

Appendix 3.2-B

Memorandum of MassDOT to Army Corps on South Station Planning and South Coast Rail (May 5, 2010)

COMMONWEALTH OF MASSACHUSETTS
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

MEMORANDUM

TO: Alan Anacheke-Nasemann, U.S. Army Corps of Engineers
FROM: Kristina Egan, Director, South Coast Rail
DATE: May 5, 2010
SUBJECT: South Station Planning and South Coast Rail

Issue Background

The analysis of South Coast Rail alternatives has, until recently, assumed that South Station would be expanded as part of a separate public-private partnership that would relocate the USPS facility, construct an office building, and add 5 tracks and station platforms. This development was considered part of the No-Build Alternative (the future environmental condition in the absence of the South Coast Rail project) because planning for such expansion was underway with the developer (Jones, Lang Lasalle). The performances of the South Coast Rail alternatives were evaluated based on having an additional 5 tracks in 2030 at South Station. This analysis showed that only the Stoughton Alternative could operate at acceptable levels with a 5-track addition.

In January 2010, Jones, Lang LaSalle withdrew from the redevelopment of the Postal Facility site. Colonel Feir requested information on a realistic suite of possibilities for buildable options at South Station in a letter dated March 12, 2010 to MassDOT's Secretary and CEO, Jeffrey Mullan. The U.S. Army Corps of Engineers' consultant on the South Coast Rail environmental review, Louis Berger Group (LBG), also asked for clarification on a variety of South Station-related issues in a memo dated February 25, 2010. Foremost among the requests of LBG is one for documentation "that firmly established the Future No Build Condition as identified by MassDOT and whether any changes have occurred since the ENF." This memorandum provides a response to the U.S. Army Corps of Engineers' requests as well as additional information about the viability of the Attleboro alternative under South Station track expansion scenarios.

South Station "No Build"

This section of the memorandum demonstrates that **the no build condition for South Station for the purposes of the South Coast Rail analysis is between five and eleven tracks.**

Boston's South Station is a 110 year old terminal for regional rail, commuter rail, rail rapid transit as well as regional and local bus operations located on the south side of

Boston. It is the northern terminus of Amtrak's Northeast Corridor and MBTA's Commuter Rail operations to Worcester, Needham, Franklin, Providence, Middleboro, Plymouth, Stoughton and Greenbush. The station also includes a station stop on the Red Line to downtown Boston and its northwestern and southern suburbs. South Station functions as the western terminus of Phase 2 of the Silver Line, the eastern terminus of the Silver Line Phase I SL4 line to Dudley Station and Boston's main intercity bus terminal with service to all of New England and the Mid-Atlantic. Local bus service accommodated at South Station includes routes 7, 11, 448, 449, and 459.

South Station expansion has independent utility because it is needed to accommodate the projected ridership growth on the existing MBTA lines and for Amtrak intercity service on the Northeast Corridor. The reason South Station has been planned for expansion, with or without South Coast Rail or other planned system expansions, is because the station is almost at capacity and the increase in the number of trains MBTA and Amtrak have projected for existing lines would exceed its current capacity.

Electrification of the Northeast Corridor, studied in 1994, entailed implementation of a number of projects to increase operating capacity including track and signal system improvements. The Northeast Corridor Transportation Plan prepared by the Federal Railroad Administration (FRA) in 1994 stated:

Demand on the existing MBTA commuter service is forecasted to grow approximately 60 percent and MBTA plans to increase service commensurately to meet the demand. Extensive service growth will occur on the branch lines merging with the NEC at or north of Canton Junction. The greatest growth will occur on the Franklin and Stoughton Lines, where peak and off-peak frequencies are expected to double. Boston to South Attleboro service is expected to be extended to Providence. In addition, service will be reintroduced on the Old Colony Line from which 100 trains are planned to merge with the NEC at the approach to South Station.¹

As projected, both ridership demand and train service have increased. Today, the peak period peak hour (8:00 to 9:00 a.m.) number of trains is 25 as detailed in Table 1.

¹ The Northeast Corridor Transportation Plan, New York City to Boston. Report to Congress, July 1994 USDOT, FRA. Office of Railroad Development p. IV-3.

Table 1 2010 South Station AM Peak Hour Train Moves

2010 ²	Trains (8 to 9 AM)		
	Arrivals	Departures	Total Moves
MBTA			
Greenbush Line	2	0	2
Old Colony Lines	3	2	5
Providence/Stoughton Line	4	2	6
Franklin Line	2	0	2
Needham Line	2	1	3
Framingham/Worcester Line	3	1	4
AMTRAK	1	2	3
Total	17	8	25

The Central Transportation Planning Staff has predicted that ridership will grow on existing lines by 28% by 2030, and the MBTA has responded to these projections by planning to add one peak train to each of the southside commuter rail lines (with the exception of the Old Colony branch lines for which adding coaches to existing trains will suffice to meet demand).³ By 2030, the total number of train moves has been projected to increase to 30 as detailed in Table 2. This increase is projected to occur without the addition of South Coast Rail service.

Table 2 2030 South Station AM Peak Hour Train Moves

2030 based on SOUTH COAST RAIL Network Simulation ⁴	Trains (8 to 9 AM)		
	Arrivals	Departures	Total Moves
NEC and Dorchester Branch	15	5	20
Old Colony Lines	5	2	7
Amtrak	0	3	3
Total	20	10	30

Amtrak incorporated these projected increases on existing MBTA lines in its Northeast Corridor Infrastructure Master Plan. The plan states:

The major NEC terminals—Boston, Penn Station New York and Washington D.C.—present some of the most difficult challenges facing the NEC. Each of these terminals is at effective capacity today with limited platform and yard space and constraints on train movements in out of the terminals....Boston South is stub-ended station, and thus additional runthrough service is not a feasible alternative under the current configuration. The Master Plan includes a Boston South Station project to add up to six additional tracks and expand storage capacity at a location to be determined. Because of the magnitude of potential costs to address terminal capacity in Boston, New York City and Washington D.C., each of these terminals will be subject to further evaluation

² Amtrak and MBTA on line schedules, March 30, 2010.

³ Memo from Jody Ray, Director of Railroad Operations, MBTA to Kristina Egan, EOT, on November 12, 2009 – Attachment 1.

⁴ Technical Memorandum, Network Simulation Analysis of Proposed 2030 MBTA/Amtrak Operations, Systra, 8/28/2009 Appendix MBTA 2030 No Build Operating Plan pp 74 – 96.

and simulation in the Preliminary Environmental Impact Statement (PEIS) expected to begin in 2010.⁵

Expansion by four to six tracks has been planned for over a decade. The MBTA and MassDOT (and its predecessor agencies) have long recognized that South Station needed to be expanded to accommodate growth on existing lines due to the constraints the current thirteen tracks pose for adding new peak period trains to existing MBTA and Amtrak lines. We have been engaged in a negotiation process with the USPS to relocate the postal facility and enable track expansion as part of any redevelopment that would occur on the site. Up until the withdrawal of Jones, Lang Lasalle from the redevelopment, the assumption has been that South Station would be expanded by four to six tracks.

In 2000, the USPS and the Executive Office of Transportation agreed in writing to a set of planning principles that would allow for a 30% increase in track capacity at South Station, the equivalent of four tracks, at South Station.⁶ In February 2008, the MBTA confirmed with the U.S. Postal Service the MBTA's need to expand South Station track capacity and references a conceptual drawing from 2007 for an additional six tracks.⁷

It was because planning for this expansion was underway with Jones, Lang Lasalle for an additional five tracks that the South Coast Rail definition of the No Build Alternative reflected this expansion. The South Station project would relocate the USPS facility, construct an office building, and add tracks to the terminal. **The Commonwealth is committed to continue working with the USPS to relocate the postal facility and achieve the needed expansion of South Station.**

Jones, Lang Lasalle, the private developer selected to implement the project, halted work on it in early 2010. This provides the Commonwealth with an opportunity to expand South Station by a greater number of tracks than previously planned. The Commonwealth is actively considering purchasing the USPS property and constructing a much more significant expansion of South Station.

MassDOT is investigating the possibility of expanding South Station by up to eleven tracks. The maximum number of tracks that can be added is eleven, given existing land. A conceptual layout of South Station with eleven tracks is attached.⁸ The exact number will require additional study to balance the future transportation needs and the requirements for sustainable economic development on this highly desirable parcel in the Financial District of downtown Boston. The Commonwealth is considering submitting a High Speed Rail application to the Federal Railroad Administration to fund work related to the expansion of South Station.

⁵ Northeast Corridor Infrastructure Master Plan, Final Draft, developed by Amtrak, February 2010, page 29.

⁶ USPS letter of June 2, 2000 - Attachment 2

⁷ MBTA letter of February 6, 2008 - Attachment 3

⁸ Conceptual layout of South Station - 11 Track Expansion - Attachment 4

Therefore, it is reasonably foreseeable that South Station will be expanded by a minimum of five and a maximum of eleven tracks.

Attleboro Alternative Performance with South Station No Build

Up until now, the South Coast Rail environmental review has conducted an analysis of operations reflecting a five track build out of South Station for the horizon year of 2030. This definition of South Station's condition – the No Build – includes the addition of five tracks to accommodate additional operational demand at South Station independent of any demand any South Coast Rail alternative may entail. South Station currently has 13 tracks with platforms to serve MBTA and Amtrak trains, so the additional tracks would yield 18 tracks total.

An operations simulation of South Station for the No Build Alternative was developed as part of the South Coast Rail project. The conclusion of the analysis of the No Build Alternative was that it was not possible to retain the current equipment cycle plan and maintain projected service levels even with the added five tracks. Therefore, a revised equipment cycle plan was required, with which projected demand could be handled by the No Build Alternative.

The South Coast Rail alternatives were then evaluated against the same No Build Alternative. The findings from this evaluation were presented in the technical memorandum prepared by Systra Consulting dated August 28, 2009.⁹ One of the conclusions was that the Attleboro Alternative, as configured, was found to be unworkable and operationally infeasible. The primary issue was the inability to run the simulation in the evening peak period indicating catastrophic delays. In short, the desired train volumes cannot be supported at Tower 1 interlocking (just outside South Station) and its approaches. This modeling clearly concluded that the Attleboro Alternative was not operationally viable due to the constraint at South Station.

Members of the Interagency Coordinating Group asked the South Coast Rail team to assess whether the Attleboro Alternative would be viable if the constraints in the area of South Station were removed. A particular suggestion was to model the operations of the Attleboro Alternative if the North-South Rail Link were built. In October 2009, Systra Consulting ran another scenario using Back Bay Station as the northern terminus. The purpose of this model run was to provide the best case scenario for the Attleboro Alternative operations by removing the constraints posed by the limited number of South Station platforms and the congestion at the Tower 1 interlocking. In other words, the simulation assumed unlimited capacity for trains leaving Back Bay Station, thereby eliminating South Station as a constraint. This scenario helps us understand what the maximum possible performance improvements for the Attleboro Alternative could be.

⁹ Technical Memorandum: Network Simulation Analysis of Proposed 2030 MBTA/Amtrak Operations, prepared by Systra Consulting, Inc. for Massachusetts Executive Office of Transportation, August 28, 2009. Posted on South Coast Rail website.

The results from this analysis¹⁰ showed that the on time performance for AM peak period trains for the Attleboro alternative would be 84.6% compared to 100% for the other alternatives. This means that 15.4% of the northbound commuter rail trains serving the Needham, Franklin, Providence and Stoughton lines would arrive late every morning. The PM peak yielded 64.1% on time performance for the South Coast Rail trains for the Attleboro Alternative compared with an average of 93.5% for the other alternatives. The added congestion from the Attleboro alternative trains also impacts the commuter rail trains in the rest of the system, showing an approximate 15% drop in on time performance. Southbound on time performance for the Needham, Franklin, Providence and Stoughton lines would be 79.9%. The analysis indicates that with no constraints at South Station, **the Attleboro Alternative still operates with unacceptable on time performance, while negatively impacting the on time performance of four other southside commuter rail lines.**

It is important to note that, in reality, there is no way to completely eliminate South Station as a constraint. Expanding the number of platforms, rebuilding the Tower 1 interlocking to allow for better through traffic, and pursuing the capacity improvement options listed in the February 22, 2010 memo from LBG to the Army Corps can all help alleviate constraints at South Station. None of these capacity enhancements completely eliminate the constraint. Nevertheless, the October 2009 Systra simulation is important because it helps us understand the outer bound of what is possible for improving the Attleboro Alternative's performance and provides us with a best case scenario.

If South Station constraints could be eliminated or reduced, the next question MassDOT needed to investigate is whether other improvements could be made to the Attleboro Alternative that would improve this alternative's performance. The Attleboro Alternative, as currently defined, requires a new third track to be constructed from the Attleboro bypass to Readville. To address the choke point identified in the October 2009 Systra simulation, a fourth track would need to be added between South Station and Readville.

In the section of the Northeast Corridor between Forrest Hills Station in Jamaica Plain and South Station, the Northeast Corridor shares the corridor with the MBTA's Orange Line and is located primarily in a "boat section" (level below the street grade). There is no room between the 20 foot (approximate) high retaining walls for an additional track. This section of the Northeast Corridor traverses very dense and economically-challenged sections of Boston. In order to add an additional track in this area significant property acquisition would be required. The construction of a fourth track between Forest Hills and Back Bay would have a significant impact on the Southwest Corridor Park. Opened in 1987, the park is a 4.7 mile, 52 acre linear park stretching from Forest Hills to Back Bay. The park is owned and maintained by the Massachusetts Department of Conservation and Recreation. It links the neighborhoods of South End, Back Bay, Roxbury, and Jamaica Plain with a street level, green open space for parkland and recreation. Approximately a quarter of the parkland is decked over existing Northeast Corridor tracks. A fourth track would have a temporary impact on the decked over

¹⁰ Memo from Roger Thrall, Systra, to Mike McArdle, VHB, on October 29, 2009 – Attachment 5.

portion of the park during construction and a permanent impact on approximately 4.5 acres of parkland.

Adding another track would also require significant structural construction of retaining walls and bridges causing major disruption with little to no benefit to the environmental justice communities along the corridor. A typical layout for the fourth track and a cross-section of this area are attached.¹¹ These infrastructure challenges are similar to those facing the Middleborough Full alternative. The cost and takings required **make building this fourth track to alleviate the constraints south of Back Bay is infeasible.**

The infeasibility of adding a fourth track is a conclusion the Federal Railroad Administration and Amtrak also reached. The FRA, in an email to the Army Corps on March 3, 2010, referenced a study they had undertaken to expand capacity of the NEC north of Canton Junction Station. They concluded a fourth track from Readville to South Station would be beneficial. However, due to significant constraints, they proposed the fourth track end at Forest Hills in Jamaica Plain.

Conclusions

1. MassDOT's commitment to expand South Station is unchanged by the withdrawal of Jones, Lang Lasalle as the developer of the South Station site.
2. The South Station expansion is a separate project from the South Coast Rail project having the independent utility of serving projected ridership growth on existing MBTA and Amtrak lines.
3. For the purposes of defining a No Build condition for South Station for South Coast Rail, it is reasonably foreseeable that South Station will be expanded by a minimum of five tracks and a maximum of eleven tracks.
4. The Attleboro Alternative is not viable if South Station is expanded by five tracks.
5. Even if South Station-related constraints are eliminated, the Attleboro Alternative still operates with unacceptable on time performance due to congestion on the Northeast Corridor from Readville to points north. Other southside commuter rail service is also negatively impacted by the Attleboro alternative.
6. To address the Attleboro Alternative's poor performance south of Back Bay, a fourth track between Forest Hills Station and South Station would be required. The infrastructure challenges of constructing this track are similar to those for building Middleborough Full alternative, and make this option infeasible.
7. Therefore, the Attleboro Alternative is not viable if South Station is expanded by eleven tracks.

¹¹ See Attachments 6 and 7.



Massachusetts Bay Transportation Authority

Deval L. Patrick
Governor

Timothy P. Murray
Lt. Governor

Jeffrey B. Mullan
Secretary & CEO

John R. Jenkins
MassDOT
Board Chair

William A. Mitchell, Jr.
Acting General Manager and
Acting Rail & Transit Administrator

November 12, 2009

Ms. Kristina Egan
Director, South Coast Rail
Executive Office of Transportation
Ten Park Plaza
Boston, MA 02111

Re: MBTA Commuter Rail
2030 Master Plan

Dear Ms. Egan:

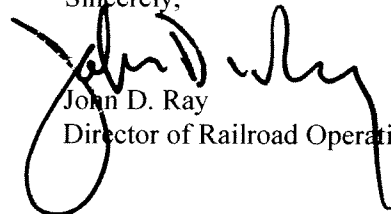
As I am sure you are aware, the MBTA's commuter rail system continues to play an ever increasing role in moving people in and out of downtown Boston. Our daily ridership on the south side set new records in 2008. As our roadways continue to become more congested and people look for alternative means to get to work, it is only reasonable to assume that commuter rail ridership will continue to grow. The Central Transportation Planning Staff (CTPS) has estimated that in 2030 commuter rail ridership demand on the south side will be at approximately 115,000 daily boardings, which represent a 28% growth rate. To address this projected growth, the MBTA plans to add one additional peak period train on each of the south side lines, except the Old Colony lines.

To address future demands for the Old Colony lines, the MBTA is proposing to add additional coaches to currently operating trains. The current configuration of South Station limits the length of the trains serving the Old Colony lines to six cars. New tracks and platforms are planned and when in place they will be capable of handling nine car trains, consistent with the rest of the lines on the south side. The additional train length will result in 33% more capacity for the Old Colony lines, which is equivalent to the one additional peak period train on the other branches.

The MBTA is committed to providing high quality consistent service on each of the commuter rail branches. Both state and federal dollars have been used over the years to make capital improvements on all of the lines to provide this service. Therefore, the MBTA is not in position to cut service on existing lines in order to provide service on a future line. The MBTA would only consider service cuts on existing lines if required to do so due to budgetary constraint.

Should you have any questions and or require additional information regarding this matter, please do not hesitate to contact me.

Sincerely,



John D. Ray
Director of Railroad Operations

cc: J. Jackson





June 2, 2000

Mr. Kevin Sullivan, Secretary
Executive Office of Transportation
State Transportation
Park Square Building
Boston, MA 02110

Subject: Reference Drawing for South Station Expansion

Dear Secretary Sullivan:

Since your request to Rudy Umscheid Vice President, Facilities United States Postal Service, your staff has been meeting regularly with our consultants to create an opportunity for the MBTA to expand on USPS land at South Station. After a lot of hard work and the commitment of Jim Scanlon from your staff and Dan Breen, of the MBTA, we have arrived at a set of planning principles that will allow for a 30% increase in track capacity at South Station. We have plenty of work ahead of us on this project and we believe that this letter is just the beginning of the transformation of the waterside of South Station.

Attached is a drawing prepared by Ove Arup & Partners which shows the agreed layout of tracks and platforms at South Station. As you know the drawing, as shown, is the result of many meetings that we have had over the last year with senior members of your staff and the MBTA Engineering Department. As we plan for the re-use of the United States Postal Service facility at South Station, the MBTA and the United States Postal Service will now use this drawing as a guideline for planned improvements on the site.

The introduction of the four added tracks, and adjustment of the alignment of track 13, creates added complexity for planning the future re-development of the Postal Service parcel. When important harbor front issues are also taken into account, the geometry becomes quite sensitive. Accordingly, this drawing has been prepared to provide a reference for the USPS and its consultants, the MBTA and its consultants, and agencies and tenants as planning moves forward. All of the professionals working on this site will need to pay particular attention to the use of the edge of platform abutting track 12 as a reference line, and the text rules on the left margin which would control potential adjustment of the layout.

This planning letter is a start in our collaboration to expand South Station and further refinement of the redevelopment plan will be required before complete binding agreements can be reached. In developing such an important plan we both agree that cooperation between the transportation interests at South Station, the Postal Service and other parties at interest is critical to our success. Nonetheless, we will use this drawing as the foundation for that planning. Our discussions to date have been founded on the expectation that the Postal Service will provide the opportunity for MBTA to

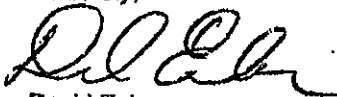
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construct the added capacity at South Station when the Postal Service has relocated to a new facility on the Reserved Channel site in South Boston.

It is our specific intent not to create any binding obligations between the parties by preparing this plan and presenting it to you. It is our intent to provide a precise reference for complex, cooperative planning efforts and to facilitate future definition of binding agreements. Therefore, your signature below indicates our agreement to proceed with discussions based on the referenced plans.

We look forward to working with your office and thank you for your vision in directing us to this opportunity.

Sincerely,



David Eales
Manager, Realty Asset Management
United States Postal Service

Agreed: 

Date: 7/21/00

cc: Jim Travers

Attachment 1
Track Setting Out Requirements:

Platform Width

Minimum 7'6" from face of column, bench, or other obstruction
Minimum 2'6" for Benches, Intermittent Columns and other platform furnishings

This effectively yields a 17'6" minimum platform width. Any obstructions over 2'6" wide would increase the platform width by the amount over 2'6".

Platform edge 5'4" from centerline of track on tangent track.

Last 150 feet of platform may be tapered down to 15 feet, provided there are no obstructions on this portion of platform.

Platform Length

Minimum platform length at South Station is 835'.

Track Spacing

Minimum 15' track centers, 1' intermittent obstructions. Any obstructions over 1' wide would increase the track width by the amount over 1'.

Minimum 7' clearance to intermittent obstructions less than 4' long (columns).

Track Geometry

Maximum Curvature - 9 degrees.

Minimum Tangent between reverse curves 100'.

Design elevation in curve 1 degree and over = 1 inch.

Minimum Spiral Length - 62'.

Elevation increased uniformly over length of spiral.

Maximum 30 minute curve in platform area or within 100' of platform end.

Turnout Geometry

No. 8 Turnout - Point of switch to 1/2" point of frog - 68'0"

Frog angle - 7 degrees, 9 minutes, 10 seconds

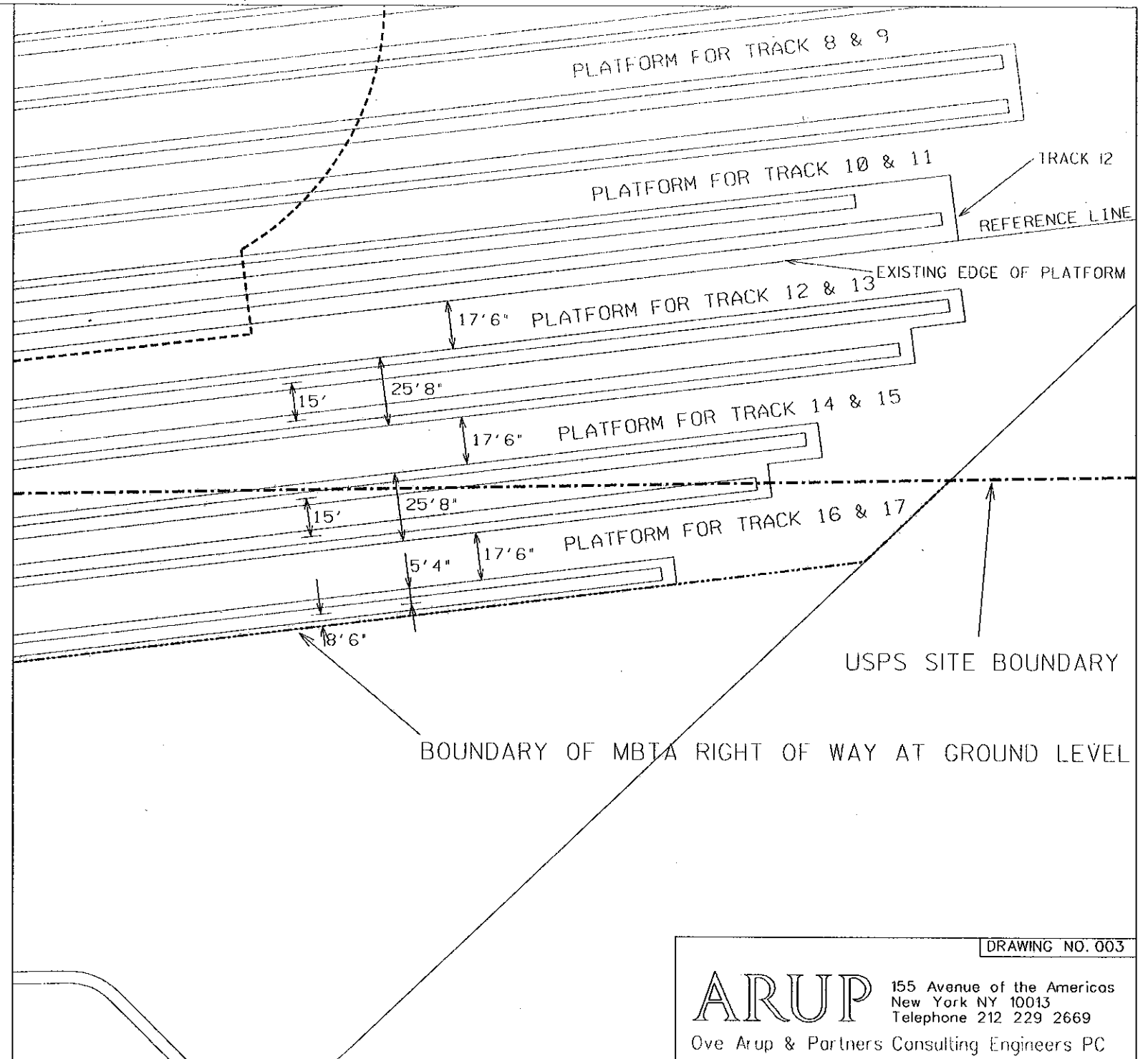
No. 10 Turnout - Point of switch to 1/2" point of frog - 77' 4 3/4"

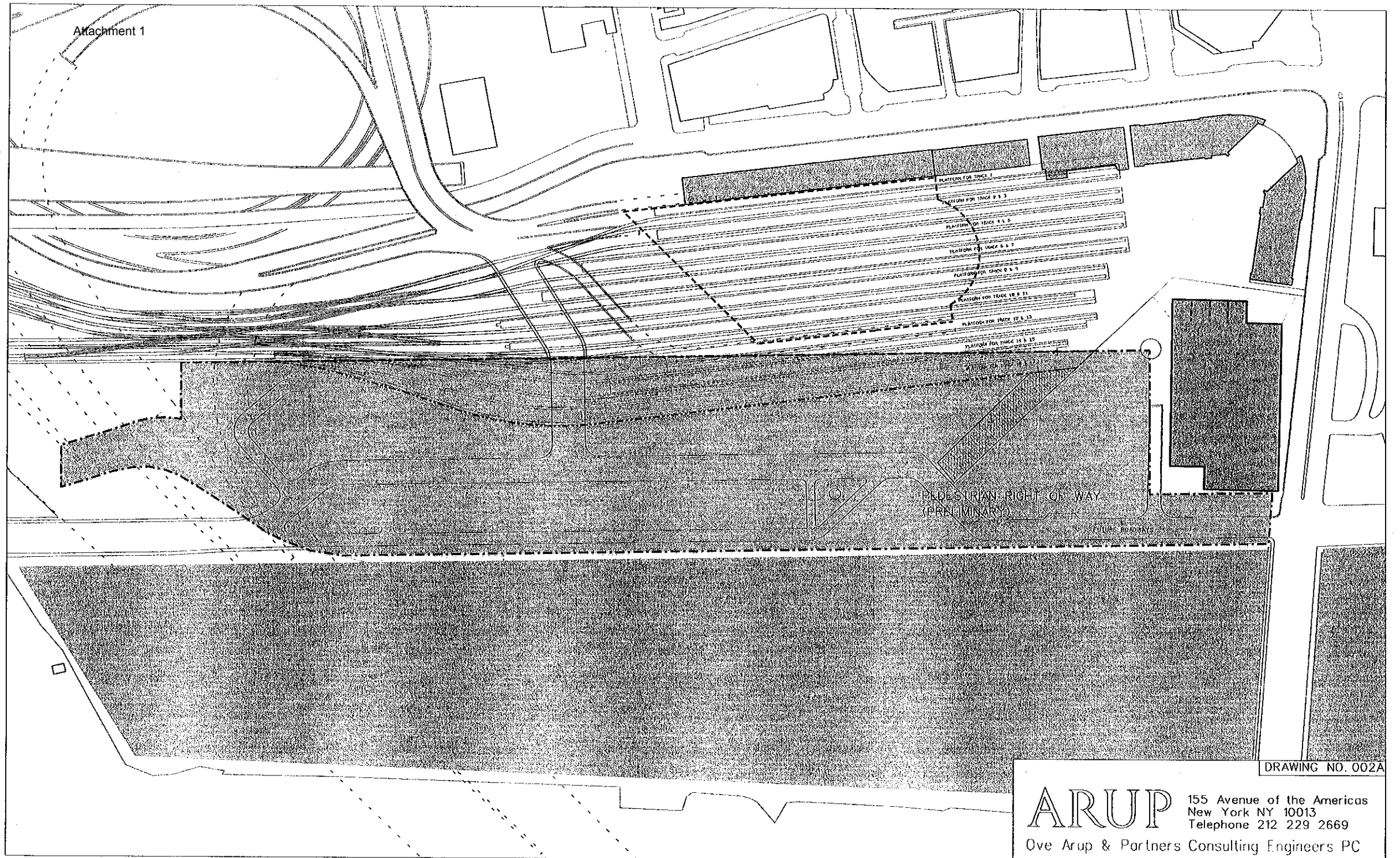
Frog angle - 5 degrees, 43 minutes, 29 seconds

Clearance and Ventilation

A minimum of 22'6" shall be provided above all tracks.

Ventilation hoods for diesel engines shall be provided on the basis that all diesel trains shall be pushed into tracks 12-17, except in an emergency. The minimum train length shall be 6 carriages, for the purpose of ventilation design.





DRAWING NO. 002A

ARUP 155 Avenue of the Americas
New York NY 10013
Telephone 212 229 2669
Ove Arup & Partners Consulting Engineers PC



Massachusetts Bay Transportation Authority

Deval L. Patrick
Governor

Timothy P. Murray
Lt. Governor

Bernard Cohen
Secretary and MBTA Chairman

Daniel A. Grabauskas
General Manager

February 6, 2008

Mr. Stephen C. Roth
Manager, Realty Asset Management
United States Postal Service
Facilities Headquarters
4301 Wilson Boulevard
NRECA Building, Suite 300
Arlington, VA 22203-1861

Re: Redevelopment of USPS Parcel, Expanded Track Capacity, South Station

Dear Mr. Roth:

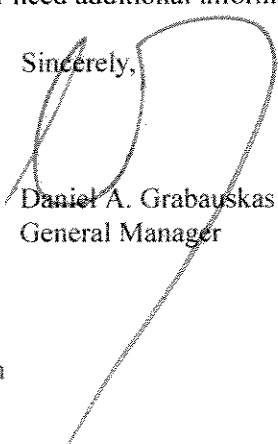
I am writing to follow-up on our meeting last Thursday, January 31, 2008, concerning the relocation of the USPS General Mail Facility and the subsequent sale and redevelopment of that parcel.

At the meeting, you requested that the MBTA confirm its intention and ability to be flexible with the proposed new 6-track alignment. As you know, the MBTA has formally stated its need to expand the South Station track capacity as an integral piece of the redevelopment project. We are in the process of developing new track and platform performance standards which will be provided to the developer of the USPS parcel. The goal is to work closely with the developer as we design and engineer our respective facilities.

The conceptual drawing prepared by HNTB, dated September 25, 2007, was illustrative and not meant to be the MBTA's definitive layout plan for the new 6-track configuration. In working with the designated developer to relocate the tracks, if necessary, any reconfiguration would need to maintain similar operational flexibility and passenger amenities as currently contemplated.

The MBTA appreciates the opportunity to collaborate with the USPS in this important project. Thank you and please contact me or Mark E. Boyle, Director of Real Estate at (617) 222-3255 or mboyle@mbta.com, if you have any further questions or need additional information regarding this matter.

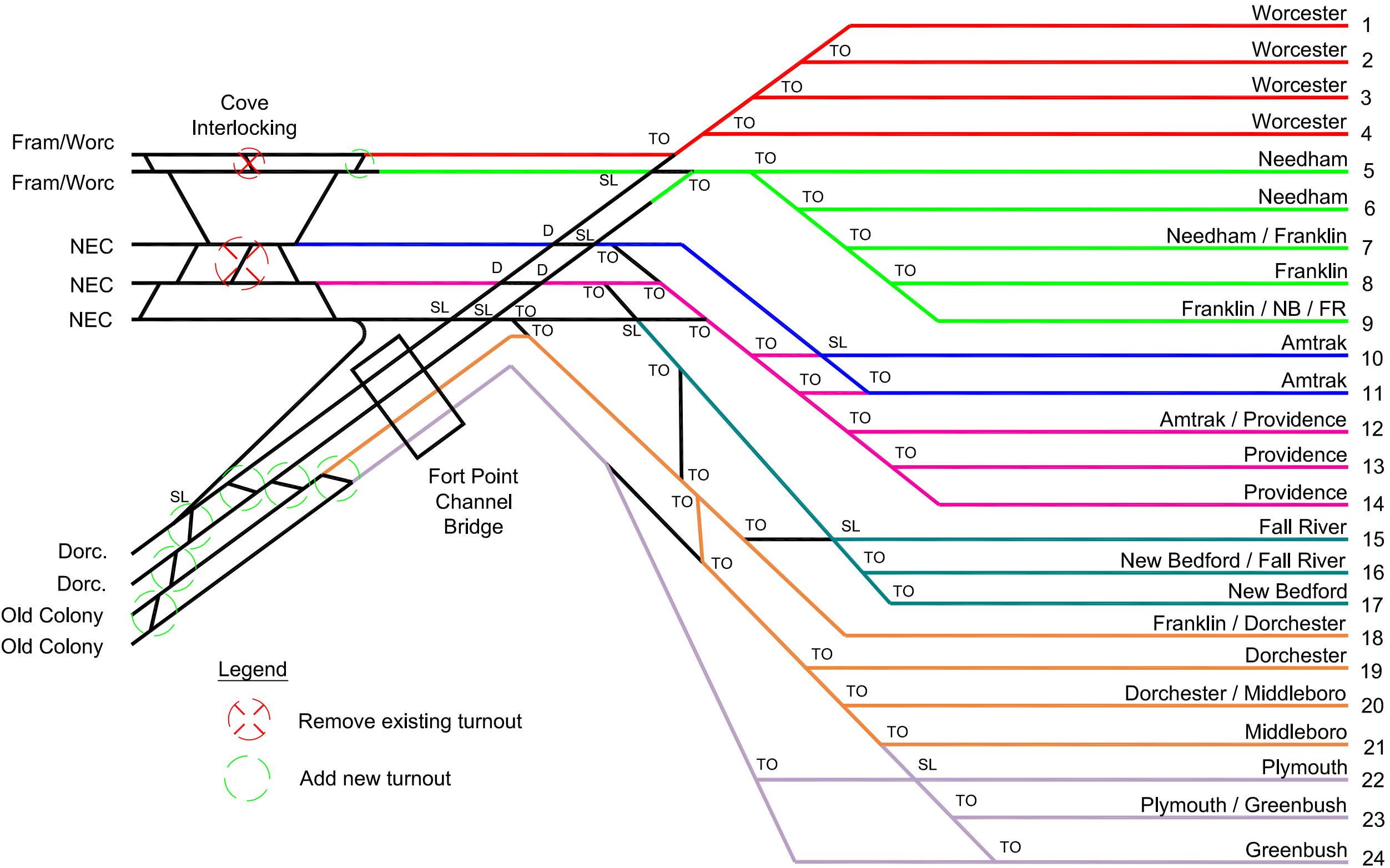
Sincerely,


Daniel A. Grabauskas
General Manager

cc: Bernard Cohen, Secretary and MBTA Chairman

Driven by Customer Service

Massachusetts Bay Transportation Authority, Ten Park Plaza, Boston, MA 02116-3974



Vanasse Hangen Brustlin, Inc.

Proposed South Station Operations
13 existing + 11 (reconfigured)
Train Groupings

MEMORANDUM



Date: 29 October 2009
Location: Lebanon, NH

To: **Michael McArdle**
Vanasse Hangen Brustlin

From: Roger Thrall

RE: **Analysis of South Coast Rail Attleboro Alternative PM Peak Period, Using Back Bay as Northerly Terminal (Tower 1 and South Station Effects Removed)**

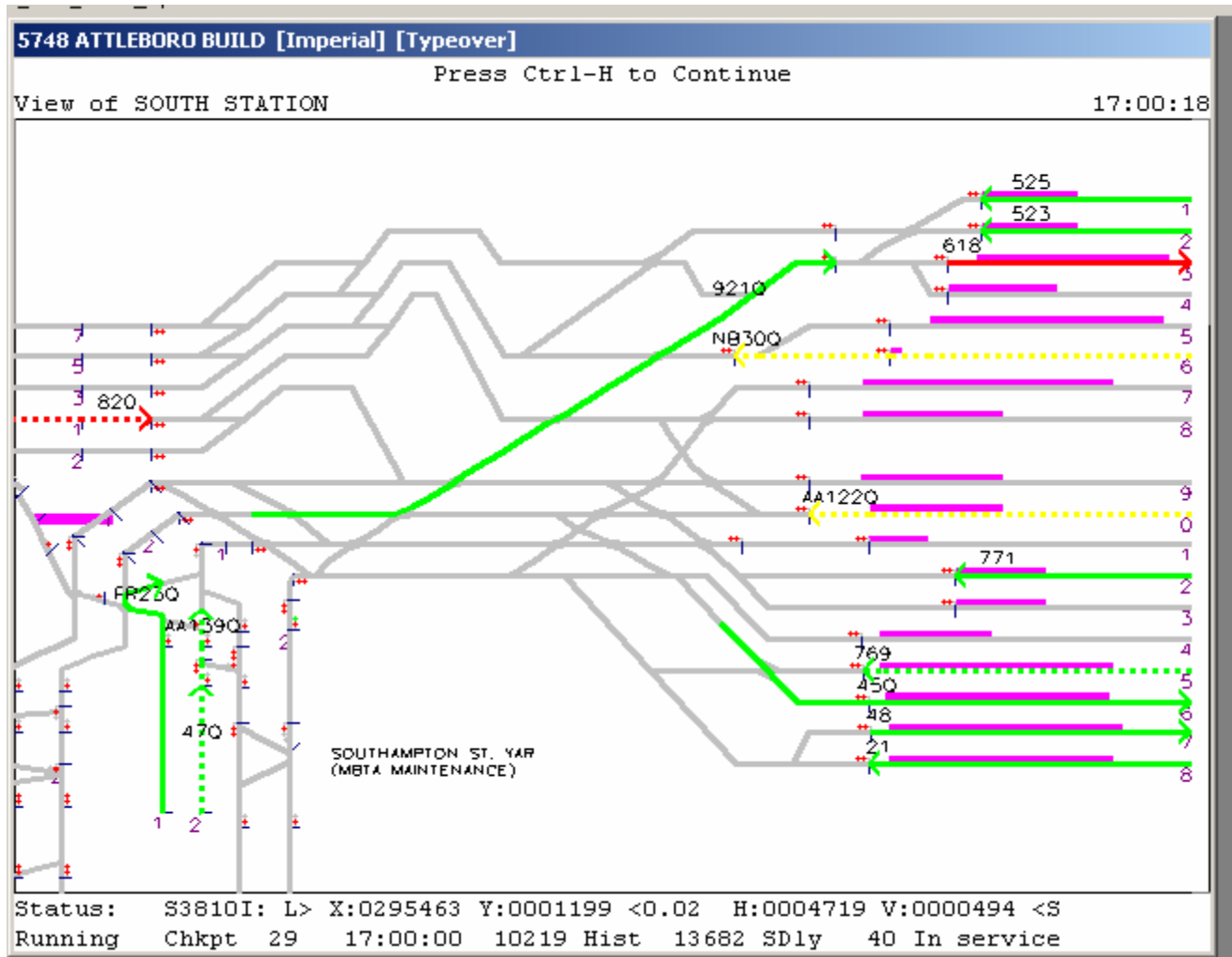
INTRODUCTION

The following discussion builds upon a report entitled "Massachusetts Executive Office of Transportation, MBTA South Coast Rail (SCR) Project, Technical Memorandum, Network Simulation Analysis of Proposed 2030 MBTA/Amtrak Operation," Rev. 1.1, dated August 28, 2009, and prepared by SYSTRA Consulting, Inc. (the "August 28 Report"). Reference is further made to a follow-up Memorandum entitled "Analysis of Proposed Reduction of PM Peak Period SCR Service via Attleboro Alternative" (the "Reduced Attleboro Memo") dated September 25, 2009. This report and memorandum provide the background and context for the analysis described herein.

The August 28 Report states that deterministic network simulation of the Attleboro Alternative using electric locomotives for South Coast Rail (SCR) trains was infeasible to the point that the very robust RAILSIM network simulation program was unable to complete its PM Peak Period simulation. The primary reason for this failure was congestion in the Tower 1 Interlocking throat area immediately south of South Station. Especially troublesome were the conflicts between inbound and outbound revenue traffic to and from South Station and the non-revenue trains coming into service from midday storage, assumed to be located east of the Fort Point Channel Bridge, at Southampton Yard (SH Yard).

The 5:00 PM RAILSIM® screen view of the Attleboro Build simulation in the area of Tower 1 and South Station, below, illustrates some of the conflicts that result from the non-revenue moves to and from storage. As can be seen, three equipment trains, FR23Q (an SCR trainset), AA139Q (an Acela trainset), and 47Q (an Old Colony Line trainset) are trying to reach South Station platforms from storage at Southampton Yard. Meanwhile, Stoughton Branch equipment train 921Q is on its way from storage at Southampton Street Yard to its berth at South Station, from which it will depart outbound as a revenue train. 921Q prevents inbound Providence train 820 and outbound (to SH Yard) SCR train NB30Q from moving (delay is indicated by a dashed train graphic). The combination of 921Q and SCR equipment train FR23Q inbound from SH Yard prevents train 769 from leaving for Readville on the Dorchester branch, even if it were not already blocked by inbound Old Colony Line equipment train 45Q. Finally, Amtrak Acela equipment train AA122Q needs to go to SH Yard for cleaning and service, a move that is against the steady flow of trains inbound from that location. Not surprisingly, this operation is extremely sensitive to the addition of new trains.

Document Control Number:	5748_20090929_0001
File Location:	P:\5748 EOT SCR (VHB)\10.0 Deliverables\10.20 Attleboro SCR Analysis with Back Bay as Terminal Memo 20091029
File Name:	5748 - MEMORANDUM - Attleboro without South Station Simulation 20091029.doc



As a follow-on to the results described in the August 28 Report, SYSTRA removed four of the eight PM peak-period peak-direction South Coast Rail trains and again attempted to simulate the Attleboro PM peak period. With the four SCR trains removed, simulated operations at Tower 1 and Broadway Interlockings and at South Station terminal remained extremely congested, to the point that as the simulation proceeded through the PM Peak, trains departed South Station late by as much as 30 minutes. Consequently, train meets scheduled at passing siding locations on the Old Colony Line could no longer occur and scheduled overtakes on the NEC near Attleboro became unworkable. The final result was, again, simulation failure, as was reported in the Reduced Attleboro Memo.

METHODOLOGY

In order to determine whether the delays were entirely a result of conflicts within Tower 1 and South Station, an additional simulation of the Attleboro PM Peak Period was performed with all proposed SCR service in place, but with Tower 1 removed from the simulation. This was accomplished by terminating all northbound NEC train routes and initiating all southbound NEC train routes at Back Bay Station. Northbound NEC trains therefore never reached Tower 1 Interlocking and their lateness, accrued south of Back Bay, was measured at Back Bay. Southbound trains were put into simulated service at Back Bay at their scheduled time and were

able to leave without encountering conflicts within Tower 1 Interlocking, and therefore any delay en route was encountered south of Back Bay.

The simulations were performed assuming electric motive power for the SCR trains, and were deterministic in nature (non-randomized).

RESULTS

With these new assumptions in place it was possible to simulate the entire 24-hour day for the SCR Attleboro Alternative. The table below summarizes on-time performance results for the new simulation (shaded) and includes, for the purpose of comparison, results of the prior Attleboro Full SCR simulations from the August 28 Report (not shaded). Old Colony trains and Dorchester Branch trains turning at Readville are not included. The lateness threshold is 05'00" —MBTA considers any train more than 04'59" late to be a late train.

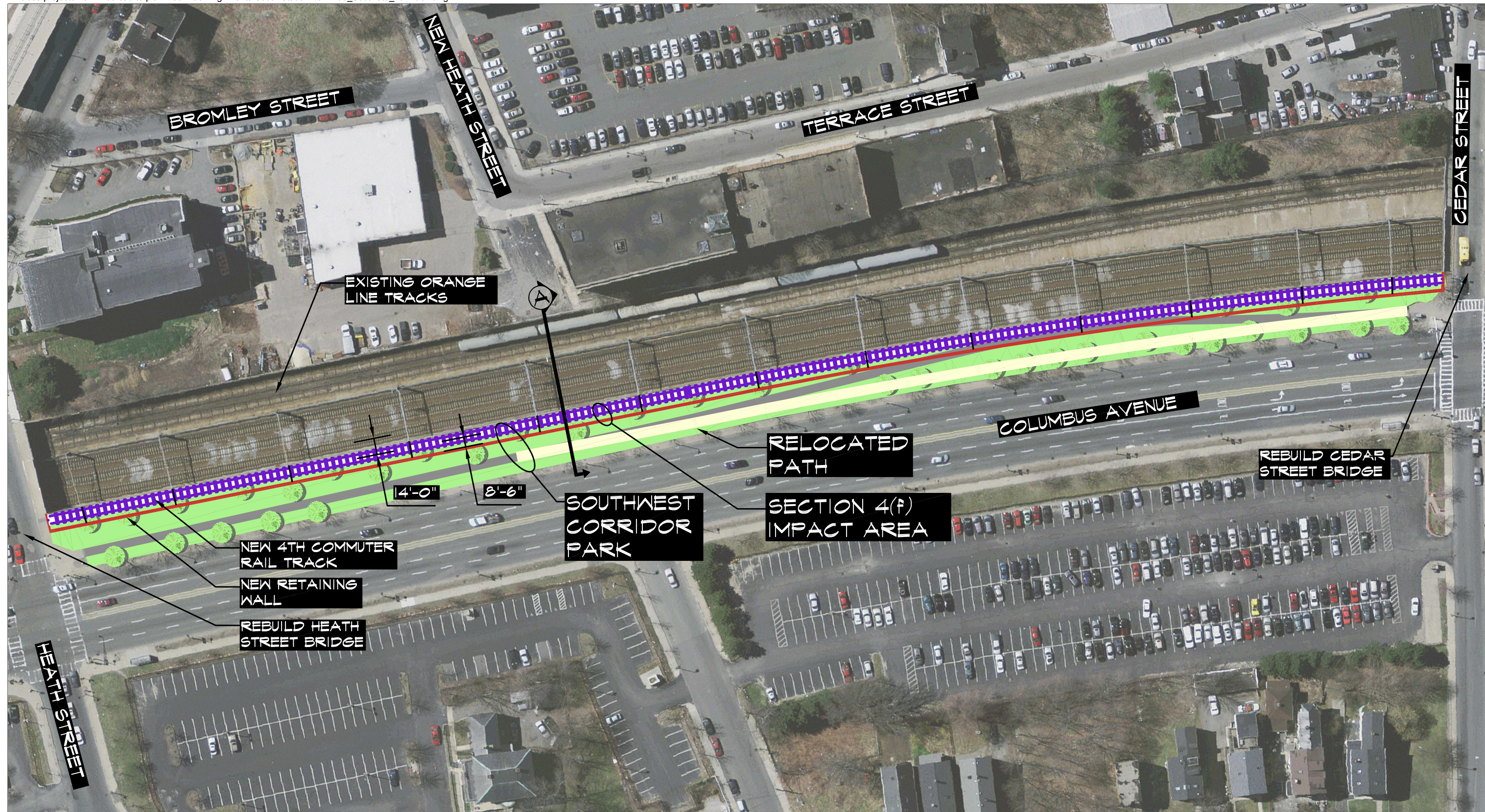
Revenue Train Arrivals at North End*		
On-Time Performance, Deterministic Simulation		
ALTERNATIVE	AM PEAK-PERIOD TRAINS	
	South Station Terminal Arr.	Back Bay Terminal Arr.
No-Build	100.0%	Not simulated
Stoughton Diesel	100.0%	Not simulated
Stoughton Electric	100.0%	Not simulated
Attleboro Diesel	61.1%	Not simulated
Attleboro Electric**	69.4%	84.6%
* These results do not include Old Colony Line trains.		
Shaded results from simulation terminating at Back Bay		
Revenue Train Arrivals at Southerly Terminals*		
On-Time Performance, Deterministic Simulation		
ALTERNATIVE	PM PEAK-PERIOD TRAINS	ALL WEEKDAY TRAINS
No-Build	94.9%	97.1%
Stoughton Diesel	93.0%	93.3%
Stoughton Electric	92.5%	95.0%
Attleboro Electric	64.1%	79.9%
* These results do not include Old Colony Line trains.		
Shaded results are from simulation with Back Bay as terminal.		

As can be seen, with Tower 1 Interlocking and South Station in the Attleboro simulation, 69.4% of the AM peak-period peak-direction trains are on time at South Station (from the August 28 Report). When the Attleboro simulation is terminated at Back Bay, the on-time performance improves to 84.6%. This is as expected a significant improvement, but still falls well short of the 100% performance of the No-Build and Stoughton Diesel and Electric scenarios.

Due to simulation failure, there are no August 28 Report results in the PM Peak Period against which the present results can be compared. However, even without comparison, it is obvious that the on-time performance of PM peak-period peak-direction trains is very poor, at 64.1%, with 79.9% of all weekday southbound trains arriving at their southerly terminals on time. All Stoughton and No-Build scenarios achieve in excess of 90%, with Tower 1 Interlocking and South Station in simulation.

CONCLUSION

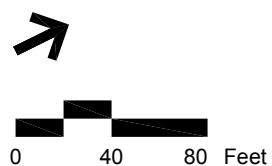
Critically, these results indicate that under the Attleboro Alternative, northbound NEC trains are already carrying significant delay prior to their arrival at Back Bay, and southbound NEC trains are encountering significant delay south of Back Bay. The important implication of this finding is that even if a solution were found to the congestion in Tower 1 Interlocking and South Station, delay south of that location would prevent acceptable on-time performance under the Attleboro Alternative.

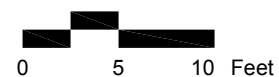
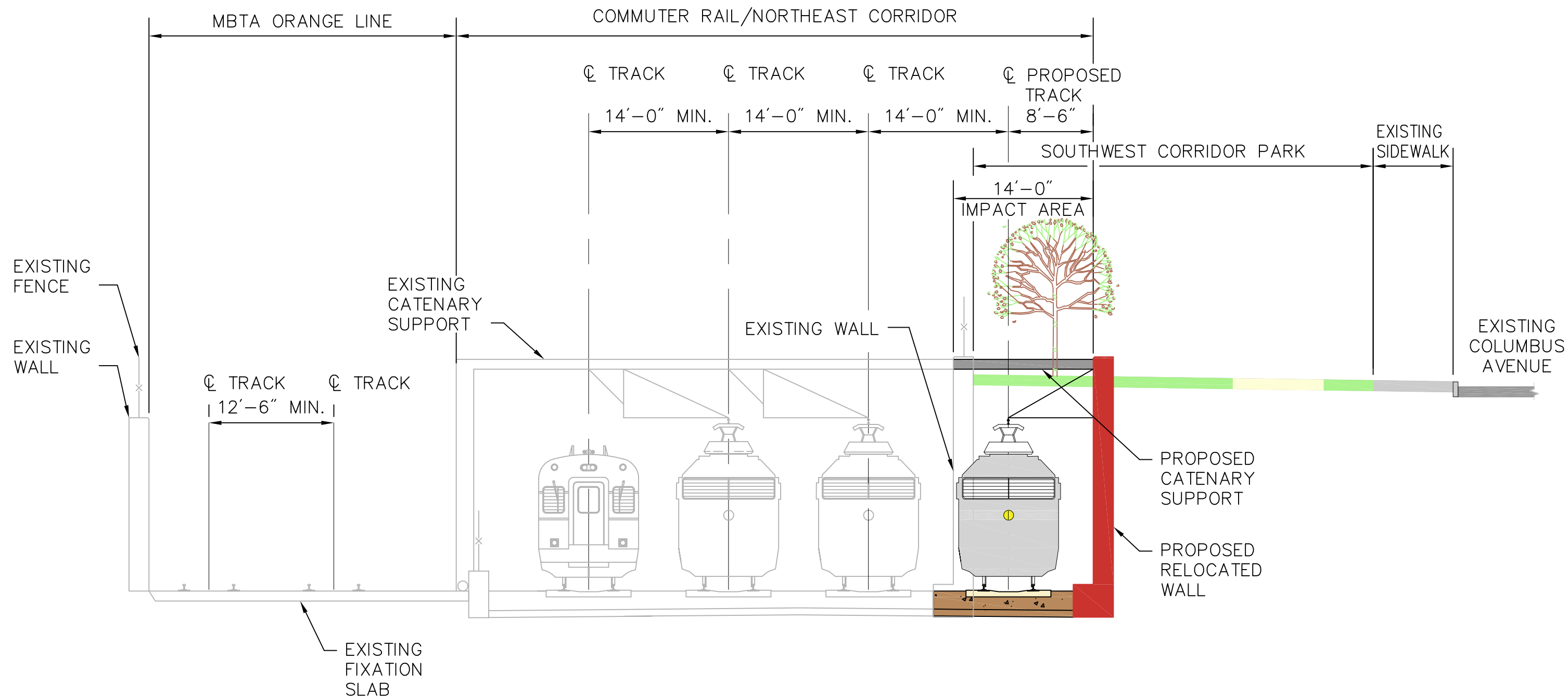


Vanasse Hangen Brustlin, Inc.

April 21, 2010

Typical Northeast Corridor
Fourth Track Construction





Vanasse Hangen Brustlin, Inc.

April 21, 2010

Typical Section
Northeast Corridor Fourth Track
Construction