,010	$87.00	$2,523,870.00
	REPROFILE EXISTING CATENARY	LF	19,000	$68.00	$1,292,000.00
	STATIC WIRE INSTALLATION	LF	19,000	$32.00	$608,000.00
12	STRUCTURES	LS	1	$24,094,000.00	$24,094,000.00
	NEW PORTAL STRUCTURES	EA	61	$269,000.00	$16,409,000.00
	NEW CANTILEVER STRUCTURES	EA	49	$125,000.00	$6,125,000.00
	NEW DOWN GUYS	EA	30	$52,000.00	$1,560,000.00
13	NEW FEEDER STRUCTURE	LS	0	$697,000.00	$0.00
14	DEMOLITION OF EXISTING OCS STRUCTURES	LS	1	$1,782,000.00	$1,782,000.00
	EXISTING STRUCTURE DEMO	EA	81	$22,000.00	$1,782,000.00
	CIVIL/ROW				$15,561,200
15	EXCAVATION	CY	10,650	$10.00	$106,500.00
	PROPOSED TRACK	CY	10,650	$10.00	$106,500.00
	TRACK LOWERINGS	CY	0	$10.00	$0.00
16	SOIL STOCKPILING	TON	14,910	$60.00	$894,600.00
17	TRACK SUBGRADE	TF	12,900	$38.00	$490,200.00
	TRACK 1	TF	0	$38.00	$0.00
	TRACK 2	TF	4,100	$38.00	$155,800.00
	TRACK 3	TF	0	$38.00	$0.00
	TRACK 4	TF	8,800	$38.00	$334,400.00
18	TRACK DRAINAGE	TF	8,800	$180.00	$1,584,000.00
	TRACK 3	TF	0	$180.00	$0.00
	TRACK 4	TF	8,800	$180.00	$1,584,000.00
19	ROW FENCE	LF	8,800	$43.00	$378,400.00
20	BROWN FIELDS ROW IMPACT	SF	140,500	$15.00	$2,107,500.00
21	UTILITY RELOCATION & DRAINAGE	LS	1	$10,000,000.00	$10,000,000.00
	SIGNALS				$29,621,880
22	TRAIN CONTROL AND SIGNALS	TF	67,010	$340.00	$22,783,400.00
23	COMMUNICATIONS	LF	48,010	$120.00	$5,761,200.00
24	CENTRAL CONTROL	LS	1	$1,000,000.00	$1,000,000.00
25	DEMOLITION OF TRACK SIGNALS	LS	1	$77,280.00	$77,280.00
	DEMOLISH TRACK SIGNAL BRIDGE	EA	5	$5,240.00	$26,200.00
	DEMOLISH TRACK SIGNAL CANTILEVER	EA	5	$5,240.00	$26,200.00
	DEMOLISH EXISTING WAYSIDE BUNGALOWS	EA	2	$12,440.00	$24,880.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - ROUTE 37 RECONSTRUCTION

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATFVE 1	
				UnFt Cost	Total Cost
	STATION				$10,623,170
26	PLATFORM	LS	1	$2,667,400	$2,667,400.00
	EB PLATFORM	LF	1,050	$800.00	$840,000.00
	WB PLATFORM	LF	200	$900.00	$180,000.00
	EB CANOPY	LF	735	$500.00	$367,500.00
	WB CANOPY	LF	320	$500.00	$160,000.00
	10" STEEL CASED MICROPILE (ASSUME 40' DEPTH)	VLF	3,870	$170.00	$657,900.00
	ELECTRICAL	SF	11,550	$40.00	$462,000.00
27	STATION BUILDING	LS	1	$6,105,770.00	$6,105,770.00
	STRUCTURE	LS	1	$5,195,500.00	$5,195,500.00
	TOILET FACILITIES	SF	0	$0.00	$0.00
	STAIRCASE	EA	1	$52,500.00	$52,500.00
	FINISHES	LS	1	$115,270.00	$115,270.00
	FIRE LIFE SAFETY	SF	990	$750.00	$742,500.00
28	WAYFINDING	LS	1	$100,000.00	$100,000.00
29	PUBLIC INFORMATION DISPLAY SYSTEM (PIDS)	LS	1	$500,000.00	$500,000.00
30	ELEVATORS/ESCALATORS	LS	1	$1,250,000.00	$1,250,000.00
	ELEVATOR -1 LEVEL	EA	2	$625,000.00	$1,250,000.00
31	FARE COLLECTION SYSTEM AND EQUIPMENT	EA	0	$54,700.00	$0.00
32	PLATFORM LOWERING	LS	0	$0.00	$0.00
	PROFESSIONAL SERVICES				$46,464,840
33	ENGINEERING (8%)	LS	1	$12,390,620.00	$12,390,620.00
34	PROJECT MANAGEMENT FOR DESIGN AND CONSTRUCTION (6%)	LS	1	$9,292,970.00	$9,292,970.00
35	CONSTRUCTION ADMINISTRATION & MANAGEMENT (6%)	LS	1	$9,292,970.00	$9,292,970.00
36	LIABILITY AND INSURANCE (3%)	LS	1	$4,646,480.00	$4,646,480.00
37	PERMITTING AND LEGAL FEES (4%)	LS	1	$6,195,310.00	$6,195,310.00
38	SURVEYS. TESTING, INVESTIGATION, INSPECTION (2%)	LS	1	$3,097,660.00	$3,097,660.00
39	CONTRACTOR MOBILIZATION (1%)	LS	1	$1,548,830.00	$1,548,830.00

CONSTRUCTION COST =	$154,882,770.00
CONTINGENCY (35%) =	$54,209,000.00
PROFESSIONAL SERVICES =	$46,464,840.00
TOTAL (2020) =	$255,556,610.00
YOE (MIDPOINT OF CONSTRUCTION 2024) =	$287,631,200.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - ROUTE 37 RECONSTRUCTION

LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATIVE 4	
				Unit Cost	Total Cost
	TRACK				$20,366,050
1	PROPOSED TRACK	TF	8,600	$388.00	$3,336,800
	TRACK 4	LF	8,600	$388.00	$3,336,800
2	SHIFT TRACK	TF	19,350	$80.00	$1,548,000
	TRACK 2-SHIFT	TF	17,250	$80.00	$1,380,000
	TRACK 3-SHIFT	TF	2,100	$80.00	$168,000
3	LINE AND SURFACE	TF	3,250	$25.00	$81,250
	TRACK 1-RS&L	TF	400	$25.00	$10,000
	TRACK 2-RS&L	TF	400	$25.00	$10,000
	TRACK 3-RS&L	TF	2,450	$25.00	$61,250
4	TRACK LOWERINGS	TF	0	$440.00	$0
	TRACK 1 -AVG 8"	TF	0	$440.00	$0
	TRACK 3	TF	0	$440.00	$0
5	SPECIAL TRACKWORK	LS	1	$15,400,000.00	$15,400,000
	NO.24 RBM CROSSOVER	EA	4	$1,650,000.00	$6,600,000
	NO.24 RBM TURNOUT	EA	1	$850,000.00	$850,000
	NO.32.7 MPF CROSSOVER	EA	3	$2,200,000.00	$6,600,000
	NO.32.7 MPF TURNOUT	EA	1	$1,100,000.00	$1,100,000
	REMOVE TURNOUT	EA	10	$25,000.00	$250,000
	STRUCTURES				$31,075,000
6	CORONADO BRIDGE RECONSTRUCTION	LS	1	$80,000.00	$80,000
	CRASH WALL	LS	1	80,000	$80,000
	BRIDGE RECONSTRUCTION	LS	0	15,000,000	$0
7	RT 37 Bridge Reconstruction (NB & SB)	SF	16,000	$1,000.00	$16,000,000
8	RT 37 Reconstruction - Roadway Improvements and Traffic Control	LS	1	$10,000,000.00	$10,000,000
9	PARKING STRUCTURE CRASH WALL	LS	1	$390,000.00	$390,000
10	RETAINING WALLS	SF	15,350	$300.00	$4,605,000.00
	OCS				$28,250,120
11	CATENARY	LS	1	$4,086,120.00	$4,086,120.00
	NEW INSTALLATION	LF	28,760	$87.00	$2,502,120.00
	REPROFILE EXISTING CATENARY	LF	15,840	$68.00	$1,077,120.00
	STATIC WIRE INSTALLATION	LF	15,840	$32.00	$506,880.00
12	STRUCTURES	LS	1	$21,751,000.00	$21,751,000.00
	NEW PORTAL STRUCTURES	EA	55	$269,000.00	$14,795,000.00
	NEW CANTILEVER STRUCTURES	EA	44	$125,000.00	$5,500,000.00
	NEW DOWN GUYS	EA	28	$52,000.00	$1,456,000.00
13	NEW FEEDER STRUCTURE	LS	1	$697,000.00	$697,000.00
14	DEMOLITION OF EXISTING OCS STRUCTURES	LS	1	$1,716,000.00	$1,716,000.00
	EXISTING STRUCTURE DEMO	EA	78	$22,000.00	$1,716,000.00
	CIVIL/ROW				$15,493,100
15	EXCAVATION	CY	10,400	$10.00	$104,000.00
	PROPOSED TRACK	CY	10,400	$10.00	$104,000.00
	TRACK LOWERINGS	CY	0	$10.00	$0.00
16	SOIL STOCKPILING	TON	14,560	$60.00	$873,600.00
17	TRACK SUBGRADE	TF	12,900	$38.00	$490,200.00
	TRACK 1	TF	0	$38.00	$0.00
	TRACK 2	TF	4,300	$38.00	$163,400.00
	TRACK 3	TF	0	$38.00	$0.00
	TRACK 4	TF	8,600	$38.00	$326,800.00
18	TRACK DRAINAGE	TF	8,600	$180.00	$1,548,000.00
	TRACK 3	TF	0	$180.00	$0.00
	TRACK 4	TF	8,600	$180.00	$1,548,000.00
19	ROW FENCE	LF	8,600	$43.00	$369,800.00
20	BROWN FIELDS ROW IMPACT	SF	140,500	$15.00	$2,107,500.00
21	UTILITY RELOCATION & DRAINAGE	LS	1	$10,000,000.00	$10,000,000.00
	SIGNALS				$26,978,880
22	TRAIN CONTROL AND SIGNALS	TF	60,440	$340.00	$20,549,600.00
23	COMMUNICATIONS	LF	44,600	$120.00	$5,352,000.00
24	CENTRAL CONTROL	LS	1	$1,000,000.00	$1,000,000.00
25	DEMOLITION OF TRACK SIGNALS	LS	1	$77,280.00	$77,280.00
	DEMOLISH TRACK SIGNAL BRIDGE	EA	5	$5,240.00	$26,200.00
	DEMOLISH TRACK SIGNAL CANTILEVER	EA	5	$5,240.00	$26,200.00
	DEMOLISH EXISTING WAYSIDE BUNGALOWS	EA	2	$12,440.00	$24,880.00

CONCEPTUAL CONSTRUCTION COST ESTIMATE - ROUTE 37 RECONSTRUCTION

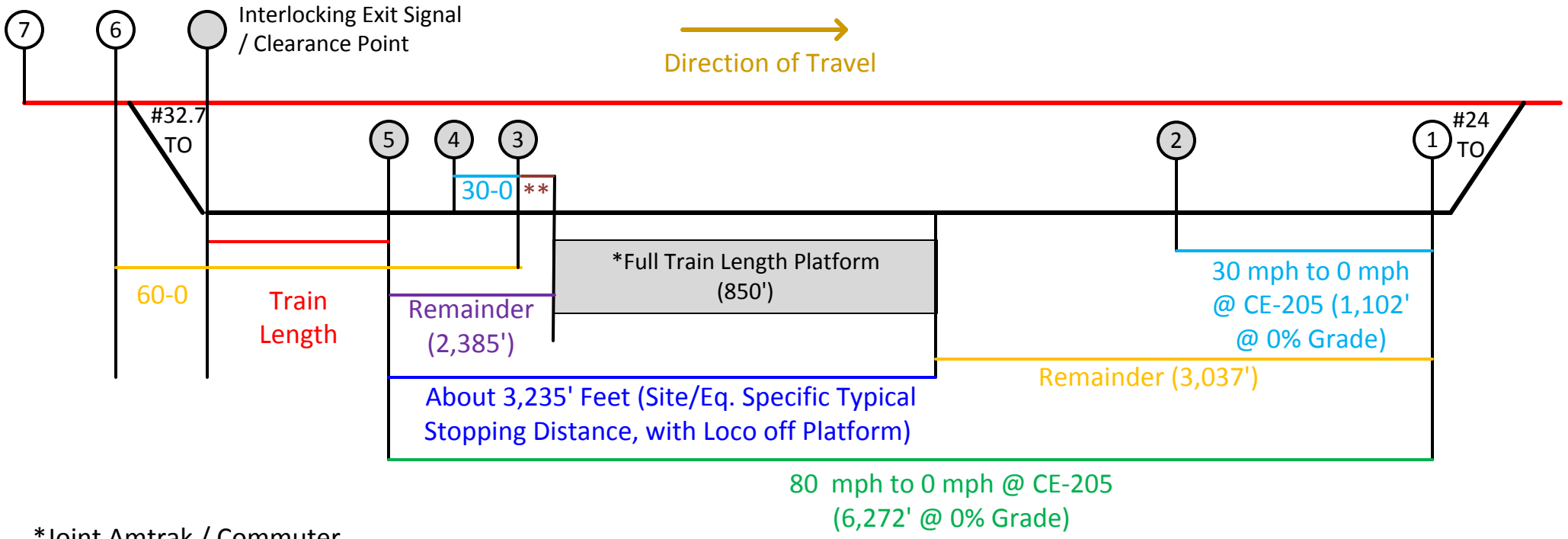
LINE NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	ALTERNATIVE 4	
				Unit Cost	Total Cost
	STATION				$10,623,170
26	PLATFORM	LS	1	$2,667,400.00	$2,667,400.00
	EB PLATFORM	LF	1,050	$800.00	$840,000.00
	WB PLATFORM	LF	200	$900.00	$180,000.00
	EB CANOPY	LF	735	$500.00	$367,500.00
	WB CANOPY	LF	320	$500.00	$160,000.00
	10" STEEL CASED MICROPILE (ASSUME 40' DEPTH)	VLF	3,870	$170.00	$657,900.00
	ELECTRICAL	SF	11,550	$40.00	$462,000.00
27	STATION BUILDING	LS	1	$6,105,770.00	$6,105,770.00
	STRUCTURE	LS	1	$5,195,500.00	$5,195,500.00
	TOILET FACILITIES	SF	0	$0.00	$0.00
	STAIRCASE	EA	1	$52,500.00	$52,500.00
	FINISHES	LS	1	$115,270.00	$115,270.00
	FIRE LIFE SAFETY	SF	990	$750.00	$742,500.00
28	WAYFINDING	LS	1	$100,000.00	$100,000.00
29	PUBLIC INFORMATION DISPLAY SYSTEM (PIDS)	LS	1	$500,000.00	$500,000.00
30	ELEVATORS/ESCALATORS	LS	1	$1,250,000.00	$1,250,000.00
	ELEVATOR -1 LEVEL	EA	2	625,000	$1,250,000.00
31	FARE COLLECTION SYSTEM AND EQUIPMENT	EA	0	$54,700.00	$0.00
32	PLATFORM LOWERING	LS	0	$0.00	$0.00
	PROFESSIONAL SERVICES				$39,835,900
33	ENGINEERING (8%)	LS	1	$10,622,910.00	$10,622,910.00
34	PROJECT MANAGEMENT FOR DESIGN AND CONSTRUCTION (6%)	LS	1	$7,967,180.00	$7,967,180.00
35	CONSTRUCTION ADMINISTRATION & MANAGEMENT (6%)	LS	1	$7,967,180.00	$7,967,180.00
36	LIABILITY AND INSURANCE (3%)	LS	1	$3,983,590.00	$3,983,590.00
37	PERMITTING AND LEGAL FEES (4%)	LS	1	$5,311,450.00	$5,311,450.00
38	SURVEYS. TESTING, INVESTIGATION, INSPECTION (2%)	LS	1	$2,655,730.00	$2,655,730.00
39	CONTRACTOR MOBILIZATION (1%)	LS	1	$1,327,860.00	$1,327,860.00

CONSTRUCTION COST =	$132,786,320.00
CONTINGENCY (35%) =	$46,475,300.00
PROFESSIONAL SERVICES =	$39,835,900.00
TOTAL (2020) =	$219,097,520.00
YOE (MIDPOINT OF CONSTRUCTION 2024) =	$246,596,200.00

APPENDIX VI - 80 MPH DIVERGE CONCEPT

FOR REFERENCE ONLY

Typical 80 mph Diverge Station Siding



*Joint Amtrak / Commuter Platforms are 1,050'.

**Locomotive Length + 50' but can be reduced/eliminated if 1,050' Platform Used unless 12 -car, locomotive hauled Commuter trains are anticipated.

***Grey Signals: Master Locations Only

Primary Signal Optimization:
***Signals for platform overtake*::**
1. Stop & Stay
2. Code Drop (0 Code)
3. Approach (75 Code)
4. N/A
5. Advance Approach (120 Code)
6. Diverge Clear/80 (120/120 Code)
7. Approach Diverge (120/120 Code)

Secondary Signal Optimization:
***Signals when platform occupied*:**
1. N/A
2. N/A
3. Stop & Proceed
4. Code Drop (0 Code)
5. Approach (75 Code)
6. Diverge Clear/60 (270 Code)
7. Approach Diverge (270 Code)

Exit turnout sized to not limit acceleration from station platform.