South Stamford Accessibility & MNRR Bridge Replacement Feasibility Study

State Project No. 135-301
Stamford, Connecticut

PRELIMINARY ENGINEERING REPORT

Volume 3 of 7

Atlantic Street - *DRAFT*

April 01, 2011

State of Connecticut
Department of Transportation

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1. INTRODUCTION

1.1. Project Location and Description

This Metro-North Railroad (MNRR) undergrade bridge[1] is located at mile post 33.19 on the New Haven Line and carries five MNRR mainline tracks over Atlantic Street. Located approximately 900 feet east of the Stamford Intermodal Transportation Center (SITC), the Atlantic Street underpass serves as an access point between the Stamford Central Business District (CBD) and areas south of the rail corridor. Approximately 180 feet north of the underpass, Atlantic Street intersects with the I-95 northbound Exit 8 exit-ramp and South State Street at state assigned intersection 135-269. Approximately 170 feet south of the underpass, Atlantic Street intersects with Station Place and the Stamford Urban Transitway (SUT). The underpass is adjacent to and intersects with Station Place, the main access to the SITC, and also the location of the station's main parking garage. Please refer to Figure 2.1 for the project location. Figures are located in Appendix G.

1.2. Site Features

The existing Atlantic Street is an undivided, two-lane road with one lane of traffic flowing in each direction. The width of Atlantic Street under the bridge increases in the southerly direction from two 23-foot lanes with no shoulders to two 33-foot lanes with no shoulders providing a curb to curb width that varies from 46 to 66 feet. Bridge columns separate the roadway from the sidewalks located on both sides of the road. The sidewalks vary in width from 8 to 10 feet.

To the north of the underpass, Atlantic Street intersects with South State Street and the I-95 northbound Exit 8 ramp at a five-legged, signalized intersection. Crosswalks are provided at this intersection to cross South State Street, the I-95 exit ramp and Atlantic Street. Beyond this intersection to the north, Atlantic Street widens to accommodate three lanes of traffic in the southbound direction, and two lanes in the northbound direction.

Immediately to the south of the underpass, Atlantic Street intersects with Manhattan Street at a T-intersection. Manhattan Street approaches Atlantic Street from the east and a crosswalk is provided to cross Manhattan Street. 150 feet further south, Atlantic Street intersects with the SUT and Station Place. The SUT approaches Atlantic Street from the east and serves as an east west collector to get people to and from the SITC from points east. Sidewalks are provided to cross Station Place, Atlantic Street, and the SUT. Beyond the intersection with Station Place and the SUT, Atlantic Street widens to accommodate four lanes of traffic in the southbound direction and two lanes in the northbound direction.

[1] An "Undergrade Bridge," in rail terms, refers to a road going under the grade of the railroad or under the track. In this case, the bridge acts to carry the tracks over Atlantic Street resulting in an undergrade bridge.

The horizontal roadway alignment of Atlantic Street is a 200-foot radius located just to the south of the underpass. The roadway alignment under the MNRR bridge follows a tangent off the 200-foot radius through the South State Street intersection. The vertical alignment has an upward grade of approximately 3.0% just north of the underpass and a relatively flat grade just south of the underpass.

South State Street, to the north of the underpass, carries two lanes of traffic from the west to Atlantic Street with a downward grade of 1.5%. To the east of Atlantic Street, South State Street widens to four lanes of traffic and has a relatively flat grade. The I-95 northbound exit ramp approaches Atlantic Street with a downward grade of the maximum recommended 6.0%. The I-95 exit ramp and South State Street are separated by a gravity-type retaining wall on the west side of Atlantic Street. Right turns from the I-95 northbound exit ramp onto Atlantic Street are prohibited because they would require crossing South State Street traffic. Likewise, left turns from South State Street onto Atlantic Street are prohibited because they would cross I-95 northbound exit-ramp traffic.

Manhattan Street intersects Atlantic Street from the east, south of the underpass. It is a relatively flat, one-way, one-lane street. Left turns onto Atlantic Street from Manhattan Street are prohibited. The Atlantic Street, Station Place and SUT intersection is a fully signalized intersection including a right-turn only lane from Atlantic Street onto Station Place and a proposed left-turn only lane onto the SUT. The SUT is located to the east of Atlantic Street and will carry 3 lanes of traffic in the westbound direction as it approaches the intersection. Atlantic Street is proposed to carry 4 lanes of traffic in the northbound direction as it approaches this busy intersection with a dedicated right-turn only lane onto the SUT. Three lanes remain carrying traffic northbound under the MNRR bridge. Atlantic Street carries two lanes southbound, away from the Station Place/SUT intersection.

1.3. Proposed Improvements

The widening of Atlantic Street will allow for the addition of two through lanes in the southbound direction and one through lane and one right-turn only lane in the northbound direction. Please refer to Figure 2.5, located in Appendix G, for the typical cross section for a 2-span configuration (lane arrangements are typical for a 4-span configuration). The new lane arrangements will enhance access to Station Place, the Stamford CBD, and the new SUT from the north. Additional improvements include two-foot shoulders and a median to divide opposing traffic. The reconstruction of the MNRR undergrade bridge will support the roadway widening and will also provide an opportunity to increase the bridge's vertical clearance from 12'-7" (posted at 12'-4") to a minimum of 14'-6", allowing for the passage of all legal height vehicles. The largest vehicles owned and operated by the City of Stamford are a HazMat truck and the Police Department's command vehicle. Both of these vehicles have a height of 12'-6" which is the current posted vertical clearance.

Proposed improvements to the undergrade bridge include total reconstruction of the superstructure and substructure. The deck type proposed for the bridge is the MNRR preferred ballasted deck rather than an open deck which is currently in place. Upgrading the roadway will reduce congestion on Washington Boulevard at Stamford Station by improving an alternate route to the SITC, and at the access to the parking garage from Station Place.

2. HIGHWAY DESIGN

The roadway design for the Atlantic Street bridge replacement included the development of three alternatives:

1. *Alternative 1* proposes that Atlantic Street be lowered as needed to obtain a vertical clearance of 14'-6". The I-95 northbound Exit 8 ramp will continue to touch down at Atlantic Street, north of the MNRR tracks. Re-grading of the exit ramp will be necessary resulting in a steeper grade than what is allowed by CTDOT for ramps, consequently requiring a "design exception".

2. *Alternative 2* proposes that Atlantic Street be lowered as needed to obtain a vertical clearance of 14'-6" and that a fly-over bridge be constructed to divert the I-95 northbound Exit 8 ramp from Atlantic Street to a point further east on South State Street. Under this scenario, ramp traffic will flow to Canal Street rather than Atlantic Street.

3. *Alternative 3* proposes that Atlantic Street be lowered to provide a vertical clearance of 13'-9" (posted at 13'-6") rather than 14'-6". The I-95 northbound Exit 8 ramp will still touch down at Atlantic Street. Re-grading of the ramp will be required, but will result in a grade not as steep as with Alternative 1. (This alternative is for comparison purposes only. A minimum vertical clearance at Atlantic Street of 14'-6" is a major criterion at this location.)

These alternatives originated from discussions with the Connecticut Department of Transportation (CTDOT), the City of Stamford, and Metro-North Railroad.

The proposed cross-section for the Atlantic Street underpass was developed based on discussions with CTDOT and the City of Stamford. The cross section is typical for each of the proposed alternatives. Please refer to Figure 2.5, located in Appendix G, for the proposed Atlantic Street cross section. The proposed lane arrangements include:

- two 11-foot through-lanes in the northbound direction
- one 11-foot right-turn only land in the northbound direction
- three 11-foot through-lanes in the southbound direction
- 2-foot shoulders; inside and outside
- an 8-foot median which will also accommodate a bridge pier
- 8-foot wide sidewalks

The Atlantic Street curb-to-curb roadway width will total 82 feet at the undergrade bridge.

The proposed horizontal alignment for the Atlantic Street underpass is also common to all of the alternatives. It is designed to match the Atlantic Street roadway under I-95 on its north side and the SUT alignment on its south side. A simple curve with a 410-foot radius is provided for Atlantic Street at the underpass.

2.1. Alternative 1

The basic parameters of Alternative 1 are summarized as follows: provide a minimum vertical clearance of 14'-6" on Atlantic Street; provide for a potential future Track 7 for the MNRR; provide for a potential future operational lane on I-95 northbound; and maintain the terminus for the I-95 northbound Exit 8 ramp at Atlantic Street.

2.1.1. Horizontal Alignments and Lane Arrangements

Atlantic Street

The proposed roadway cross section of the Atlantic Street underpass will have 11-foot lanes, 2-foot shoulders, and an 8-foot sidewalk in each direction of traffic. Northbound and southbound traffic will be divided by an 8-foot median and the northbound direction will be provided with a right-turn only lane onto South State Street.

The horizontal alignment for the Atlantic Street underpass is designed to match the existing roadway on its north side and the SUT alignment on its south side. A simple curve of a 410-foot radius is provided at the underpass. Please refer to Figures 2.21(2S)a and 2.21(2S)b for the Atlantic Street roadway plan.

South State Street

The proposed roadway cross section for South State Street will have two 11-foot lanes and 2-foot shoulders. West of Atlantic Street a 7-foot sidewalk will be provided on the south side of the roadway connecting to the existing sidewalk at the SITC. East of Atlantic Street a 4-foot refuge area will be provided on the south side of the roadway.

The horizontal alignment for South State Street is designed to allow for future construction of MNRR Track 7 and the I-95 northbound exit ramp reconstruction.

I-95 Northbound Exit 8 Off-Ramp

The proposed roadway cross section for the I-95 northbound exit ramp will have three 11-foot lanes and 2-foot shoulders. The left lane will be a dedicated left turn lane, the middle lane will be for left turns and through movements, and the right lane will be for through movements. The prohibition of the right turn to southbound Atlantic Street will be maintained under this alternative.

The grading of the ramp pavement at the terminus will match the profile grade of Atlantic Street. This results in a cross slope on the ramp of approximately 6% for the left turn lanes. Vehicles making the left turns would traverse an adverse slope of 6%. This would be an undesirable maneuver for trucks and other vehicles with high centers of gravity.

The horizontal alignment for the ramp is designed to provide space for a potential widening of I-95 northbound. This would allow for a future operational lane on I-95 and would also allow the ramp touch-down to match the proposed Atlantic Street roadway.

2.1.2. Vertical Profiles

Atlantic Street

The vertical alignment for Atlantic Street will be a sag curve controlled by the bridge structure and the minimum required clearance of 14'-6". To provide the required minimum clearance with a two-span bridge, the profile for Atlantic Street has to be lowered by approximately three feet with a 180-foot sag vertical curve and a minimum grade of 0.6% and a maximum grade of 6.8%. The headlight stopping sight distance (SSD) of 121 feet meets the values for a 20 per hour (mph) design speed. However, the provided SSD of 380 feet exceeds the minimum for a design speed of 45 mph. Please refer to Figure 2.31(2S)a for the Atlantic Street proposed Alternative 1 profile.

South State Street

The proposed vertical geometry for South State Street will follow a series of crest and sag curves with a minimum grade of 1.8% and a maximum grade of 4.3%. The stopping sight distance and the K values exceed those for a 30 mph design speed. Please refer to Figure 2.31(2S)b for the South State Street proposed Alternative 1 profile.

I-95 Northbound Exit 8 Ramp

The proposed vertical geometry for the exit ramp will follow a 220-foot crest curve and a 200-foot sag curve with a minimum grade of 0.8% and a maximum grade of 8.3%. The 220-foot crest curve extends through the existing ramp gore area and has an SSD of 265 feet for a 36 mph design speed. The 200-foot sag curve is located at the ramp terminus and has an SSD value exceeding 305 feet for a 40 mph design speed. The crest curve sight distance could be improved by reconstructing the end span of the bridge over Washington Street, but it is anticipated that the improvement would not result in a minimum desirable SSD value. The K values for these curves correspond to design speeds of 32 mph for the crest curve and 24 mph for the sag curve. Please refer to Figure 2.31(2S)c for the I-95 Exit 8 off-ramp, proposed Alternative 1 profile.

2.1.3. Rights-of-Way

There are no rights-of-way impacts.

2.1.4. Exceptions to Geometric Design Criteria

Intersection Sight Distance for the intersection of South State Street and Atlantic Street does not meet the minimum value for a design speed of 25 mph and will require a design exception.

The profile grade of 8.3% on the I-95 exit ramp exceeds the recommended maximum of 8% for downgrades on ramps.

The SSD for the crest curve on the I-95 exit ramp does not meet the desired value for a 50 mph design speed.

2.2. Alternative 2

The basic parameters of Alternative 2 are summarized as follows: provide a minimum vertical clearance of 14'-6" on Atlantic Street; provide for a potential future Track 7 for MNRR; provide for a potential future operational lane on I-95, northbound; and relocate the terminus for the I-95 northbound Exit 8 ramp to South State Street, mid-point between Atlantic Street and Canal Street. Please refer to Figures 2.22(2S)a and 2.22(2S)b for the Atlantic Street Alternative 2 roadway plan.

2.2.1. Horizontal Alignments and Lane Arrangements

Atlantic Street

As described above, the proposed roadway cross-section of the Atlantic Street underpass will have 11-foot lanes, 2-foot shoulders, and an 8-foot sidewalk in each direction of traffic. Northbound and southbound traffic will be divided by an 8-foot median and the northbound direction will be provided with a right-turn only lane.

The horizontal alignment for the Atlantic Street underpass is designed to match the existing roadway on its north side and the SUT alignment on its south side. A simple curve with a 410-foot radius is provided at the underpass.

South State Street

The proposed roadway cross section for South State Street will have two 11-foot lanes and 2-foot shoulders. West of Atlantic Street an 8-foot sidewalk will be provided on the south side of the roadway connecting to the existing sidewalk at the SITC. East of Atlantic Street a 4-foot refuge area will be provided on the south side of the roadway.

The horizontal alignment for South State Street is designed to provide for the future Track 7 and the I-95 northbound Exit 8 ramp reconstruction.

I-95 Northbound Exit 8 Ramp

The proposed roadway cross section for the I-95 northbound Exit 8 ramp will have three 11-foot lanes and 2-foot shoulders at the terminus on South State Street.

The horizontal alignment for the I-95 northbound Exit 8 ramp is designed to provide for a future I-95 northbound operational lane and fly-over Atlantic Street and touch down with a new terminus on South State Street, at a mid-point between Atlantic Street and Canal Street. Relocating the exit ramp will allow for the elimination of the existing prohibition of left turns from eastbound South State Street onto Atlantic Street. Removing the ramp from Atlantic Street will improve the traffic operations of the intersection and access between downtown Stamford's Central Business District (CBD), the SITC and southern Stamford.

2.2.2. Vertical Profiles

Atlantic Street

The vertical alignment for Atlantic Street will be the same as that proposed under Alternative 1. Please refer to Figure 2.32(2S)a for the Atlantic Street, Alternative 2 profile, located in Appendix G.

South State Street

The vertical alignment for South State Street will be the same as that proposed under Alternative 1. Please refer to Figure 2.32(2S)bi and Figure 2.32(2S)bii for the South State Street, Alternative 2 profile, located in Appendix G.

I-95 Northbound Exit 8 Ramp

Alternative 2 proposes a fly-over for the exit ramp over Atlantic Street and touching down on South State Street mid-way between Atlantic and Canal Streets. The proposed vertical geometry for the exit ramp will follow two 200-foot crest curves and a 220-foot sag curve with a minimum grade of 0.9% and maximum grade of 6.8%. The first 200-foot crest curve extends through the existing ramp gore area and has a stopping sight distance (SSD) value of 500 feet for a 55 mph design speed. The second crest curve follows a 500-foot vertical tangent grade and has an SSD of 325 feet for a 40 mph design speed. The 220-foot sag curve is located at the ramp terminus and has an SSD value exceeding 204 feet for a 30 mph design speed. The K values for these curves correspond to design speeds of 48, and 38 mph for the respective crest curves, and 30 mph for the sag curve. Please refer to Figure 2.32(2S)ci and Figure 2.32(2S)cii for the I-95 northbound Exit 8 off-ramp, Alternative 2 profile, located in Appendix G.

2.2.3. Rights-of-Way

There are no rights-of-way impacts.

2.2.4. Exceptions to Geometric Design Criteria

Intersection Sight Distance ISD for the intersection of South State Street and Atlantic Street does not meet the criteria for a design speed of 25 mph and will require a design exception.

The SSD for the crest curve on the I-95 exit ramp does not meet the desired value for a 50 mph design speed.

2.3. Alternative 3

The basic design parameters for Alternative 3 are summarized as follows: provide a minimum posted vertical clearance of 13'-6" on Atlantic Street; provide for a future operational lane on I-95 northbound; and maintain the terminus for the I-95 northbound Exit 8 ramp. This alternative was developed as a baseline for minimum acceptable design features and construction costs. A vertical clearance of 13'-9" does not meet the CTDOT's Highway Design Manual (HDM) criteria for vertical clearance, and a design exception would be required. Please refer to Figure 2.23(2S) for the Atlantic Street, Alternative 3 roadway plan, located in Appendix G.

2.3.1. Horizontal Alignments and Lane Arrangements

Atlantic Street

As described above, the proposed roadway cross-section of the Atlantic Street underpass will have 11-foot lanes, 2-foot shoulders, and an 8-foot sidewalk in each direction of traffic. Northbound and southbound traffic will be divided by an 8-foot median and the northbound direction will be provided with a right-turn only lane.

The horizontal alignment for the Atlantic Street underpass is designed to match the existing roadway on its north side and the SUT alignment on its south side. A simple curve of a 410 foot radius is provided at the underpass.

South State Street

The proposed roadway cross section for South State Street will have two 11-foot lanes and 2-foot shoulders. West of Atlantic Street an 8-foot sidewalk will be provided on the south side of the roadway connecting to the existing sidewalk at the SITC.

The horizontal alignment for South State Street does not provide for a future MNRR Track 7.

I-95 Northbound Exit 8 Ramp

Similar to Alternative 1, the proposed roadway cross-section for the I-95 northbound Exit 8 ramp will have three 11-foot lanes and 2-foot shoulders. The

left lane will be a dedicated left turn lane, the middle lane will be for left turns and through movements, and the right lane will be for through movements. The prohibition of the right turn onto southbound Atlantic Street will be maintained under this alternative.

The grading of the ramp pavement at the terminus will match the profile grade of Atlantic Street, similar to Alternative 1. This results in a cross slope on the ramp of approximately 6% for the left turn lanes. Vehicles making left turns would traverse an adverse slope of 6%. This would be an undesirable maneuver for trucks and other vehicles with high centers of gravity.

The horizontal alignment for the ramp is designed to match the proposed Atlantic Street roadway at the terminus.

2.3.2. Vertical Profiles

The vertical alignment for this alternative is designed to give a minimum vertical clearance of 13'-9", resulting in a posted clearance of 13'-6".

Atlantic Street

The vertical alignment for Atlantic Street will be a sag curve controlled by the bridge structure and the minimum vertical clearance of 13'-9". To provide the required minimum clearance with a two span bridge, the profile for Atlantic Street has to be lowered by approximately 2.5 feet with a 180-foot sag curve and a minimum grade of 0.6% and a maximum grade of 6%. The headlight stopping sight distance (SSD) of 145 feet meets the values for a 23 mph design speed. However, the SSD of 305 feet exceeds the minimum for a design speed of 40 mph. Please refer to Figure 2.33(2S)a for the Atlantic Street Alternative 3 roadway profile.

South State Street

The proposed vertical geometry for South State Street will follow a series of crest curves and sag curves with a minimum grade of 0.9% and a maximum grade of 2.4%. The SSD and the K values exceed those for a 30 mph design speed. Please refer to Figure 2.33(2S)b for the South State Street, Alternative 3 roadway profile.

I-95 Northbound Exit 8 Ramp

The proposed vertical geometry for the exit ramp will follow a 220' crest curve and a 190' sag curve with a minimum grade of 0.7% and a maximum grade of 7.8%. The 220' crest curve extends through the existing ramp gore area and has an SSD value of 265' for a 36 mph design speed. The 200' sag curve is located at the ramp terminus and has an SSD value exceeding 305' for a 40 mph design speed. Similar to Alternative 1, the crest curve sight distance could be improved by reconstructing the end span of the bridge over Washington Street, but it is

anticipated that the improvement would not result in a minimum desirable SSD value. The K values for these curves correspond to design speeds of 33 mph for the crest curve and 24 mph for the sag curve. Please refer to Figure 2.33(2S)c for the I-95 northbound Exit 8 off-ramp Alternative 3 roadway profile.

2.3.3. Rights-of-Way

There are no rights-of-way impacts.

2.3.4. Exceptions to Geometric Design Criteria

Intersection Sight Distance for the intersection of South State Street with Atlantic Street does not meet the minimum value for a design speed of 25 mph and will require a design exception.

The stopping sight distance for the crest curve on the I-95 exit ramp does not meet the desired value for a 50 mph design speed.

Alternative 3 does not provide the minimum required clearance of 14'-6" as per the standards.

2.4. Four-Span Option

The basic parameters of a four-span option are summarized as follows: provide a minimum posted vertical clearance of 14'-6" on Atlantic Street with a four-span bridge configuration; provide for a future operational lane on I-95 northbound; and maintain the terminus for the I-95 northbound Exit 8 ramp at Atlantic Street.

The horizontal geometry and lane arrangement are similar to Alternative 1. The four-span bridge configuration reduces the depth of structure by about 7-inches. The reduced structural depth allows the roadway profile to be raised beneath the bridge, resulting in profiles similar to those of Alternative 3.

Please refer to Figures 2.21(4S)a through b and 2.31(4S)a through c located in Appendix G, for details pertaining to the four-span option's roadway plan and vertical profile.

2.5 Enhancements to Pedestrians, Bus, Taxi and Transit Operations

The outermost traffic lanes are designed for possible use as a dedicated lane for the operation of a streetcar. The concept of a streetcar system in Stamford is currently being studied and the true potential of a streetcar system will be determined based on the results of this study.

The outermost lanes will be used for other transit operation including buses and taxis. Passengers may be discharged on Atlantic Street, south of the underpass, and access the

SITC via the proposed extension of the walkway along the south side of the railroad tracks to the northbound platform.

On South State Street, the existing sidewalk at the SITC does not extend to Atlantic Street and the travel lanes east of Atlantic Street do not have a shy distance to the retaining walls. West of Atlantic Street a 7-foot sidewalk will be provided to connect to the existing sidewalk at the SITC and east of Atlantic Street. For alternatives 1 and 2, a four-foot refuge area will be provided along the retaining walls.

3. RAIL OPERATION

3.1 Rail Staging and Sequencing Requirements

The Atlantic Street bridge is an undergrade structure on the New Haven Line at mile post (MP) 33.19 in Stamford, CT. The bridge is situated between CP233 and CP234. CP233 and CP234 are interlockings[2]. The "CP" signifies "Control Point", the "2" indicates that the interlockings are located on the New Haven Line, and the last two digits indicate approximate mile posts.

Atlantic Street bridge is located approximately 500 feet east of the SITC. The bridge carries five tracks: the four New Haven Line Tracks, numbered 3, 1, 2, and 4, and the New Canaan Branch (Track 5). Replacement of the bridge will be done one track at a time. The replacement work will require that each track be taken out of service while the reconstruction work on the portion of the bridge under that track is performed. The bridge replacement work can be done either working in the north to south, or the south to north direction.

The construction staging plans for the Atlantic Street bridge (please refer to Appendix C for the Construction Schedule) show the reconstruction of the bridge being progressed in a south to north direction (Track 4 to Track 5). The bridge reconstruction work is shown being done in five main stages. Each of these stages will require a continuous track outage for the track being replaced on the portion of the bridge being reconstructed. It is estimated that the duration of the continuous track outages required for each track reconstruction will be 150 calendar days.

The installation of a temporary passenger platform will be required during Stage 4 of the project work. This platform will allow Track 1 to be used as a passenger boarding/unloading track at the SITC. Two additional short track outage periods will also be required during this stage for the installation and removal of the temporary passenger platform.

[2] Interlockings are switches and/or crossovers that allow trains to travel from one track to another governed by signal indications. On the New Haven line, these points are remotely controlled by the MNRR Operations Control Center.

The continuous track outages will impact the use of the SITC passenger platforms. During these outages, the normal routing of eastbound and westbound trains into the station area will have to be adjusted to accommodate the out-of-service tracks and passenger platforms.

With the mobilization period, the 150 calendar days required for each continuous track outage, and the approximate five month period to complete the roadway work under the bridge, the total project duration time for the replacement of the Atlantic Street bridge is approximately 2 years, 11 months.

3.2 Impact and Operational Issues of Proposed Construction

Replacement of Track 4 - When Track 4 is taken out of service at the Atlantic Street bridge, the passenger platform for Track 4 in the station will be out of service for eastbound and westbound trains. Please refer to Figure 3.1a, located in Appendix G, for details.

Eastbound trains on Track 4 will use SELLECK to divert to one of the three adjacent in-service passenger platform tracks or to Track 1.

Westbound trains on Track 4 will be required to use CP234 to divert to one of the other three adjacent in-service passenger platform tracks or to Track 1 in the station area.

Replacement of Track 2 - When Track 2 at the Atlantic Street bridge is taken out of service, the passenger platform for Track 2 in the station will be out of service for eastbound and westbound trains. Please refer to Figure 3.1b, located in Appendix G, for details.

Eastbound trains on Track 2 will use SELLECK or CP233 to divert to one of the other three adjacent in-service passenger platform tracks or to Track 1 in the station area.

Westbound trains on Track 2 will be required to use the crossovers in CP234 to divert to one of the other three adjacent in-service passenger platform tracks or to Track 1 in the station area.

During the Track 2 outage at the Atlantic Street bridge, a consideration may be given to installing bridge plates or a temporary platform from the south center platform over Track 2. The temporary platform would allow Track 1 (normally a through track) to be used as a passenger boarding and disembarking track.

Replacement of Track 1 - When Track 1 at the Atlantic Street bridge is taken out of service, Track 1 in the station area will also be out of service. The Track 1 outage on the bridge will not require any of the four platform tracks in the station to be taken out of service. Please refer to Figure 3.1c, located in Appendix G, for details.

Eastbound trains on Track 1 will be diverted from Track 1 in SELLECK or CP233 to one of the other four in-service passenger platform tracks in the station area.

Westbound trains will be required to use the crossover(s) in CP234 to divert to one of the other four adjacent in-service passenger platform tracks in the station area.

Replacement of Track 3 - When Track 3 at the Atlantic Street bridge is taken out of service, Track 3 through the station area will be out of service. A temporary passenger platform over Track 3 will be required to allow trains to board and unload passengers from Track 1. This is needed to maintain an adequate number of passenger platform tracks at the SITC to facilitate train operations during this stage of the bridge replacement work. Please refer to Figure 3.1d-f, located in Appendix G, for details.

Eastbound trains on Track 1 will be able to use the temporary passenger platform over Track 3, or be diverted in SELLECK to one of the other three in-service passenger platforms in the station.

Westbound trains on Track 3 can use the 5-3 crossover in CP235 to divert to Track 5. Westbound trains on Track 3 can also use the 1-3 crossover in CP234 to divert to Track 1 or one of the other two passenger platform tracks in the station area. Track 3 in the station area will be out of service, however Track 1 will be used for boarding and un-loading passengers onto the temporary passenger platform over Track 3.

Replacement of Track 5 (New Canaan Branch) - The Track 5 outage at the Atlantic Street bridge will not require any of the four passenger platform tracks or through-Track 1 in the SITC to be taken out-of-service. Please refer to Figure 3.1g, located in Appendix G for details.

Eastbound trains on Track 5 can use the 5-3 and the W3-5 crossovers in CP234 to run around the bridge work on Track 5.

Westbound trains will be able to use all four of the platform tracks and Track 1 in the station area. Westbound trains on Track 5 will be able to use the W3-5 and 5-3 crossovers in CP234 to detour around the Track 5 outage at the Atlantic Street bridge.

3.3 Summary and Conclusions

Construction of the Atlantic Street bridge will impact train operations both east and west of the SITC. Use of the SITC passenger platform tracks will also be impacted during the reconstruction of each track section of the bridge.

The Atlantic Street bridge construction will require modifications to train operations through the SITC area. Reconstruction of the Track 3 portion of the bridge will require that a temporary platform be installed in the station over Track 3 to allow passenger boarding/unloading from Track 1. The Atlantic Street bridge work will also require

several adjustments to normal train routing both east and west of the SITC area during reconstruction of each of the tracks.

It is recommended that reconstruction of this bridge be done in the same time-frame as the work for the Greenwich Avenue bridge. Construction of the Atlantic Street and Greenwich Avenue bridges will similarly impact the train operation in and through the SITC area. It would be cost effective to combine the station impacts and train operation inconveniences required for both of these bridges in a single construction sequencing period, rather than having to allow for them twice in different construction periods.

It is not recommended that the Atlantic Street bridge be reconstructed in the same time frame as the Canal Street bridge. This is not recommended because both of these bridges are within CP234, and concurrent reconstruction of them would cause substantial and severe train operation restrictions within this interlocking and to the SITC passenger platform tracks.

The Atlantic Street bridge could also be considered for reconstruction with the Elm Street and East Main Street bridges. Metro-North should be consulted for its concurrence regarding these recommendations, and to determine any other train operation impacts.

4. BRIDGE 08012R – MNRR OVER ATLANTIC STREET

4.1. Existing Bridge

The existing MNRR bridge is identified as Bridge No. 08012R at MNRR mile post (MP) 33.19. Originally constructed in 1896, the bridge carries five MNRR mainline tracks over Atlantic Street. The bridge has a maximum overall length of 71 feet and a maximum center span length of 64.5 feet. The out-to-out deck dimension is 64.5 feet. The vertical clearance is measured to be 12’-7” and posted to be 12’-4”. Because of the intersection to the south, the abutments and piers flare out to increase the bridge opening, varying the length of the bridge.

The three-span, open-deck superstructure is simply supported on steel frame piers. The center span consists of riveted through-girders, common to the adjacent tracks, floorbeams, and stringers. The end spans use the stringers to bridge over the sidewalks.

The superstructure is supported by brownstone masonry abutments with concrete bridge seats and steel-framed piers. The existing abutments and wingwalls are made of brownstone masonry. The north wingwalls are parallel to the tracks and abut the stone masonry walls that are supporting the railroad tracks while the south wingwalls are flared out conforming to the current roadway configuration and taper down with the railroad embankment.

A Bridge Inspection Report dated October of 2008 found the condition of the MNRR bridge over Atlantic Street to be in an overall poor condition with a rating of "4". The report noted numerous deteriorations of the superstructure, ranging from section losses and cracks to vehicular collision damages. Heavy corrosion was reported near the bearing areas of steel members and rivet head loss. The report also noted the substructure to be in poor condition with settlement under the bearings, resulting in the stringers coming in contact with the backwall. The bridge has been load rated for a Cooper E48 - Normal Load Rating, controlled by the through girder between Tracks 2 and 4.

There are no record plans for the north retaining walls to indicate the type of wall and the depth of embedment of their foundations. Based on visual inspection and an understanding of typical construction of like retaining walls used during the period the bridge was constructed, they are assumed to be gravity type walls without a reinforced concrete foundation. These walls are immediately adjacent to the south side of South State Street with no roadway barrier between South State Street and the retaining walls.

4.2. Proposed Improvements

Sections 2.1 through 2.4 laid out three main alternatives along with variations for proposed improvements to Atlantic Street. Proposed improvements include:

1. Increasing the bridge span length to accommodate the wider curb-to-curb width of Atlantic Street.

2. Increasing the vertical clearance to accommodate all legal height vehicles.

3. Reconstructing the bridge to provide for a potential future extension of MNRR Track 7 to be located north of existing MNRR Track 5.

4. Constructing a pedestrian walkway to provide access from the eastern sidewalk on the south side of the Atlantic Street undergrade bridge to the northbound platform of the SITC.

These proposed improvements create conflicts at the five-legged intersection to the north of the underpass for Alternative 1. To mitigate the conflicts, the intersection has been shifted slightly north, realigning South State Street and the I-95 northbound exit ramp. Please refer to Figures 4.1a and 4.1c for the General Plan and Elevation for Alternatives 1, 2, and 3 with a two-span configuration.

4.2.1. Critical Controls

4.2.1.1. Depth of Structure

In order to accommodate the proposed roadway widening, the bridge's span length must be increased. The existing abutment walls need to be relocated back approximately 26'-11" and 16'-8" along the centerline of MNRR Track 1

for the east and west abutments, respectively. These dimensions are driven by the location of the centerline of the pier and the horizontal alignment of Atlantic Street.

Depending upon the final depth of proposed structure (measured from top of rail to bottom of superstructure), the profile of Atlantic Street will need to be lowered about two and a half to three feet.

1. *Conventional Abutment*

   One option to reduce the structure depth involves shortening the span length. This would be accomplished by using a conventional abutment construction method instead of a top-down construction method, reducing the overall length of the bridge. This construction method would shorten the design span length from 62.8 feet to 56.9 feet, which in turn reduces the structural depth by about three inches.

   A cost analysis indicates the increase in total cost to be about 6.5 million dollars. This increase in cost is mainly due to the fact that:

   - a conventional abutment method requires a deeper excavation, down to four feet below the street grade
   - a more substantial support of excavation system is needed
   - the complete demolition of the existing abutment is required before reconstruction

   This earth excavation would occur adjacent to operating tracks and increasing the depth of excavation, would add to the complexity of the construction. In addition to being more costly, the construction of conventional abutments would require a longer construction period than the top-down construction method.

2. *Four-Span Option*

   A four-span option was considered in addition to a two-span option. The four-span option would reduce the design-span length from 62.8 feet to 48.8 feet. The shortened span length would reduce the structure depth by about 7 inches. The four-span bridge configuration was analyzed only with the top-down abutment construction method. Please refer to Figure 4.1b for the General Plan and Elevation for a four-span configuration applied to Alternative 1, located in Appendix G.

4.2.1.2. MNRR Track Alignment

A requirement of Metro-North is that the elevation and horizontal alignment of the MNRR tracks remain unchanged. Since the tracks cannot be raised, the required minimum vertical clearance of 14’-6” (or 13’-9”) in conjunction with

the depth of proposed structure will control the elevation and vertical geometry of Atlantic Street. The final vertical profile of Atlantic Street will determine the extent that Atlantic Street will need to be lowered and the resulting impacts on adjacent intersections, roadways and properties.

4.2.1.3. Limited Headroom

Overhead catenary wires will be de-energized but will be maintained in their current location during construction activities, restricting headroom. This constraint will limit the use of overhead equipment, e.g. cranes. This is of particular importance during construction of the foundations and erection of the superstructure.

4.2.1.4. Horizontal Alignment

Since Atlantic Street is not on a tangent but instead is a curve with a 410-foot radius, the width of the median varies slightly, providing a minimum required width of 8 feet. Both the pier and the abutment walls are parallel to a chord on the Atlantic Street baseline curve and provide at least the minimum required width for the sidewalks and median. The shoulder and lane delineations were offset from the baseline to provide the minimum median shoulder width of 12 feet. The pier also acts to divide opposing traffic.

4.2.2. Superstructure Types

Several bridge types were considered for the preliminary engineer study including:

- through girders
- 2-girder ballasted concrete deck
- 4-girder ballasted steel plate deck
- multi concrete-encased beams
- prestressed butted box beams

Two bridge configurations were considered: a two-span option and a four-span option. The two-span option had two simple spans, with a design span length of 62'-9½". A four-span option was considered in order to reduce the span length and consequently the depth of structure, minimizing impacts to the existing Atlantic Street profile. The four-span option has a design span length of 48'-9½".

For consistency, each structure type is compared based on its structure depth. The structure depth is measured from the top of track to the bottom of girder. The girder depth takes into account only the total depth of the girder. Common dimensions include: $7^{5}/_{16}$-inch rail height, 8½-inch concrete ties, 8½-inch minimum ballast thickness, and a 1-inch ballast mat. Dimensions for specific structure types include: a 13-inch concrete deck with haunch for the two-girder option, 1½-inch steel deck plate for the through girder option, and 2-inch thick steel deck plate for the multi-steel girder option.

Only the shallowest superstructure alternate, the concrete-encased steel beam structure type, was considered to be a viable option because of the extent to which Atlantic Street needs to be lowered,

Precast Multi Concrete-Encased Beams: This superstructure type is economical and requires low maintenance. The butted beam construction allows for a ballasted track without the need to provide for an additional deck system. This structure type offers the shallowest superstructure depth among the alternatives considered, but usually requires significantly more steel than the other alternatives. This system is appropriate for short to moderate span lengths. Considering a two-span, top-down abutment construction method, this structure type option would require a 4'-11" superstructure depth at Atlantic Street. For the four-span, top-down abutment construction method, the precast multi concrete-encased beam structure type would require a structure depth of 4'-4". Please refer to Figure 4.2 for the typical section with precast multiple concrete-encased steel girders, located in Appendix G.

4.2.3. Abutments

Because the bridge is being built in stages, it is proposed that the new abutments be constructed using a top-down construction technique. Please refer to Figure 4.5, located in Appendix G, for more details pertaining to the Abutment Plan. This construction technique allows for short stub abutments supported on mini-piles. Because this type of abutment and methodology requires less excavation and materials, it greatly reduces the support of excavation requirements within close proximity to the adjacent operating tracks. Drilled mini-piles are the recommended foundation type for the abutments because of their ease of installation in low overhead conditions. The abutment seat will be constructed with cast-in-place concrete and the abutment wall will be built using a tie-back wall with steel walers, concrete lagging, and a concrete fascia aesthetically treated with concrete formliner.

Alternatively, conventional abutments may be used, which will reduce the span length and subsequently reduce the superstructure depth by approximately three inches. However, construction of conventional type abutments would require a significant amount of structural excavation adjacent to live tracks and an extensive temporary earth retaining system. Because of this, this type of abutment results in a longer construction duration. Roadway construction cost savings from the reduction of the superstructure depth is estimated to be minimal, if not insignificant, and is not considered to be commensurate to the significant additional costs associated with this substructure construction.

The abutments will be extended to the north under Alternatives 1 and 2 to tie into the new location of the walls that retain the MNRR embankment. This will also accommodate a potential extension of MNRR Track 7 across Atlantic Street.

4.2.4. Pier

Due to the increased length of the bridge and the need to provide a shallow superstructure, a two-span and a four-span bridge option is proposed. The multiple spans will be supported by the appropriate abutment type and new proposed pier(s). These pier(s) will also act as a divider between directional traffic and, for the four-span option, a divider between the sidewalks and bike lanes.

The proposed pier(s) will be comprised of a footing, pier cap, and circular columns. The pier cap width is estimated to be approximately 5.5 feet in order to accommodate two rows of bearings. The circular columns are estimated to be 4-foot in diameter and will be supported on an 8-foot wide pile cap founded on mini-piles. Two-foot, vertical traffic barriers will be placed on either side of the pier(s) to protect the columns from vehicular collisions. Please refer to Figure 4.6 for the Pier Plan, located in Appendix G.

Atlantic Street will be closed to traffic during construction. Similar to the other undergrade bridge locations in this project, the Atlantic Street pier(s) will have a footing founded on drilled mini-piles.

The pier(s) will be extended to the north under Alternatives 1 and 2 to match the abutments, and can accommodate a potential extension of MNRR Track 7.

4.2.5 Retaining Walls

Retaining walls are discussed in Section 5 – Other Structures.

4.3. Phased Construction Requirements

Because only one MNRR track can be taken out of service at a time, the construction of a new bridge must be done in phases. The tracks can be taken out of service in a north to south or a south to north order. As previously discussed in the rail operations section of this report, the tracks are shown as being taken out-of-service from north to south.

As a track is taken out of service, work will immediately begin to stabilize the foundation of the adjacent tracks to permit excavation under the track that is out. Once the earth retaining system has been installed, construction of the new abutments will begin in a top-down method, or a conventional method, to support the new structure. Simultaneously, the existing pier will be demolished under the track that is out and the new pier will be constructed in its proposed location. The new superstructure will be fully supported by new substructure with the existing, independently functioning structure one track away. Once the new structure is completed, the next adjacent track will be taken out of service. Again, care will be taken not to disturb the existing foundations and the new foundations. Please refer to Figures 4.3a through 4.3b and 4.4a through 4.4e for more details pertaining to the construction staging and sequence.

4.3.1. Suggested Superstructure Erection Method

The present conditions around the track make for a challenging erection procedure. Particular challenges include:

- obtaining the required vertical clearance
- horizontal clearances limited by adjacent live tracks
- overhead wires

A method of erection that is suited to these constraints is launching the girders on the out-of-service track. This involves the building of a beam erection frame on both the abutment and the pier at track level. These frames will support an erection beam that will span from pier to abutment and be capable of supporting at least one half the weight of a bridge beam. The bridge beam will be delivered to the site via rail car on the track that is out of service. One end of the bridge beam will be supported by rollers on the bottom flange of the erection beam while the other beam will be supported on land by another rolling mechanism. The bridge beam will then be launched across the span and lowered to its permanent location. These steps will be repeated for all beams to complete the superstructure.

4.4. Aesthetic Treatments

The face of the concrete abutments will be treated aesthetically with formliner to simulate a stone appearance and can be made to mimic the appearance of the original brownstone masonry.

4.5. Summary and Conclusions

4.5.1. Structure Summary

It is proposed that the existing three-span, plate girder bridge be replaced with a two-span bridge or a four-span bridge configuration. The proposed structure type is a multi concrete-encased steel beam structure which will provide the shallowest depth of structure. The longer proposed span, to accommodate additional travel lanes, will require the addition of a pier in order to minimize structure depth.

Five structure types were considered for feasibility. Non-viable options were eliminated and the remaining options were considered for impact to Atlantic Street alignment, constructability and cost.

One track will be taken out of service at a time to mitigate impact to the rail operations. As a result, construction will progress in phases. Each phase will require a track outage where the existing bridge will be removed and reconstructed without disturbing the adjacent tracks which are to remain in operation. Because of the constraints presented, a top-down construction method is recommended to construct the abutments. For the purposes of this report, the tracks were replaced from south to north.

4.5.2. Construction Duration

The construction of the new undergrade bridge will be performed in five phases since only one track can be taken out of service at a time (one phase for each track). It is estimated that each track outage will require 150 calendar days to complete the necessary bridge reconstruction. Including time for mobilization, the five track outages, and the five months necessary to complete the roadway work for Atlantic Street, the total estimated construction duration is 2 years and 11 months. Please refer to Appendix C for the proposed construction schedule.

4.5.3. Estimated Construction Cost

Construction cost estimates have been developed based on the weighted unit prices listed in the Connecticut Department of Transportation's Item Master File (December 2010) and the CTDOT's Preliminary Cost Estimating Guidelines (January 2011). The unit prices have been adjusted to reflect construction cost in 2011. The cost estimates do not include costs associated with environmental studies, environmental remediation, rights-of-way acquisitions, or professional services for survey, design, or construction engineering and inspection. The construction costs for the Atlantic Street site are summarized as follows:

		Alternative 1	Alternative 2	Alternative 3
Roadway, Drainage, Traffic, Structures and Rail Operations	$	32,705,000	36,282,000	26,884,000
Utilities	$	3,158,000	3,158,000	3,158,000
Railroad	$	8,598,000	8,598,000	8,274,000
Incidentals and Contingencies	$	9,157,000	10,159,000	7,527,000
Totals	**$**	**53,618,000**	**58,197,000**	**45,843,000**
Four-Span Alternative Price Differential	$	6,953,000	NA	NA
Total	**$**	**60,571,000**	**NA**	**NA**

For details pertaining to the estimates, please refer to Appendix D.

5. OTHER STRUCTURES

5.1. Alternative 1

Please refer to Figures 2.41(2S)a through 2.41(2S)b for critical cross sections pertaining to Alternative 1.

5.1.1. Roadway Retaining Walls

In order to obtain the minimum vertical clearance of 14'-6", it is necessary to lower Atlantic Street when reconstructing the bridge. The shallowest depth of structure is obtained by using the multi concrete-encased beams. Depending upon the span configuration of the bridge and the abutment construction method, the depth of structure from top of rail to bottom of beam would range from 4'-4" to 4'-11". Using a multi concrete-encased beam structure type will require lowering the Atlantic Street profile by about 3 to 3.5 feet at the underpass. Alternative 1 and 2 also propose that the five-legged intersection be shifted to the north to allow room for the extension of the bridge to accommodate a potential extension of MNRR Track 7.

The impact of lowering Atlantic Street and shifting the five-legged intersection extend beyond Atlantic Street to the intersecting roads. South State Street runs parallel to the tracks and will need to be lowered to meet the proposed grade of Atlantic Street, where the two intersect. Where South State Street extends east of Atlantic Street, the existing retaining wall to the north used to support I-95 will need to be demolished and replaced with a new retaining wall, relocated as needed. Please refer to Figure 5.2 for proposed roadway retaining walls.

A northbound exit ramp from I-95 requires retaining walls on both sides of the structure. Due to the lowering of the I-95 exit ramp profile and shifting of the five-legged intersection, retaining walls supporting this ramp require demolition and relocation as needed.

5.1.2. Railroad Retaining Walls

The existing retaining walls located between South State Street and the tracks retain the embankment supporting the MNRR tracks. This existing wall is constructed of brownstone masonry. The structural details of the wall are unknown. Based on the time period the walls were built, it is assumed that they are gravity type construction. Because the intersection with Atlantic Street has been shifted north to accommodate the expanded structure, the retaining walls must be reconstructed along South State Street to approximately station 507+00 to the west, and station 514+75 to the east (the exact location depends upon the span configuration and the abutment construction method). Beyond these points to the west and east, the lowering of South State Street has the potential to undermine this wall and therefore further evaluation must be made to determine if the wall must be reinforced, underpinned or replaced. Please refer to Figure 5.1A for proposed railroad retaining walls.

5.2. Alternative 2

Please refer to Figure 2.42(2S)a through 2.42(2S)b for critical cross-sections pertaining to Alternative 2.

5.2.1. Fly-Over Exit Ramp

An independent structure is proposed to be built over Atlantic Street to carry the I-95 exit ramp and touch down onto South State Street at a point mid-way between Atlantic and Canal Streets. This will eliminate prohibitively steep grades on the exit ramp. The proposed structure is a 93-foot simple span. The bridge will be composed of steel girders and an 8.5-inch concrete deck, composite with the girders. This structure will not be integral with the existing I-95 bridge. Please refer to Figure 5.3, located in Appendix G for more details.

5.2.2. Roadway Retaining Walls

Alternative 2 proposes taking the I-95 exit ramp over Atlantic Street and tying into South Street further east, and not at the Atlantic Street intersection as is currently the case. This would eliminate the steep profile grade that would occur if the exit ramp were to be lowered to meet the depressed Atlantic Street intersection. This proposed solution requires a new retaining wall be constructed the full height of the I-95 embankment to the west of Atlantic Street where the ramp once came down, and also a new wall in the ramps proposed location. This would require modifying the retaining wall that separates I-95 along the proposed location of the new exit ramp. Please refer to Figure 5.2 for proposed roadway retaining walls.

5.2.3. Railroad Retaining Walls

The existing retaining walls located between South State Street and the MNRR tracks retain the embankment supporting the tracks. This existing wall is constructed of brownstone masonry. The structural details of the wall are unknown. Based on the time period the walls were built, it is assumed that they are gravity type construction. Because the intersection with Atlantic Street will be moved north to accommodate the expanded structure, the retaining walls must be reconstructed along South State Street to approximately station 507+00, to the west, and station 514+75, to the east (the exact location depends upon the span configuration and the abutment construction method). Beyond these points to the west and east, the lowering of South State Street has the potential to undermine this wall and therefore further evaluation must be made to determine if the wall must be reinforced, underpinned or replaced. Please refer to Figure 5.1A for proposed railroad retaining walls.

5.3. Alternative 3

Please refer to Figure 2.43(2S)a through 2.43(2S)b for critical cross-sections pertaining to Alternative 3.

5.3.1. Roadway Retaining Walls

For Alternative 3, the new undergrade bridge will not be expanded to the north to accommodate a potential future MNRR Track 7. The five-legged intersection alignments for the I-95 northbound exit ramp and South State Street will not

change. The vertical profiles will be affected on South State Street and the I-95 exit ramp requiring that the existing roadway retaining walls be evaluated to determine if they will be undermined by the lowering of these roads. Further evaluation of these walls must be done to determine if reinforcement, underpinning or replacement is necessary. Please refer to Figure 5.2 for proposed roadway retaining walls.

5.3.2. Railroad Retaining Walls

For Alternative 3, since the five-legged intersection will not be moved to the north, the only concern lies in the change in vertical profile of South State Street. Further evaluation of the retaining wall south of South State Street that support the MNRR tracks is needed to determine the depths of their foundations, and if reinforcement, underpinning or replacement will be needed. Please refer to Figure 5.1B for proposed railroad retaining walls, located in Appendix G.

5.4. Pedestrian Access Ramps

A pedestrian walkway is proposed to cross over Atlantic Street and connect pedestrians to the northbound platform. Stairs and an elevator constructed on the south side of the east abutment will provide access to the pedestrian walkway. The bridge will be a dedicated, single span truss, extending from abutment 1 to abutment 2. A platform will provide the connection between the existing northbound platform and the new pedestrian bridge.

5.5. Catenary Tower

There is a catenary tower located to the west of Atlantic Street on the southern side of the MNRR tracks. The foundation of the tower will be in conflict with the new abutment footing. It is proposed that the tower be moved further west to ensure the foundations are not in conflict.

6. TRAFFIC

6.1. Traffic Operational Requirements

Atlantic Street is multi-lane road that is generally classified as an Urban Arterial/Urban Collector. Although it generally consists of multiple through and turning lanes in both directions throughout its length, it narrows to a single wide lane in each direction as it passes under the MNRR bridge. A major intersection with South State Street is located immediately to the north of the bridge, between the railroad and Interstate 95. Immediately south of the bridge is an intersection with Manhattan Street, a one-way street in the northbound direction, away from the intersections. Posted turn restrictions prohibit turning left onto Manhattan Street from Atlantic Street southbound.

Complicating the traffic flow in the area are the additional intersections of Station Place within 175 feet of Manhattan Street, the parking garage entrance located south of Station Place, and the North State Street intersection on the north side of Interstate 95.

The combined effect of these heavily utilized, signalized intersections presents a condition where traffic flows are heavily impacted by both upstream and downstream operations. With only 160 feet between North State Street and South State Street, and only 250 feet available between South State Street and Station Place, queuing between these intersections can lead to congestion at adjoining locations even though the basic intersection capacity may theoretically be sufficient. Intersection signal timings, phasing, and system coordination influence the operation and level of service within the entire corridor.

The MNRR bridge presents a choke point due to its lack of width and the lane restrictions associated with the present cross section. Following discussions with City officials, lane arrangements for Atlantic Street were chosen that reflect the proposed Urban Transitway (SUT) that will result in a re-alignment of Atlantic Street, Manhattan Street and Station Place, and the provision of two through lanes, a right turn lane and a left turn lane southbound, as well as three through travel lanes northbound through the structure.

Although capacity analyses of existing traffic volumes indicate that the corridor operates below capacity, the present lane arrangements produce queues that exceed available storage, in some cases by double the available capacity. Continued growth to the projected design horizon of 2029 will cause severe increases in congestion throughout the corridor, with most intersections exceeding their available capacity, and virtually all northbound and southbound queues will exceed the available storage between intersections.

The proposed reconstruction will provide additional lanes in both the northbound and southbound directions, resulting in two through lanes, a left turn lane and a right turn lane southbound and three through lanes northbound. These additional lanes will provide additional capacity and lane continuity with the SUT, reduce queues, and improve operations throughout the corridor.

It is anticipated that the existing traffic signal at the intersection of Atlantic Street and South State will have to be replaced as part of this project. In order to accommodate the additional through and turning lanes on Atlantic Avenue and the realignment of the roadway, the signal head placement will have to be revised. In addition, the proposed modifications to the curb lines at the intersection will cause the signal controller to be relocated, and loop detectors and associated conduit runs to be relocated. The result is the reconstruction of the entire signal. However, because there is a minimal change proposed to the curb lines, lane configurations, or roadway alignment at North State Street or at the SUT, it is anticipated that the signals at these locations can remain in place, with potentially minor revisions to the signal head placement.

6.2. M&PT Requirements

Replacement of the bridge will be done one track at a time. The replacement work will require that each track be taken out of service while the reconstruction work on the bridge under that track is performed. The bridge replacement work can be done either working in the north to south, or the south to north direction.

In order to obtain the desired minimum vertical clearance of 14'-6", Atlantic Street will be lowered under the MNRR bridge by approximately 2 feet. The lowering of the profile for Atlantic Street will potentially impact South State Street, the I-95 northbound Exit 8 ramp, North State Street, Station Place and the SUT. Proposed changes to the horizontal alignment are related to the SUT. It is also anticipated that the lowering of Atlantic Street will result in the need to relocate the following utilities:

- Low Pressure Gas
- Water (2-parallel)
- Underground Electric (2)
- Underground Telephone with fiberoptics (2)

Construction of the center bridge pier, which is skewed and located between the existing piers, severely limits the space available for the maintenance and protection of traffic.

Construction of the proposed bridge over Atlantic Street is likely to require a full roadway closure and traffic detour to another street to cross under the MNRR. Please refer to Figure 6.1, Roadway M&PT, for more details. This impact is primarily due to location of the mid-span bridge pier, and the construction area needed to erect it. During closure, detour routes will have to be established to re-route traffic to other parallel roadways. Westbound I-95 traffic should be signed to use Canal Street, and Eastbound I-95 traffic should be signed to use Greenwich Avenue, and then McCoullough Street to South State Street, or Pulaski Street to the south of the station. Local traffic should use Washington Street and Canal Street to bypass the closure. Depending upon construction sequence, it may be possible to maintain a single lane of traffic throughout all or part of the construction, although severe limitations on vertical clearance will require detours to be established for trucks and emergency vehicles.

In order to construct the new bridge abutments, modify the retaining wall supporting the MNRR, demolish the existing structure and erect the new structure, it is anticipated that the southernmost lane of South State Street will be closed to traffic throughout the construction. The I-95 northbound exit ramp will require a reduction in width to accommodate the change in profile. Intermittent ramp closures may be required to implement the reconstruction.

Pedestrian detours will need to be developed whenever a sidewalk under a bridge is closed. Pedestrians should be directed to cross at the nearest signalized intersection on

either side of the bridge. These detours will be developed during the final design stages.

7. DRAINAGE

7.1. Existing System Conditions

Atlantic Street has a low point at the existing railroad bridge. From this low point, the contributing areas to the north extend to just north of the MNRR bridge. The high point, located south of the bridge, is at a point approximately 100 feet to the south of the MNRR crossing. Please refer to Figure 7.1, located in Appendix G, for more details pertaining to the drainage plan.

Runoff along North State Street is collected in a system running west to east, following the profile of the roadway. Runoff concentrated along South State Street is also collected and conveyed in a system running west to east. No stormwater runoff is contributed from the north of the MNRR bridge over Atlantic Street.

At the Y-intersection south of the MNRR bridge, Manhattan Street splits off from Atlantic Street; however, drainage along that street is conveyed away (south-east) from Atlantic Street. Similarly, the existing SUT decreases in grade from the intersection with Atlantic Street (to the east) as does the drainage system servicing the road.

From the survey, it appears that the runoff collected at the eastern low point beneath the bridge is conveyed by a 12-inch pipe running north to the South State Street system, though the tie-in is not shown. The runoff collected at the western low point is conveyed through a 12-inch RCP southerly through multiple manholes to the system servicing Station Place at its intersection with Atlantic Street. Due to inaccessible inverts, the flow line is not known.

7.2. System Constraints and Concepts Considered

For this study, a separate system was analyzed for the new alignment at the low point under the bridge. Due to the uncertainty of the existing drainage system at the intersection of Station Place and Atlantic Street, the tie-in at an existing manhole (station 15+43, 30 LT), where a 36-inch RCP flow line is well defined, was used for the proposed drainage. Historical research on the Stamford drainage systems has revealed a record drawing prepared by the ACOE (revised in 1967) that shows this 36-inch pipe connects to the Dyke Lane Pump Station approximately ¾ of a mile south, which discharges flows into the harbor. It is assumed that the pump station has the capacity to handle the contributing flows in the existing condition. Due to lack of information on the design hydraulic grade line of the 36-inch pipe, it is conservatively assumed that the pipe flows full for the 25 year event.

Note that there are multiple alternatives proposed for the lowering of Atlantic Street. For the purposes of this study, the alternate providing the worst case for drainage (that being the greatest lowering of the roadway) was selected for presentation of findings.

7.3. Design Criteria

The City of Stamford requires that the storm sewer design accommodate a 25-year event. All other requirements for storm sewer design will adhere to the CTDOT Drainage Manual. Specifically:

- low points will be analyzed for a 25-year event
- on-grade gutter flow spread will be one half of the travel lane at maximum
- sag condition gutter flow spread will be all but one lane width at maximum
- storm sewer design will address full flow (non-pressure) conditions

7.4. Design Documentation

The proposed drainage for the sag point of Atlantic Street at the underpass includes providing catch basins at the low point (either side of the bridge) with flanker basins set 0.5-feet higher than the top of frame at the low point. Design documentation is located in Appendix E.

7.4.1.Gutter Flow

Gutter flow to the low points has been calculated from best available information. Drainage areas which were delineated to the low point are preliminary and subject to final grading based on vertical profile. The area contributing to the sag point at 17+45 LT is approximately 1.5 acres. This drainage area includes portions of South Main Street approaching the SITC because of the abandonment of a catch basin on South State Street due to the realignment of that street. This drainage area may be conservative because information on the drainage system on South State Street is not available. A 25-year rainfall event of 5.5 inches per hour was used assuming a minimum time of concentration of 10 minutes given contributing surface cover. This, along with an assumed combined runoff coefficient of 0.5, yields 4-cfs of runoff contributed. Computed spread and depth to this point is 18 feet and 0.4 feet, respectively. This will allow for one lane to be open during the design flood.

The area contributing to the sag point at 17+45 LT is approximately 0.3 acres and includes only portions of Atlantic Street. Assuming a minimum time of concentration of 5 minutes for impervious surfaces returns a 25-year rainfall event of 6.7 inches per hour. This, along with a runoff coefficient representative of impervious surfaces (0.9), yields 2-cfs of flow being contributed to the low point. Computed spread and depth to this point is 9 feet and 0.2 feet, respectively. This provides for greater than one lane of travel to remain open.

7.4.2. Pipe Flow

Using Manning's equation for flow in pipes, and the runoff calculated for the contributing areas, pipe sizes for the left (west) leg of the system will be 15 inches to accommodate the 4-cfs of flow collected. Pipe sizes for the right (east) leg will be 12 inches to accommodate the 2-cfs of flow collected.

7.4.3. Hydraulic Grade Line

As outlined in Section 7.2 of this report, the receiving pipe was assumed to flow full under design conditions. With the starting water surface elevation set at the crown of the receiving pipe, the computed hydraulic grade line propagating up to the low point is 8.9 feet for the western leg and 8.8 feet for the eastern leg. This provides for one foot of freeboard to the top of frame at the low point.

7.5. Summary of Impacts and Proposed Improvements

Based on the alternative requiring the greatest lowering of the roadway profile for Atlantic Street, the proposed improvements presented in this study will accommodate the design requirements for the drainage for this project.

8. UTILITIES

It is anticipated that the roadway will require an estimated 3 to 3.5 feet of lowering at the underpass. At the Atlantic Street bridge, the impacted utilities identified are low pressure gas, water, underground electric, and underground Telephone with fiberoptics. The City also has underground Con96 fiber communication cable in a City owned duct for their traffic operations system which would also be impacted. The limits of work and utilities that would be affected are shown on Figure 8.1, located in Appendix G. The depth of these utilities is not known at this time and it is assumed that these utilities will have to be lowered to accommodate the roadway lowering. Vertical depth information is required to determine the limits of the actual relocation needs.

9. GEOTECHNICAL

9.1. Summary of Subsurface Conditions

9.1.1. Regional Geology

Published geologic mapping indicates the predominant natural surficial deposit within the project area is glacial till. The glacial till in this area is generally less than 15 feet thick and is absent in some areas. The glacial till is predominantly loose to moderately compact, generally sandy, and commonly stony and, where present, is underlain by bedrock. The underlying bedrock within the project site is mapped as principally Pumpkin Ground Member of Harrison Gneiss, which is a gray to spotted, medium to coarse grained, foliated gneiss.

9.1.2. Pilot Borings

Three geotechnical borings were performed to preliminarily explore the subsurface conditions at the site. The approximate as-drilled pilot boring locations are shown on Figure 9.1, Atlantic Street Pilot Boring Program, located in Appendix G. Each geotechnical boring was located in the field by taping from existing site features and observed and logged during drilling.

The geotechnical boring depths ranged between about 8 and 17 feet below the existing ground surface at their respective locations. Representative soil samples were obtained semi-continuously to a depth of at least 10 feet and at about 5-foot intervals thereafter. Samples were collected by split-barrel sampling procedures in general accordance with ASTM D 1586 and bedrock was cored at one location to confirm its depth, nature, and quality. An observation well was installed within one of the geotechnical borings to observe longer term groundwater levels.

9.1.3. Subsurface Conditions

The subsurface conditions as interpreted from the geotechnical borings generally consisted of asphalt over either roadway subbase or concrete over natural sand and gravel over bedrock, which is consistent with published geologic data. A detailed description of the subsurface conditions encountered in each of the geotechnical borings is contained on the logs.

The asphalt encountered was less than 1 foot thick and was underlain be either approximately 12 to 18 inches of roadway subbase material or 6 inches of concrete.

9.1.4. Soil

Sand and gravel immediately underlies the superficial materials described above and was between 3 and 8 feet thick. The sand and gravel was generally classified as loose to very dense, fine to coarse sand with varying fractions of silt and gravel to fine to coarse gravel with trace silt.

Bedrock was observed below the sand and gravel at depths between approximately 5 to 11 feet below the existing ground surface at the boring locations. The depth to bedrock was inferred at geotechnical borings B-2 and B-3 based on drilling effort. However, the depth, nature, and quality of the bedrock were confirmed by coring at geotechnical boring B-1. At this location, the bedrock generally consisted of poor quality, moderately hard, slightly weathered, whitish gray, medium grained gneiss.

9.1.5. Groundwater

Groundwater was not observed in any of the geotechnical borings during drilling or within the observation well. However, fluctuations in the observed groundwater level occur due to variation in precipitation, temperature, and other factors different from those existing at the time the measurements were made.

9.2. Geotechnical Construction Issues

Based on the bridge rehabilitation concepts, the primary geotechnical issues that are anticipated will be the following:

- Protection of railroad operations and of the existing tracks is required.

- Protection of existing structures during construction. These structures include railroad catenary structures, overhead and underground utilities, buildings and retaining walls.

- Management and disposal of excavated materials. Since both abutments are being removed and replaced, mini-piles will be drilled and significant excavation of the embankment soils will be required. Drill spoils will have to be disposed of in accordance with State and Local requirements. Excavated soils may be able to be reused elsewhere on the project depending on the nature and quality of the materials. Otherwise, they will have to be disposed of in accordance with State and Local requirements.

9.3. Foundation Recommendations

Based on the information available, drilled mini-piles are recommended for the support of the proposed abutments and pier. The drilled mini-piles will have a permanent casing installed to the top of bedrock and will develop their capacity in the underlying bedrock. A continuous reinforcing bar will be installed from the bottom of the rock socket to the top of the pile. The rock socket and casing will be filled with tremie placed grout.

The mini-piles will be designed to carry the required design load in the rock socket and will be sized and reinforced appropriately to resist any other imposed loads (e.g. uplift, lateral, etc.). Based on preliminary design loads and subsurface conditions, it is estimated that rock socket lengths will be approximately 10 to 15 feet and overall mini-pile lengths will be approximately 25 to 40 feet for the center pier and abutments, respectively.

10. ENVIRONMENTAL

10.1. Required Environmental Permits

Work activities proposed for Atlantic Street fall outside of any FEMA regulated Floodplain and Floodway, therefore Flood Management Certification is not anticipated for the project.

The project site does not fall within the Coastal Boundary indicating that a DEP administered Coastal Area Management Permit (CAM) will not be required. Wetland

impacts are not expected for this highly urban setting; consequently local or tidal wetland permits are not anticipated.

The total project footprint is expected to be greater than 1 acre which will trigger the requirements for a DEP administered General Permit for *Stormwater and Dewatering Wastewaters from Construction Activities.*

A map of the 100-Year FEMA floodplain is provided in Appendix G, Figure 10.1.

11. SUMMARY AND CONCLUSIONS

In order to accommodate the rising traffic demands within the City of Stamford and to open up access between downtown Stamford and destinations south of the MNRR tracks, it is necessary to address the bottlenecking that occurs at the Metro-North undergrade bridge. Additional travel lanes will be added upon the reconstruction of the Atlantic Street undergrade bridge. The proposed new underpass will provide for two eight-foot sidewalks, two-foot shoulders, three 11-foot through lanes traveling in the southbound direction, two 11-foot through lanes and one 11-foot right-turn only lane traveling in the northbound direction.

After consideration of several structure types, the precast multi concrete-encased beams remain the most viable as providing the shallowest superstructure. This is critical due to the extent that Atlantic Street may need to be lowered to accommodate a new superstructure and a minimum vertical clearance of 14'-6".

The lowering of Atlantic Street will have major impacts on the I-95 exit ramp that terminates at the five-legged intersection located just north of the bridge. A two-span configuration requires lowering the terminus of the exit ramp, thereby increasing the downward slope of the road to a maximum 8.3%. The proposed horizontal alignment creates a 6% cross-slope when leaving the exit ramp and turning left onto Atlantic Street, not ideal for vehicles with high centers of gravity. To mediate these effects, a flyover bridge (Alternative 2) is proposed to terminate the exit ramp further east along South State Street. A four-span configuration is also proposed to reduce the structure depth and lessen the extent that the Atlantic Street profile would need to be lowered. This reduces the downward slope of the exit ramp to a maximum 8.1% but did not eliminate the cross slope of 6% turning left onto Atlantic Street.

There are several options that must be considered before the design-span length and structure depth can be determined. The design span length will depend upon the abutment construction methodology and the span configuration. The depth of structure is dependent upon the design span length and the structure type. The depth of which the Atlantic Street profile will be lowered to obtain the minimum vertical clearance of 14'-6" will determine the extent of impacts upon nearby intersections, roadways and properties. There are several combinations that have been evaluated and can be considered to optimize the benefits and reduce costs for the reconstruction of the Atlantic Street undergrade bridge.

Impacts to rail operations will be minimized by taking one Metro-North railroad track out-of-service at a time. Throughout the construction of the project, Atlantic Street will be closed to traffic.

APPENDIX A – HIGHWAY DESIGN CRITERIA

Atlantic Street is located in built-up areas with a design speed of 30 mph. Atlantic Street is classified as a Minor Urban Arterial according to the Connecticut Department of Transportation's criterion for roadway design based on roadway classification.

Key design criteria are outlined in the table below.

Atlantic Street - Minor Urban Arterial					
Design Element		**Recommended Design Value**	**Proposed Design Value**		
			Alternative 1	**Alternative 2**	**Alternative 3**
Design Speed		30 - 40 mph	25	25	25
Travel Lane Width		10'-12'	11'	11'	11'
Shoulder Width	Right	4' – 8'	2'	2'	2'
	Left	2' – 4'	2'	2'	2'
Cross Slope		1.5 – 2.0%	2%	2%	2%
Turn Lane Width		11'	11'	11'	11'
Turn Lane Shoulder Width		2' – 4'	2'	2'	2'
Sidewalk Width		5' Minimum	8'	8'	8'
Bicycle Lane	Width	5'	N/A	N/A	N/A
	Cross Slope	2.0%	N/A	N/A	N/A
Roadside Clear Zones		14'	10'	10'	10'
Stopping Sight Distance		155'	160'	160'	160'
Intersection Sight Distance		295'			
Minimum radius (e=4.0%)		230'	410'	410'	410'
Superelevation Maximum		4.00%	None	None	None
Maximum Grade		9.00%	7.3%	7.3%	6.7%
Minimum Grade		0.50%	0.6%	0.6%	0.6%
Vertical Curvature (K-Value)	Crest	19	22	22	26
	Sag	37	18	18	23
Minimum Vertical Clearance Under New Bridge		16'-3"(1)	14'-6"(1)	14'-6"(1)	13'-9"(2)

Source: Figure 5D, Connecticut Department of Transportation Highway Design Manual, 2003 Edition

(1) 14'-6" minimum vertical clearance used.
(2) 13'-9" is the actual vertical clearance. 13'-6" is the posted vertical clearance.

APPENDIX B – BRIDGE DESIGN CRITERIA

- Structure Layout
  - Bridge will span over the proposed roadway cross section conforming to the City of Stamford requirements
  - Abutments will be located outside of proposed sidewalks
  - Pier is located between the northbound and southbound lanes
  - Substructure units will be parallel or tangent to the roadway baseline and parallel to each other
  - Bridge will be extended to the north to support the potential extension of MNRR Track 7 (future)
  - A free standing pedestrian bridge on to the south side of the MNRR to provide access to the Stamford Station northbound platform from the east side of Atlantic Street

- Bridge Type
  - Superstructure
    - Bridge will consist of two simple spans supported on abutments and a pier
    - Primary replacement bridge choice will be Metro-North's preferred ballasted deck
    - Structure types considered:
      - Half-through Plate Girders
      - Two-Girder Ballasted Concrete Deck
      - Four-Girder Ballasted Steel Plate Deck
      - Multi Concrete-Encased Beams
      - Prestressed Butted Box Beams
    - Design considerations:
      - Girders are designed for strength
      - Girders also have a service criteria
        - Maximum deflection is equal to L/640
    - Structure type used for the purposes of this report is the multi-concrete encased beams
    - Access walkways will be provided for the purposes of servicing the tracks

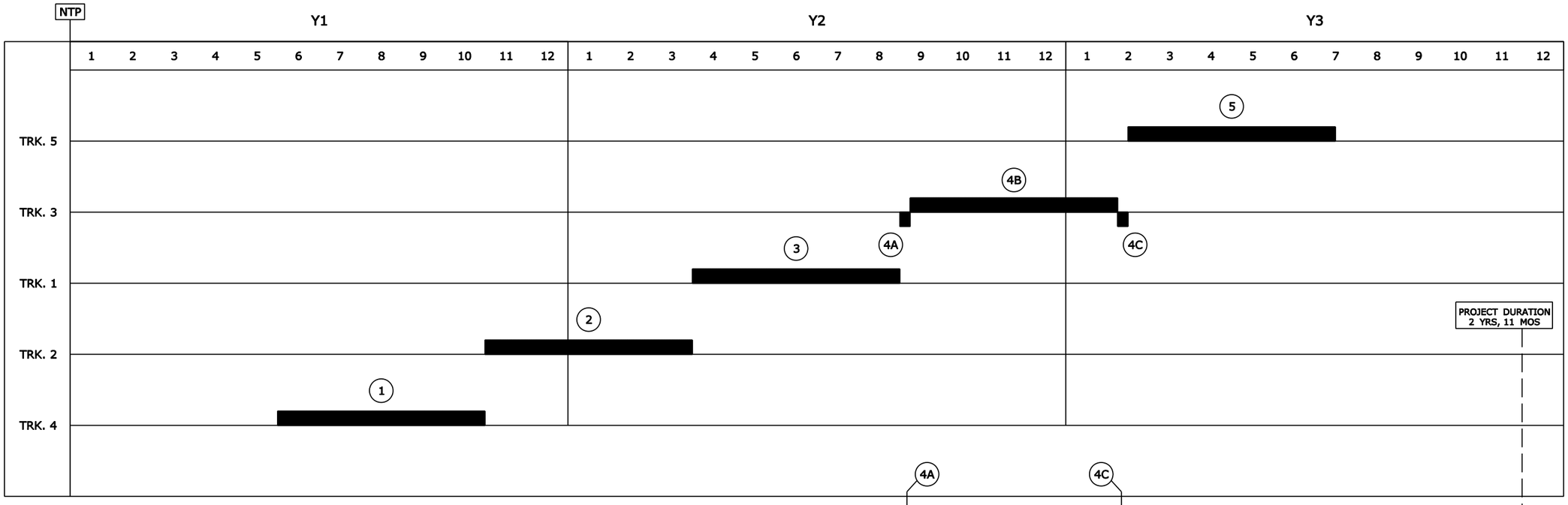
- Substructure
  - The abutments and the pier are proposed to be constructed using cast-in-place concrete. Precast concrete modules will be considered for an accelerated construction schedule.
- Foundation
  - The footing of the abutment will be founded on mini-piles
  - The footing for the pier will be on a spread footing if the proper width can be obtained given the constraints posed by MP&T. If a spread footing is not attainable, mini-piles will be used.

- Structure Depth
  - Structure depth is based on a top of rail elevation to bottom of beam depth and is based on the following assumptions:
    - Rail height – 7 5/8" (typ.)
    - Depth of Concrete Tie – 8.5" (typ.)
    - Depth of Ballast below railroad tie – 8.5" (typ.) bridge was designed for an additional 3.5" to be added in the future
    - Ballast Mat – 1" (typ.)
    - Concrete Deck with Haunch – 13" (specific to the 2-girder ballasted concrete deck structure type)
    - Steel Plate – 1.5" (specific to the 4-girder ballasted steel plate deck structure type)
    - Depth of Beam (this dimension is in addition to the previously mentioned items with the exception of the half-thru girder option. For the half-thru girder option, the structure depth is equivalent to the beam depth as the top flange is at the top of rail elevation.)

- Construction
  - Stage construction is based on single track outages
  - For the purposes of this report, tracks are taken out of service from south to north
  - Construction of the abutments will use a top-down methodology
  - Catenary wires will remain in place during construction and will be maintained and protected

- Rail Geometry
  - Existing horizontal and vertical alignment will be maintained

APPENDIX C – CONSTRUCTION SCHEDULE



STAGE NO.	MOBILIZATION STAGE	1	2	3		4B		5	
CALENDAR DAYS	150	150	150	150	7	150	7	150	

ATLANTIC STREET (ROAD WORK)	REMOVE EX. ABUTMENTS	INSTALL ROADWAY

LEGEND:

CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET TRACK OUTAGE SCHEDULE

URS

SCALE: N.T.S.

APPENDIX D – CONSTRUCTION COST ESTIMATES

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

				Alternative 1					
				Two Span Top Down Concrete-Encased Steel Beams		Two Span Conventional Concrete-Encased Steel Beams		Four Span Top Down Concrete-Encased Steel Beams	
Item No.	Description	Unit	Unit Price	Quant.	Price	Quant.	Price	Quant.	Price
Highway & Traffic Items									
1.	Earth Excavation	CY	$26.00	11,434	$297,284.00	11,434	$297,284.00	11,434	$297,284.00
2.	Rock Excavation	CY	$50.00	1,270	$63,522.22	1,270	$63,522.22	1,270	$63,522.22
3.	Borrow	CY	$20.00	1,067	$21,340.00	1,067	$21,340.00	1,067	$21,340.00
4.	Drainage; Pipe (12")	LF	$55.00	128	$7,040.00	128	$7,040.00	128	$7,040.00
5.	Drainage; Pipe (15")	LF	$60.00	244	$14,640.00	244	$14,640.00	244	$14,640.00
6.	Drainage; Catch Basins	EA	$2,800.00	6	$16,800.00	6	$16,800.00	6	$16,800.00
7.	Manhole	EA	$3,500.00	1	$3,500.00	1	$3,500.00	1	$3,500.00
8.	Milling of Bituminous Concrete 0"-4"	SY	$8.00	978	$7,822.22	978	$7,822.22	978	$7,822.22
9.	HMA - Superpave	T	$105.00	2,661	$279,375.25	2,661	$279,375.25	2,661	$279,375.25
10.	Processed Aggregate Base	T	$45.00	2,480	$111,600.72	2,480	$111,600.72	2,480	$111,600.72
11.	Subbase	T	$35.00	2,823	$98,816.67	2,823	$98,816.67	2,823	$98,816.67
12.	Temporary PCBC	LF	$42.00	1,620	$68,040.00	1,620	$68,040.00	1,620	$68,040.00
13.	Relocate TPCBC	LF	$17.00	1,620	$27,540.00	1,620	$27,540.00	1,620	$27,540.00
14.	Impact Attenuators	EA.	$25,000.00	2	$50,000.00	2	$50,000.00	2	$50,000.00
15.	Curbing; Concrete	LF	$30.00	2,110	$63,300.00	2,110	$63,300.00	2,110	$63,300.00
16.	Concrete Sidewalk	SF	$15.00	9,200	$138,000.00	9,200	$138,000.00	9,200	$138,000.00
17.	Trafficperson (City/State Police)	HR	$75.00	5,100	$382,500.00	5,100	$382,500.00	5,100	$382,500.00
18.	Roadway Lighting	LF	$40.00	1,675	$67,000.00	1,675	$67,000.00	1,675	$67,000.00
19.	Traffic Signals; New	EA	$200,000.00	1	$200,000.00	1	$200,000.00	1	$200,000.00
20.	Traffic Signals; Minor Modification	EA	$30,000.00	1	$30,000.00	1	$30,000.00	1	$30,000.00
21.	Retaining Walls (Roadway)	SF	$70.00	31,655	$2,215,850.00	31,655	$2,215,850.00	31,655	$2,215,850.00
22.	Retaining Walls (Railroad)	SF	$110.00	18,950	$2,084,500.00	18,950	$2,084,500.00	18,950	$2,084,500.00
Section Sub-Total					$6,248,471.08		$6,248,471.08		$6,248,471.08
Structures Items - Undergrade Bridge									
23.	Structure Excavation - Earth	CY	$90.00	7,000	$630,000.00	10,000	$900,000.00	7,800	$702,000.00
24.	Ballast	CY	$175.00	500	$87,500.00	500	$87,500.00	500	$87,500.00
25.	Ballast Mat	SF	$15.00	9,400	$141,000.00	9,400	$141,000.00	9,400	$141,000.00
26.	Pervious Structure Backfill	CY	$105.00	500	$52,500.00	1,600	$168,000.00	600	$63,000.00
27.	Removal of Superstructure	LS	$250,000.00	1	$250,000.00	1	$250,000.00	1	$250,000.00
28.	Removal of Substructure	LS	$670,000.00	1	$670,000.00	1	$670,000.00	1	$670,000.00
29.	Temporary Support	LS	$200,000.00	1	$200,000.00	1	$200,000.00	1	$200,000.00
30.	Tie-Back Wall	SF	$400.00	5,050	$2,020,000.00	5,050	$2,020,000.00	5,050	$2,020,000.00
31.	Steel-Laminated Elastomeric Brgs.	CI	$3.00	40,000	$120,000.00	40,000	$120,000.00	40,000	$120,000.00
32.	Class "A" Concrete	CY	$850.00	900	$765,000.00	1,600	$1,360,000.00	1,100	$935,000.00
33.	Class "F" Concrete	CY	$1,250.00	200	$250,000.00	200	$250,000.00	400	$500,000.00
34.	Architectural Formliner	SY	$400.00	200	$80,000.00	200	$80,000.00	200	$80,000.00
35.	Deformed Steel Bars	LBS	$1.60	110,000	$176,000.00	180,000	$288,000.00	150,000	$240,000.00
36.	P/C Conc. Enc. Steel Grdrs (33"D)	LF	$1,560.00	5,100	$7,956,000.00	0	$0.00	0	$0.00
37.	P/C Conc. Enc. Steel Grdrs (30"D)	LBS	$1,530.00	0	$0.00	4,600	$7,038,000.00	0	$0.00
38.	P/C Conc. Enc. Steel Grdrs (26"D)	LBS	$1,500.00	0	$0.00	0	$0.00	6,200	$9,300,000.00
39.	Drilled Mini-Piles	EA	$5,500.00	250	$1,375,000.00	250	$1,375,000.00	420	$2,310,000.00
40.	Temp. Earth Retaining System	SF	$50.00	1,970	$98,500.00	1,970	$98,500.00	5,900	$295,000.00
41.	Temp. Earth Retaining System (RR)	SF	$160.00	6,130	$980,800.00	23,500	$3,760,000.00	6,130	$980,800.00
42.	Lead Health Protection Program	LS	$100,000.00	1	$100,000.00	1	$100,000.00	1	$100,000.00
Section Sub-Total					$15,952,300.00		$18,906,000.00		$18,994,300.00
Structures Items - South Platform Extension									
43.	South Platform Extension	LS	$100,000.00	1	$100,000.00	1	$100,000.00	1	$100,000.00
44.	Stair Structure	LS	$120,000.00	1	$120,000.00	1	$120,000.00	1	$120,000.00
45.	Pedestrian Bridge	LS	$120,000.00	1	$120,000.00	1	$120,000.00	1	$120,000.00
Section Sub-Total					$340,000.00		$340,000.00		$340,000.00

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Item No.	Description	Unit	Unit Price	Alternative 1: Two Span Top Down Concrete-Encased Steel Beams Quant.	Alternative 1: Two Span Top Down Concrete-Encased Steel Beams Price	Alternative 1: Two Span Conventional Concrete-Encased Steel Beams Quant.	Alternative 1: Two Span Conventional Concrete-Encased Steel Beams Price	Alternative 1: Four Span Top Down Concrete-Encased Steel Beams Quant.	Alternative 1: Four Span Top Down Concrete-Encased Steel Beams Price
Rail Operations									
46.	Temporary Platform[3] (Stamford Sta.)	LF	$350.00	2,000	$700,000.00	2,000	$700,000.00	2,000	$700,000.00
47.	Bridge Plates	EA	$9,000.00	20	$180,000.00	20	$180,000.00	20	$180,000.00
48.	Removal & Erection - Bridge Plates	EA	$1,200.00	20	$24,000.00	20	$24,000.00	20	$24,000.00
Section Sub-Total					$904,000.00		$904,000.00		$904,000.00
Project Sub-Total									
Highway & Traffic + Structure + Rail Operations					$23,444,771.08		$26,398,471.08		$26,486,771.08
Percentage Based Items (applied to Project Sub-Total)									
1.	Clearing and Grubbing Roadway	@	2%		$468,895.42	2%	$527,969.42	2%	$529,735.42
2.	M & P of Traffic	@	4%		$937,790.84	4%	$1,055,938.84	4%	$1,059,470.84
3.	Mobilization	@	7.5%		$1,758,357.83	7.5%	$1,979,885.33	7.5%	$1,986,507.83
4.	Construction Staking	@	1%		$234,447.71	1%	$263,984.71	1%	$264,867.71
5.	Minor Items	@	25%		$5,861,192.77	25%	$6,599,617.77	25%	$6,621,692.77
Section Sub-Total					$9,260,684.58		$10,427,396.08		$10,462,274.58
Project Total									
Project Sub-Total + Percentage Based Items					$32,705,455.66		$36,825,867.16		$36,949,045.66
Utility Relocation Costs									
1.	Utility Relocation	Est.	$3,157,500.00	1	$3,157,500.00	1	$3,157,500.00	1	$3,157,500.00
Section Sub-Total					$3,157,500.00		$3,157,500.00		$3,157,500.00
Railroad Costs									
1.	RR Force Account Work[1&2]	@	40%		$8,598,150.00	40%	$10,075,000.00	40%	$10,119,150.00
Section Sub-Total					$8,598,150.00		$10,075,000.00		$10,119,150.00
Incidentals and Contingencies (applied to Project Total)									
1.	Incidentals	@	18%		$5,886,982.02	18%	$6,628,656.09	18%	$6,650,828.22
2.	Contingencies	@	10%		$3,270,545.57	10%	$3,682,586.72	10%	$3,694,904.57
Section Sub-Total					$9,157,527.58		$10,311,242.80		$10,345,732.78
Cost of Bridge Replacement (2011)					**$53,618,633.24**		**$60,369,609.96**		**$60,571,428.44**
		SAY			**$53,600,000.00**		**$60,400,000.00**		**$60,600,000.00**
Inflation to Mid-Point of Construction									
Price Adjustment (adj. to 2016)	5 years	@	5%		$14,813,839.77	5%	$16,679,010.17	5%	$16,734,768.89
Cost of Bridge Replacement (2016)					**$68,432,473.01**		**$77,048,620.13**		**$77,306,197.34**
		SAY			**$68,400,000.00**		**$77,000,000.00**		**$77,300,000.00**

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Alternative 1

Project Cost Escalation Footnotes:

1. *Estimated construction cost shown above is based on 2011 prices.*
2. *Rate of construction cost escalation is estimated at 5% per year, per CTDOT Estimating Guidelines, calculated to the mid-point of construction, which is anticipated to be 2016 based on an anticipated 2014 start of construction. Accordingly, the cost escalation factor is 1.28.*

NOTES:

1. MNRR Force Account value is based on 40% of the sum of the total structure and rail operations work for the Undergrade Bridge and Platform Extension + 25% minor items applied to the total structure work.
2. MNRR Force Account includes the cost of Metro North personnel and railroad work associated with the removal of the existing bridge and construction of the proposed bridge, including removal & replacement of railroad tracks, communications & signals, and catenary pole relocation where applicable.
3. Temporary Platform includes 1000-ft of installation and 1000-ft of removal.
4. Items NOT included in this estimate:
   - Building Demolition / ROW acquisitions
   - Environmental Remediation
   - Environmental Studies (20% of Environmental Remediation Costs)

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Item No.	Description	Unit	Unit Price	Alternative 2: Two Span Top Down Concrete-Encased Steel Beams Quantity	Alternative 2: Two Span Top Down Concrete-Encased Steel Beams Price	Alternative 2: Two Span Conventional Concrete-Encased Steel Beams Quantity	Alternative 2: Two Span Conventional Concrete-Encased Steel Beams Price
Highway & Traffic Items							
1.	Earth Excavation	CY	$26.00	12,484	$324,581.11	12,484	$324,581.11
2.	Rock Excavation	CY	$50.00	909	$45,435.19	909	$45,435.19
3.	Borrow	CY	$20.00	2,205	$44,100.00	2,205	$44,100.00
4.	Drainage; Pipe (12")	LF	$55.00	128	$7,040.00	128	$7,040.00
5.	Drainage; Pipe (15")	LF	$60.00	244	$14,640.00	244	$14,640.00
6.	Drainage; Catch Basins	EA	$2,800.00	6	$16,800.00	6	$16,800.00
7.	Manhole	EA	$3,500.00	1	$3,500.00	1	$3,500.00
8.	Milling of Bituminous Concrete 0" - 4"	SY	$8.00	3,911	$31,288.89	3,911	$31,288.89
9.	HMA - Superpave	T	$105.00	5,861	$615,355.42	5,861	$615,355.42
10.	Processed Aggregate Base	T	$45.00	2,867	$129,022.32	2,867	$129,022.32
11.	Subbase	T	$35.00	3,264	$114,242.59	3,264	$114,242.59
12.	Temporary PCBC	LF	$42.00	2,140	$89,880.00	2,140	$89,880.00
13.	Relocate TPCBC	LF	$17.00	2,140	$36,380.00	2,140	$36,380.00
14.	Impact Attenuators	EA.	$25,000.00	2	$50,000.00	2	$50,000.00
15.	Curbing; Concrete	LF	$30.00	3,180	$95,400.00	3,180	$95,400.00
16.	Concrete Sidewalk	SF	$15.00	9,200	$138,000.00	9,200	$138,000.00
17.	Trafficperson (City/State Police Officer)	HR	$75.00	8,100	$607,500.00	8,100	$607,500.00
18.	Roadway Lighting	LF	$40.00	2,930	$117,200.00	2,930	$117,200.00
19.	Traffic Signals; New	EA	$200,000.00	3	$600,000.00	3	$600,000.00
20.	Traffic Signals; Minor Modification	EA	$30,000.00	2	$60,000.00	2	$60,000.00
21.	Retaining Walls (Roadway)	SF	$70.00	51,350	$3,594,500.00	51,350	$3,594,500.00
22.	Retaining Walls (Railroad)	SF	$110.00	6,480	$712,800.00	6,480	$712,800.00
Section Sub-Total					$7,447,665.51		$7,447,665.51
Structures Items - Undergrade Bridge							
23.	Structure Excavation - Earth (Complete)	CY	$90.00	7,000	$630,000.00	10,000	$900,000.00
24.	Ballast	CY	$175.00	500	$87,500.00	500	$87,500.00
25.	Ballast Mat	SF	$15.00	9,400	$141,000.00	9,400	$141,000.00
26.	Pervious Structure Backfill	CY	$105.00	500	$52,500.00	1,600	$168,000.00
27.	Removal of Superstructure	LS	$250,000.00	1	$250,000.00	1	$250,000.00
28.	Removal of Substructure	LS	$670,000.00	1	$670,000.00	1	$670,000.00
29.	Temporary Support	LS	$200,000.00	1	$200,000.00	1	$200,000.00
30.	Tie-Back Wall	SF	$400.00	5,050	$2,020,000.00	5,050	$2,020,000.00
31.	Steel-Laminated Elastomeric Bearings	CI	$3.00	40,000	$120,000.00	40,000	$120,000.00
32.	Class "A" Concrete	CY	$850.00	900	$765,000.00	1,600	$1,360,000.00
33.	Class "F" Concrete	CY	$1,250.00	200	$250,000.00	200	$250,000.00
34.	Architectural Formliner	SY	$400.00	200	$80,000.00	200	$80,000.00
35.	Deformed Steel Bars	LBS	$1.60	110,000	$176,000.00	180,000	$288,000.00
36.	P/C Conc. Encased Steel Girders (33"D)	LF	$1,560.00	5,100	$7,956,000.00	0	$0.00
37.	P/C Conc. Encased Steel Girders (30"D)	LBS	$1,530.00	0	$0.00	4,600	$7,038,000.00
38.	Drilled Mini-Piles	EA	$5,500.00	250	$1,375,000.00	250	$1,375,000.00
39.	Temporary Earth Retaining System	SF	$50.00	1,970	$98,500.00	1,970	$98,500.00
40.	Temporary Earth Retaining System (RR)	SF	$160.00	6,130	$980,800.00	23,500	$3,760,000.00
41.	Lead Health Protection Program	LS	$100,000.00	1	$100,000.00	1	$100,000.00
Section Sub-Total					$15,952,300.00		$18,906,000.00
Structures Items - South Platform Extension							
42.	South Platform Extension	LS	$100,000.00	1	$100,000.00	1	$100,000.00
43.	Stair Structure	LS	$120,000.00	1	$120,000.00	1	$120,000.00
44.	Pedestrian Bridge	LS	$120,000.00	1	$120,000.00	1	$120,000.00
Section Sub-Total					$340,000.00		$340,000.00

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Item No.	Description	Unit	Unit Price	Alternative 2: Two Span Top Down Concrete-Encased Steel Beams Quantity	Alternative 2: Two Span Top Down Concrete-Encased Steel Beams Price	Alternative 2: Two Span Conventional Concrete-Encased Steel Beams Quantity	Alternative 2: Two Span Conventional Concrete-Encased Steel Beams Price
Structures Items - Ramp Fly-Over Bridge							
45.	Structure Excavation - Earth (Complete)	CY	$90.00	3,700	$333,000.00	3,700	$333,000.00
46.	Pervious Structure Backfill	CY	$105.00	1,500	$157,500.00	1,500	$157,500.00
47.	Steel-Laminated Elastomeric Bearings	CI	$3.00	5,300	$15,900.00	5,300	$15,900.00
48.	Class "A" Concrete	CY	$850.00	460	$391,000.00	460	$391,000.00
49.	Class "F" Concrete	CY	$1,250.00	140	$175,000.00	140	$175,000.00
50.	Deformed Steel Bars	LBS	$1.60	46,000	$73,600.00	46,000	$73,600.00
51.	Deformed Steel Bars Epoxy Coated	LBS	$1.70	16,800	$28,560.00	16,800	$28,560.00
52.	Structural Steel	LBS	$3.25	54,800	$178,100.00	54,800	$178,100.00
53.	Temporary Sheet Piling	SF	$50.00	240	$12,000.00	240	$12,000.00
Section Sub-Total					$1,364,660.00		$1,364,660.00
Rail Operations							
54.	Temporary Platform[3] (Stamford Station)	LF	$350.00	2,000	$700,000.00	2,000	$700,000.00
55.	Bridge Plates	EA	$9,000.00	20	$180,000.00	20	$180,000.00
56.	Removal & Erection Cycle - Bridge Plates	EA	$1,200.00	20	$24,000.00	20	$24,000.00
Section Sub-Total					$904,000.00		$904,000.00
Project Sub-Total							
Highway & Traffic + Structure + Rail Operations					$26,008,625.51		$28,962,325.51
Percentage Based Items (applied to Project Sub-Total)							
1.	Clearing and Grubbing Roadway	@		2%	$520,172.51	2%	$579,246.51
2.	M & P of Traffic	@		4%	$1,040,345.02	4%	$1,158,493.02
3.	Mobilization	@		7.5%	$1,950,646.91	7.5%	$2,172,174.41
4.	Construction Staking	@		1%	$260,086.26	1%	$289,623.26
5.	Minor Items	@		25%	$6,502,156.38	25%	$7,240,581.38
Section Sub-Total					$10,273,407.08		$11,440,118.58
Project Total							
Project Sub-Total + Percentage Based Items					$36,282,032.59		$40,402,444.09
Utility Relocation Costs							
1.	Utility Relocation	Est.	$3,157,500.00	1	$3,157,500.00	1	$3,157,500.00
Section Sub-Total					$3,157,500.00		$3,157,500.00
Railroad Costs							
1.	RR Force Account Work[1&2]	@		40%	$8,598,150.00	40%	$10,075,000.00
Section Sub-Total					$8,598,150.00		$10,075,000.00
Incidentals and Contingencies (applied to Project Total)							
1.	Incidentals	@		18%	$6,530,765.87	18%	$7,272,439.94
2.	Contingencies	@		10%	$3,628,203.26	10%	$4,040,244.41
Section Sub-Total					$10,158,969.13		$11,312,684.35
Cost of Bridge Replacement (2011)					**$58,196,651.72**		**$64,947,628.44**
		SAY			**$58,200,000.00**		**$64,900,000.00**
Inflation to Mid-Point of Construction							
Price Adjustment (adjust to 2016)		5 years	@	5%	$16,078,661.87	5%	$17,943,832.27
Cost of Bridge Replacement (2016)					**$74,275,313.59**		**$82,891,460.70**
		SAY			**$74,300,000.00**		**$82,900,000.00**

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Alternative 2

Project Cost Escalation Footnotes:

1. *Estimated construction cost shown above is based on 2011 prices.*
2. *Rate of construction cost escalation is estimated at 5% per year, per CTDOT Estimating Guidelines, calculated to the mid-point of construction, which is anticipated to be 2016 based on an anticipated 2014 start of construction. Accordingly, the cost escalation factor is 1.28.*

NOTES:

1. MNRR Force Account value is based on 40% of the sum of the total structure and rail operations work for the Undergrade Bridge and Platform Extension + 25% minor items applied to the total structure work.
2. MNRR Force Account includes the cost of Metro North personnel and railroad work associated with the removal of the existing bridge and construction of the proposed bridge, including removal & replacement of railroad tracks, communications & signals, and catenary pole relocation where applicable.
3. Temporary Platform includes 1000-ft of installation and 1000-ft of removal.
4. Items NOT included in this estimate:
   - Building Demolition / ROW acquisitions
   - Environmental Remediation
   - Environmental Studies (20% of Environmental Remediation Costs)

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Item No.	Description	Unit	Unit Price	Alternative 3 – Two Span Top Down Concrete-Encased Steel Beams Quantity	Alternative 3 – Two Span Top Down Concrete-Encased Steel Beams Price	Alternative 3 – Two Span Conventional Concrete-Encased Steel Beams Quantity	Alternative 3 – Two Span Conventional Concrete-Encased Steel Beams Price
Highway & Traffic Items							
1.	Earth Excavation	CY	$26.00	9,775	$254,137.00	9,775	$254,137.00
2.	Rock Excavation	CY	$50.00	1,086	$54,302.78	1,086	$54,302.78
3.	Borrow	CY	$20.00	900	$18,000.00	900	$18,000.00
4.	Drainage; Pipe (12")	LF	$55.00	128	$7,040.00	128	$7,040.00
5.	Drainage; Pipe (15")	LF	$60.00	244	$14,640.00	244	$14,640.00
6.	Drainage; Catch Basins	EA	$2,800.00	6	$16,800.00	6	$16,800.00
7.	Manhole	EA	$3,500.00	1	$3,500.00	1	$3,500.00
8.	Milling of Bituminous Concrete 0" - 4"	SY	$8.00	1,350	$10,800.00	1,350	$10,800.00
9.	HMA - Superpave	T	$105.00	1,661	$174,386.80	1,661	$174,386.80
10.	Processed Aggregate Base	T	$45.00	1,891	$85,083.33	1,891	$85,083.33
11.	Subbase	T	$35.00	2,159	$75,558.19	2,159	$75,558.19
12.	Impact Attenuators	EA.	$25,000.00	6	$150,000.00	6	$150,000.00
13.	Curbing; Concrete	LF	$30.00	705	$21,150.00	705	$21,150.00
14.	Concrete Sidewalk	SF	$15.00	12,880	$193,200.00	12,880	$193,200.00
15.	Trafficperson (City/State Police Officer)	HR	$75.00	3,200	$240,000.00	3,200	$240,000.00
16.	Roadway Lighting	LF	$40.00	1,355	$54,200.00	1,355	$54,200.00
17.	Traffic Signals; New	EA	$200,000.00	1	$200,000.00	1	$200,000.00
18.	Retaining Walls (Roadway)	SF	$70.00	14,385	$1,006,950.00	14,385	$1,006,950.00
19.	Under-Pin Railroad Retaining Walls	LF	$450.00	320	$144,000.00	320	$144,000.00
Section Sub-Total					$2,723,748.11		$2,723,748.11
Structures Items - Undergrade Bridge							
20.	Structure Excavation - Earth (Complete)	CY	$90.00	5,100	$459,000.00	7,300	$657,000.00
21.	Ballast	CY	$175.00	500	$87,500.00	500	$87,500.00
22.	Ballast Mat	SF	$15.00	9,400	$141,000.00	9,400	$141,000.00
23.	Pervious Structure Backfill	CY	$105.00	400	$42,000.00	1,500	$157,500.00
24.	Removal of Superstructure	LS	$250,000.00	1	$250,000.00	1	$250,000.00
25.	Removal of Substructure	LS	$670,000.00	1	$670,000.00	1	$670,000.00
26.	Temporary Support	LS	$200,000.00	1	$200,000.00	1	$200,000.00
27.	Tie-Back Wall	SF	$400.00	4,460	$1,784,000.00	4,460	$1,784,000.00
28.	Steel-Laminated Elastomeric Bearings	CI	$3.00	40,000	$120,000.00	40,000	$120,000.00
29.	Class "A" Concrete	CY	$850.00	700	$595,000.00	1,200	$1,020,000.00
30.	Class "F" Concrete	CY	$1,250.00	200	$250,000.00	200	$250,000.00
31.	Architectural Formliner	SY	$400.00	170	$68,000.00	170	$68,000.00
32.	Deformed Steel Bars	LBS	$1.60	90,000	$144,000.00	140,000	$224,000.00
33.	P/C Conc. Encased Steel Girders (33"D)	LF	$1,560.00	5,100	$7,956,000.00	0	$0.00
34.	P/C Conc. Encased Steel Girders (30"D)	LBS	$1,530.00	0	$0.00	4,600	$7,038,000.00
35.	Drilled Mini-Piles	EA	$5,500.00	250	$1,375,000.00	250	$1,375,000.00
36.	Temporary Earth Retaining System	SF	$50.00	1,630	$81,500.00	1,630	$81,500.00
37.	Temporary Earth Retaining System (RR)	SF	$160.00	6,130	$980,800.00	23,500	$3,760,000.00
38.	Lead Health Protection Program	LS	$100,000.00	1	$100,000.00	1	$100,000.00
Section Sub-Total					$15,303,800.00		$17,983,500.00
Structures Items - South Platform Extension							
39.	South Platform Extension	LS	$100,000.00	1	$100,000.00	1	$100,000.00
40.	Stair Structure	LS	$120,000.00	1	$120,000.00	1	$120,000.00
41.	Pedestrian Bridge	LS	$120,000.00	1	$120,000.00	1	$120,000.00
Section Sub-Total					$340,000.00		$340,000.00

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Item No.	Description	Unit	Unit Price	Alternative 3: Two Span Top Down Concrete-Encased Steel Beams Quantity	Alternative 3: Two Span Top Down Concrete-Encased Steel Beams Price	Alternative 3: Two Span Conventional Concrete-Encased Steel Beams Quantity	Alternative 3: Two Span Conventional Concrete-Encased Steel Beams Price
Rail Operations							
42.	Temporary Platform[3] (Stamford Station)	LF	$350.00	2,000	$700,000.00	2,000	$700,000.00
43.	Bridge Plates	EA	$9,000.00	20	$180,000.00	20	$180,000.00
44.	Removal & Erection Cycle - Bridge Plates	EA	$1,200.00	20	$24,000.00	20	$24,000.00
Section Sub-Total					$904,000.00		$904,000.00
Project Sub-Total							
Highway & Traffic + Structure + Rail Operations					$19,271,548.11		$21,951,248.11
Percentage Based Items (applied to Project Sub-Total)							
1.	Clearing and Grubbing Roadway	@		2%	$385,430.96	2%	$439,024.96
2.	M & P of Traffic	@		4%	$770,861.92	4%	$878,049.92
3.	Mobilization	@		7.5%	$1,445,366.11	7.5%	$1,646,343.61
4.	Construction Staking	@		1%	$192,715.48	1%	$219,512.48
5.	Minor Items	@		25%	$4,817,887.03	25%	$5,487,812.03
Section Sub-Total					$7,612,261.50		$8,670,743.00
Project Total							
Project Sub-Total + Percentage Based Items					$26,883,809.61		$30,621,991.11
Utility Relocation Costs							
1.	Utility Relocation	Est.	$3,157,500.00	1	$3,157,500.00	1	$3,157,500.00
Section Sub-Total					$3,157,500.00		$3,157,500.00
Railroad Costs							
1.	RR Force Account Work[1&2]	@		40%	$8,273,900.00	40%	$9,613,750.00
Section Sub-Total					$8,273,900.00		$9,613,750.00
Incidentals and Contingencies (applied to Project Total)							
1.	Incidentals	@		18%	$4,839,085.73	18%	$5,511,958.40
2.	Contingencies	@		10%	$2,688,380.96	10%	$3,062,199.11
Section Sub-Total					$7,527,466.69		$8,574,157.51
Cost of Bridge Replacement (2011)					**$45,842,676.30**		**$51,967,398.62**
		SAY			**$45,800,000.00**		**$52,000,000.00**
Inflation to Mid-Point of Construction							
Price Adjustment (adjust to 2016)		5 years	@	5%	$12,665,486.24	5%	$14,357,634.09
Cost of Bridge Replacement (2016)					**$58,508,162.53**		**$66,325,032.71**
		SAY			**$58,500,000.00**		**$66,300,000.00**

PRELIMINARY ENGINEERING CONSTRUCTION COST ESTIMATE
ATLANTIC STREET

Alternative 3

Project Cost Escalation Footnotes:

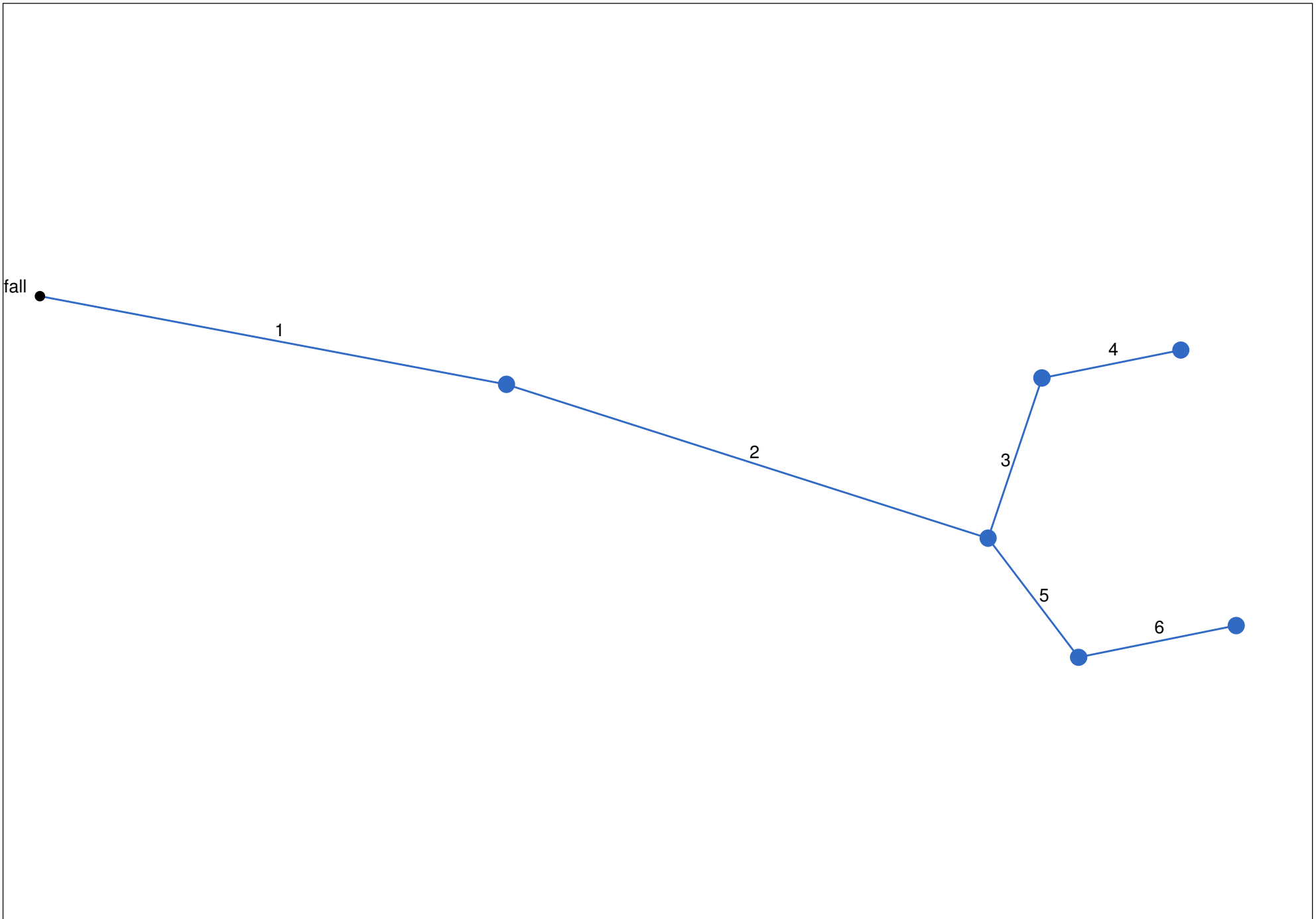
1. *Estimated construction cost shown above is based on 2011 prices.*
2. *Rate of construction cost escalation is estimated at 5% per year, per CTDOT Estimating Guidelines, calculated to the mid-point of construction, which is anticipated to be 2016 based on an anticipated 2014 start of construction. Accordingly, the cost escalation factor is 1.28.*

NOTES:

1. MNRR Force Account value is based on 40% of the sum of the total structure and rail operations work for the Undergrade Bridge and Platform Extension + 25% minor items applied to the total structure work.
2. MNRR Force Account includes the cost of Metro North personnel and railroad work associated with the removal of the existing bridge and construction of the proposed bridge, including removal & replacement of railroad tracks, communications & signals, and catenary pole relocation where applicable.
3. Temporary Platform includes 1000-ft of installation and 1000-ft of removal.
4. Items NOT included in this estimate:
   - Building Demolition / ROW acquisitions
   - Environmental Remediation
   - Environmental Studies (20% of Environmental Remediation Costs)

APPENDIX E – DRAINAGE CALCULATIONS

Hydraflow Storm Sewers Plan



Project File: atlantic drainage.stm	Number of lines: 6	Date: 09-17-2010

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4		4.14	0.00	4.14	0.00	Grate	0.0	0.00	3.13	2.31	1.35	Sag	2.00	0.050	0.020	0.000	0.42	18.16	0.42	18.16	0.0	Off
5		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
6		1.81	0.00	1.81	0.00	Grate	0.0	0.00	3.13	2.31	1.35	Sag	2.00	0.050	0.020	0.000	0.24	9.18	0.24	9.18	0.0	Off

Project File: atlantic drainage.stm | Number of lines: 6 | Run Date: 09-17-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 101.98 / (Inlet time + 15.80) ^ 0.90; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	124	0.00	1.80	0.00	0.00	1.02	0.0	11.2	5.3	5.41	62.82	0.96	36	0.89	4.00	5.10	7.00	7.00	13.33	14.19	
2	1	132	0.00	1.80	0.00	0.00	1.02	0.0	10.5	5.4	5.55	4.70	4.52	15	0.53	5.30	6.00	7.00	7.98	14.19	11.80	
3	2	44	0.00	1.50	0.00	0.00	0.75	0.0	10.2	5.5	4.11	4.35	3.35	15	0.45	6.00	6.20	8.44	8.62	11.80	10.30	
4	3	37	1.50	1.50	0.50	0.75	0.75	10.0	10.0	5.5	4.14	3.36	3.38	15	0.27	6.20	6.30	8.77	8.92	10.30	9.80	
5	2	39	0.00	0.30	0.00	0.00	0.27	0.0	5.2	6.6	1.79	2.55	2.28	12	0.51	6.20	6.40	8.53	8.63	11.80	10.30	
6	5	42	0.30	0.30	0.90	0.27	0.27	5.0	5.0	6.7	1.81	2.46	2.30	12	0.48	6.40	6.60	8.70	8.81	10.30	9.80	

Project File: atlantic drainage.stm | Number of lines: 6 | Run Date: 09-17-2010

NOTES: Intensity = 101.98 / (Inlet time + 15.80) ^ 0.90; Return period = 25 Yrs. ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	36	5.41	4.00	7.00	3.00	7.07	0.77	0.01	7.01	0.007	124	5.10	7.00	1.90	4.72	1.15	0.02	7.02	0.012	0.009	0.012	0.15	0.00
2	15	5.55	5.30	7.00	1.25	1.23	4.52	0.32	7.32	0.738	132	6.00	7.98	1.25	1.23	4.52	0.32	8.29	0.738	0.738	0.974	1.00	0.32
3	15	4.11	6.00	8.44	1.25	1.23	3.35	0.17	8.61	0.406	44	6.20	8.62	1.25	1.23	3.35	0.17	8.79	0.406	0.406	0.178	0.89	0.16
4	15	4.14	6.20	8.77	1.25	1.23	3.38	0.18	8.95	0.412	37	6.30	8.92	1.25	1.23	3.37	0.18	9.10	0.411	0.411	0.152	1.00	0.18
5	12	1.79	6.20	8.53	1.00	0.79	2.28	0.08	8.61	0.253	39	6.40	8.63	1.00	0.79	2.28	0.08	8.71	0.253	0.253	0.099	0.92	0.07
6	12	1.81	6.40	8.70	1.00	0.79	2.30	0.08	8.79	0.258	42	6.60	8.81	1.00	0.79	2.30	0.08	8.90	0.258	0.258	0.108	1.00	0.08

Project File: atlantic drainage.stm | Number of lines: 6 | Run Date: 09-17-2010

; c = cir e = ellip b = box

APPENDIX F – BORING LOGS

Connecticut DOT Boring Report

Inspector: D. Lu	Town: Stamford	Hole No.: B-1
Engineer: J. Kidd	Project No.: 0101-025.00	Stat./Offset:
Start Date: 8-26-10	Route No.:	Northing:
Finish Date: 8-26-10	Bridge No.:	Easting:
Project Description: Atlantic Street, Pilot Boring Program		Surface Elevation:
Casing Size/Type: 3"/NW	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 24in.	Hammer Wt.: 140 lb. Fall: 30 in.	
Groundwater Observations: @None observed		

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Asphalt		
						Subbase		
	S-1	13 11 8 50/0"	18	12			S-1: Medium dense, brown fine to medium SAND, little fine Gravel, trace Silt	
						Sand with Gravel & Silt		
	S-2	4 6 4 13	24	12			S-2: Loose, gray fine to coarse SAND, little fine Gravel, little Silt	
5								
	S-3	63 55 61 92	24	9			S-3: Very dense, gray fine to coarse GRAVEL, trace Silt	
10	S-4	33 50/3"	9	6			S-4: Very dense, gray fine to medium SAND, little fine to coarse Gravel, little Silt	
						Bedrock		
	C-1		56.4	44	30		C-1: Poor Quality, Moderately Hard, Slightly Weathered, whitish gray, medium grained, GNEISS	
15								
							END OF BORING 16.7ft	
20								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 12ft Rock: 4.7ft	NOTES: Refusal at approximately 2.6' b.g., and move to 3' north and start to take second sample at 3' b.g. Auger chattered a lot between 6' to 8' b.g. Possiblly inferred cobbles at approximately 10.75 b.g., and advanced to 12' b.g. with rolling bit.	Sheet 1 of 1
No. of Soil Samples: 4 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: D. Lu	Town: Stamford	Hole No.: B-2 (OW)
Engineer: J. Kidd	Project No.: 0101-025.00	Stat./Offset:
Start Date: 9-3-10	Route No.:	Northing:
Finish Date: 9-3-10	Bridge No.:	Easting:
Project Description: Atlantic Street, Pilot Boring Program		Surface Elevation:
Casing Size/Type: 3"/NW	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 24in.	Hammer Wt.: 140 lb. Fall: 30 in.	
Groundwater Observations: @None observed		

Depth (ft)	SAMPLES: Sample Type/No.	SAMPLES: Blows on Sampler per 6 inches	SAMPLES: Pen. (in.)	SAMPLES: Rec. (in.)	SAMPLES: RQD %	Generalized Strata Description	Material Description and Notes	Well Construction	Elevation (ft)
0						Asphalt			
						Subbase			
	S-1	17 13 8 8	24	1		Sand with Gravel & Silt	S-1: Medium dense, gray fine to coarse SAND, little fine to coarse Gravel, little Silt		
	S-2	11 7 11 100/2"	20	2			S-2: Medium dense, brown fine to coarse SAND, some fine to coarse Gravel, little Silt		
5	S-3	22 50/2"	8	4		Weathered Rock	S-3: Very dense, brown fine to coarse GRAVEL and fine to coarse SAND, trace Silt		
							END OF BORING 8ft		
10									
15									
20									

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 8ft Rock: 0ft	NOTES: Auger chatterred at approximately 5' b.g.	Sheet 1 of 1
No. of Soil Samples: 3 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: R. Janeiro	Town: Stamford	Hole No.: B-3
Engineer: J. Kidd	Project No.: 0101-025.00	Stat./Offset:
Start Date: 8-30-10	Route No.:	Northing:
Finish Date: 8-30-10	Bridge No.:	Easting:
Project Description: Atlantic Street, Pilot Boring Program		Surface Elevation:
Casing Size/Type: 3"/NW	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 24in.	Hammer Wt.: 140 lb. Fall: 30 in.	
Groundwater Observations: @None observed		

Depth (ft)	SAMPLES: Sample Type/No.	SAMPLES: Blows on Sampler per 6 inches	SAMPLES: Pen. (in.)	SAMPLES: Rec. (in.)	SAMPLES: RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Asphalt		
						Concrete		
						Sand with Gravel & Silt		
	S-1	17 15 14 17	24	10			S-1: Medium dense, gray fine to coarse SAND, some Silt, little fine Gravel	
	S-2	20 15 100/5"	17	5			S-2: Very dense, brown fine to coarse GRAVEL, some fine to coarse Sand, little Silt	
5	S-3	62 66 98 100/3"	21	15		Weathered Rock	S-3: Very dense, brown fine to medium SAND, little fine Gravel, little Silt, trace coarse Sand, (with Rock fragments jammed mid-sample)	
							END OF BORING 8.5ft	
10								
15								
20								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 8.5ft Rock: 0ft	NOTES: Advanced open hole to EOB; Piece of gravel in tip of S-1; Rock fragments jammed in S-3.	Sheet 1 of 1
No. of Soil Samples: 3 No. of Core Runs: 0		SM-001-M REV. 1/02

APPENDIX G – FIGURES

LIST OF FIGURES

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LIST OF FIGURES *(continued)*

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Other Structures

Figure 5.1a-b – Railroad Retaining Walls
Figure 5.2 – Roadway Retaining Walls
Figure 5.4 – I-95 Exit Ramp Bridge over Atlantic Street

Traffic

Figure 6.1 – Maintenance and Protection of Traffic
Figure 6.2 – Detour Plans

Drainage

Figure 7.1 – Drainage Plan

Utilities

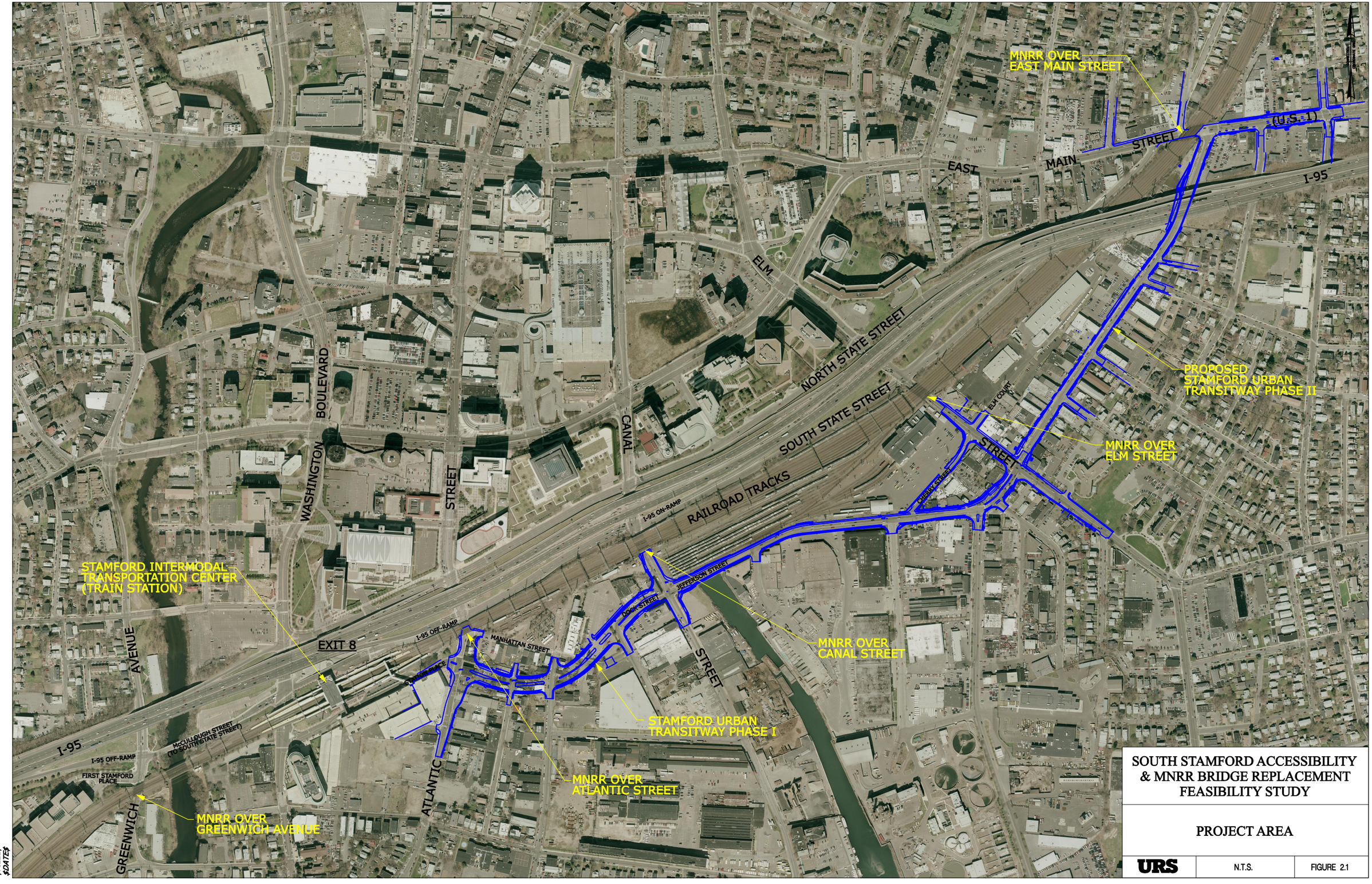
Figure 8.1 – Utility Plan

Geotechnical

Figure 9.1 – Boring Plan

Environmental

Figure 10.1 – 100 Year FEMA Floodplain

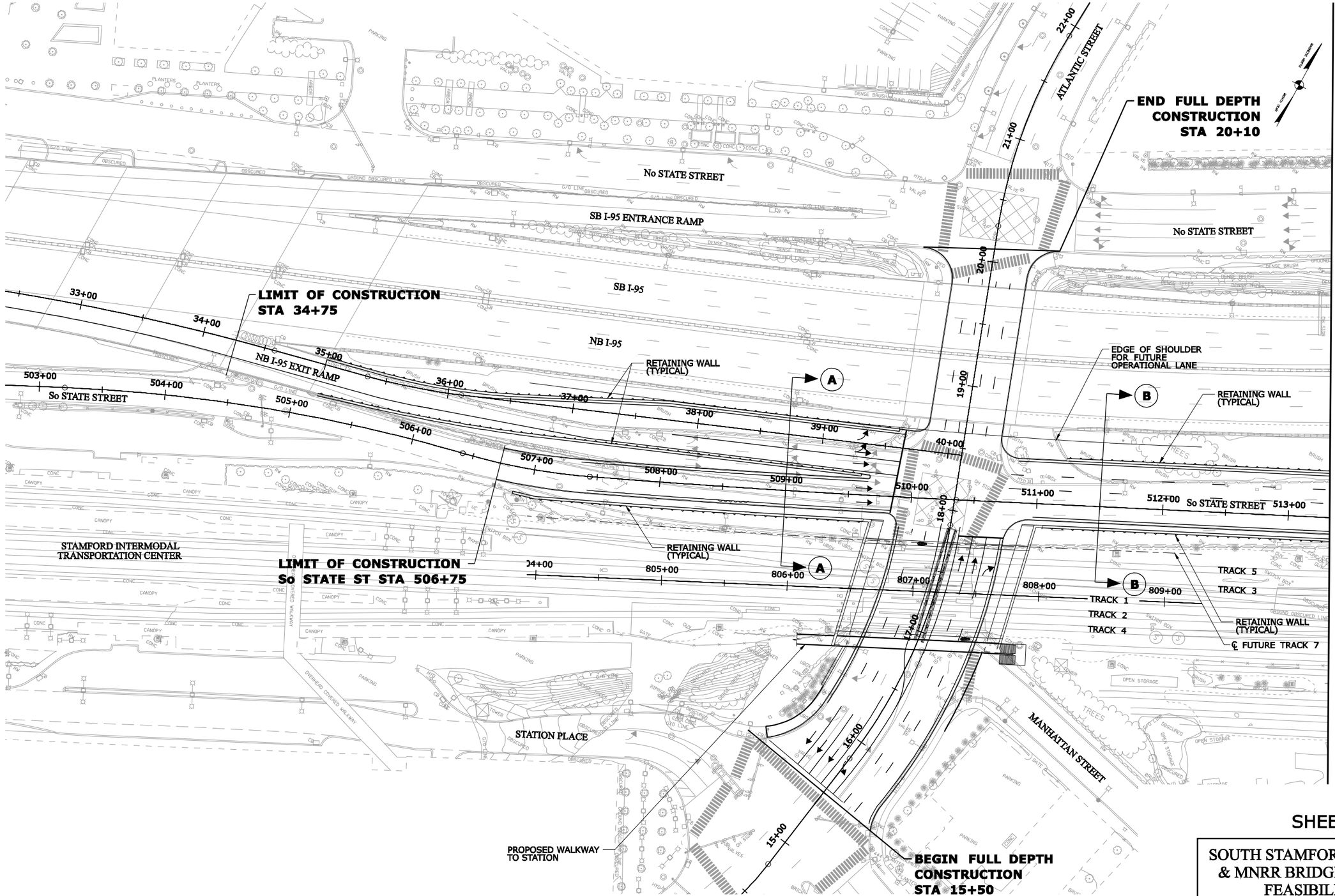


SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

PROJECT AREA

URS | N.T.S. | FIGURE 2.1

$FILE$
$DATE$



SHEET 1 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-1
ROADWAY PLAN (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.21(2S)a

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2/28/2011

MATCH LINE

No STATE STREET

SB I-95

NB I-95

So STATE STREET

RETAINING WALL (TYPICAL)

EDGE OF SHOULDR FOR FUTURE OPERATIONAL LANE

END FULL DEPTH FULL WIDTH CONSTRUCTION STA 515+00

RETAINING WALL (TYPICAL)

℄ FUTURE TRACK 7

514+00 515+00 516+00 517+00 518+00 519+00 520+00 521+00 521+46

811+00 812+00 813+00 814+00 815+00 816+00 817+00 818+00 819+00

TRACK 7
TRACK 5
TRACK 3
TRACK 1
TRACK 2
TRACK 4
TRACK 6

CANAL STREET

SCALE 1" = 40'

80 40 0 80

SHEET 2 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-1
ROADWAY PLAN (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE2.21(2S)b

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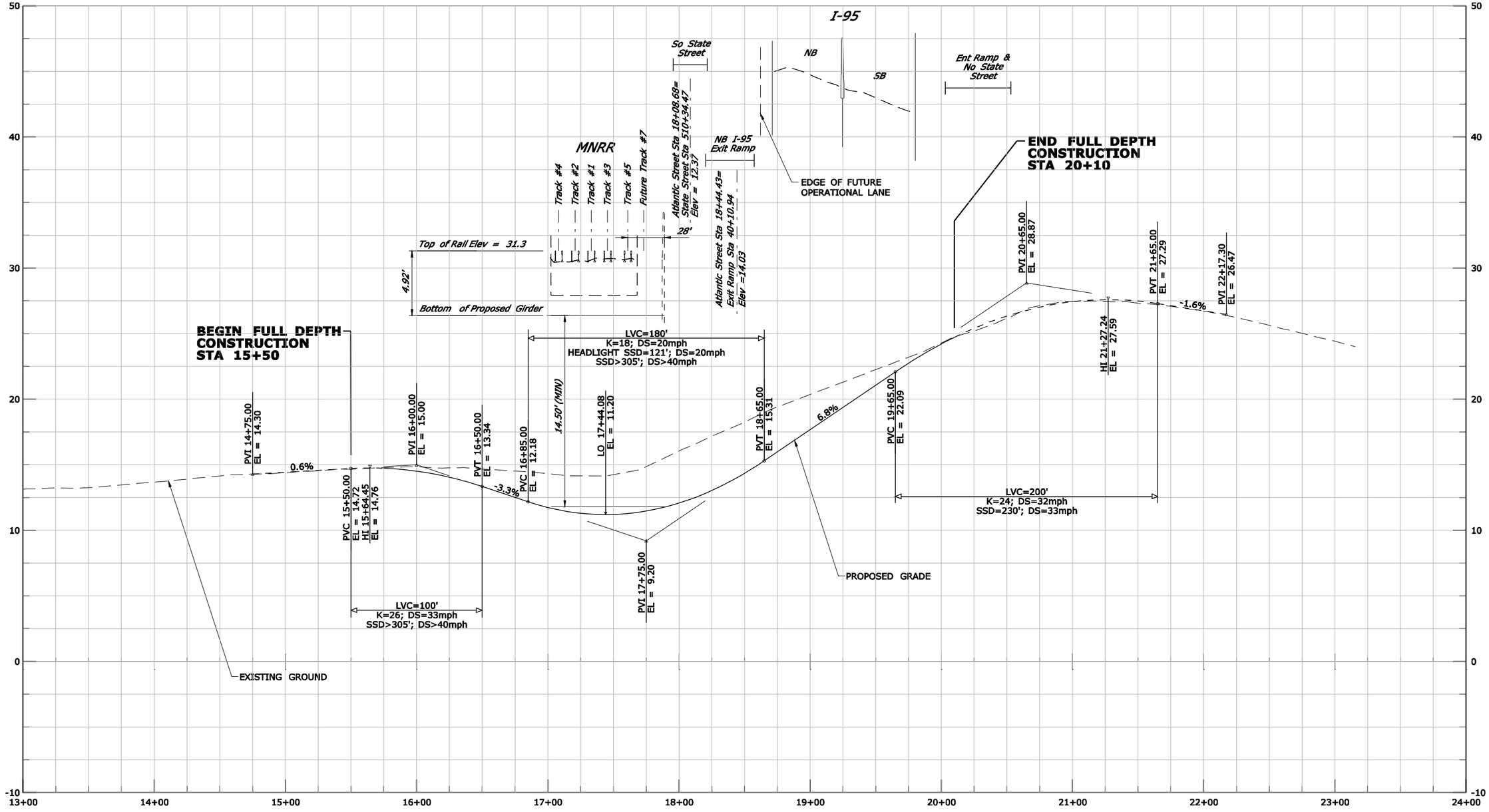
10/22/2010



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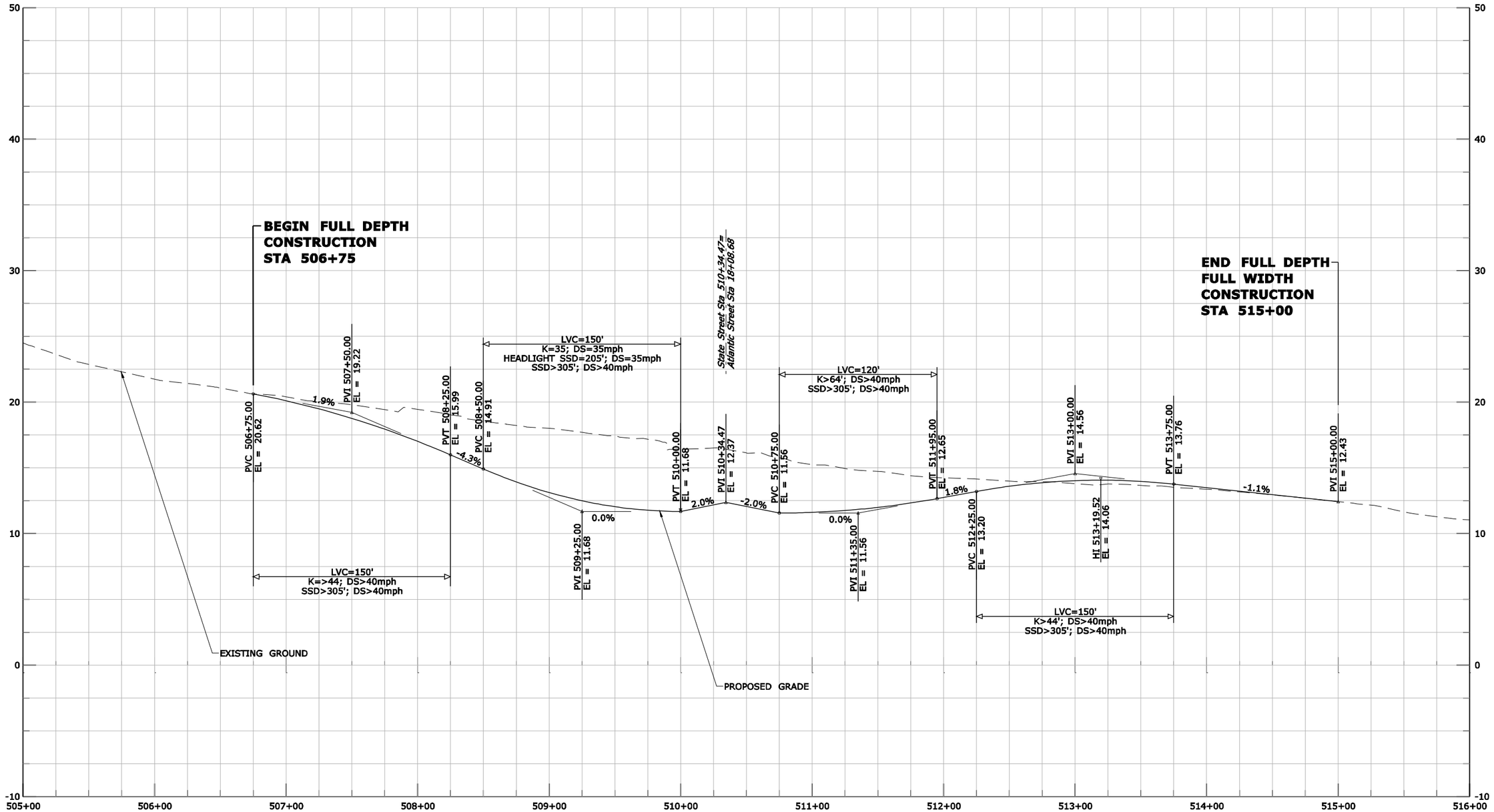
10/22/2010

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-1
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.31(2S)a



SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

So STATE STREET ALT-1
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.31(2S)b

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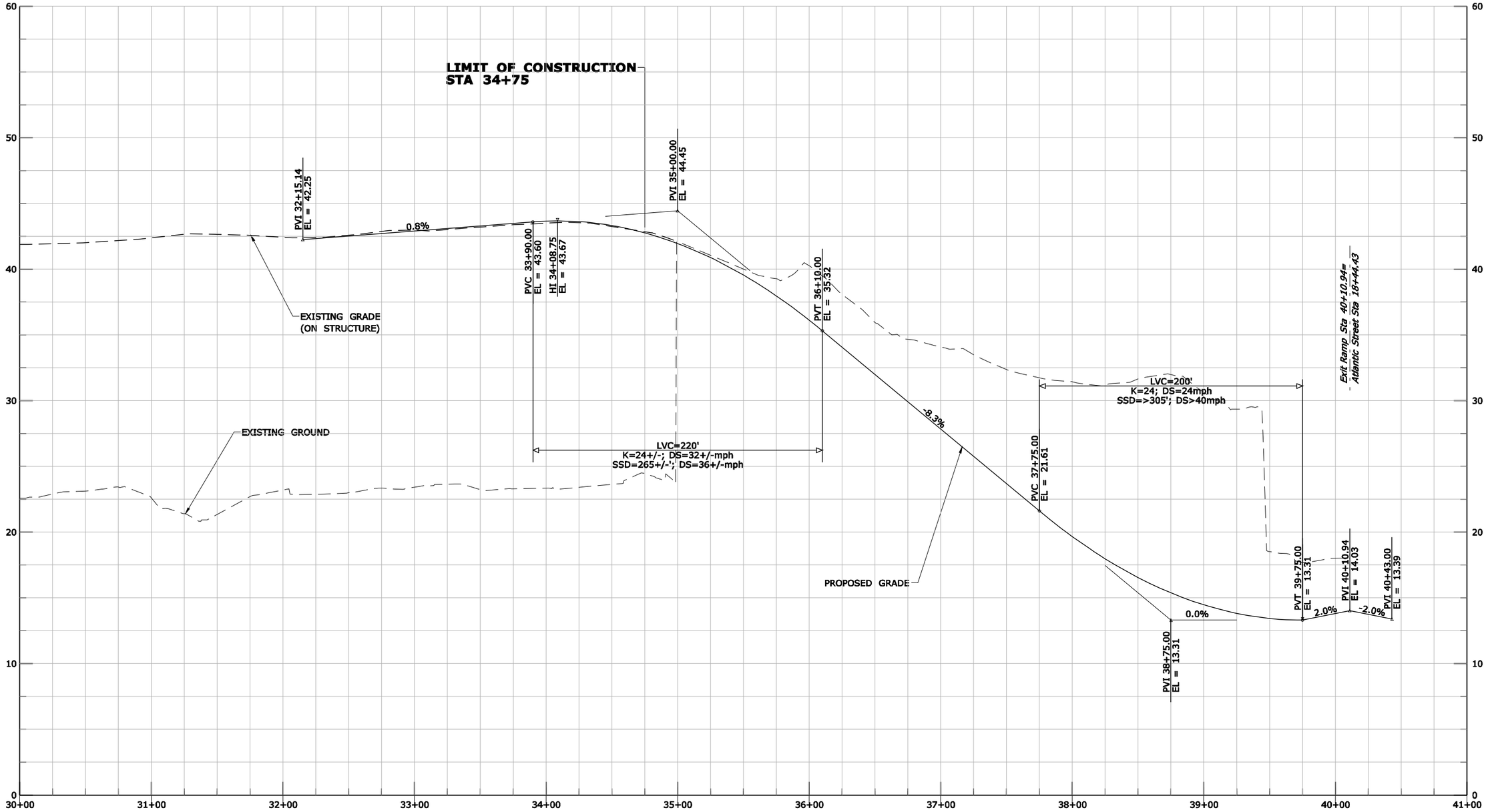

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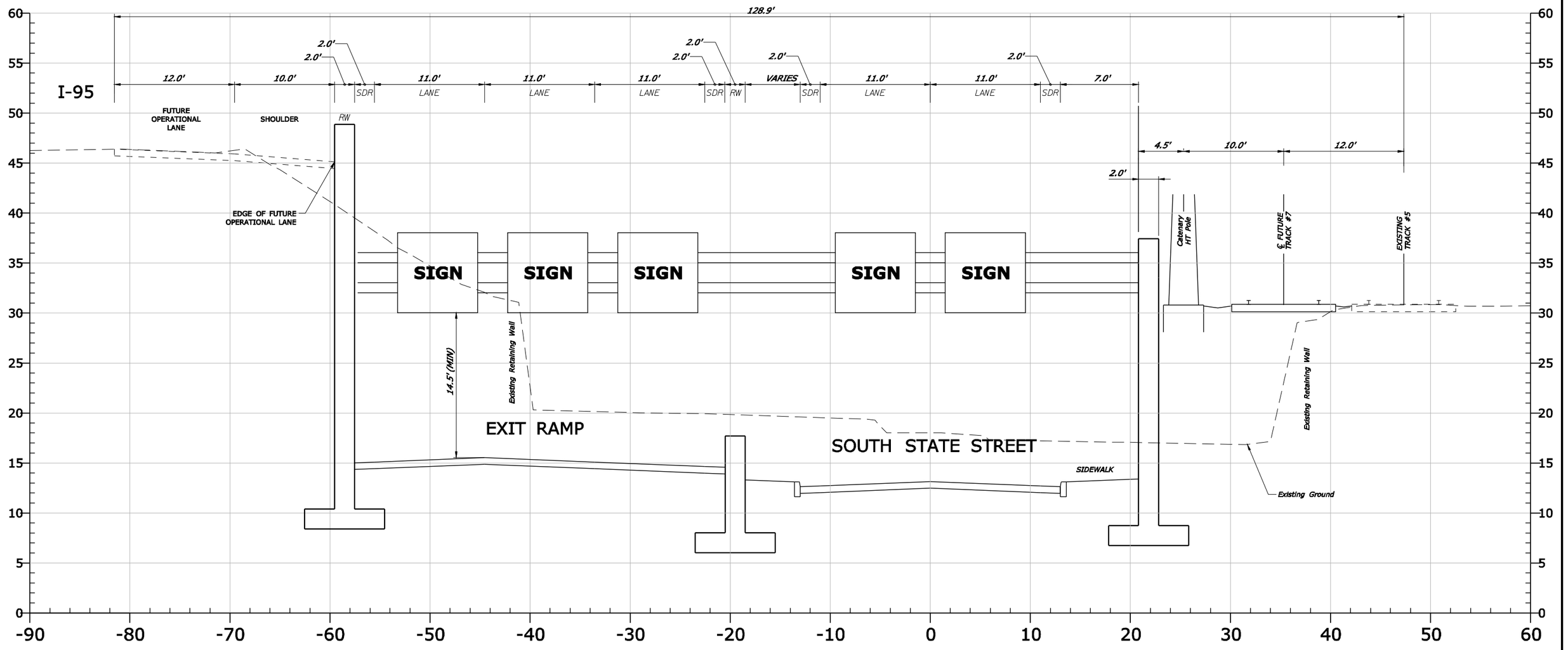
10/22/2010

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

NB I-95 EXIT RAMP ALT-1
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.31(2S)c



SECTION A-A
509+00
(So State Street)

SCALE: 1" = 5'

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

CRITICAL CROSS SECTION
ALTERNATIVE 1 (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.41(2S)a

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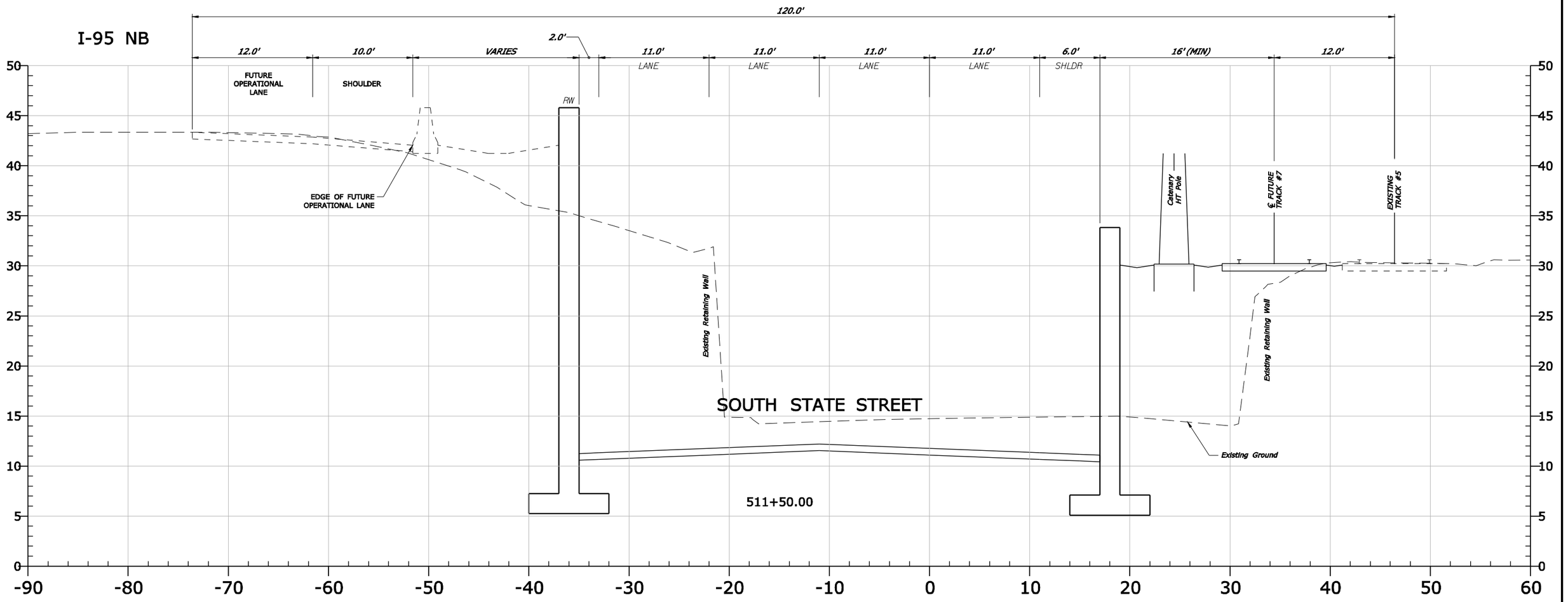
10/22/2010

I-95 NB



SECTION B-B
511+50
(So State Street)

SCALE: 1" = 5'

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

CRITICAL CROSS SECTION
ALTERNATIVE 1 (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.41(2S)b

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10/22/2010

END FULL DEPTH CONSTRUCTION STA 20+10

LIMIT OF CONSTRUCTION STA 34+75

LIMIT OF CONSTRUCTION So STATE ST STA 506+75

BEGIN FULL DEPTH CONSTRUCTION STA 15+50

MATCH LINE

No STATE STREET

SB I-95 ENTRANCE RAMP

SB I-95

NB I-95

NB I-95 EXIT RAMP

So STATE STREET

RETAINING WALL (TYPICAL)

EDGE OF SHOULDER FOR FUTURE OPERATIONAL LANE

RELOCATED RAMP

STAMFORD INTERMODAL TRANSPORTATION CENTER

OVERHEAD COVERED WALKWAY

STATION PLACE

PROPOSED WALKWAY TO STATION

MANHATTAN STREET

TRACK 1
TRACK 2
TRACK 4
TRACK 5
TRACK 3
℄ FUTURE TRACK 7

SCALE 1" = 40'
80 40 0 80

SHEET 1 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-2
ROADWAY PLAN (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.22(2S)a

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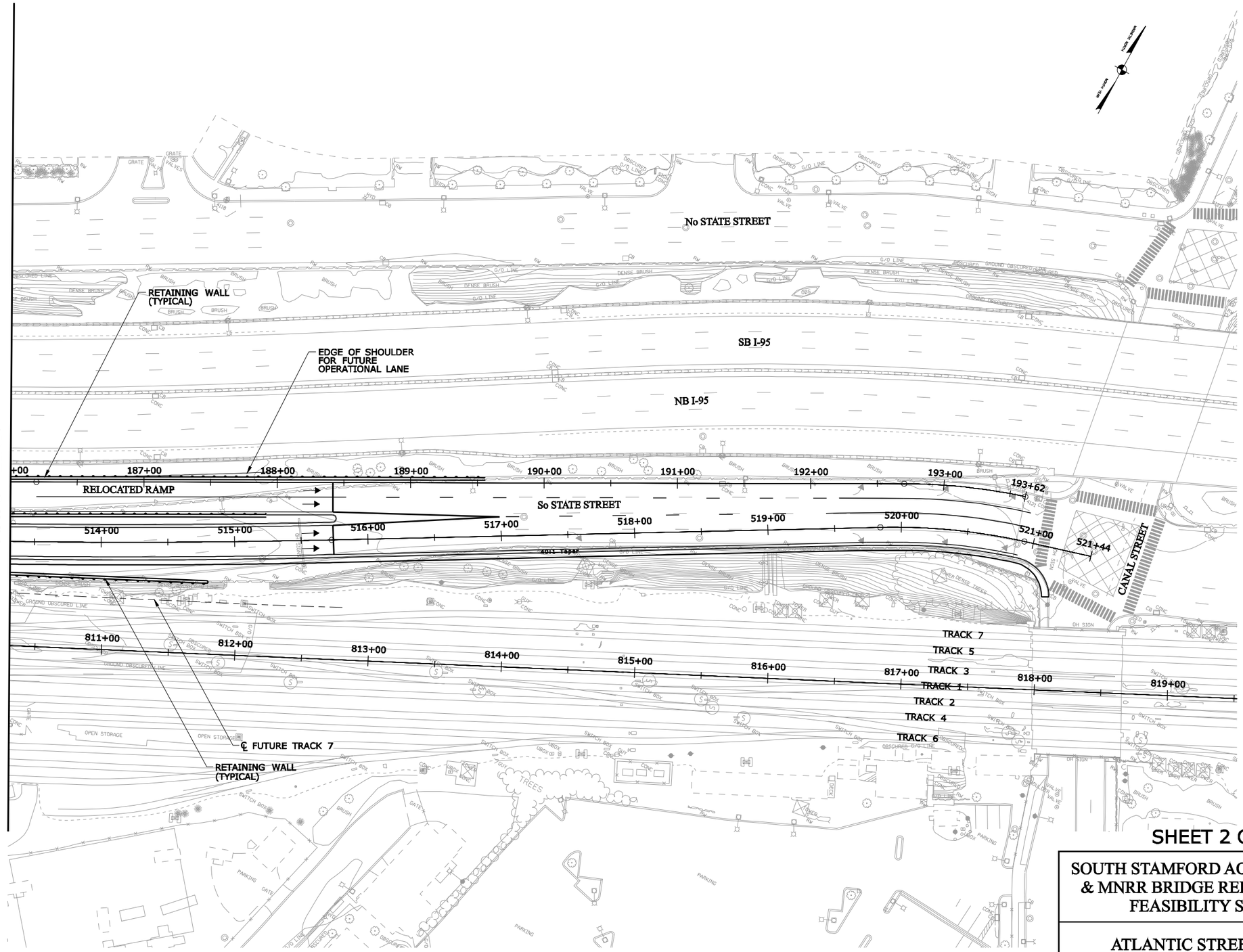

SHEET 2 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-2 ROADWAY PLAN (2 SPAN BRIDGE)

URS	SCALE AS NOTED	FIGURE 2.22(2S)b

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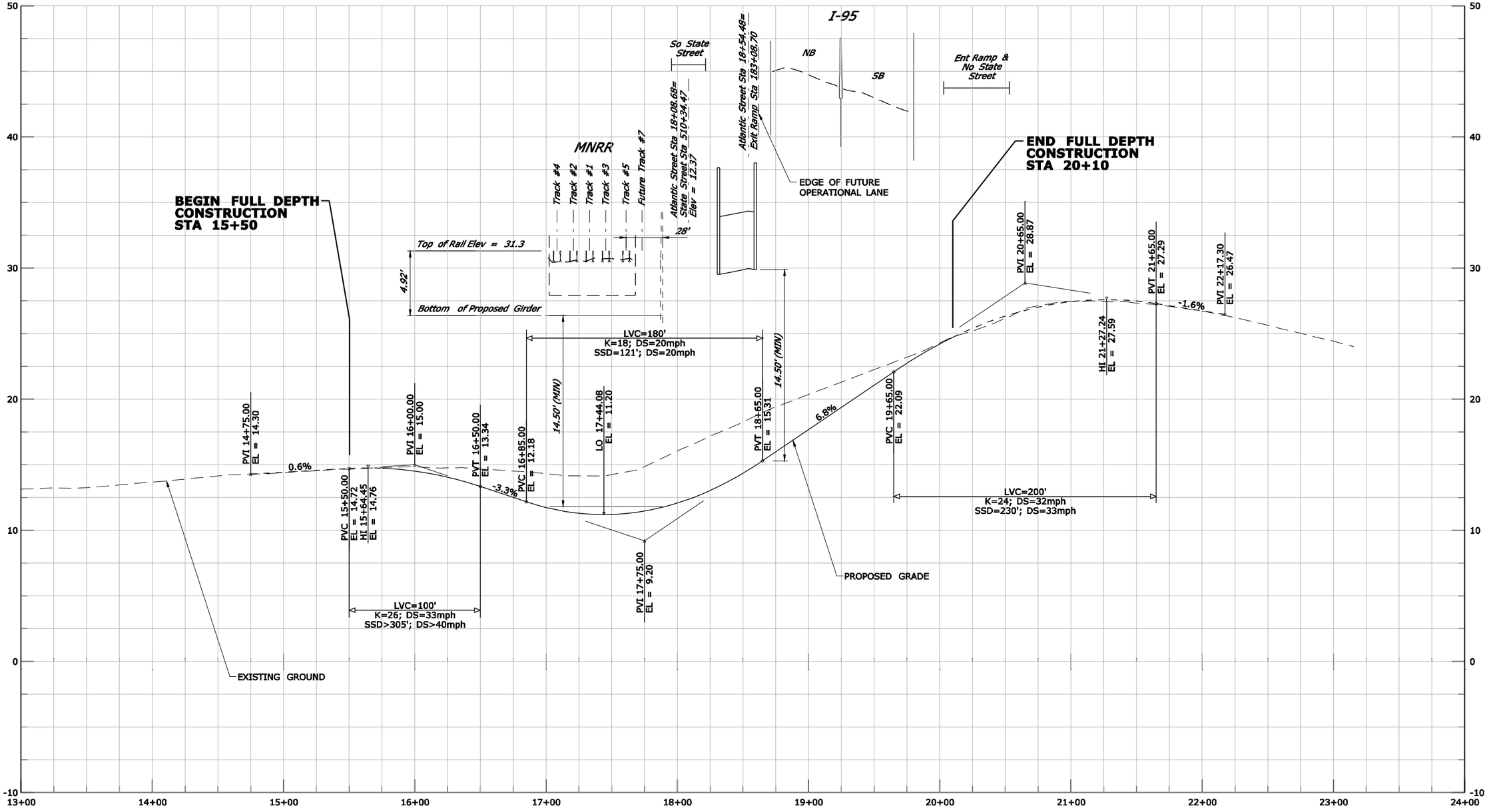

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-2
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.32(2S)a

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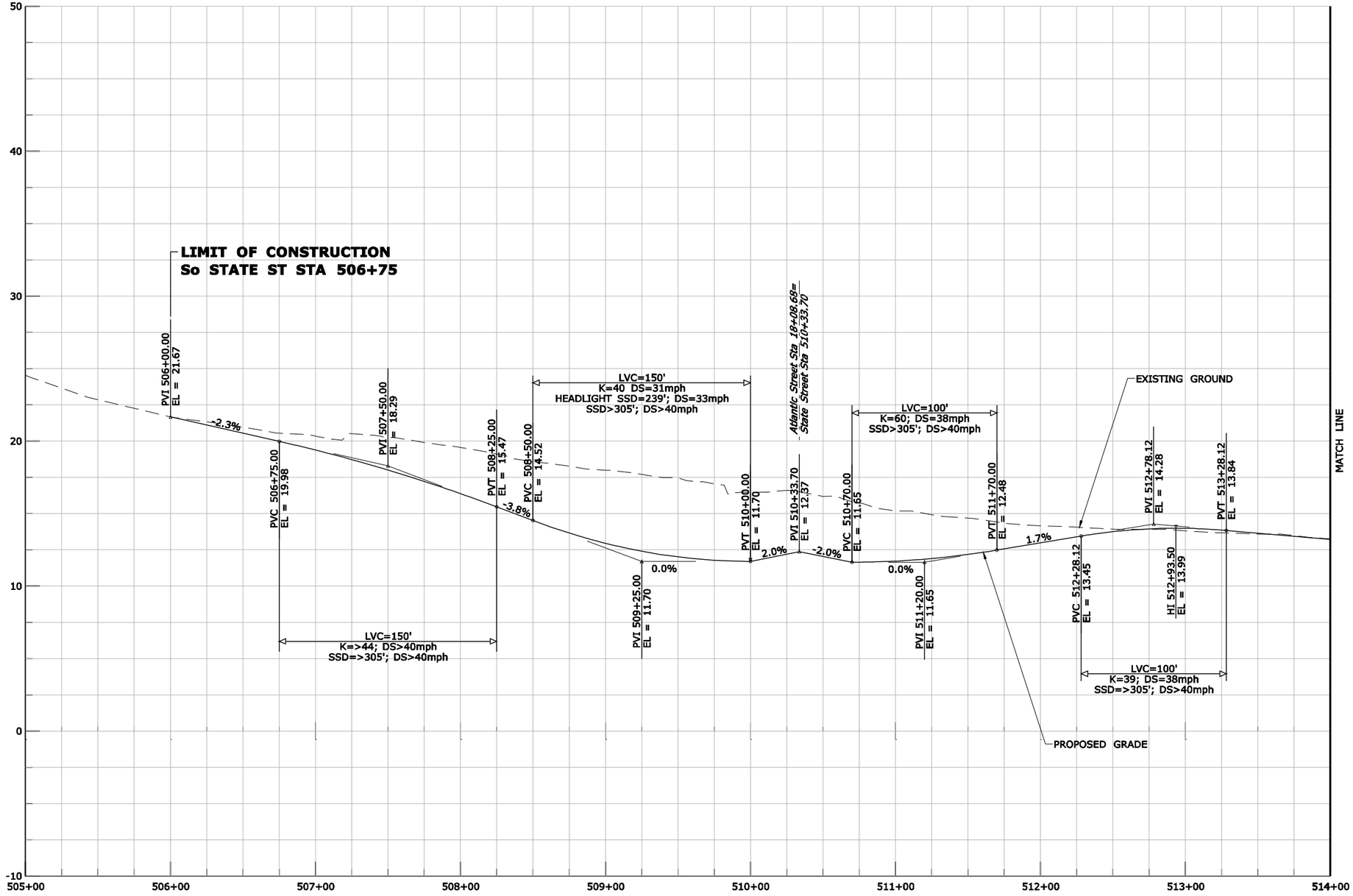

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10/22/2010

SHEET 1 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

So STATE STREET ALT-2
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.32(2S)bi

SHEET 2 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

So STATE STREET ALT-2
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.32(2S)bii

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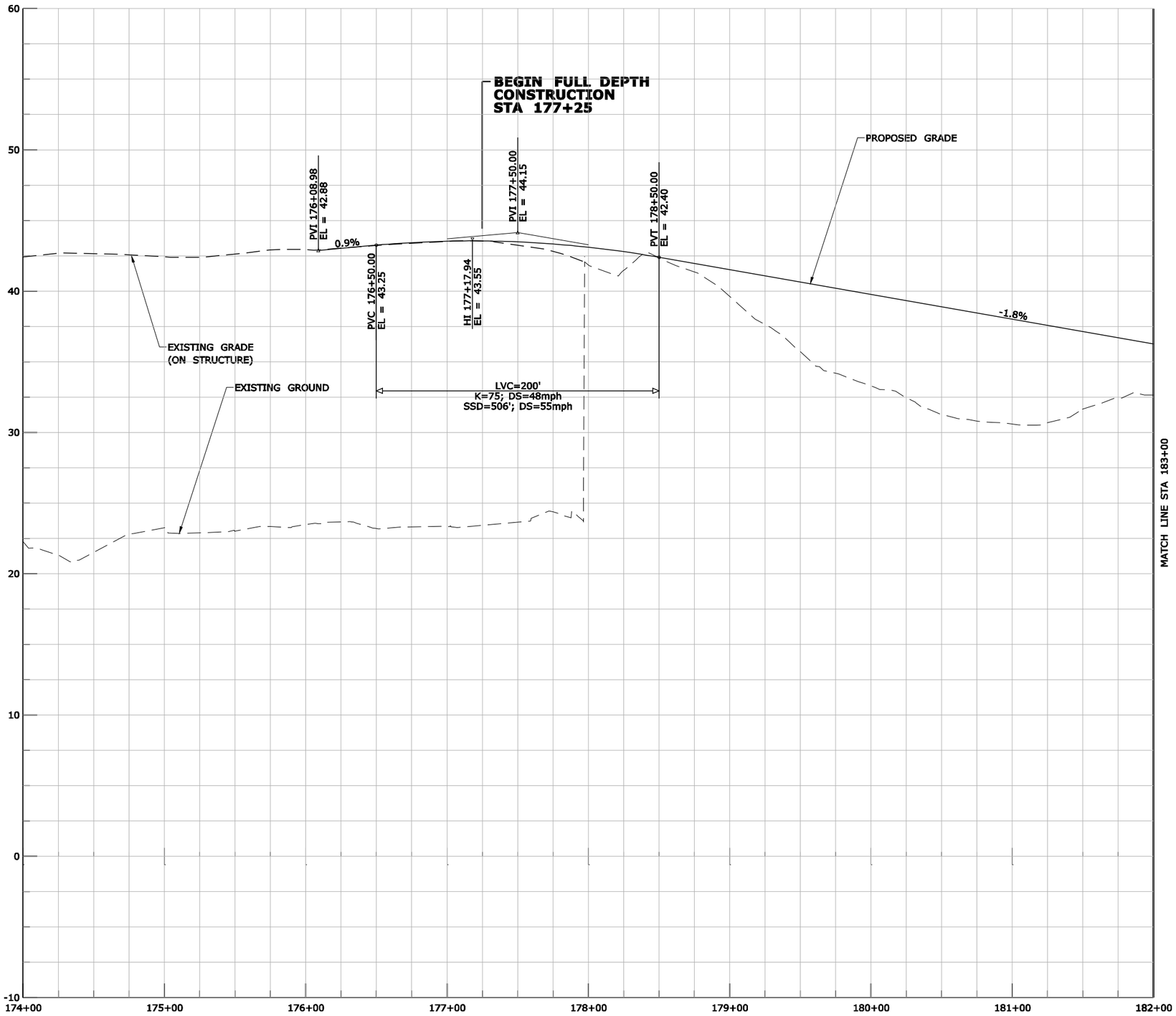

HORIZ. SCALE IN FEET
0 40 80

VERT. SCALE IN FEET
0 4 8

SHEET 1 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

NB EXIT RAMP ALT-2
PROFILE (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.32(2S)ci

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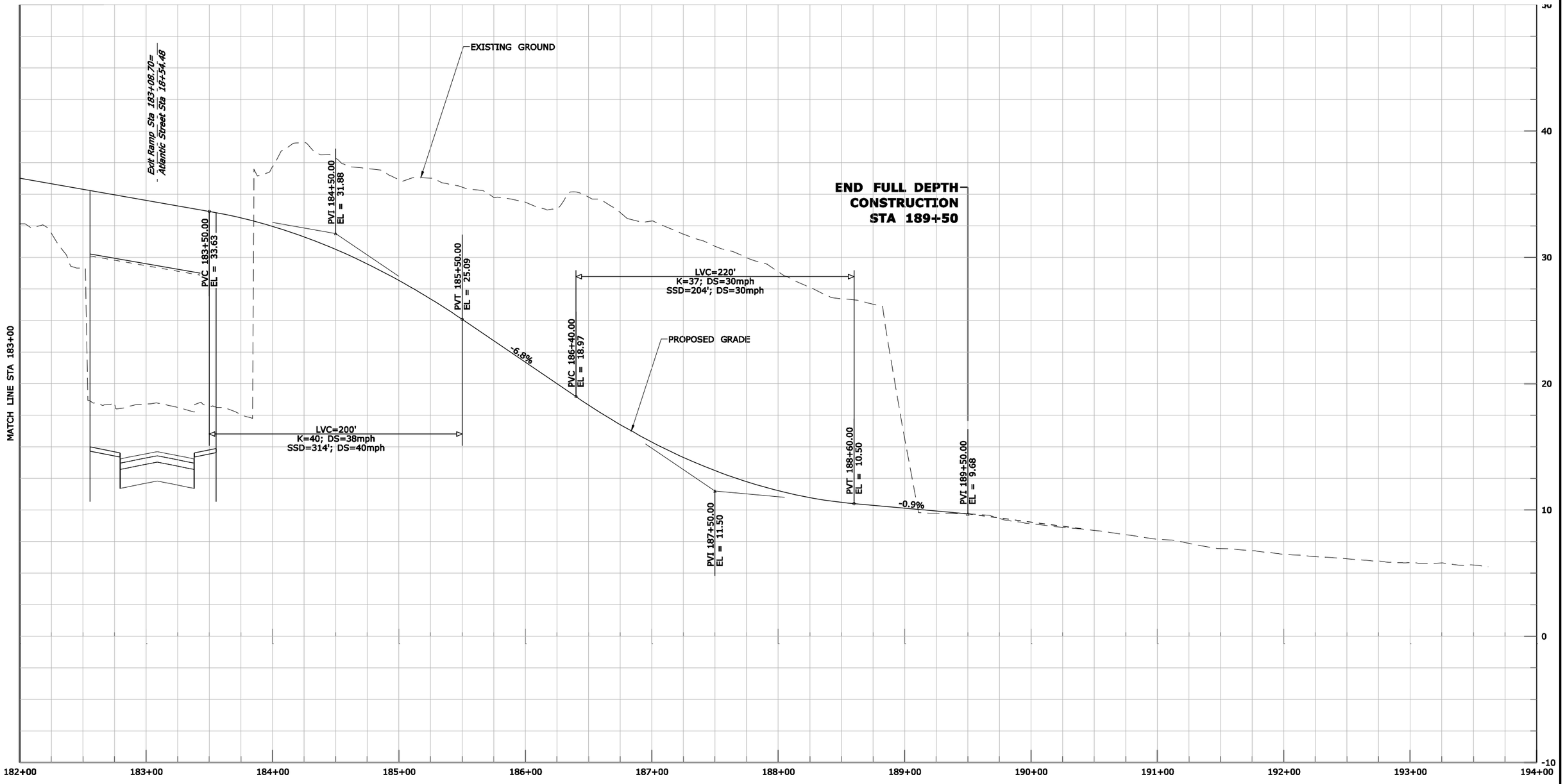

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10/22/2010

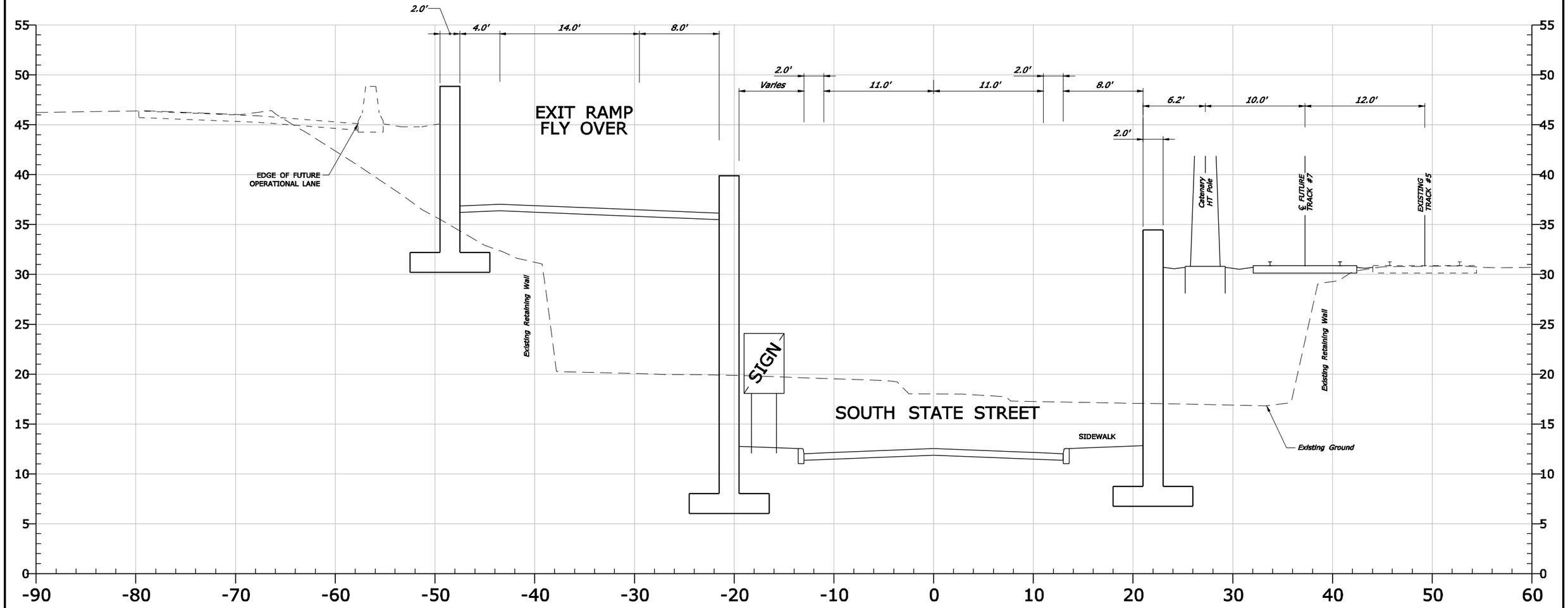
SHEET 2 OF 2

SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

NB EXIT RAMP ALT-2
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.32(2S)cii



SECTION A-A

509+00
(So State Street)

SCALE: 1" = 5'

SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

CRITICAL CROSS SECTION
ALTERNATIVE 2 (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.42(2S)a

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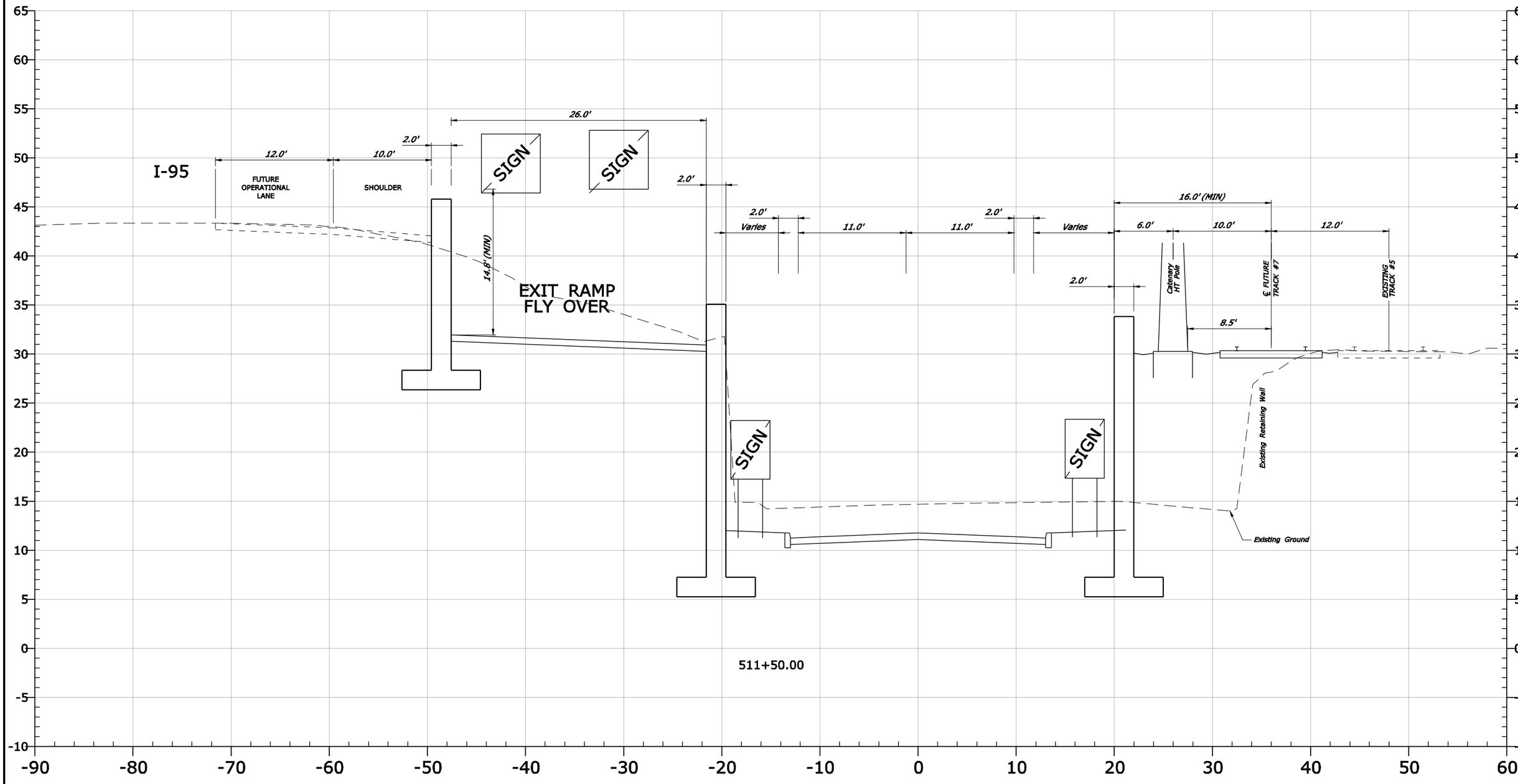
10/22/2010



SECTION B-B

511+50
(So State Street)

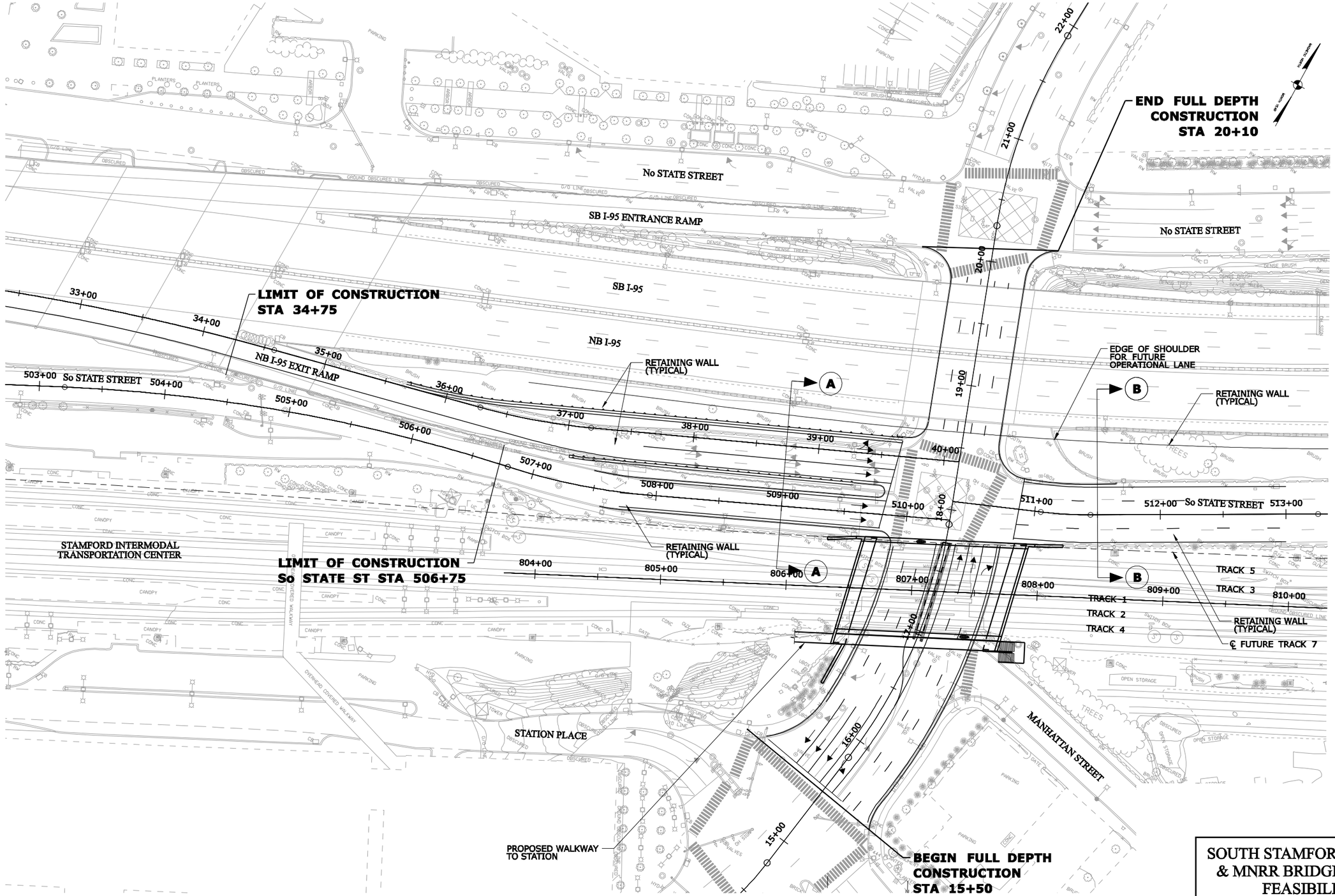
SCALE: 1" = 5'

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

CRITICAL CROSS SECTION ALTERNATIVE 2 (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.42(2S)b

P:\CTDOT_projects\135-301\Highways\Phase-2\Atlantic\MSta_Contract_Sheet_Files\2-SPAN_XSC_A2-02.dgn
10/22/2010



SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-3
ROADWAY PLAN (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.23(2S)

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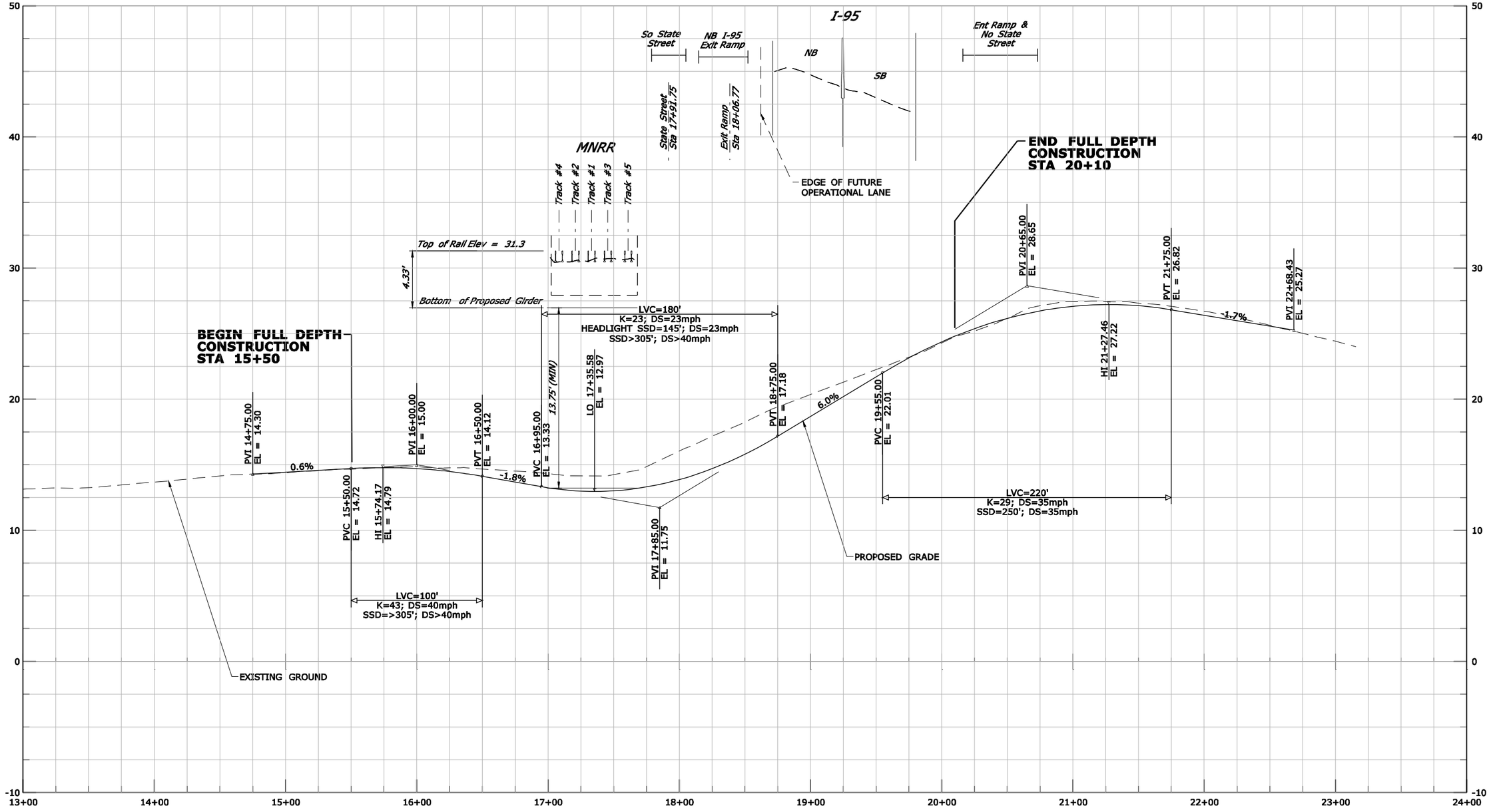
2/28/2011



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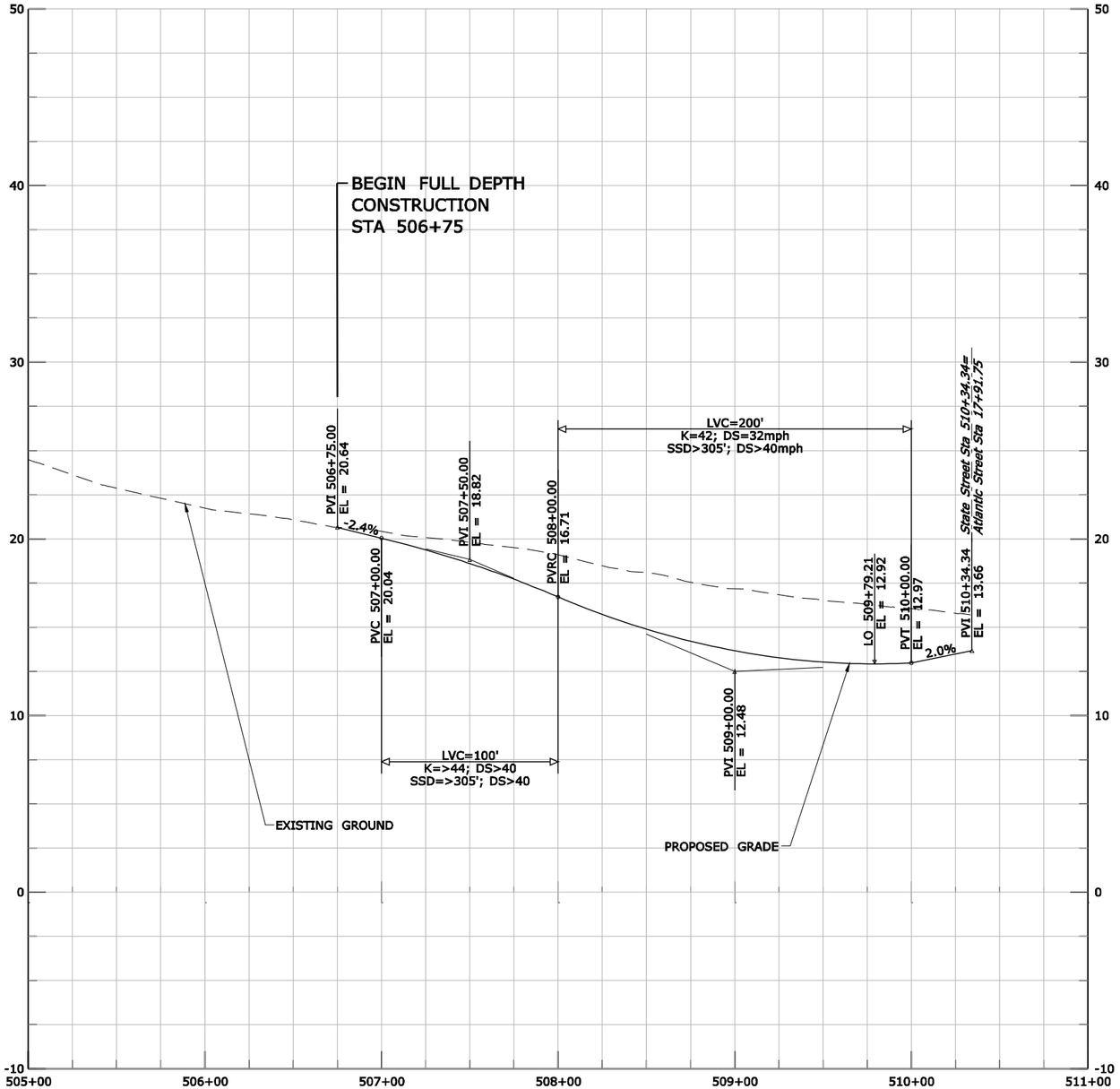
10/22/2010

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

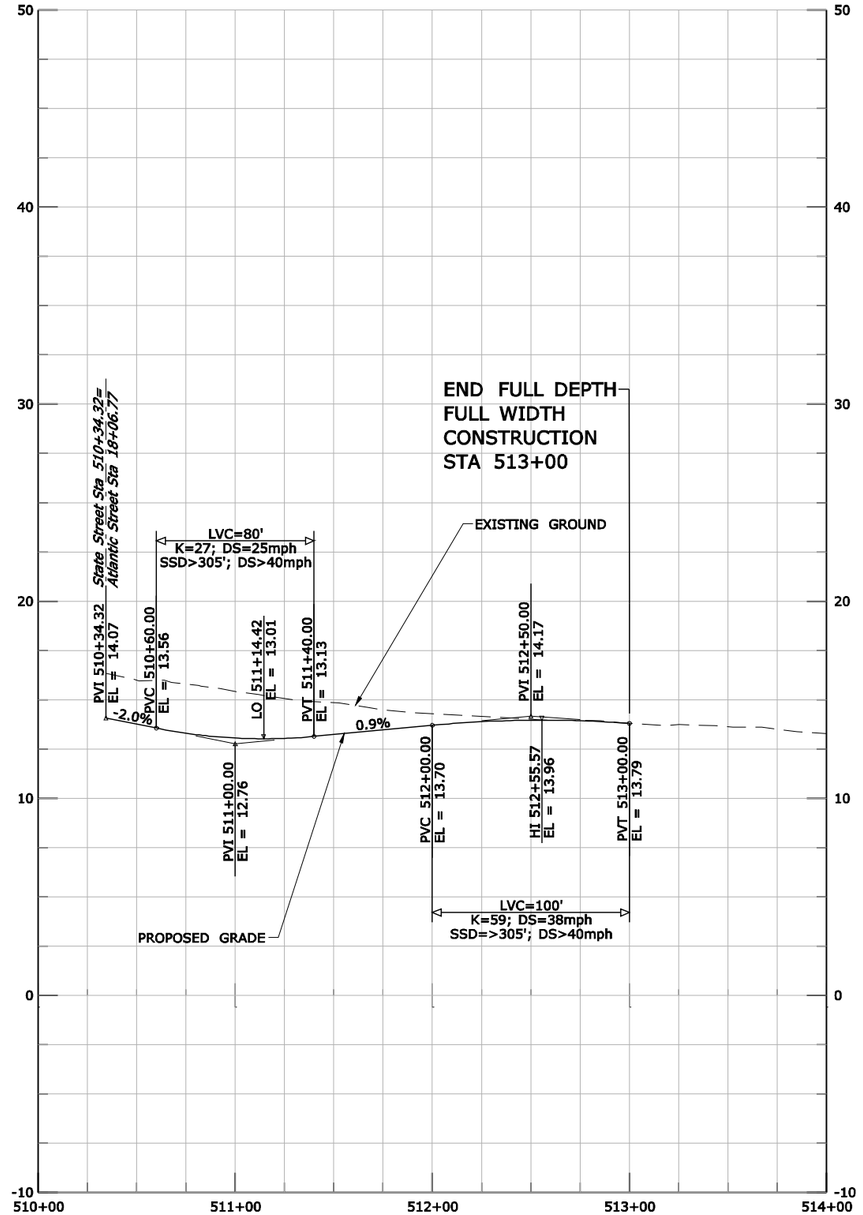
ATLANTIC STREET ALT-3
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.33(2S)a



So STATE STREET
WEST OF ATLANTIC STREET



So STATE STREET
EAST OF ATLANTIC STREET

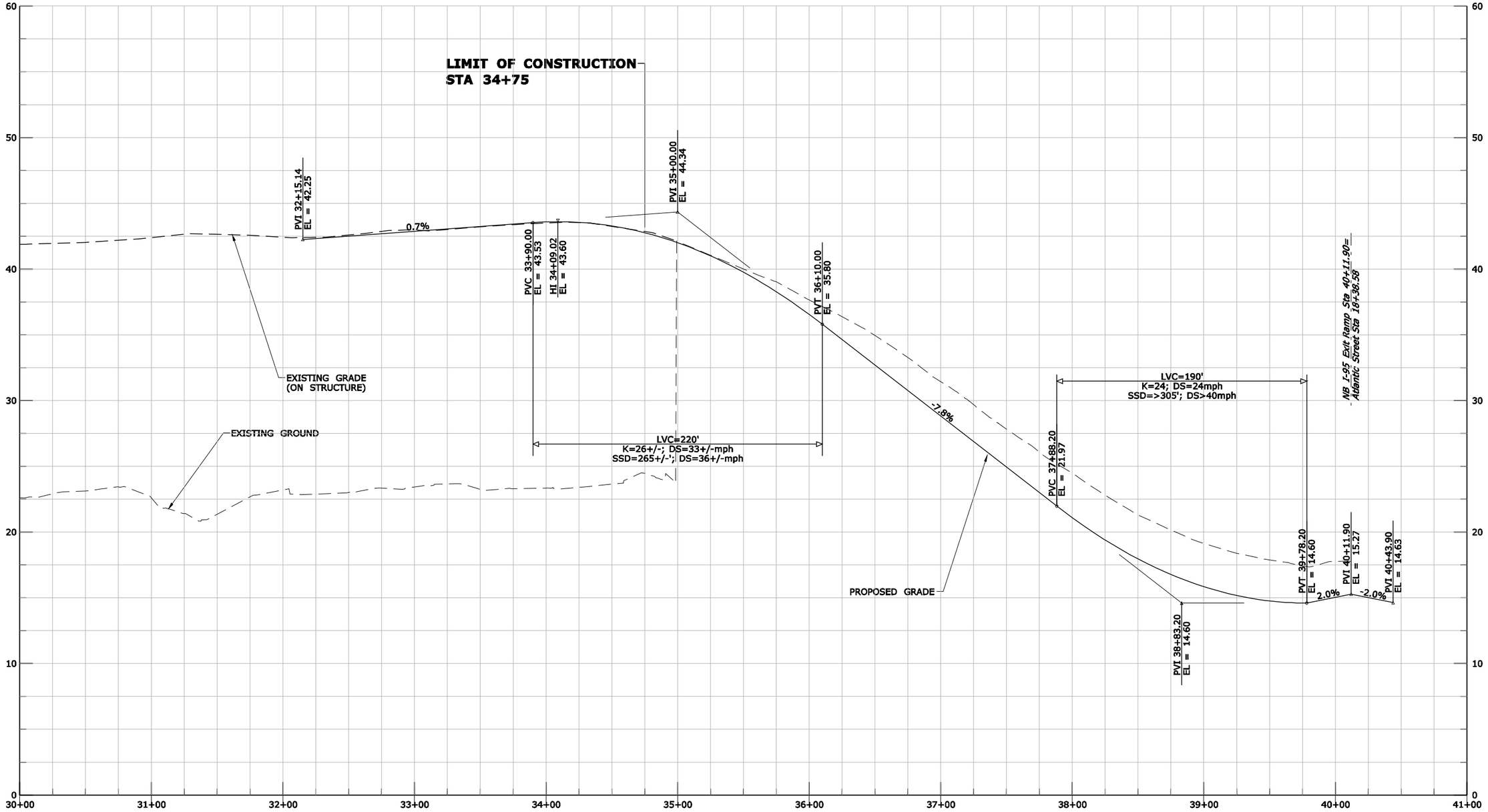
SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

So STATE STREET ALT-3
PROFILE (2 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.33(2S)b

P:\CTDOT_projects\135-301\Highways\Phase_2\Atlantic\MSta_Contract_Sheet_Files\2-SPAN_PRO_SS-A3.dgn
10/22/2010



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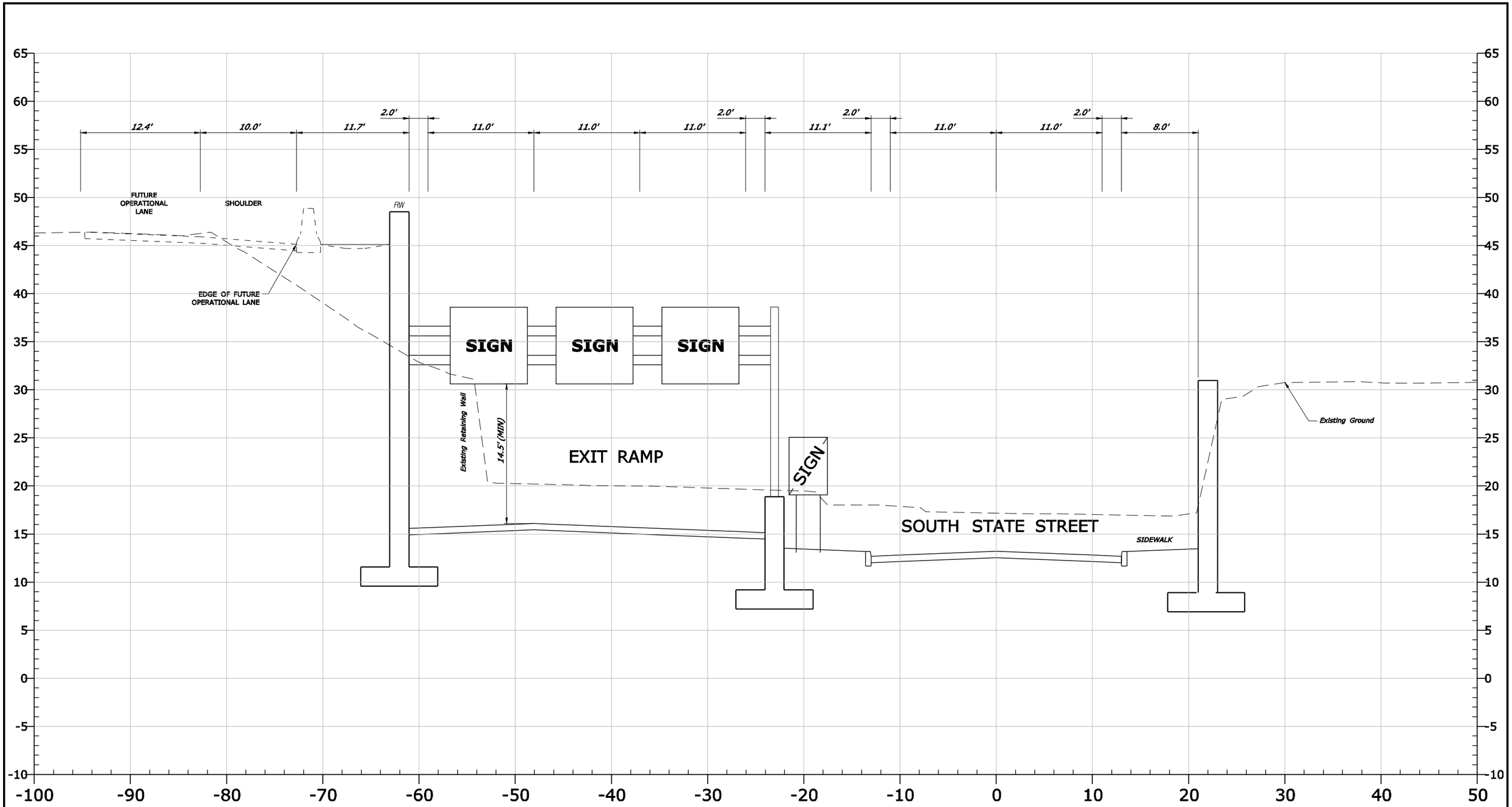
10/22/2010

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

NB I-95 EXIT RAMP ALT-3
PROFILE (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.33(2S)c



SECTION A-A
509+00
(So State Street)

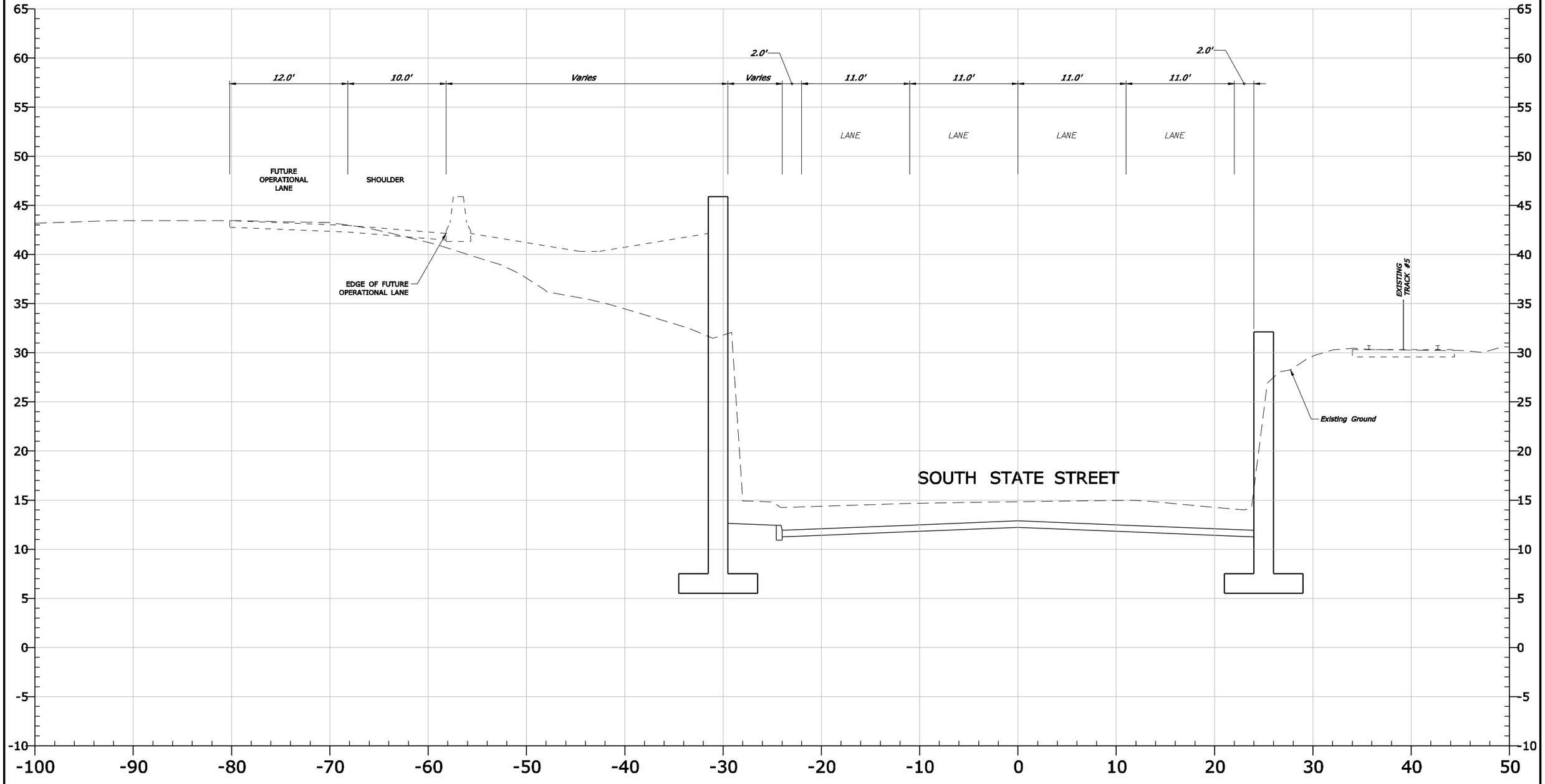
SCALE: 1" = 5'

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

CRITICAL CROSS SECTION
ALTERNATIVE 3 (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 243(2S)a

P:\CTDOT_projects\135-301\Highways\Phase_2\Atlantic\MSta_Contract_Sheet_Files\2-SPAN_XSC_A3-01.dgn
10/22/2010



SECTION B-B
511+50
(So State Street)

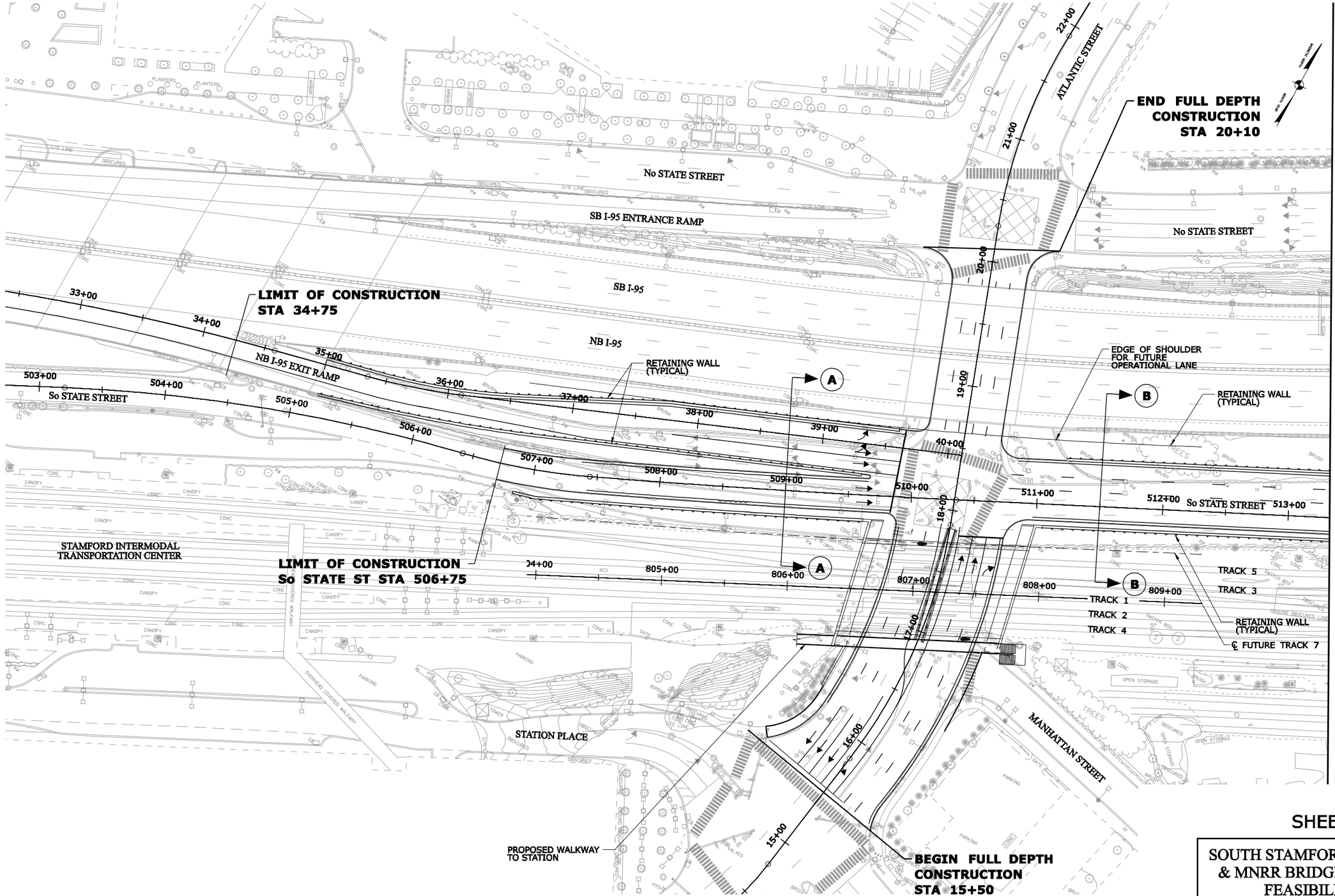
SCALE: 1" = 5'

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

CRITICAL CROSS SECTION
ALTERNATIVE 3 (2 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.43(2S)b

P:\CTDOT_projects\135-301\Highways\Phase-2\Atlantic\MSta_Contract_Sheet_Files\2-SPAN_XSC_A3-02.dgn
10/22/2010



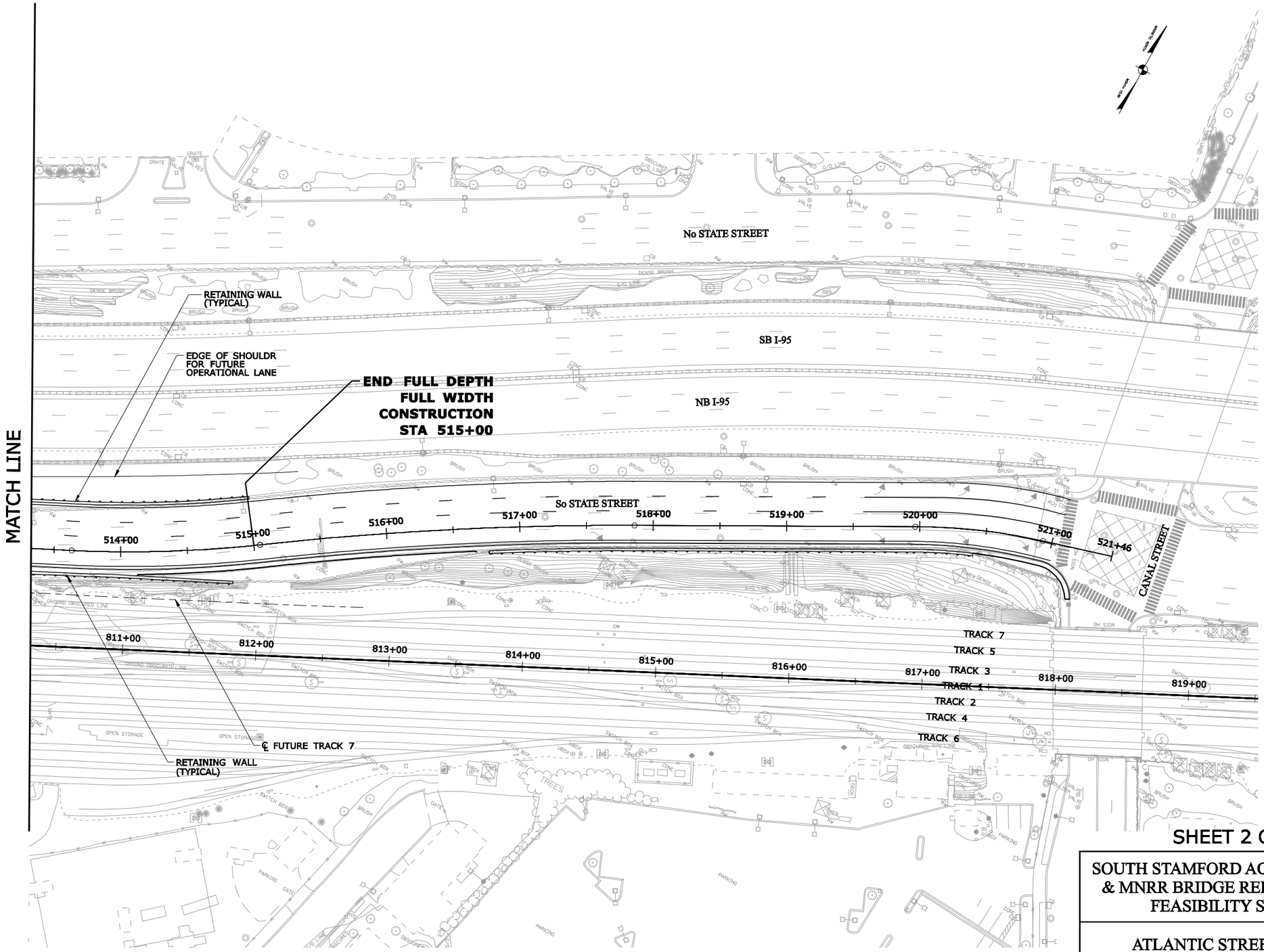
SHEET 1 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-1
ROADWAY PLAN (4 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.21(4S)a

P:\CTDOT_projects\135-301\Highways\Phase-2\Atlantic\MSta_Contract_Sheet_Files\4-SPAN_PLN_AT-A1-01.dgn
2/28/2011



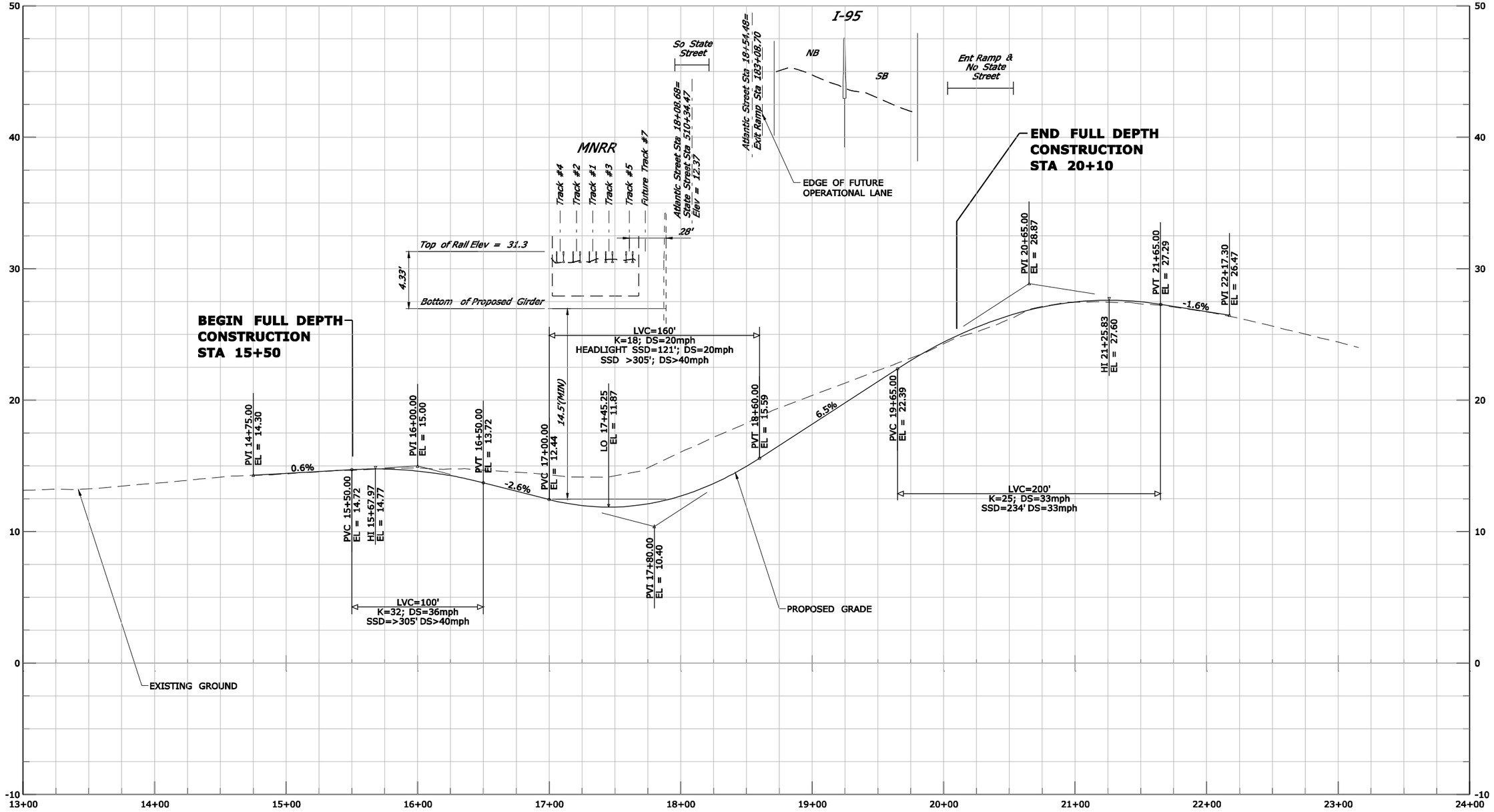
SHEET 2 OF 2

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-1
ROADWAY PLAN (4 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.21(4S)b

P:\CTDOT_projects\135-301\Highways\Phase-2\Atlantic\MSta_Contract_Sheet_Files\4-SPAN_PLN_AT-A1-02.dgn
10/22/2010



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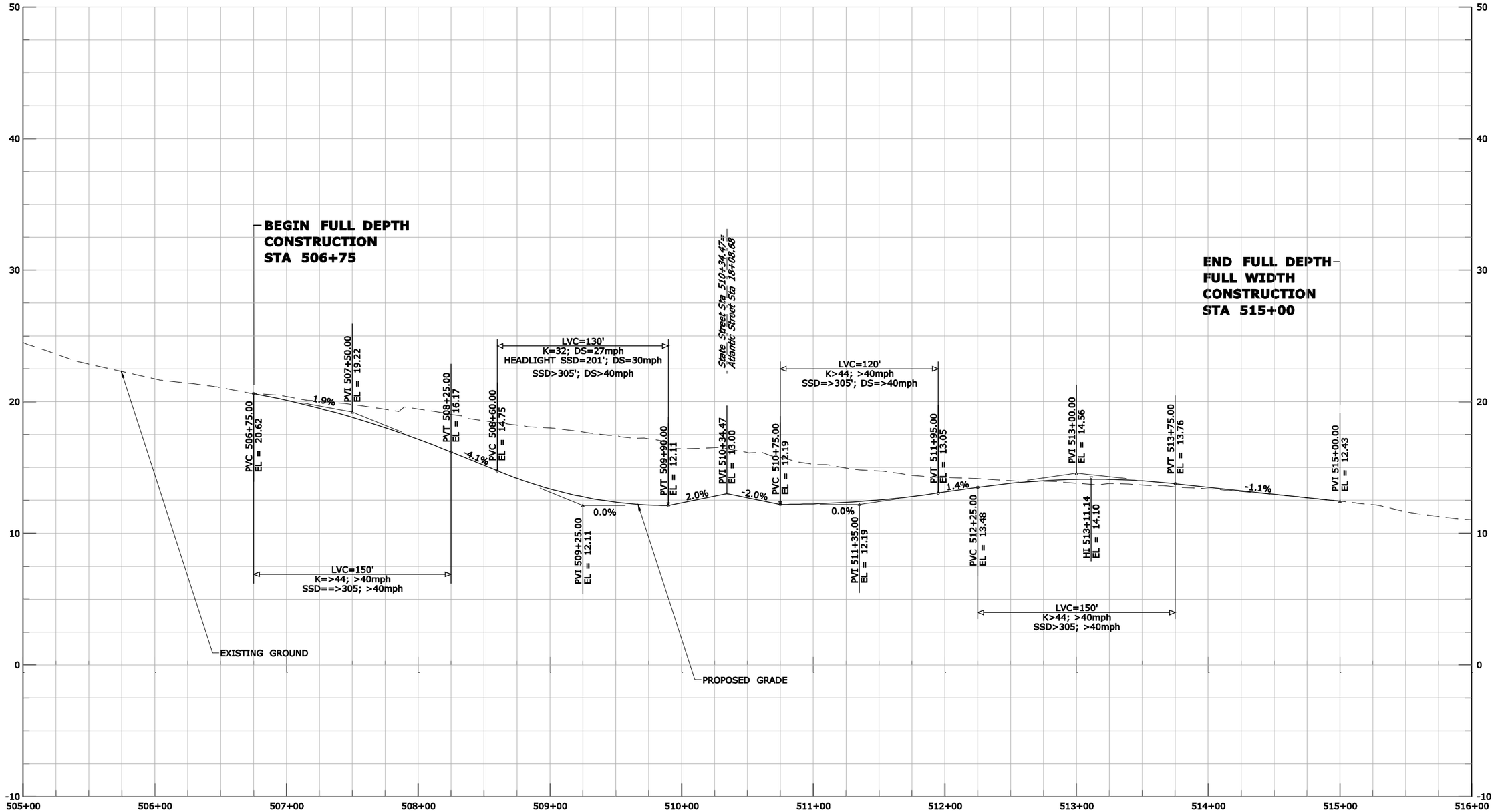
10/22/2010

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ALT-1
PROFILE (4 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.31(4S)a



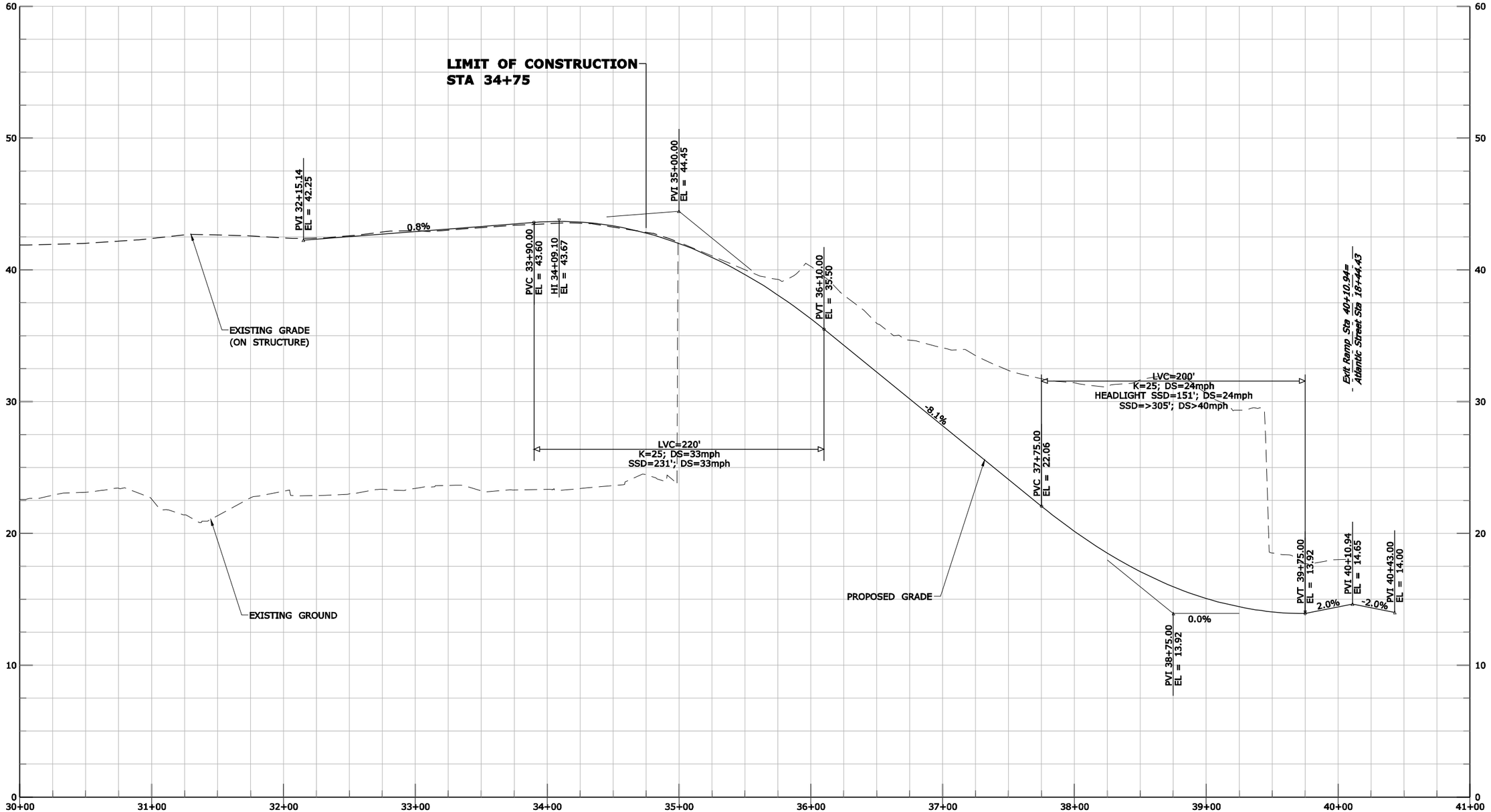
P:\CTDOT_projects\135-301\Highways\Phase-2\Atlantic\MSta_Contract_Sheet_Files\4-SPAN_PRO_SS-A1.dgn
10/22/2010

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

So STATE STREET ALT-1
PROFILE (4 SPAN BRIDGE)

HORIZ. SCALE IN FEET
0 40 80
VERT. SCALE IN FEET
0 4 8

URS | SCALE AS NOTED | FIGURE 2.31(4S)b

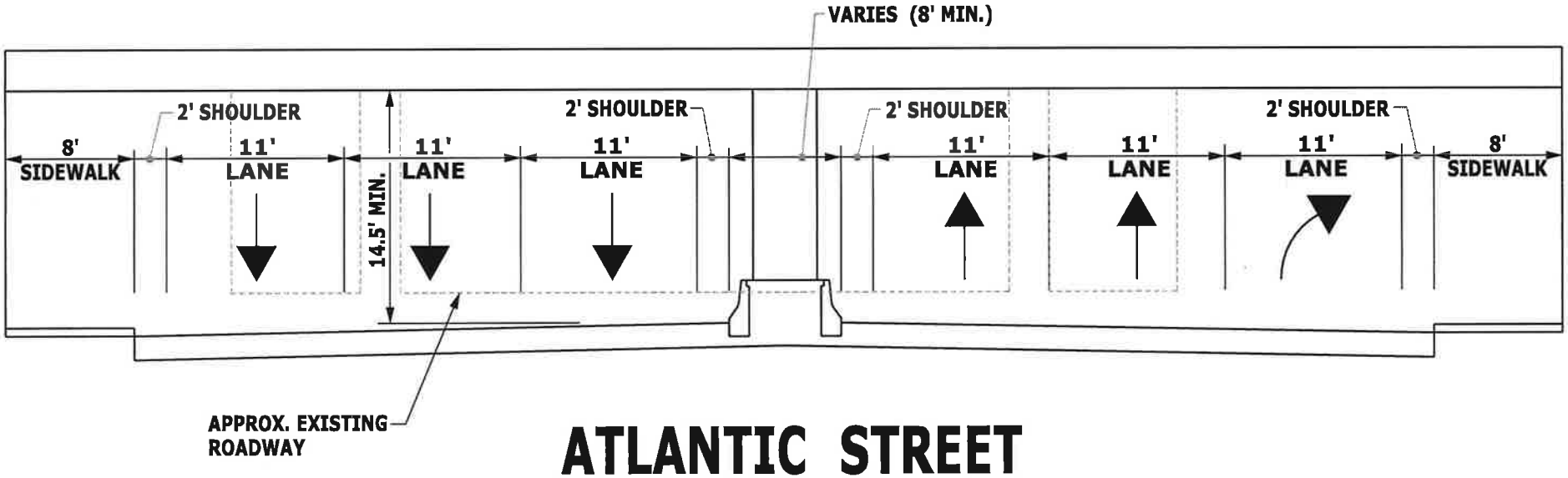


SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

NB I-95 EXIT RAMP ALT-1
PROFILE (4 SPAN BRIDGE)

URS | SCALE AS NOTED | FIGURE 2.31(4S)c

P:\CTDOT_projects\135-301\Highways\Phase_2\Atlantic\MSta_Contract_Sheet_Files\4-SPAN_PRO_ER-A1.dgn
10/22/2010



ATLANTIC STREET
LOOKING NORTHBOUND

METRO NORTH RAILROAD
BRIDGE REPLACEMENT
FEASIBILITY STUDY

ATLANTIC STREET
ROADWAY CROSS SECTION

URS | SCALE: 1"=10' | FIGURE 2.5

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LEGEND:

TRACK IN SERVICE

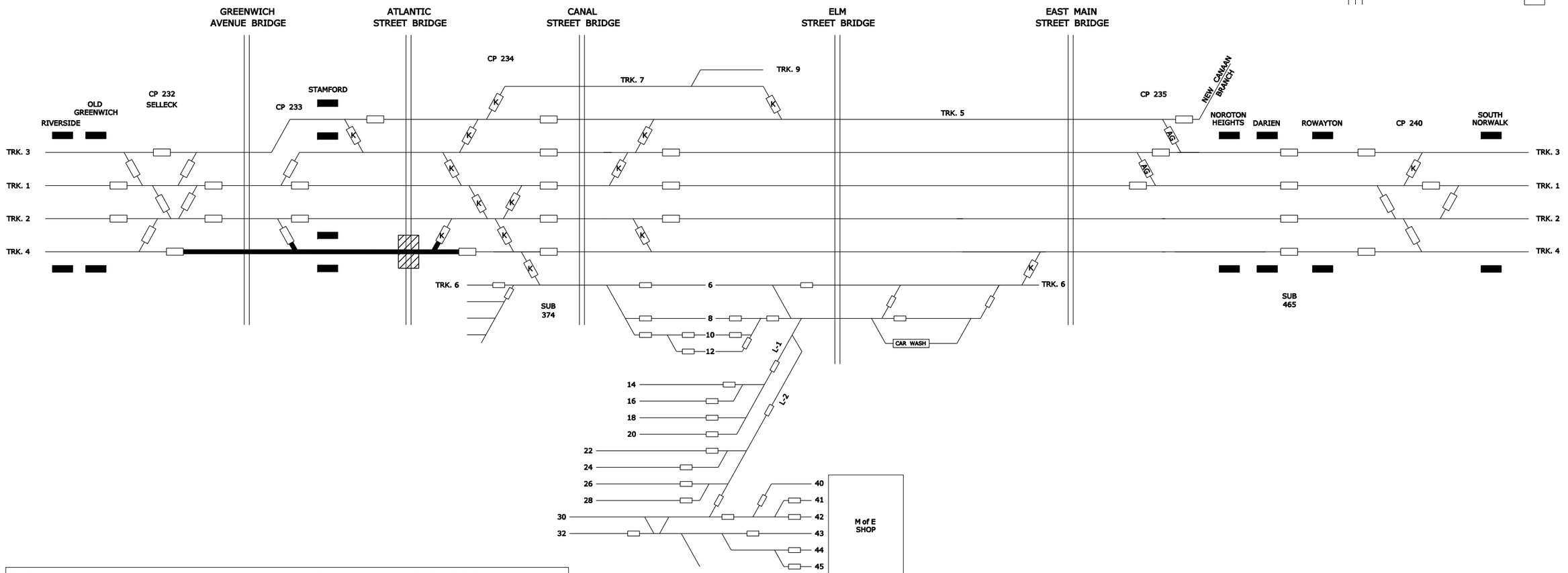
CONT. TRACK OUTAGE

OFF-PEAK OUTAGE

BRIDGE PLATES

BRIDGE CONSTRUCTION

TEMPORARY PLATFORM



STAGE	TASK	TRACK	TRACK OUTAGE
(1)	1) REMOVE TRACK 4 AT ATLANTIC ST. 2) REMOVE EXISTING STEEL SUPERSTRUCTURE 3) INSTALL NEW ABUTMENTS 4) INSTALL NEW CENTER PIER 5) CUT BACK TOPS OF EXISTING ABUTMENTS 6) INSTALL NEW SUPERSTRUCTURE 7) INSTALL NEW TRACK 4 AT ATLANTIC ST.	4	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

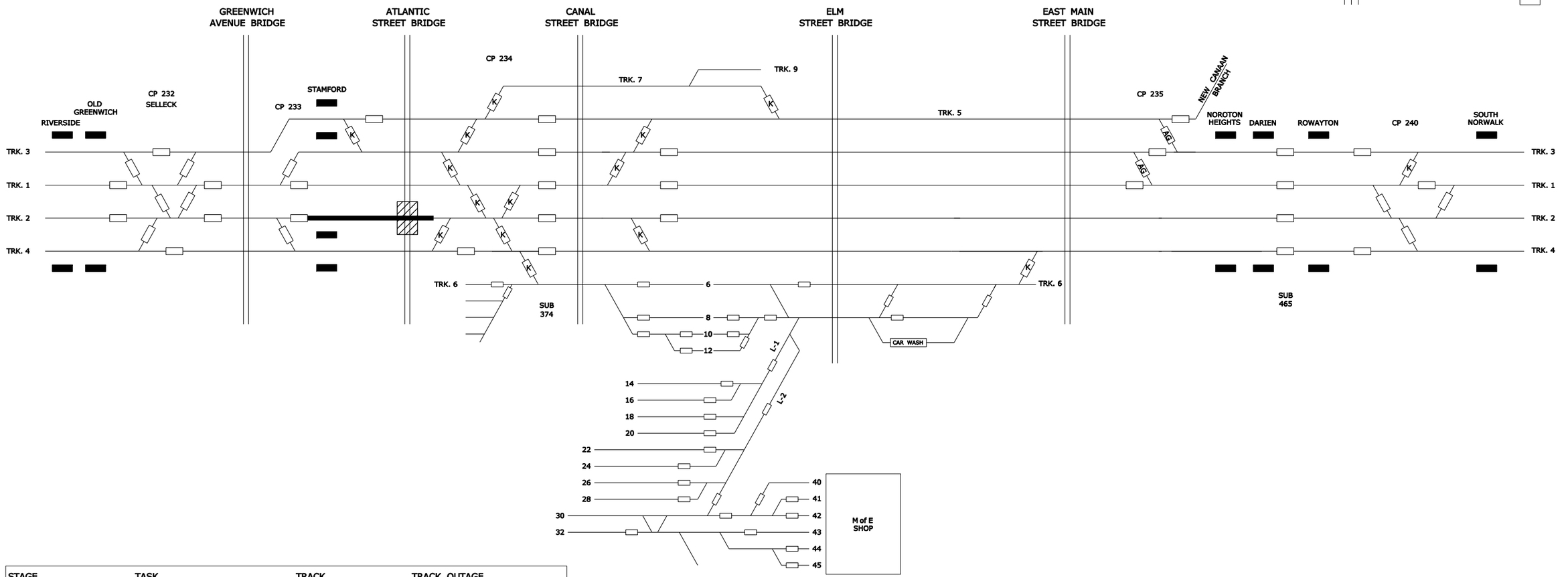
ATLANTIC STREET CONSTRUCTION STAGING

STAGE (1)

URS | SCALE: N.T.S. | FIGURE 3.1a

LEGEND:

TRACK IN SERVICE
CONT. TRACK OUTAGE
OFF-PEAK OUTAGE
BRIDGE PLATES
BRIDGE CONSTRUCTION
TEMPORARY PLATFORM



STAGE	TASK	TRACK	TRACK OUTAGE
(2)	1) REMOVE TRACK 2 AT ATLANTIC ST. 2) REMOVE EXISTING STEEL SUPERSTRUCTURE 3) INSTALL NEW ABUTMENTS 4) INSTALL NEW CENTER PIER 5) CUT BACK TOPS OF EXISTING ABUTMENTS 6) INSTALL NEW SUPERSTRUCTURE 7) INSTALL NEW TRACK 2 AT ATLANTIC ST.	2	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

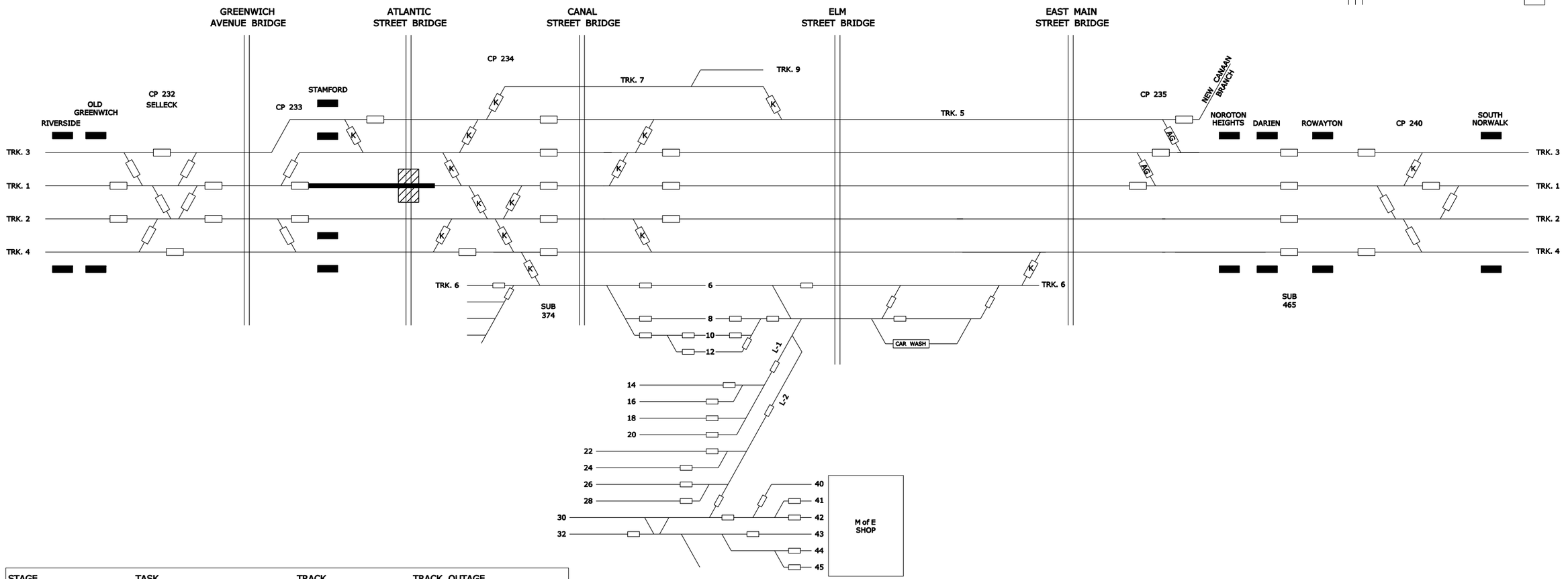
ATLANTIC STREET CONSTRUCTION STAGING

STAGE (2)

URS | SCALE: N.T.S. | FIGURE 3.1b

LEGEND:

TRACK IN SERVICE
CONT. TRACK OUTAGE
OFF-PEAK OUTAGE
BRIDGE PLATES
BRIDGE CONSTRUCTION
TEMPORARY PLATFORM



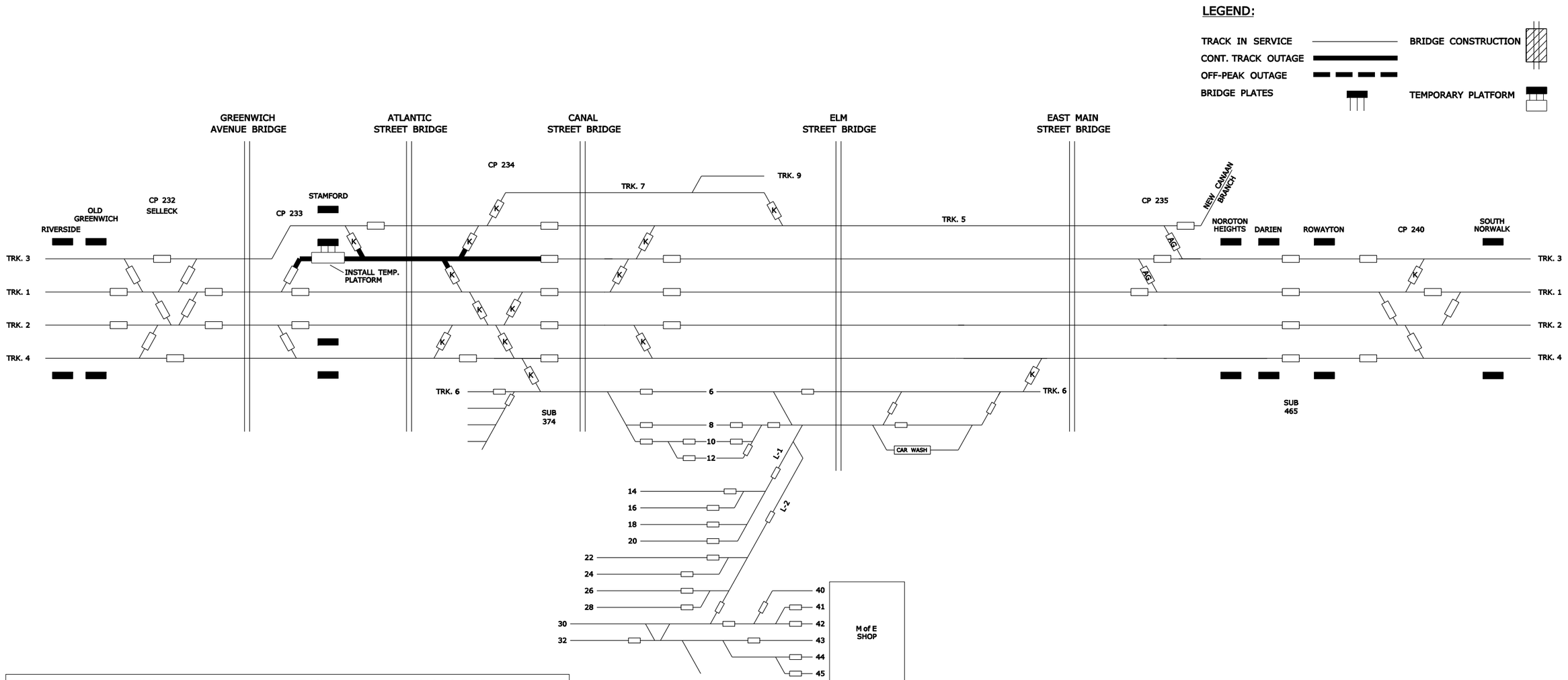
STAGE	TASK	TRACK	TRACK OUTAGE
3	1) REMOVE TRACK 1 AT ATLANTIC ST. 2) REMOVE EXISTING STEEL SUPERSTRUCTURE 3) INSTALL NEW ABUTMENTS 4) INSTALL NEW CENTER PIER 5) CUT BACK TOPS OF EXISTING ABUTMENTS 6) INSTALL NEW SUPERSTRUCTURE 7) INSTALL NEW TRACK 1 AT ATLANTIC ST.	1	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET CONSTRUCTION STAGING

STAGE 3

URS | SCALE: N.T.S. | FIGURE 3.1c



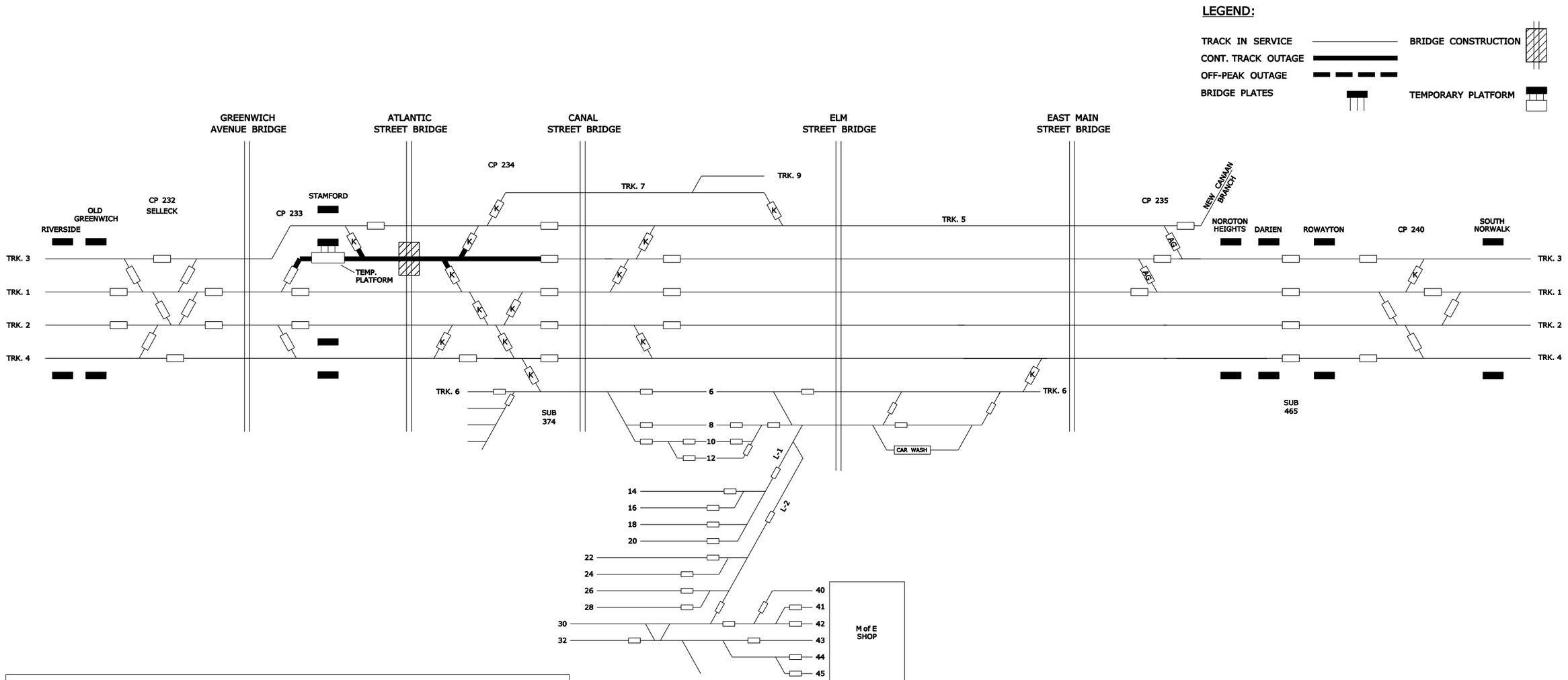
STAGE	TASK	TRACK	TRACK OUTAGE
4A	1) INSTALL TEMPORARY PASSENGER PLATFORM AT STAMFORD STATION	3	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET CONSTRUCTION STAGING

STAGE 4A

URS | SCALE: N.T.S. | FIGURE 3.1d



STAGE	TASK	TRACK	TRACK OUTAGE
4B	1) REMOVE TRACK 3 AT ATLANTIC ST. 2) REMOVE EXISTING STEEL SUPERSTRUCTURE 3) INSTALL NEW ABUTMENTS 4) INSTALL NEW CENTER PIER 5) CUT BACK TOPS OF EXISTING ABUTMENTS 6) INSTALL NEW SUPERSTRUCTURE 7) INSTALL NEW TRACK 3 AT ATLANTIC ST.	3	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET CONSTRUCTION STAGING

STAGE 4B

URS | SCALE: N.T.S. | FIGURE 3.1e

LEGEND:

TRACK IN SERVICE

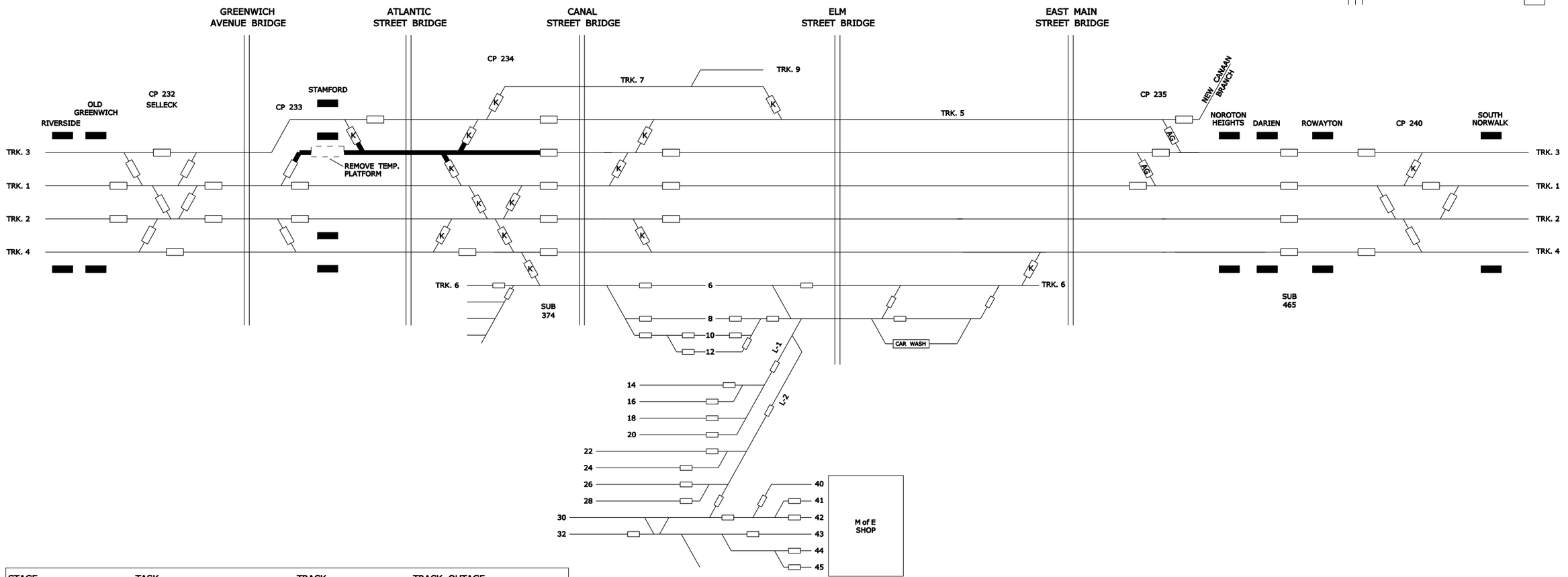
CONT. TRACK OUTAGE

OFF-PEAK OUTAGE

BRIDGE PLATES

BRIDGE CONSTRUCTION

TEMPORARY PLATFORM



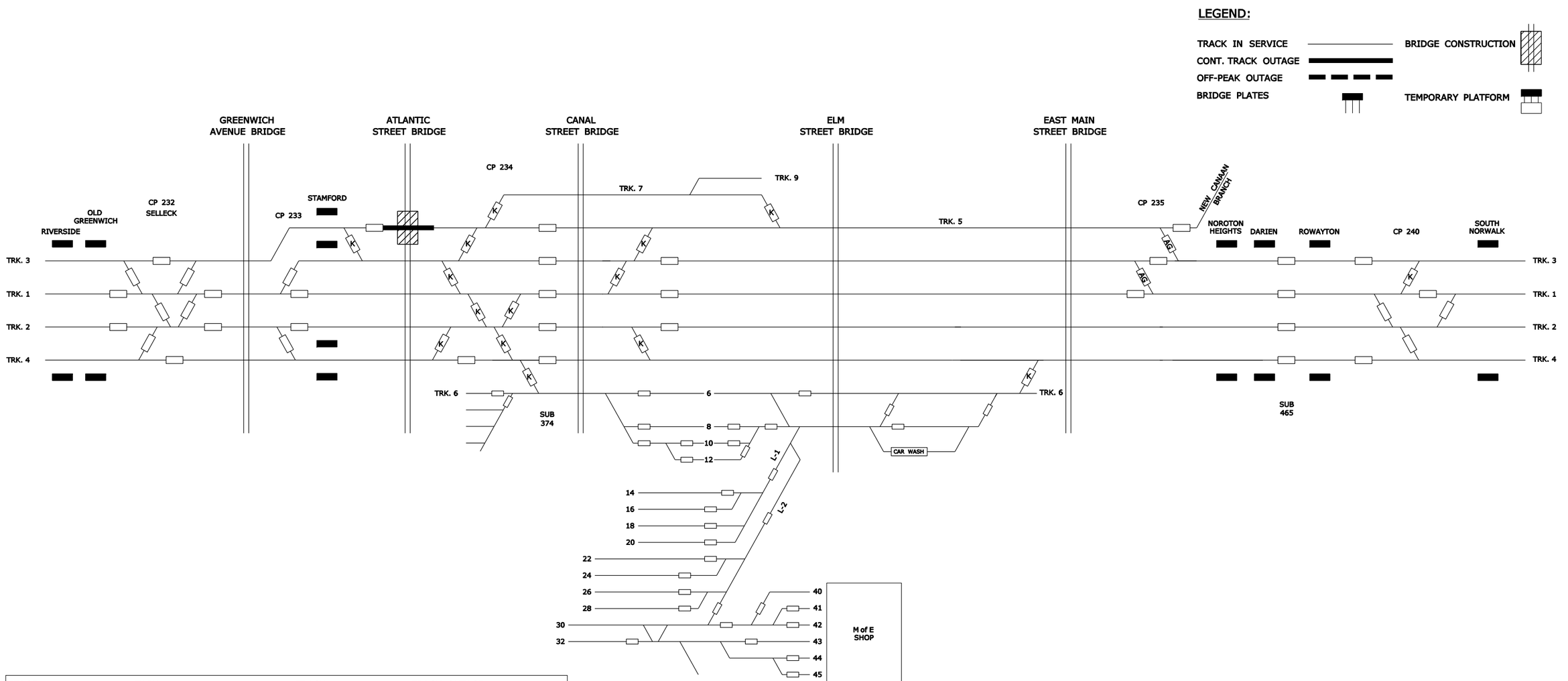
STAGE	TASK	TRACK	TRACK OUTAGE
4C	1) REMOVE TEMPORARY PASSENGER PLATFORM AT STAMFORD STATION	3	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET CONSTRUCTION STAGING

STAGE 4C

URS | SCALE: N.T.S. | FIGURE 3.1f



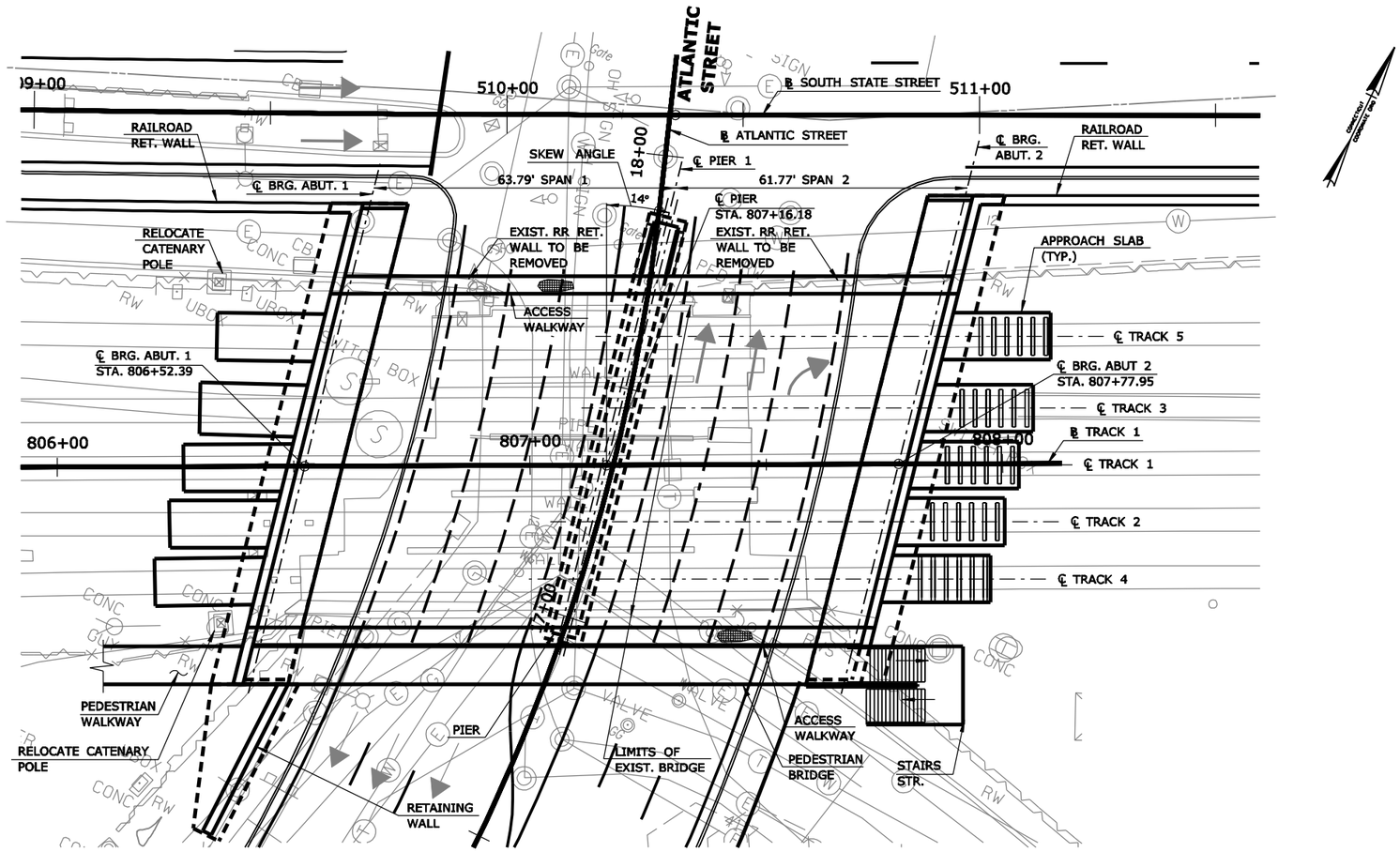
STAGE	TASK	TRACK	TRACK OUTAGE
5	1) REMOVE TRACK 5 AT ATLANTIC ST. 2) REMOVE EXISTING STEEL SUPERSTRUCTURE 3) INSTALL NEW ABUTMENTS 4) INSTALL NEW CENTER PIER 5) CUT BACK TOPS OF EXISTING ABUTMENTS 6) INSTALL NEW SUPERSTRUCTURE 7) INSTALL NEW TRACK 5 AT ATLANTIC ST.	5	CONTINUOUS TRACK OUTAGE

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

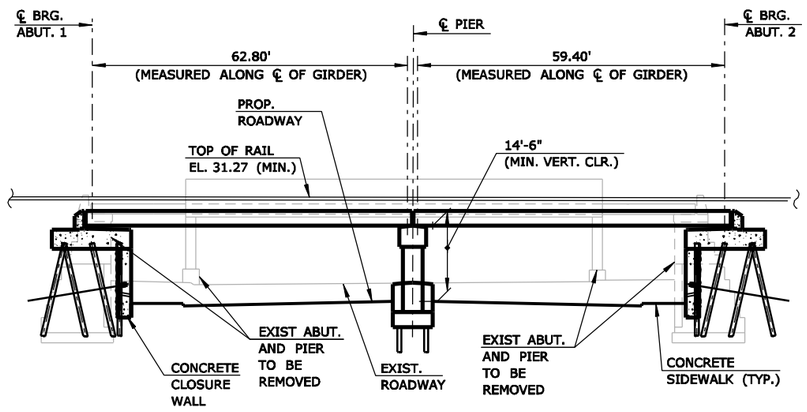
ATLANTIC STREET CONSTRUCTION STAGING

STAGE 5

URS | SCALE: N.T.S. | FIGURE 3.1g



PROPOSED PLAN
SCALE: 1" = 30'

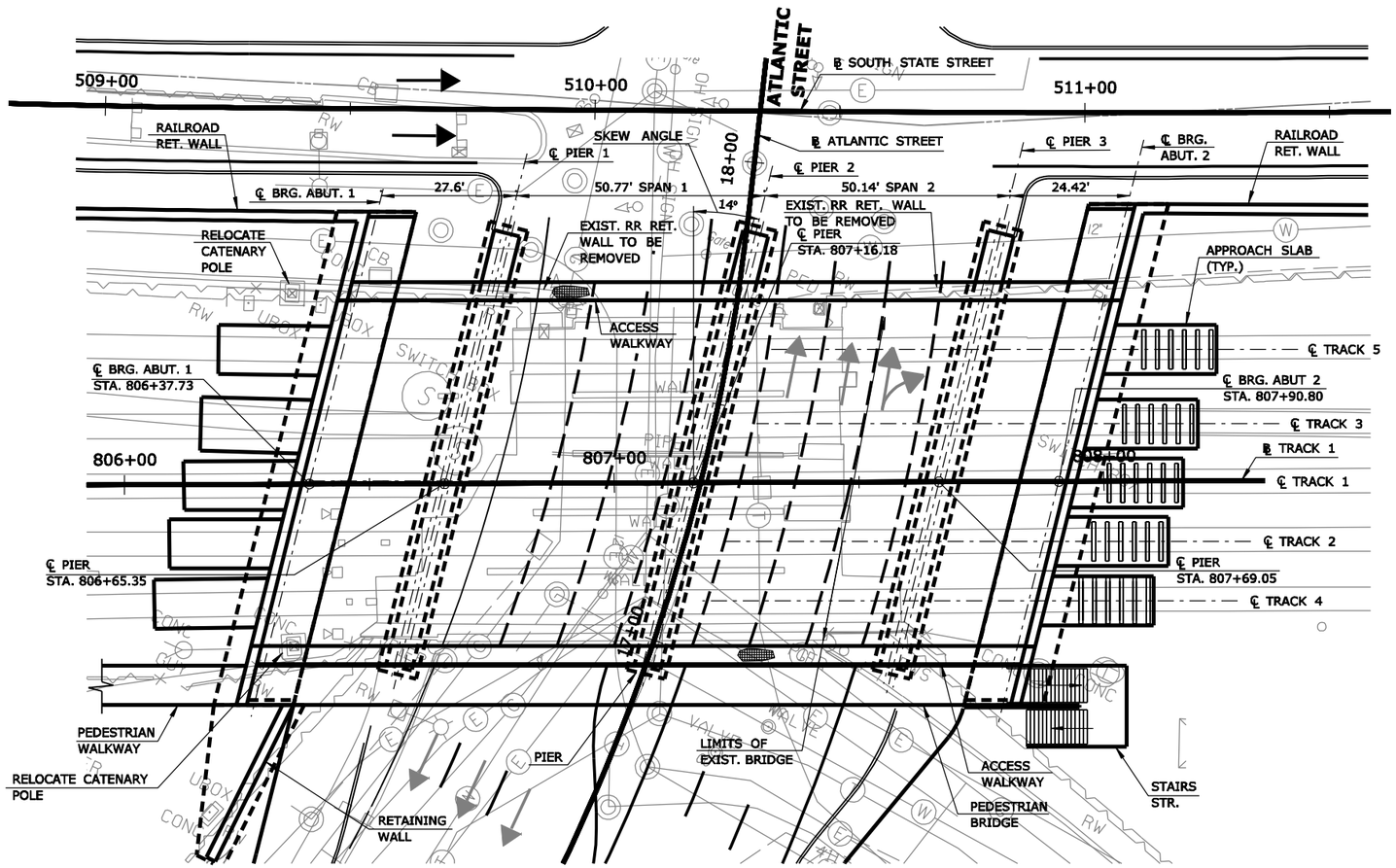


ELEVATION
SCALE: 1" = 30'

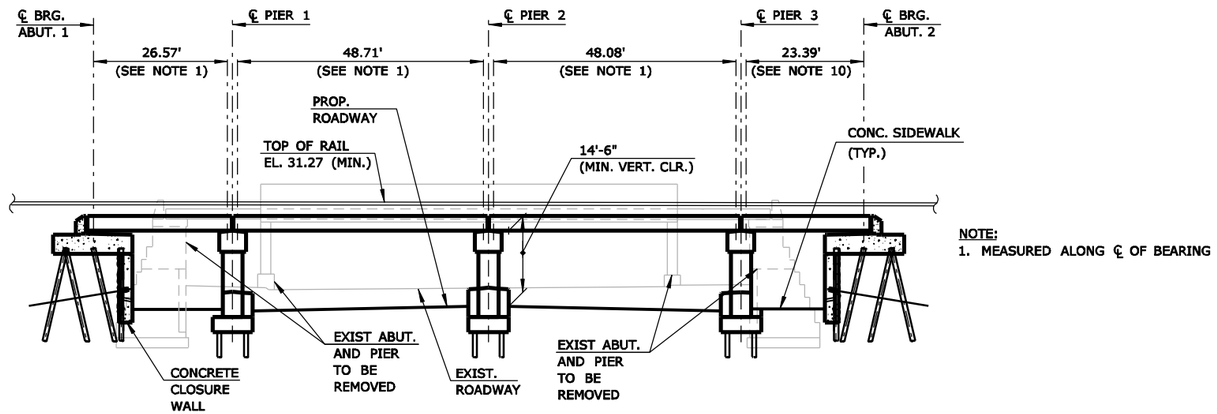
SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
GENERAL PLAN AND ELEVATION
ALT. 1 & 2 (2-SPAN)

URS | SCALE AS NOTED | FIGURE 4.1A



PROPOSED PLAN
SCALE: 1" = 30'



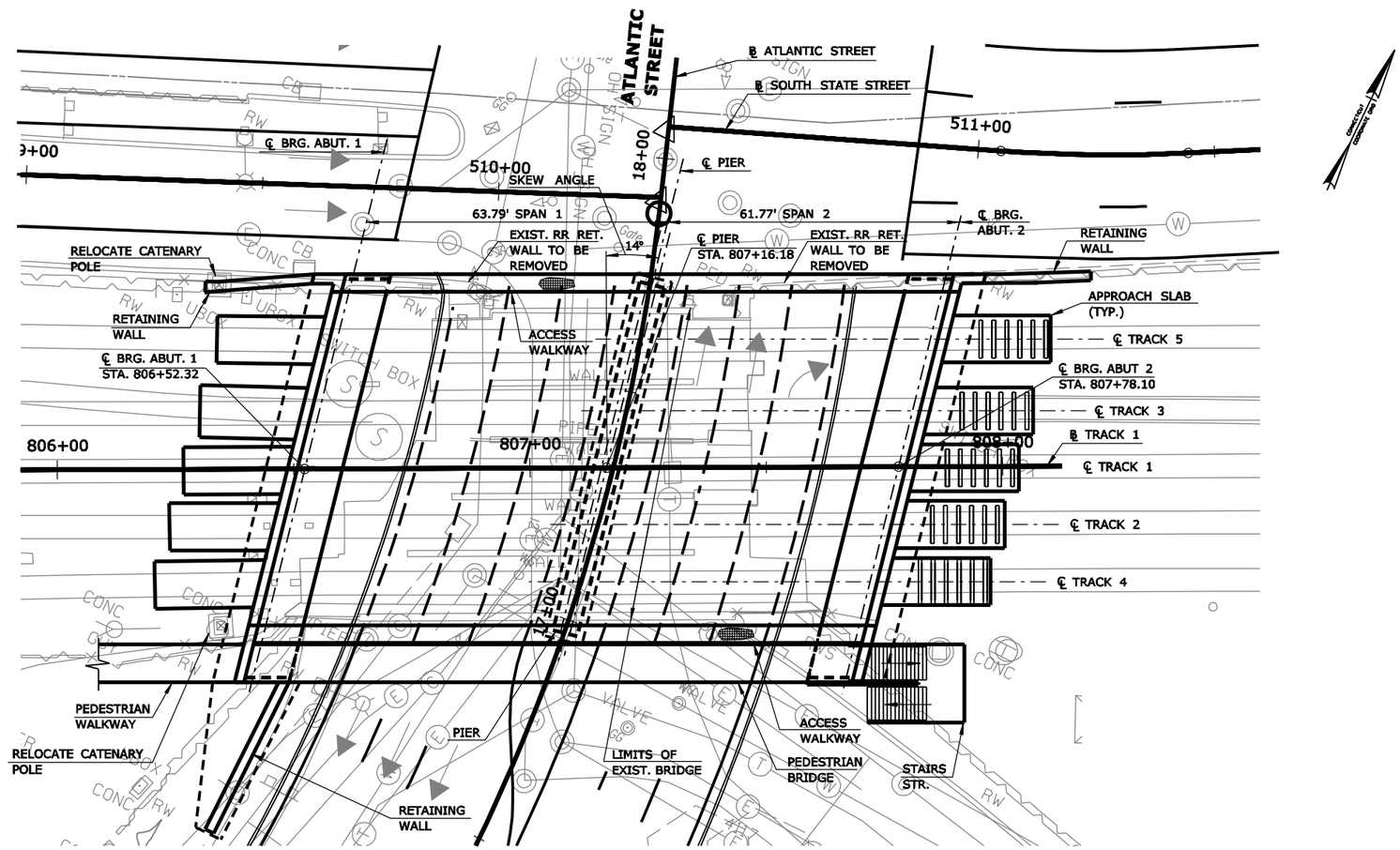
ELEVATION
SCALE: 1" = 30'

NOTE:
1. MEASURED ALONG ℄ OF BEARING

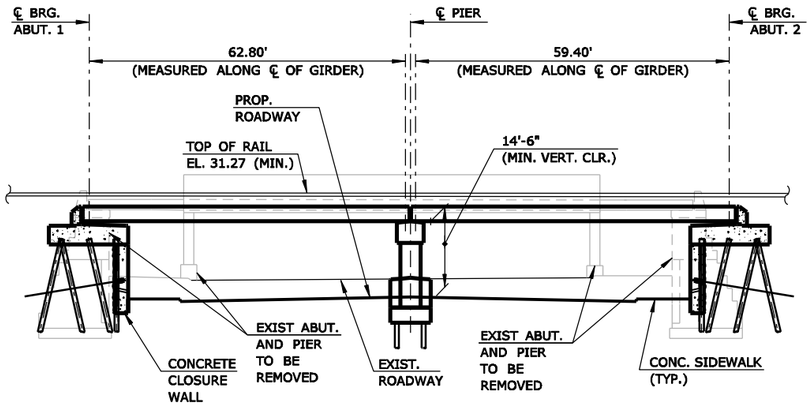
SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
GENERAL PLAN & ELEVATION
ALT. 1 (4-SPAN)

URS | SCALE AS NOTED | FIGURE 4.1B



PROPOSED PLAN
SCALE: 1" = 30'

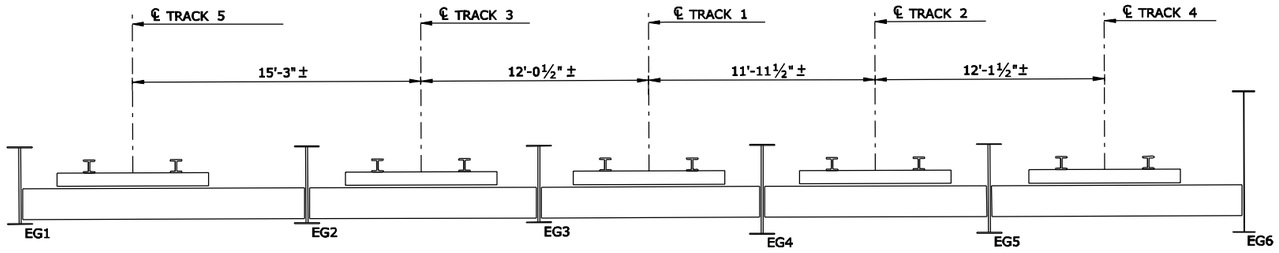


ELEVATION
SCALE: 1" = 30'

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
GENERAL PLAN AND ELEVATION
ALT. 3 (2-SPAN)

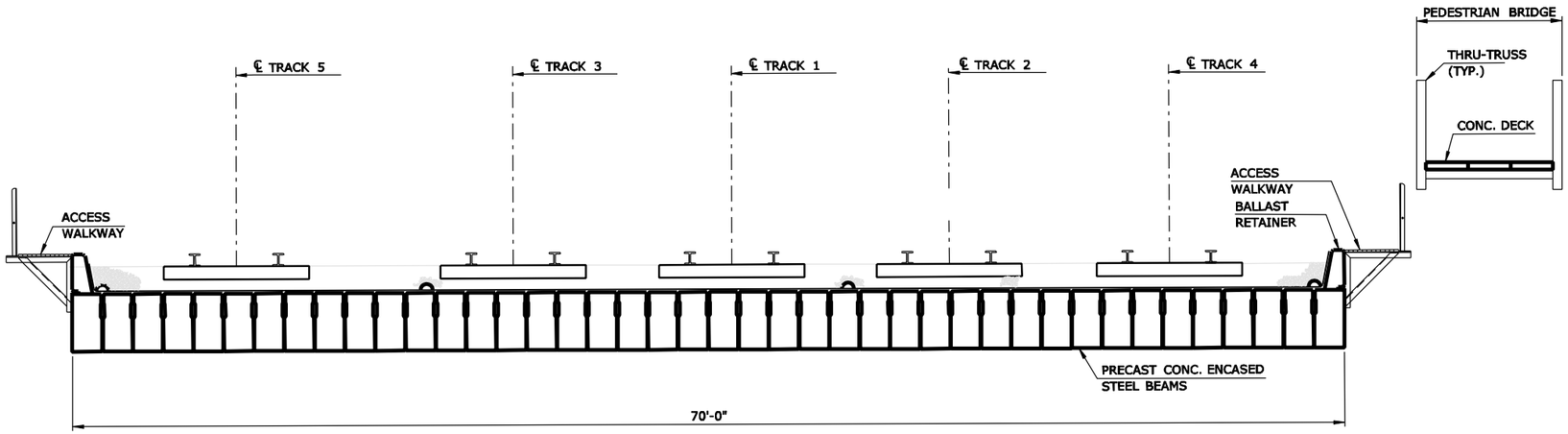
URS | SCALE AS NOTED | FIGURE 4.1C



EXISTING SECTION

NOTE:

1. CONSIDERING THE SIGNIFICANT AMOUNT REQUIRED TO LOWER ATLANTIC STREET AND THE IMPACTS ASSOCIATED WITH IT. MULTI-STEEL GIRDER FRAMING SYSTEM IS CONSIDERED NOT AN OPTION FOR THIS SITE AS IT REQUIRES DEEPER SUPERSTRUCTURE THAN THE CONCRETE-ENCASED BEAM ALTERNATE.



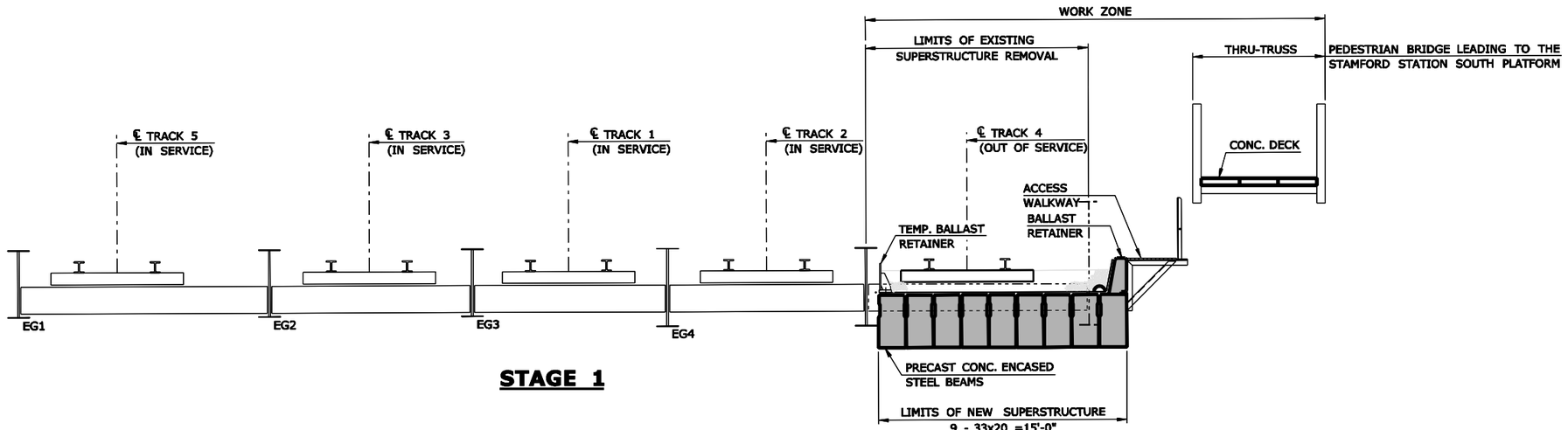
TYPICAL SECTION - PRECAST MULTIPLE CONCRETE ENCASED STEEL GIRDERS

SCALE: ⅛" = 1'-0"

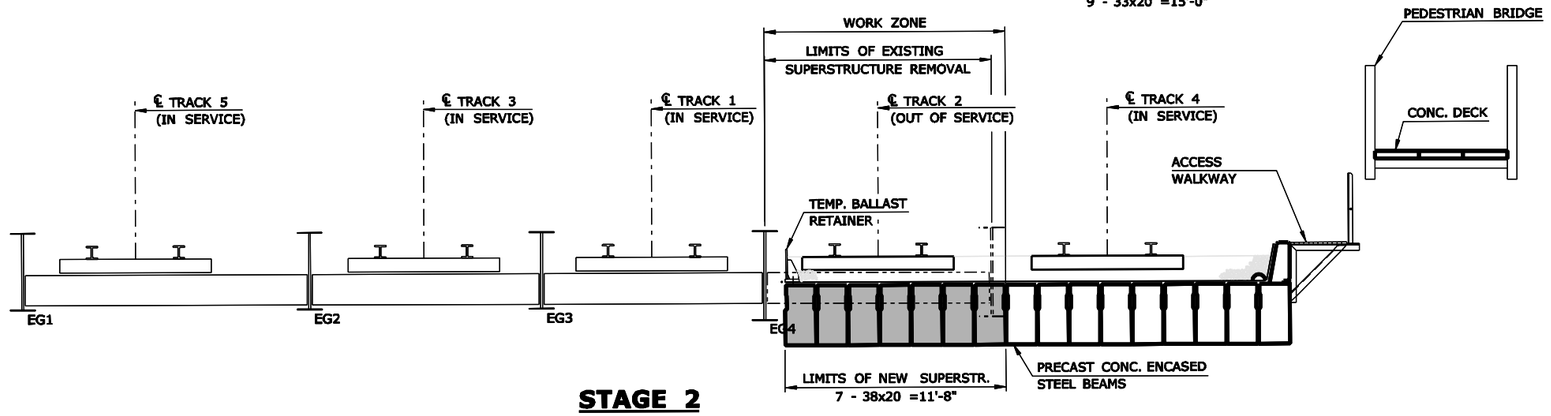
SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
TYPICAL SECTIONS

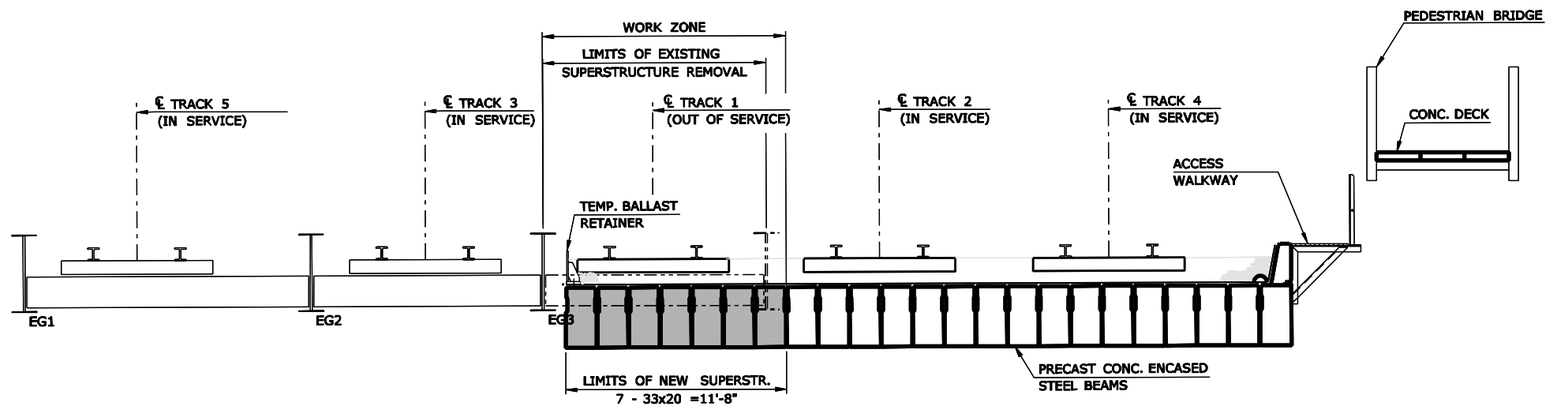
URS	SCALE AS NOTED	FIGURE 4.2



STAGE 1



STAGE 2



STAGE 3

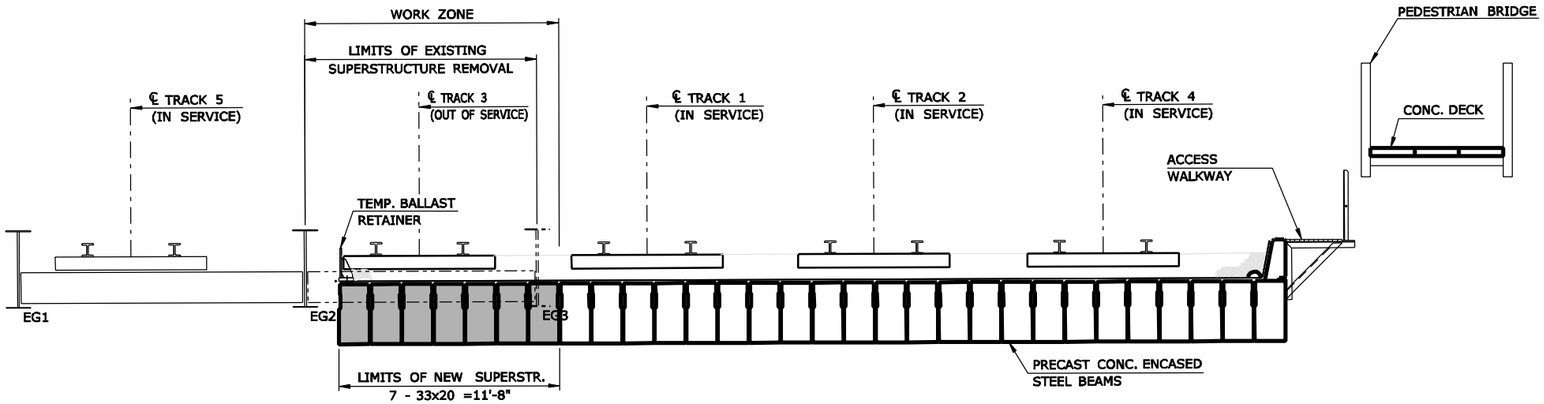
STAGE CONSTRUCTION - PRECAST MULTIPLE CONCRETE ENCASED STEEL GIRDERS

SCALE: ⅛" = 1'-0"

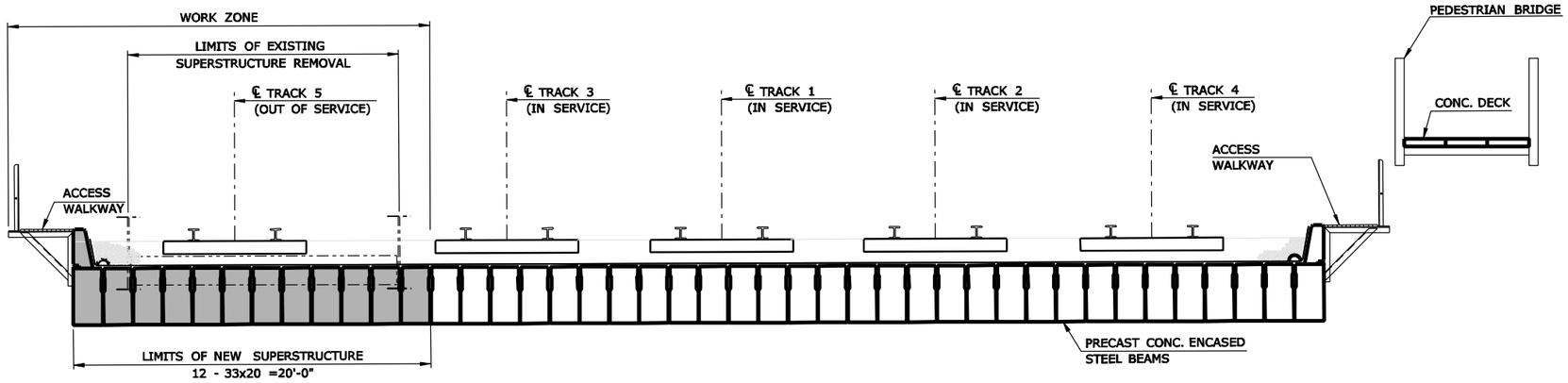
SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

ATLANTIC STREET
CONSTRUCTION STAGE 1, 2 & 3

URS | SCALE AS NOTED | FIGURE 4.3A



STAGE 4



STAGE 5

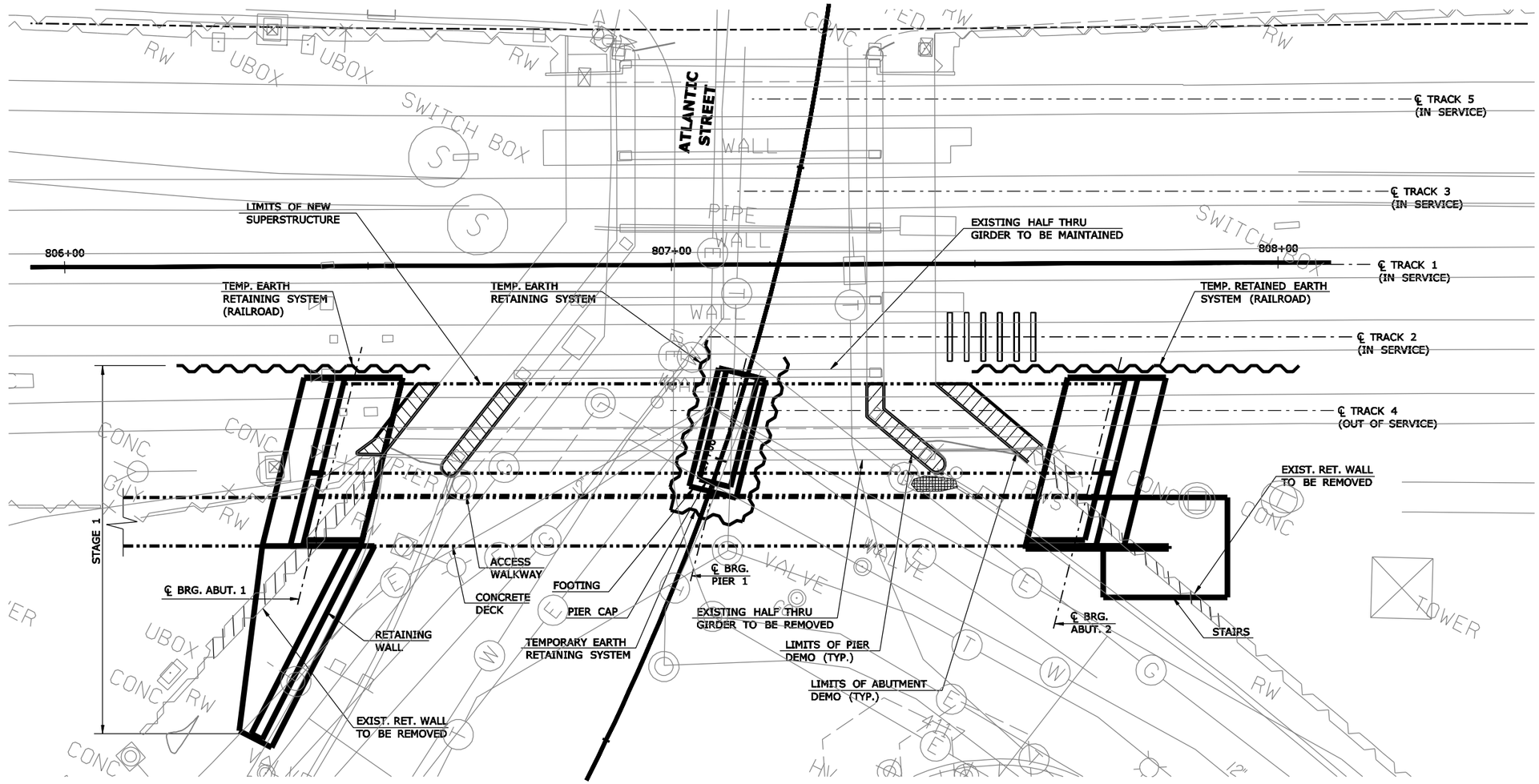
STAGE CONSTRUCTION - PRECAST MULTIPLE CONCRETE ENCASED STEEL GIRDERS

SCALE: 1/8" = 1'-0"

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
CONSTRUCTION STAGE 4 & 5

URS | SCALE AS NOTED | FIGURE 4.3B



STAGE 1 CONSTRUCTION PLAN

SCALE: 1" = 20'

NOTE:

1. CONSTRUCTION STAGES 2-5 WILL BE DONE IN A SIMILAR MANNER AS STAGE 1.

CONSTRUCTION SEQUENCE GENERAL NOTES:

THE SUGGESTED STEPS ILLUSTRATE A SEQUENCE OF CONSTRUCTION THAT CONFORMS TO THE RAILROAD STAGING REQUIREMENTS. ALTERATIONS TO THESE STEPS SHALL ENSURE THAT THE OPERATION OF THE RAILROAD, STATION SERVICES AND STREET TRAFFIC ARE MAINTAINED IN ACCORDANCE WITH THE RAILROAD AND STATION OPERATIONS AND THE MAINTENANCE AND PROTECTION OF TRAFFIC REQUIREMENTS.

BRIDGE WORK SHALL BE COORDINATED WITH RAILROAD OPERATIONS AND SEQUENCED WITH THE ROADWAY CONSTRUCTION.

CONSTRUCTION STAGING IS BASED ON SINGLE TRACK CLOSURE WITH ADJACENT TRACKS MAINTAINED DURING CONSTRUCTION. CONSTRUCTION STAGING IS ALSO BASED ON FULL CLOSURE OF ATLANTIC STREET WITHIN THE BRIDGE CONSTRUCTION LIMITS.

CONSTRUCTION MEANS AND METHODS ARE BASED ON LIMITED TRACK OUTAGE DURATION, MAINTENANCE OF EXISTING CATENARY SYSTEM, AND LIMITED HEADROOM CONDITIONS.

SUGGESTED CONSTRUCTION SEQUENCE - STAGE 1:

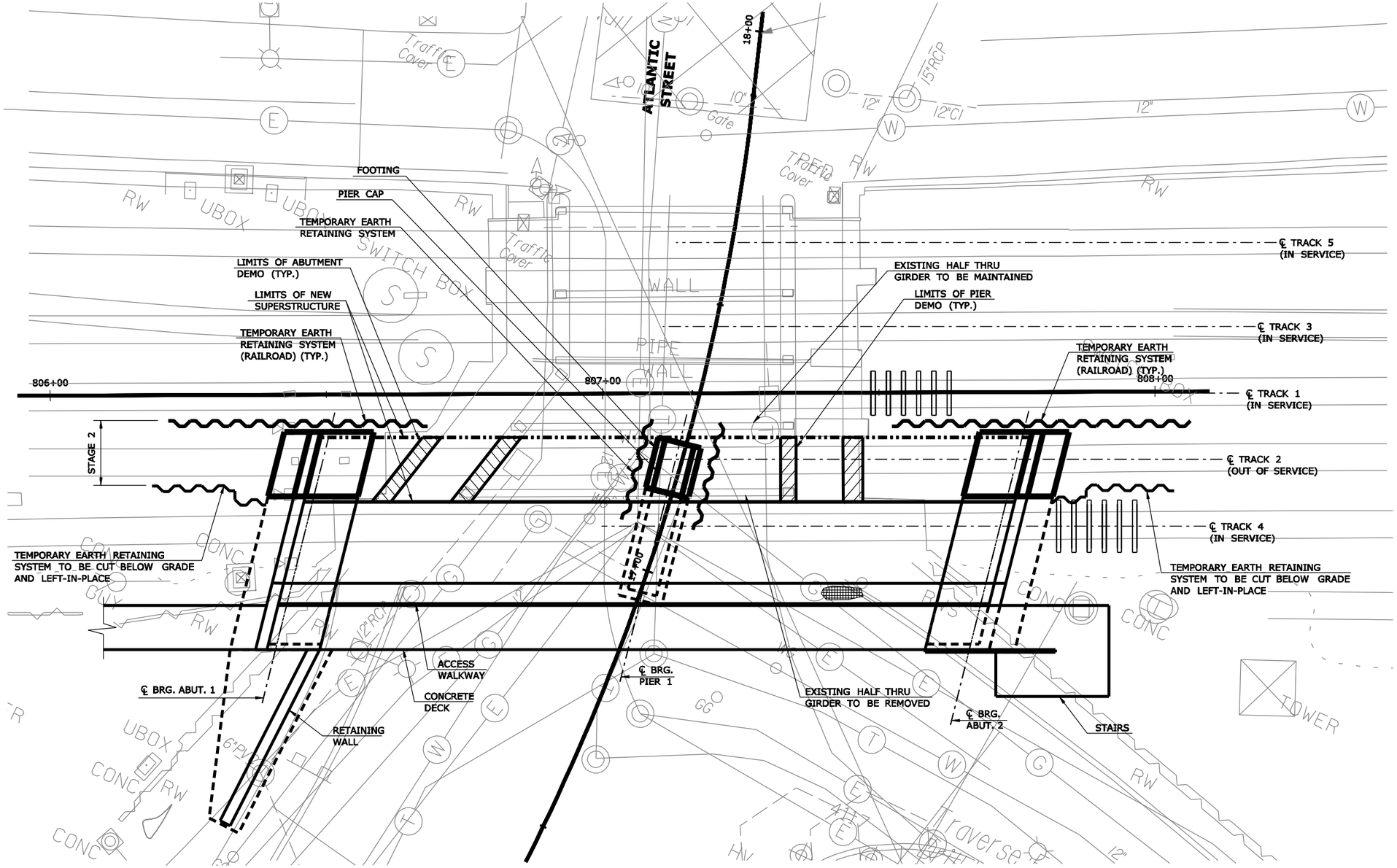
1. TAKE TRACK 4 OUT OF SERVICE.
2. PROVIDE PEDESTRIAN ACCESS AND INSTALL APPROPRIATE TEMPORARY PEDESTRIAN PROTECTION FACILITY ON ATLANTIC STREET.
3. REMOVE RAILS AND TIES FOR TRACK WITHIN THE LIMITS OF BRIDGE CONSTRUCTION.
4. INSTALL TEMP. EARTH RETAINING SYSTEMS BETWEEN TRACKS 4 AND 2 BEHIND EXISTING ABUTMENTS 1 & 2 TO LIMITS SHOWN.
5. REMOVE EXISTING GIRDER G-6 AND SUPERSTRUCTURE FRAMING SYSTEM SUPPORTING TRACK 4.
6. EXCAVATE BACKFILL BEHIND EXISTING ABUTMENTS 1 & 2.
7. PARTIALLY REMOVE TOP PORTION OF EXISTING ABUTMENTS AND RETAINING WALLS. PARTIALLY DEMOLISH EXISTING PIERS TO LIMITS SHOWN.
8. INSTALL TEMP. EARTH RETAINING SYSTEMS AROUND PROPOSED PIER FOUNDATION AND EXCAVATE WITHIN LIMITS OF STAGE 1 FOUNDATION.
9. INSTALL MINI-PILES WITHIN LIMITS OF PROPOSED ABUTMENT CONSTRUCTION AND WITHIN LIMITS OF PROPOSED PIER CONSTRUCTION.
10. CONSTRUCT ABUTMENTS AND PIER TO LIMITS SHOWN.
11. INSTALL PERVIOUS STRUCTURE BACKFILL BEHIND NEW SECTIONS OF PROPOSED ABUTMENTS.
12. ERECT AND INSTALL CONCRETE ENCASED BEAMS.
13. INSTALL BALLAST, TIES AND RAILROAD TRACKS.
14. PUT TRACK BACK IN SERVICE.

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
STAGE 1 CONSTRUCTION PLAN

URS | SCALE AS NOTED | FIGURE 4.4A

4/15/14 12:47:28



STAGE 2 CONSTRUCTION PLAN

SCALE: 1" = 20'

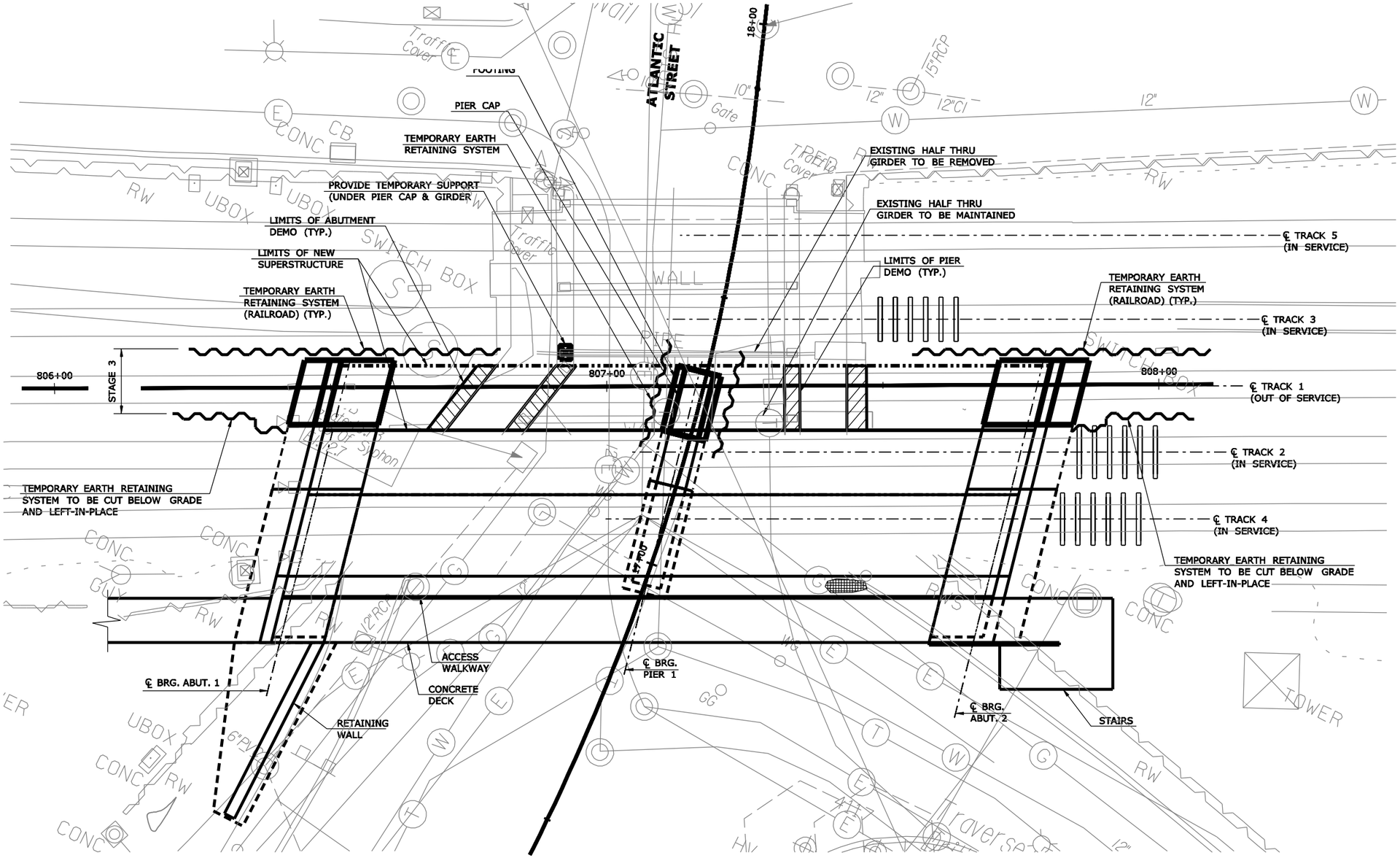
SUGGESTED CONSTRUCTION SEQUENCE - STAGE 2:

1. TAKE TRACK 2 OUT OF SERVICE.
2. REMOVE RAILS AND TIES FOR TRACK WITHIN THE LIMITS OF BRIDGE CONSTRUCTION.
3. INSTALL TEMPORARY EARTH RETAINING SYSTEMS BETWEEN TRACKS 2 AND 1 BEHIND EXISTING ABUTMENTS 1 & 2 TO LIMITS SHOWN.
4. REMOVE GIRDER G-5 AND SUPERSTRUCTURE FRAMING SYSTEM SUPPORTING TRACK 2.
5. EXCAVATE BACKFILL BEHIND EXISTING ABUTMENTS 1 & 2.
6. PARTIALLY REMOVE TOP PORTION OF EXISTING ABUTMENTS AND PIERS TO LIMITS SHOWN.
7. INSTALL MINI-PILES WITHIN LIMITS OF PROPOSED ABUTMENT AND PIER CONSTRUCTION.
8. CONSTRCT ABUTMENTS AND PIER TO LIMITS SHOWN.
9. INSTALL PERVIOUS BACKFILL BEHIND NEW ABUTMENTS.
10. ERECT AND INSTALL CONCRETE ENCASED BEAMS.
11. INSTALL BALLAST, TIES AND RAILROAD TRACKS.
12. PUT TRACK BACK IN SERVICE.

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
STAGE 2 CONSTRUCTION PLAN

URS | SCALE AS NOTED | FIGURE 4.4B



STAGE 3 CONSTRUCTION PLAN
SCALE: 1" = 20'

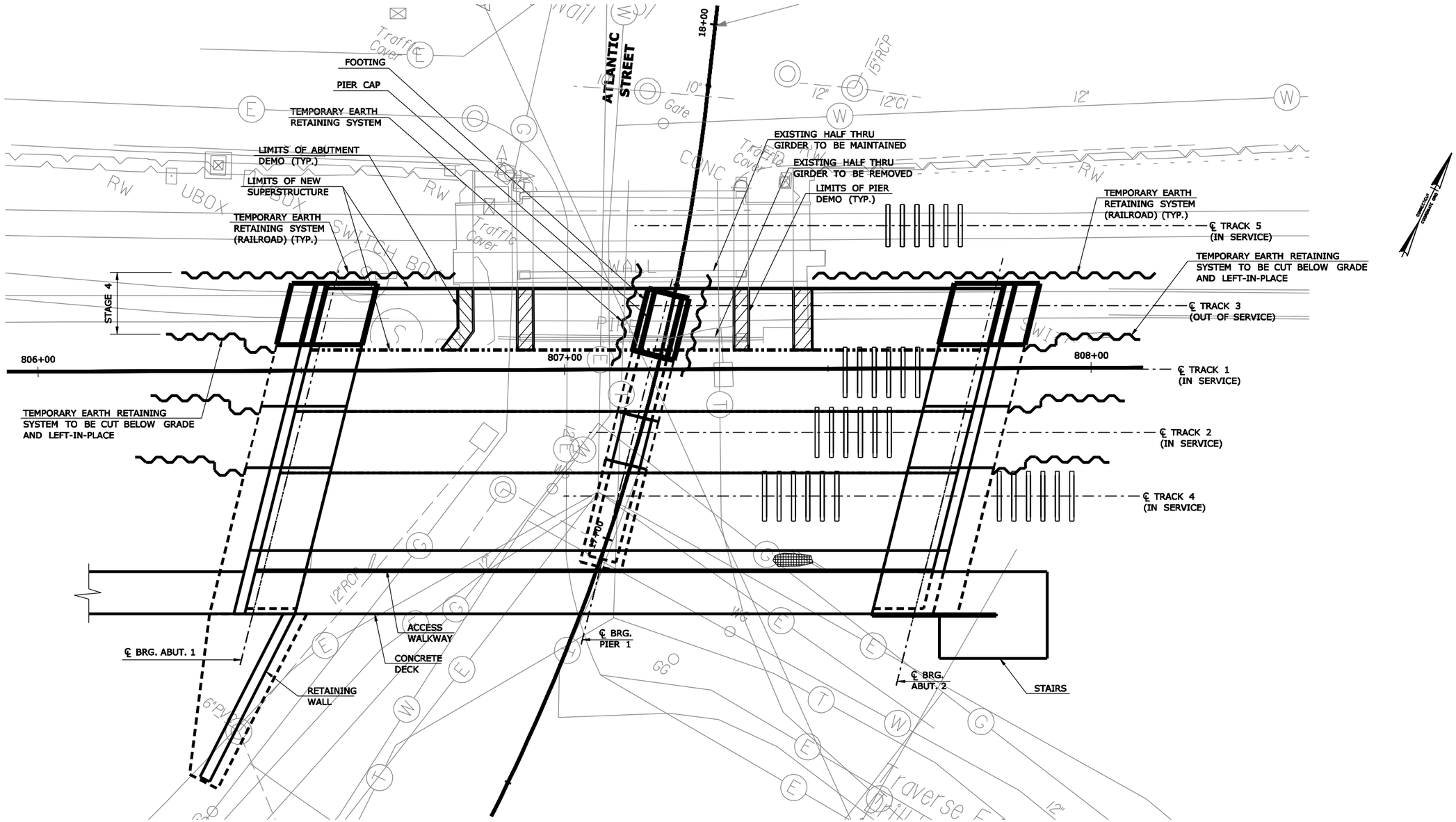
SUGGESTED CONSTRUCTION SEQUENCE - STAGE 3:

NOTE: SEE STAGE 2 CONSTRUCTION SEQUENCE, SIMILAR.

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
STAGE 3 CONSTRUCTION PLAN

URS | SCALE AS NOTED | FIGURE 4.4C



STAGE 4 CONSTRUCTION PLAN
SCALE: 1" = 20'

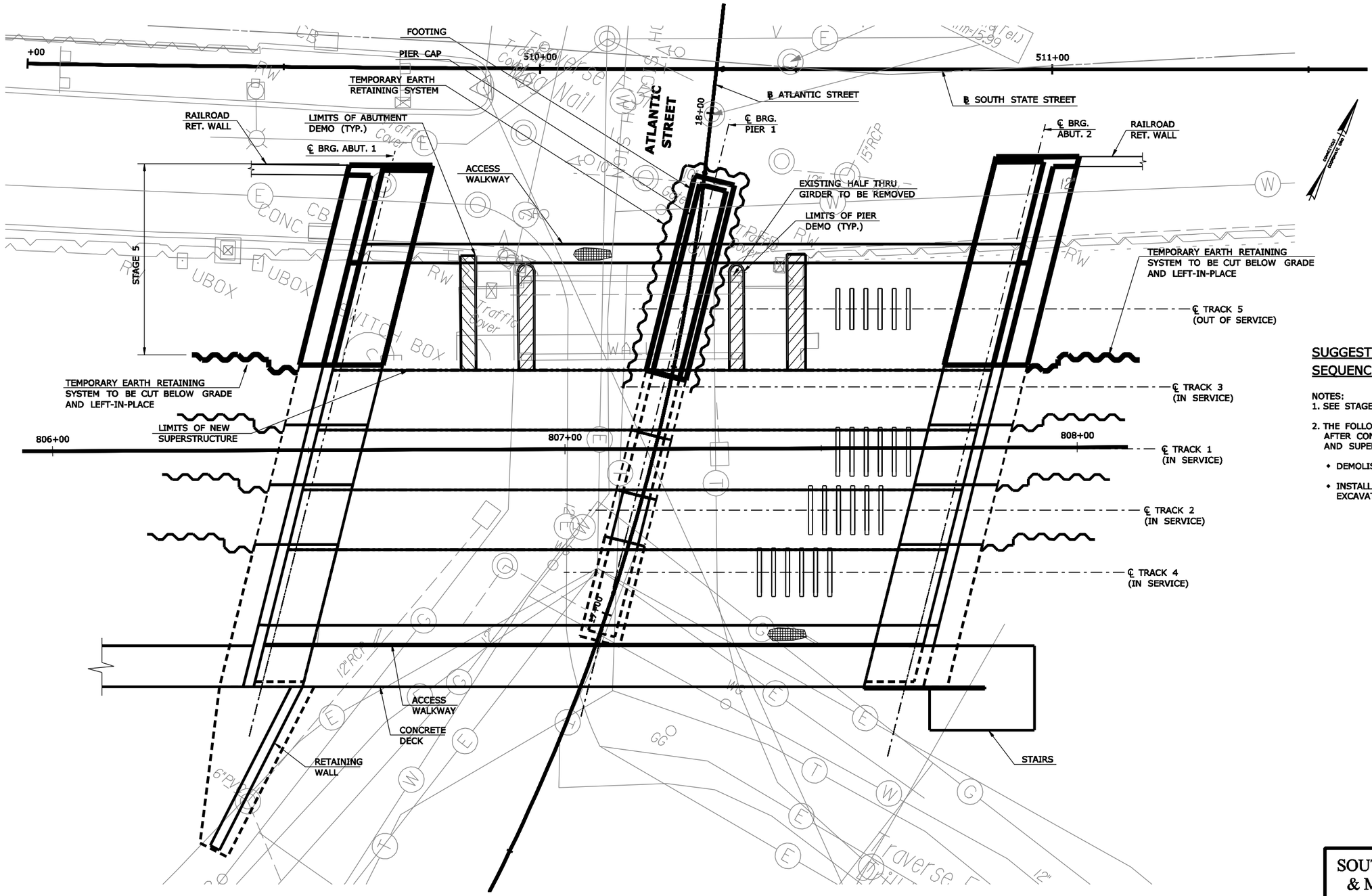
SUGGESTED CONSTRUCTION SEQUENCE - STAGE 4:

NOTE: SEE STAGE 2 CONSTRUCTION SEQUENCE, SIMILAR.

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
STAGE 4 CONSTRUCTION PLAN

URS | SCALE AS NOTED | FIGURE 4.4D



STAGE 5 CONSTRUCTION PLAN
SCALE: 1" = 20'

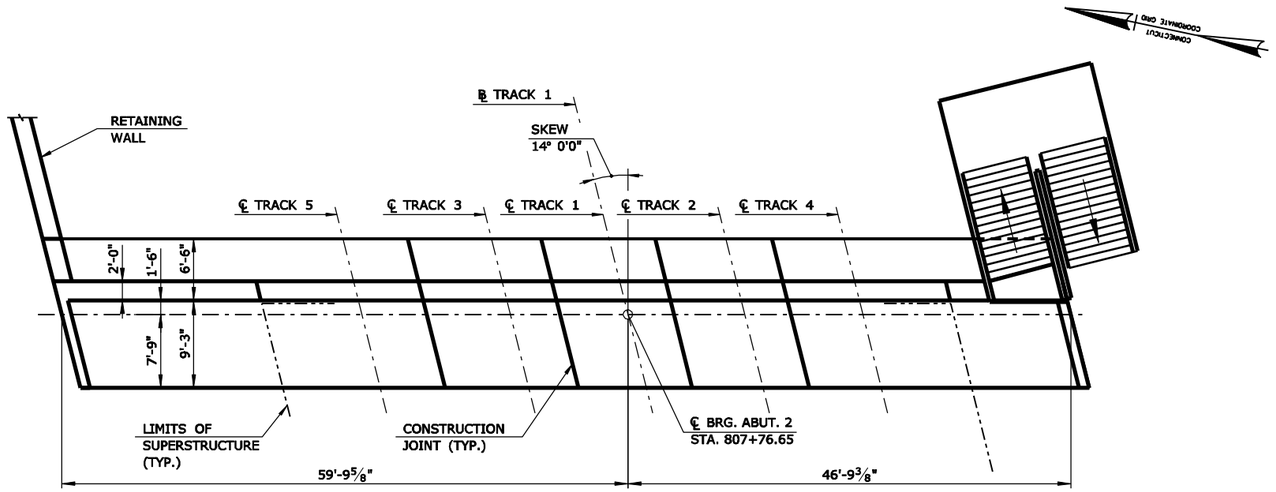
SUGGESTED CONSTRUCTION SEQUENCE - STAGE 5:

NOTES:
1. SEE STAGE 2 CONSTRUCTION SEQUENCE, SIMILAR.
2. THE FOLLOWING CONSTRUCTION SEQUENCE FOLLOWS AFTER CONSTRUCTION OF BRIDGE SUBSTRUCTURE AND SUPERSTRUCTURE IS COMPLETED.
   - DEMOLISH REMAINING PORTION OF EXISTING ABUTMENTS.
   - INSTALL TIE-BACK WALL IN CONJUNCTION WITH EXCAVATION OF BACKFILL BEHIND EXISTING ABUTMENTS.

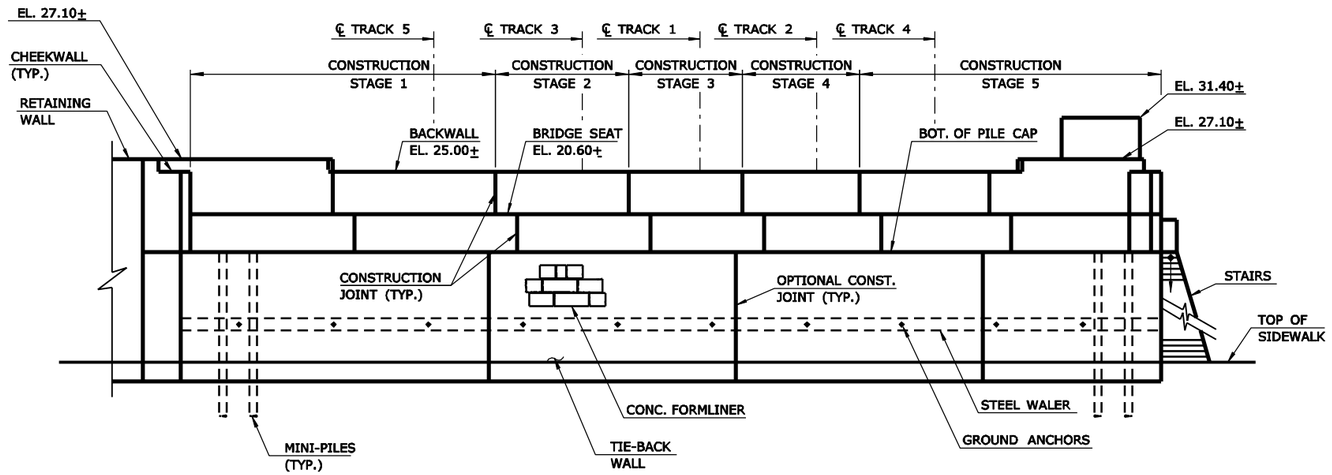
SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
STAGE 5 CONSTRUCTION PLAN

URS | SCALE AS NOTED | FIGURE 4.4E



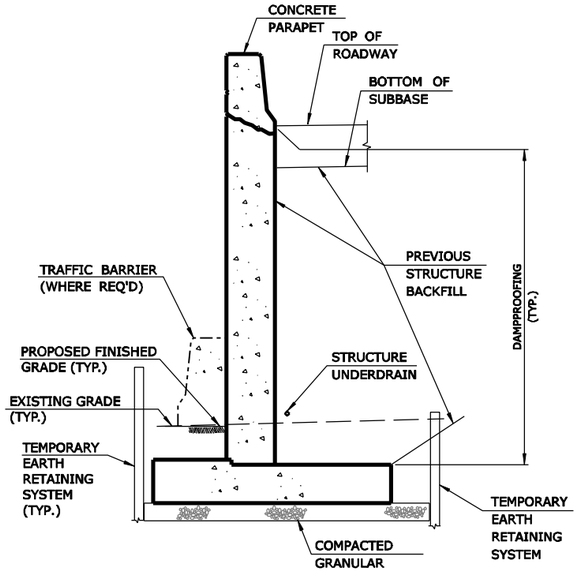
PLAN



ELEVATION

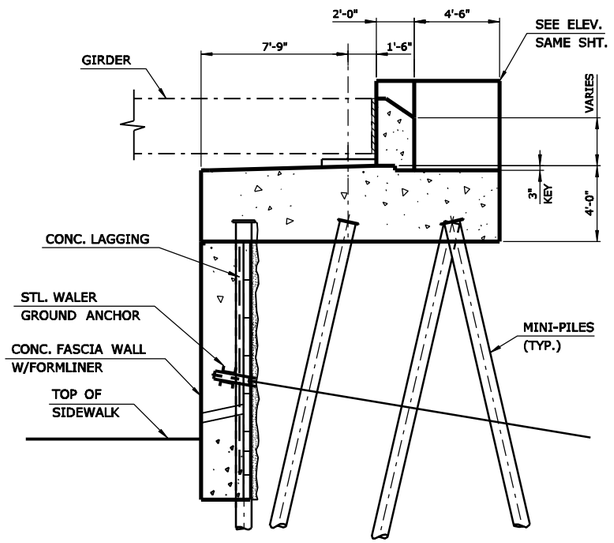
ABUTMENT 2

SCALE: 1/16" = 1'-0"



WINGWALL SECTION

SCALE: 1/8" = 1'-0"



ABUTMENT SECTION

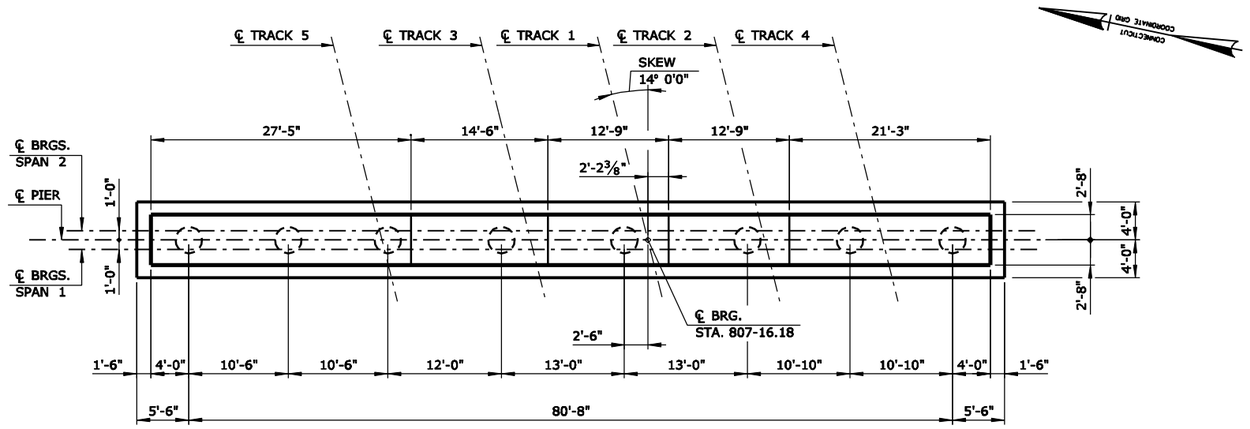
SCALE: 1/8" = 1'-0"

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

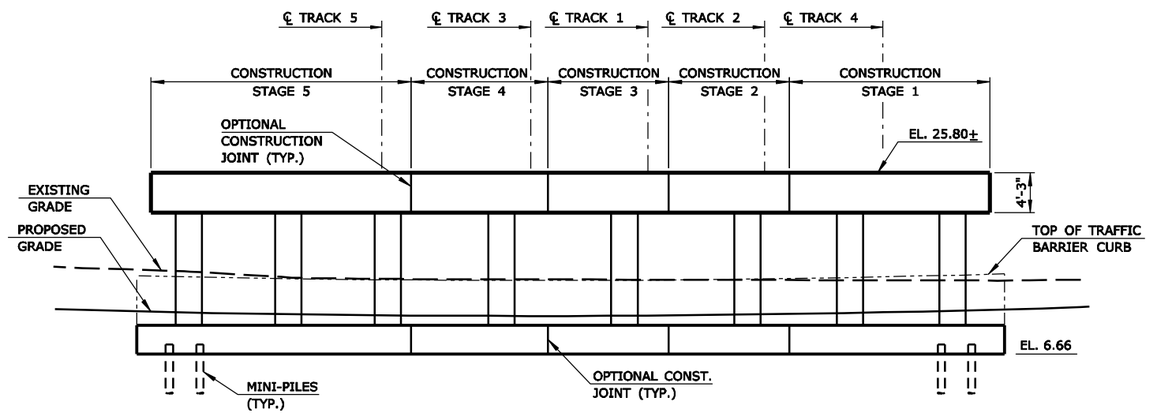
ATLANTIC STREET ABUTMENT PLAN

URS | SCALE AS NOTED | FIGURE 4.5

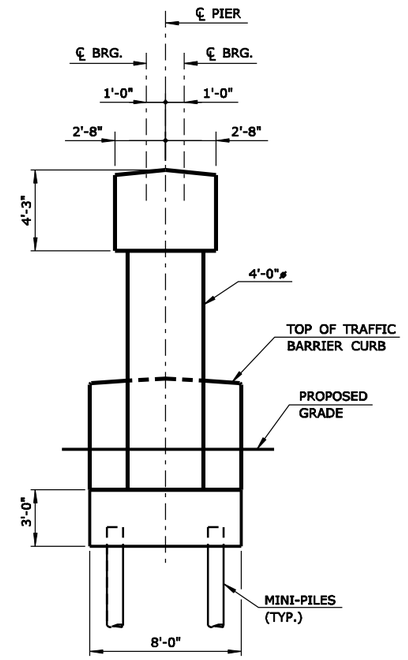
STYLES
SDATES



PIER PLAN
SCALE: 1/16" = 1'-0"



PIER ELEVATION
SCALE: 1/16" = 1'-0"



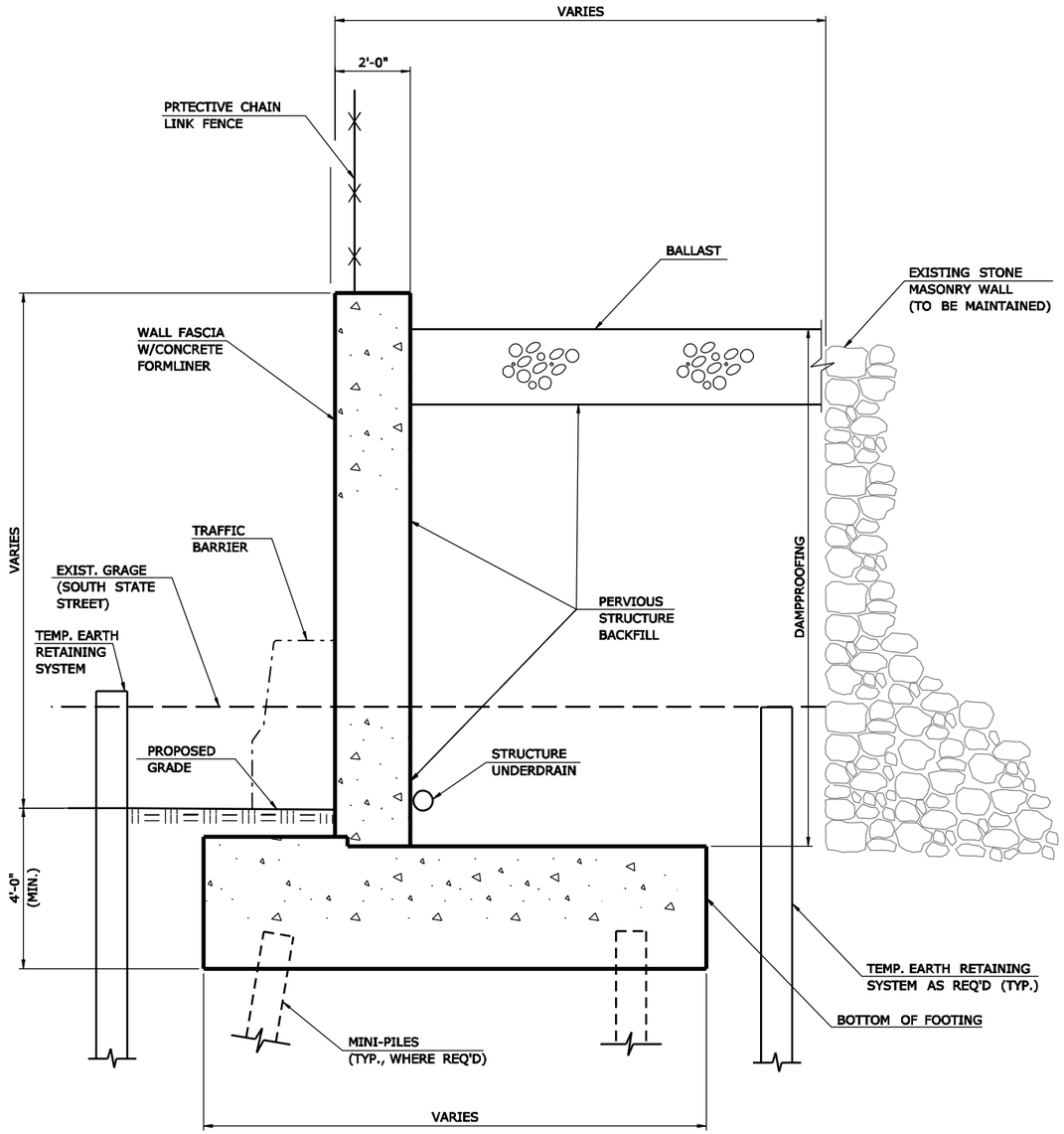
SECTION
SCALE: 1/8" = 1'-0"

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

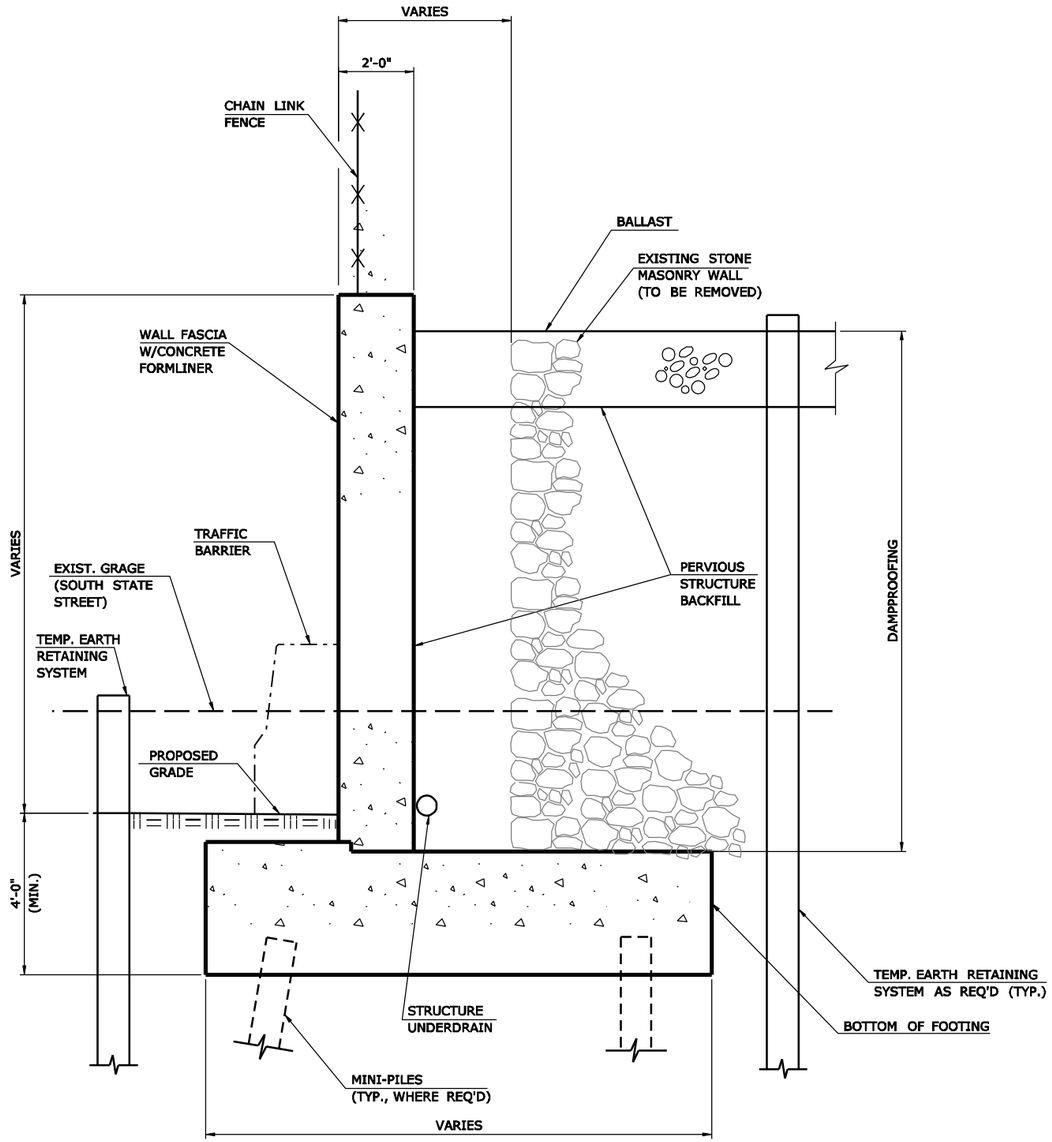
ATLANTIC STREET
PIER PLAN

URS | SCALE AS NOTED | FIGURE 4.6

STYLES SCNTPS



SECTION 1



SECTION 2

RAILROAD RETAINING WALLS (ALT. 1 & 2)

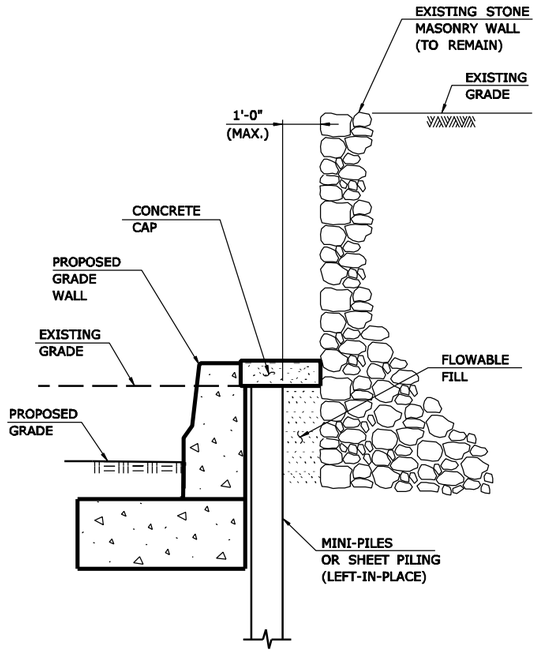
N.T.S.

SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

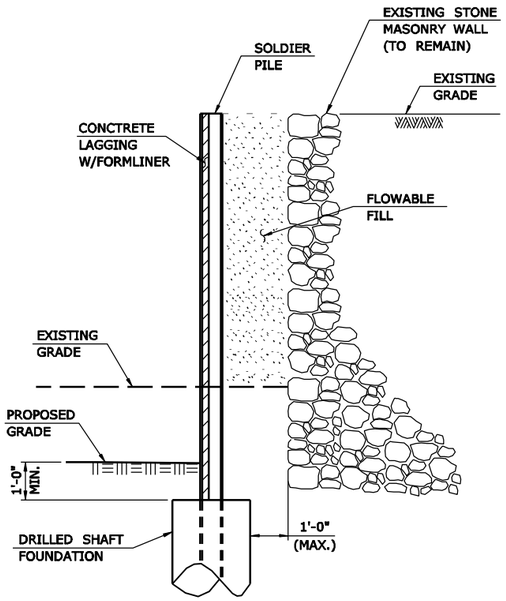
ATLANTIC STREET
RAILROAD RETAINING WALLS

URS | SCALE AS NOTED | FIGURE 5.1A

FILES
DATES



GRADE WALL



SOLDIER PILE & LAGGING

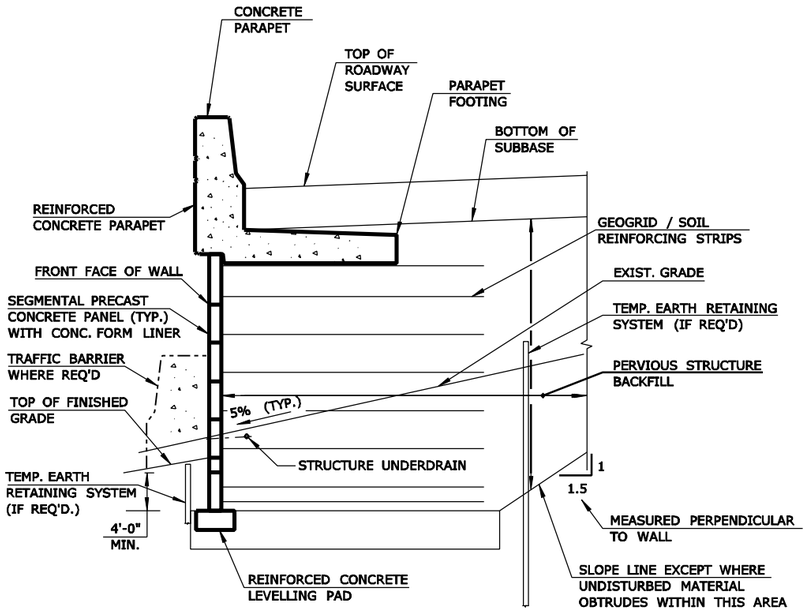
RAILROAD RETAINING WALLS (ALT. 3)

N.T.S.

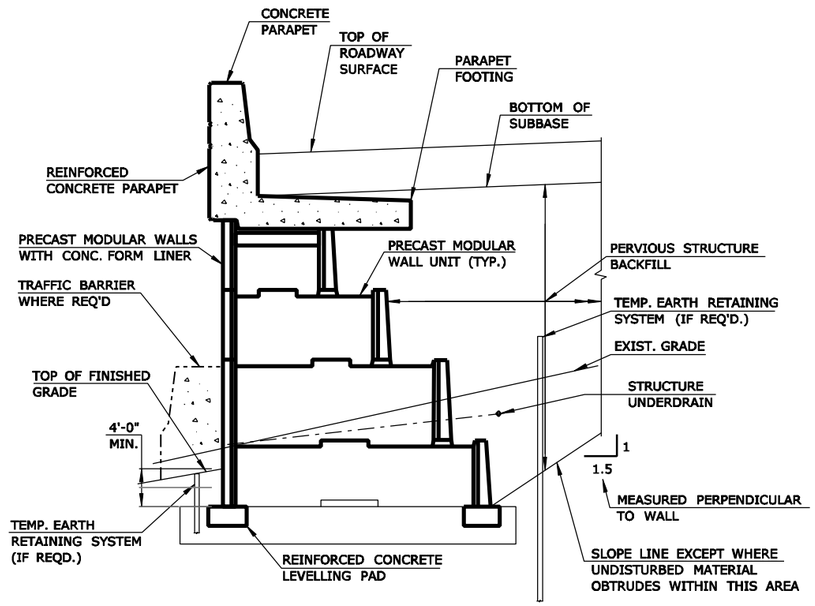
SOUTH STAMFORD ACCESSIBILITY
& MNRR BRIDGE REPLACEMENT
FEASIBILITY STUDY

ATLANTIC STREET
RAILROAD RETAINING WALLS

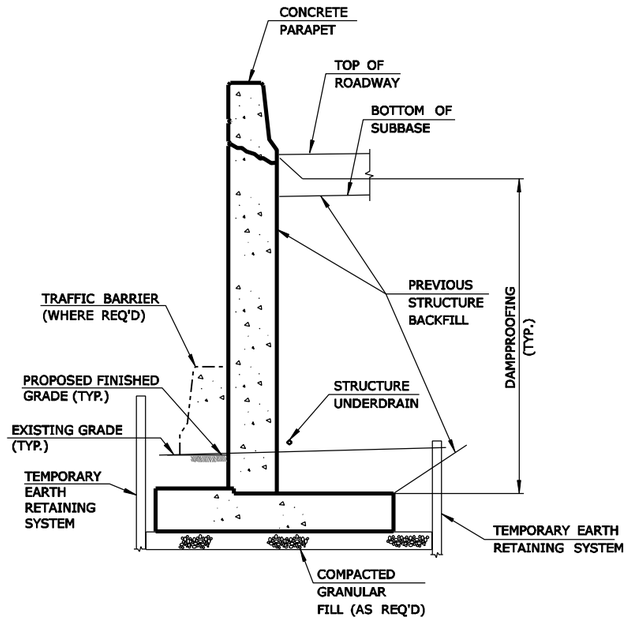
URS | SCALE AS NOTED | FIGURE 5.1B



MECHANICALLY STABILIZED EARTH WALL



PREFABRICATED MODULAR WALL



CAST-IN-PLACE WALL

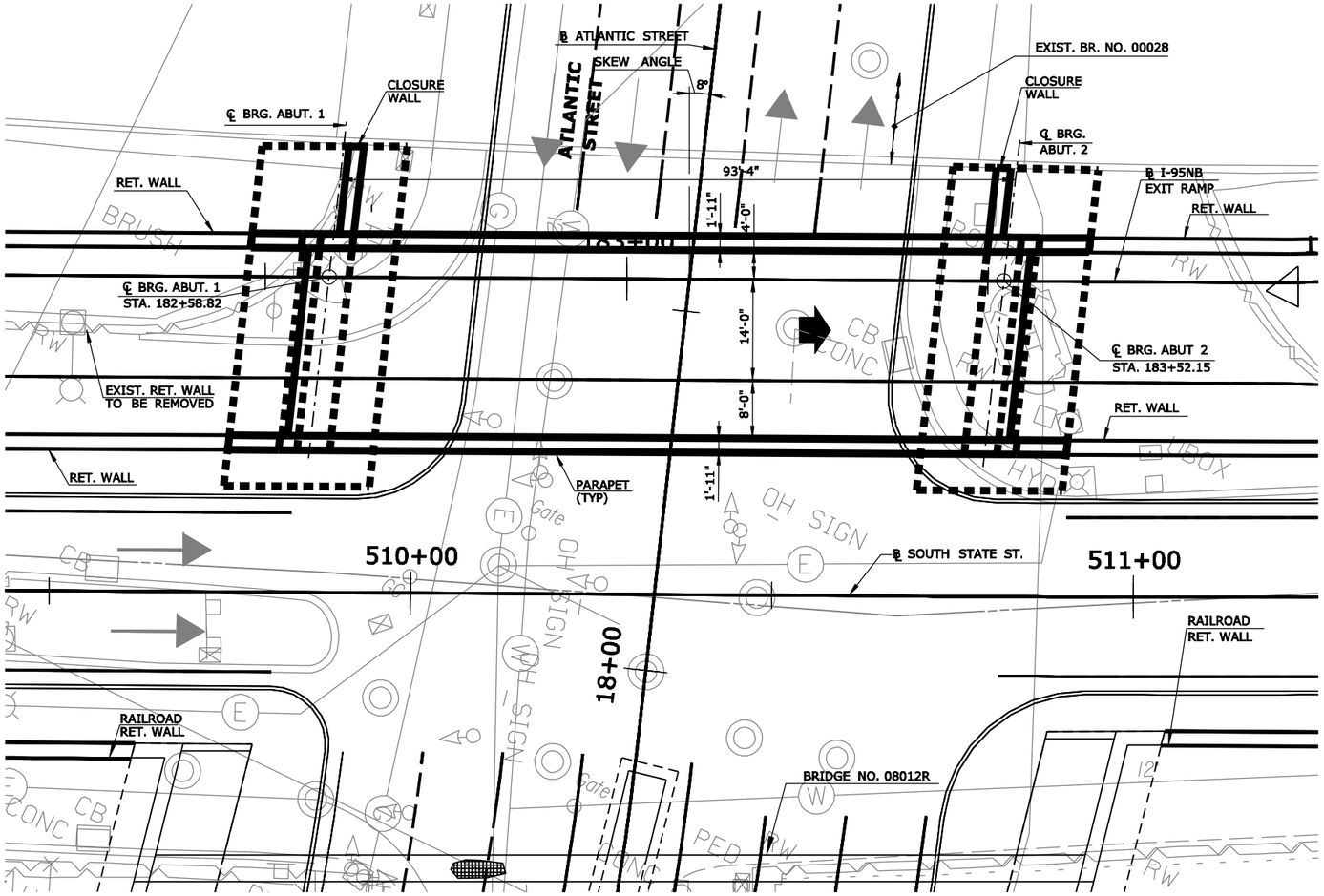
ROADWAY RETAINING WALLS

N.T.S.

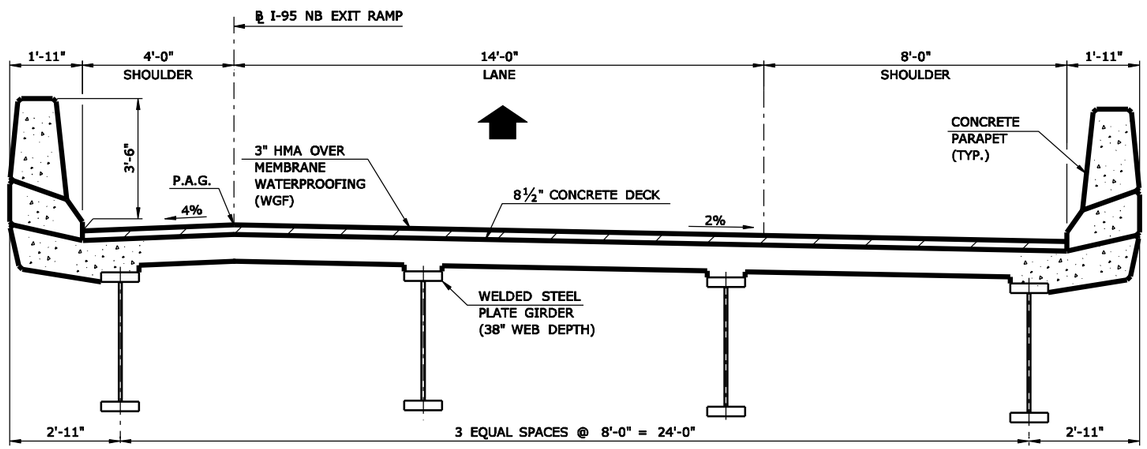
SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
ROADWAY RETAINING WALLS

URS | SCALE AS NOTED | FIGURE 5.2



PROPOSED PLAN
SCALE: 1" = 20'



SECTION
SCALE: ¼" = 1'-0"

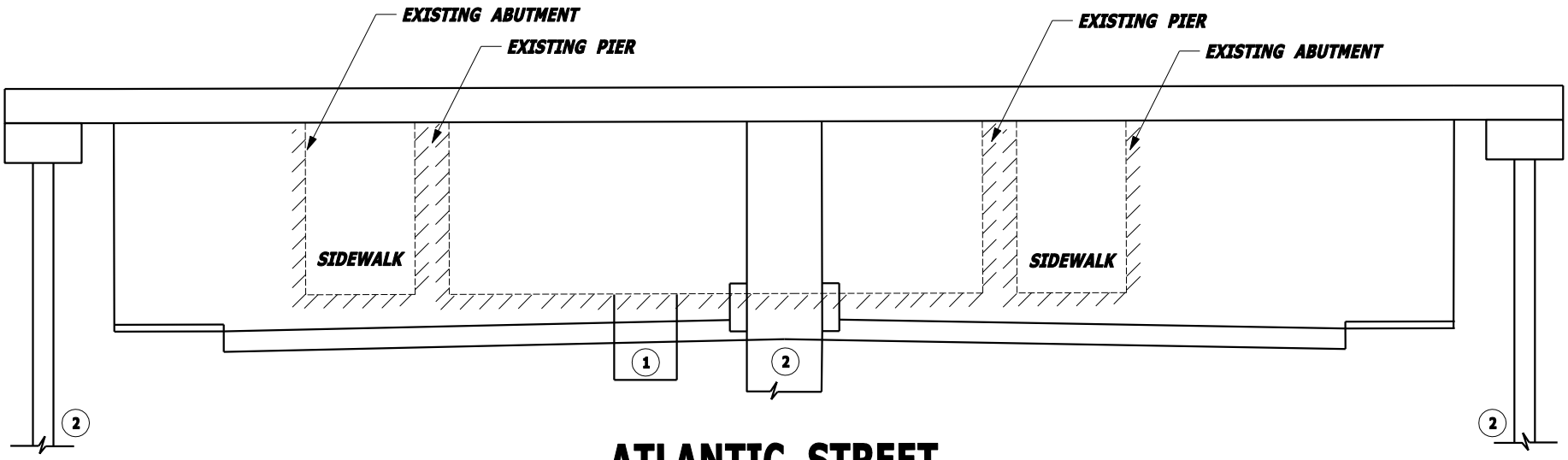
SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET
GENERAL PLAN AND ELEVATION
I-95 EXIT RAMP BRIDGE

URS | SCALE AS NOTED | FIGURE 5.3

MAINTENANCE AND PROTECTION OF TRAFFIC

- CLOSE ROADWAY TO TRAFFIC FOR DURATION OF CONSTRUCTION.
- MAINTAIN PEDESTRIAN ACCESS ON A MINIMUM OF ONE SIDEWALK FOR DURATION OF CONSTRUCTION.



ATLANTIC STREET
LOOKING NORTHBOUND

CONSTRUCTION STAGING

1. RELOCATE UTILITIES AS REQUIRED.
2. CONSTRUCT ABUTMENTS AND PIERS.
3. DEMOLISH EXISTING ABUTMENTS AND PIERS.
4. RECONSTRUCT ROADWAY.

SOUTH STAMFORD ACCESSIBILITY & MNRR BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET ROADWAY MPT

URS | SCALE: 1"=12' | FIGURE 6.1

DRAINAGE AREA

STATION PLACE

C-CB
TF=10.3' NAVD '88
INV (S) = 6.5'

ABANDON

C-CB
TF=9.8' NAVD '88
FL=6.3'

C-CB
TF=10.3' NAVD '88
FL=6.2'

EXISTING 36" RCP

15" RCP

12" RCP

ABANDON

C-CB
TF=10.3' NAVD '88
INV(S)=6.9

C-CB
TF=9.8' NAVD '88
FL=6.6'

C-CB
TF=10.3' NAVD '88
FL=6.4

TIE-IN EXIST MH
TF=14.19' NAVD '88
INV IN=5.3'
INV OUT=5.1'

MH
TF=11.8' NAVD '88
INV(NE)=6.2'
INV(NW)=6.0
INV(S)=6.0'

URBAN TRANSITWAY

MANHATTAN STREET

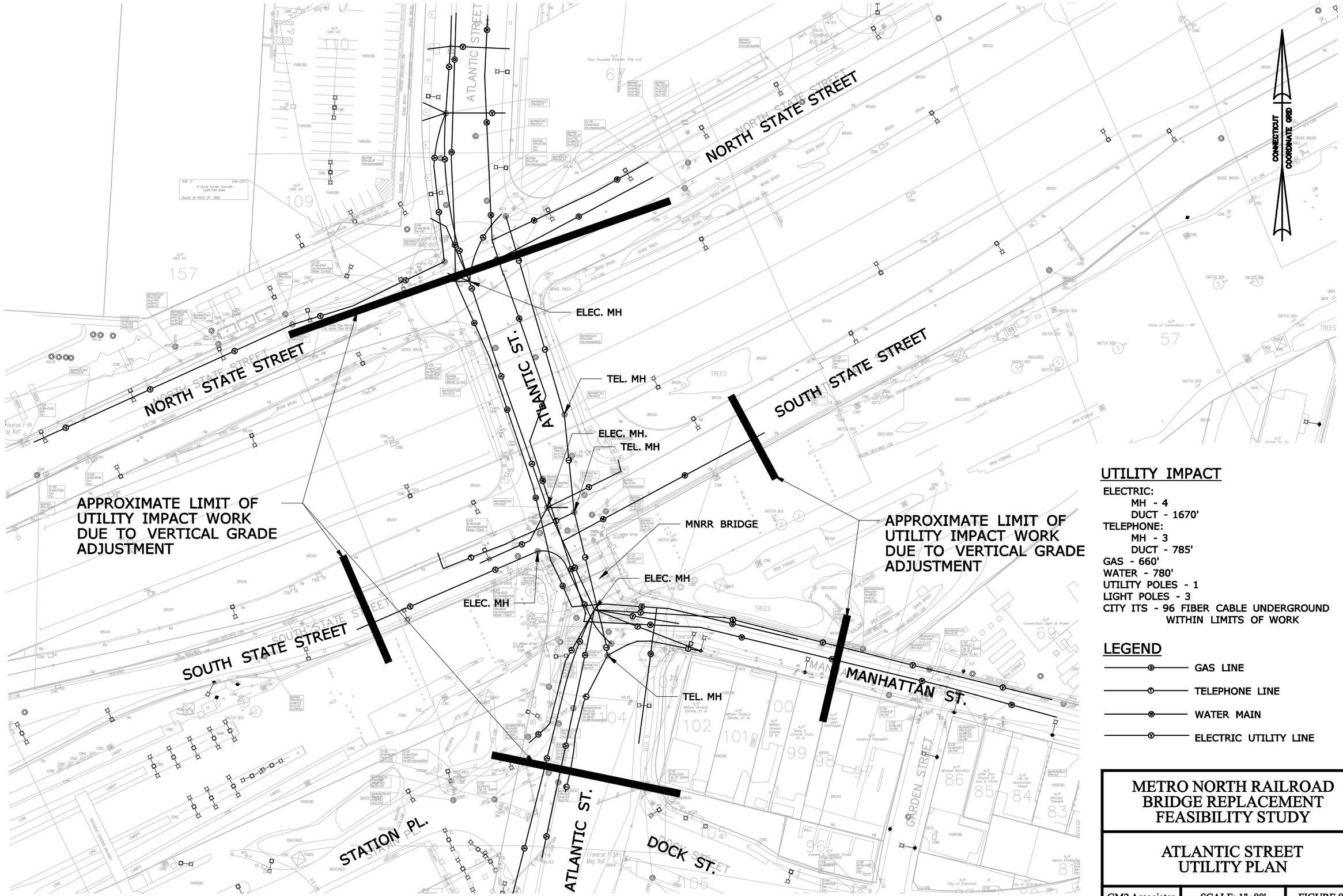
DENSE BRUSH

GROUND DISCHARGE LINE

METRO NORTH RAILROAD BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET DRAINAGE

GM2 Associates	SCALE: 1"=80'	FIGURE 7.1



UTILITY IMPACT

ELECTRIC:
- MH - 4
- DUCT - 1670'

TELEPHONE:
- MH - 3
- DUCT - 785'

GAS - 660'
WATER - 780'
UTILITY POLES - 1
LIGHT POLES - 3
CITY ITS - 96 FIBER CABLE UNDERGROUND WITHIN LIMITS OF WORK

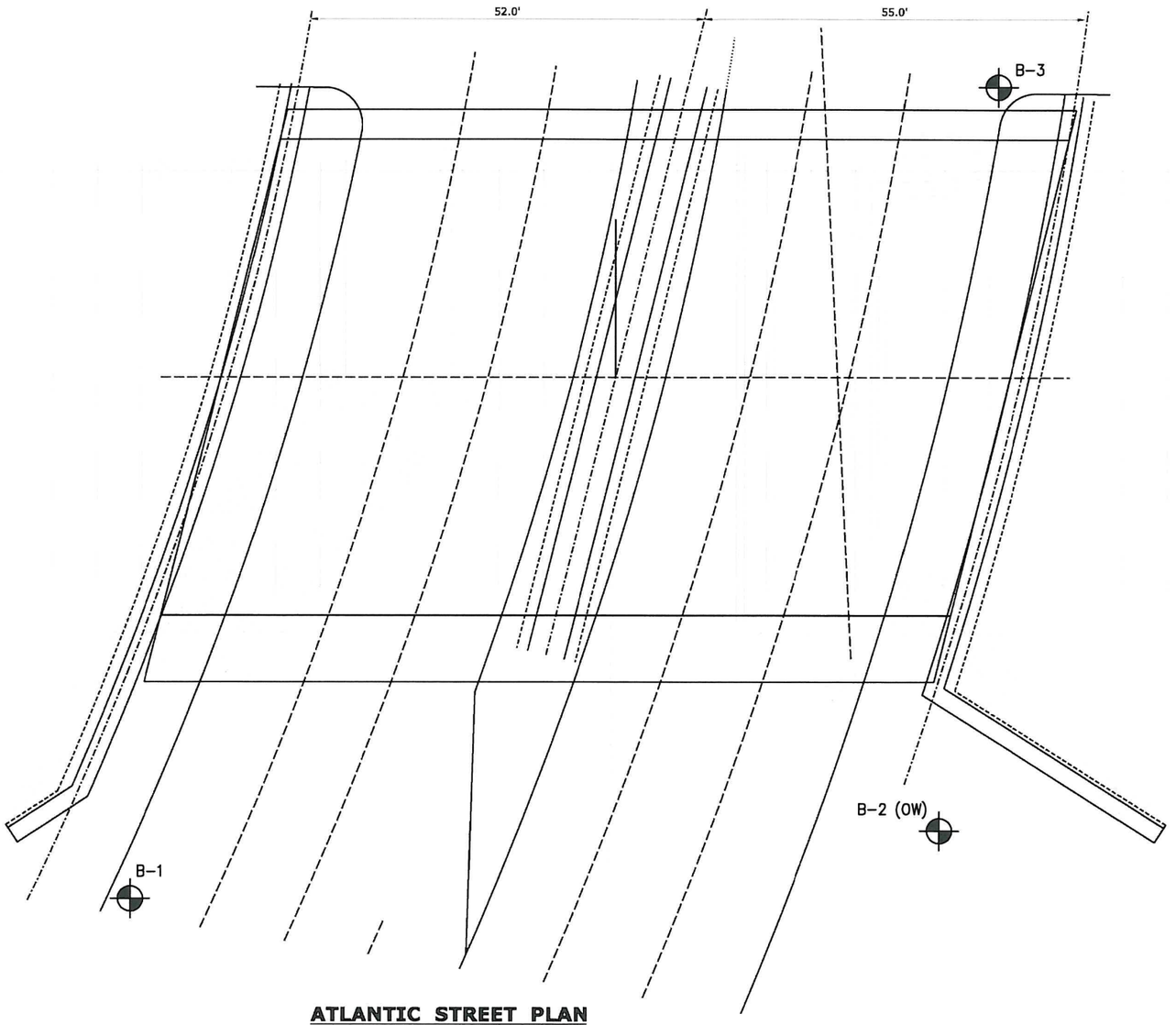
LEGEND

- GAS LINE
- TELEPHONE LINE
- WATER MAIN
- ELECTRIC UTILITY LINE

METRO NORTH RAILROAD BRIDGE REPLACEMENT FEASIBILITY STUDY

ATLANTIC STREET UTILITY PLAN

GM2 Associates	SCALE: 1"=80'	FIGURE 8.1



ATLANTIC STREET PLAN

CONNECTICUT
CORPORATE LINE

LEGEND

B-1 PROPOSED PILOT BORING

NOTES:
1) BASE MAP DEVELOPED FROM AN ELECTRONIC FILE PROVIDED BY URS ENTITLED 'METRO NORTH BRIDGE REPLACEMENT FEASIBILITY STUDY – ATLANTIC STREET PLAN' DATED 1/11/2010. ORIGINAL SCALE 1/8" = 1'–0".
2) THE LOCATIONS OF THE BORINGS WERE DETERMINED BY TAPING AND VISUAL ESTIMATES FROM EXISTING SITE FEATURES.

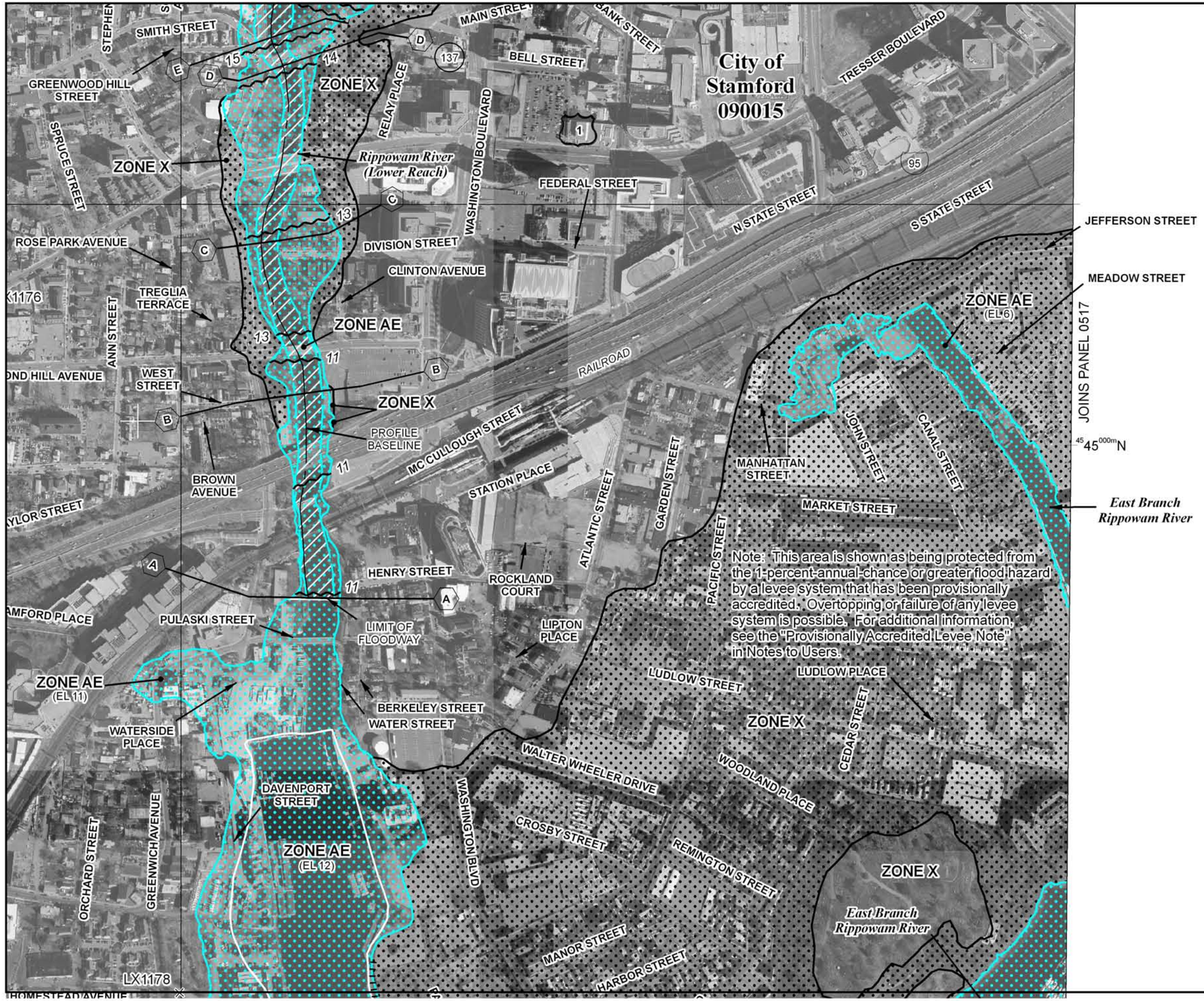
SCALE 1"= 20'
20' 10' 0 20'

METRO NORTH RAILROAD
BRIDGE REPLACEMENT
FEASIBILITY STUDY

ATLANTIC STREET
PILOT BORING PROGRAM

URS | SCALE: 1"=20' | FIGURE 9.1

M:\CL\0101\25\PHASE I\CADD\ATLANTIC ST.dwg



MAP SCALE 1" = 500'

0 500 1000 FEET

0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0516F

FIRM

FLOOD INSURANCE RATE MAP

FAIRFIELD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)

PANEL 516 OF 626
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GREENWICH, TOWN OF	090008	0516	F
STAMFORD, CITY OF	090015	0516	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09001C0516F

EFFECTIVE DATE
JUNE 18, 2010

Federal Emergency Management Agency

METRO NORTH RAILROAD
BRIDGE REPLACEMENT
FEASIBILITY STUDY

ATLANTIC STREET
100-YEAR FEMA FLOODPLAIN

URS | FIGURE 10.1