Appendix B-4
Orange Tunnel Concept

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Part 1: Engineering Considerations

1. ORANGE TUNNEL CONCEPT

Introduction

The "I-81 Independent Feasibility Study" (November 2017), released by NYSDOT in December 2017, identified the Orange Alternative as the tunnel concept with the "greatest benefit" in comparison to the multiple potential alternatives described in the report. Under its "Key Findings and Conclusions," it states, "The study team recommends that the Orange Alternative be considered for further study as a viable tunnel alternative." As described in this report, the Orange Alternative would involve construction of a tunnel with a southern portal south of Dr. Martin Luther King, Jr. East (MLK, Jr. East) and a northern portal near the I-81/I-690 interchange. This potential alternative would involve the reconstruction and reconfiguration of a substantial portion of I-690 to connect with the tunnel. According to the report, construction would take approximately nine years, cost $3.6 billion, and require 22 parcel acquisitions including 12 buildings.

In accordance with the independent study's recommendation, NYSDOT conducted an analysis and assessment of the Orange Alternative. NYSDOT developed and refined the Orange Alternative to a level of engineering detail sufficient to evaluate its potential social, economic, and environmental effects. Sections 1 and 2 of this appendix include a description of the major components of the potential alternative, including the modifications made to the original design as a result of further study. These design modifications were implemented either to make the tunnel concept feasible (see **Section 2** of this appendix for a list of modifications implemented to address issues with the Orange Alternative), to minimize impacts, and to add elements that are common to the Viaduct and Community Grid Alternatives. The modified Orange Alternative is hereafter referred to as the "Orange tunnel concept."

Alignment and Major Features of the Orange Tunnel Concept

Overview

The Orange tunnel concept would involve the demolition of the existing viaduct between the New York, Susquehanna and Western (NYS&W) Railway bridge and the I-81/I-690 interchange and construction of a tunnel carrying two through lanes in each direction. The southern tunnel portal would be located approximately 400 feet south of MLK, Jr. East and the northern tunnel portal would be just south of James Street. The length of this route would be 1.7 miles (1.4 miles of tunnel and .3 miles of depressed roadway segments). The main line of the Orange tunnel would be constructed primarily with a tunnel-boring machine (TBM) in bedrock (generally about 40 to 100 feet from the surface to the top of the tunnel, and from 85 to 145 feet from the surface to the bottom of the tunnel). The highway would be depressed as it travels to and from the tunnel portals and connections, and the approaches would involve cut and cover and sequential

excavation methods of construction. **Section 3** of this appendix provides additional detail about the tunnel construction.

I-690, including the I-81/I-690 interchange, would be reconstructed from Leavenworth Avenue to Lodi Street. Both fully directional (with all possible connections) and partial I-81/I-690 interchanges (with five of the eight possible connections) were considered. Under the partial interchange option, existing I-81 would be de-designated as an interstate, and existing I-481 would be re-designated as the new I-81. The section of I-81 between the southern I-81/I-481 interchange (Interchange 16A) and the I-81/I-481 northern interchange (Interchange 29) in Cicero would be re-designated as a business loop[1] of I-81 (BL 81). **Figures 1-1 through 1-4** depict the partial interchange option. Under the full interchange concept, the Orange tunnel would carry I-81 (refer to **Figures 1-5 and 1-6**). For the purpose of this study, a partial interchange was assumed and is depicted in the plans, but both options are feasible.

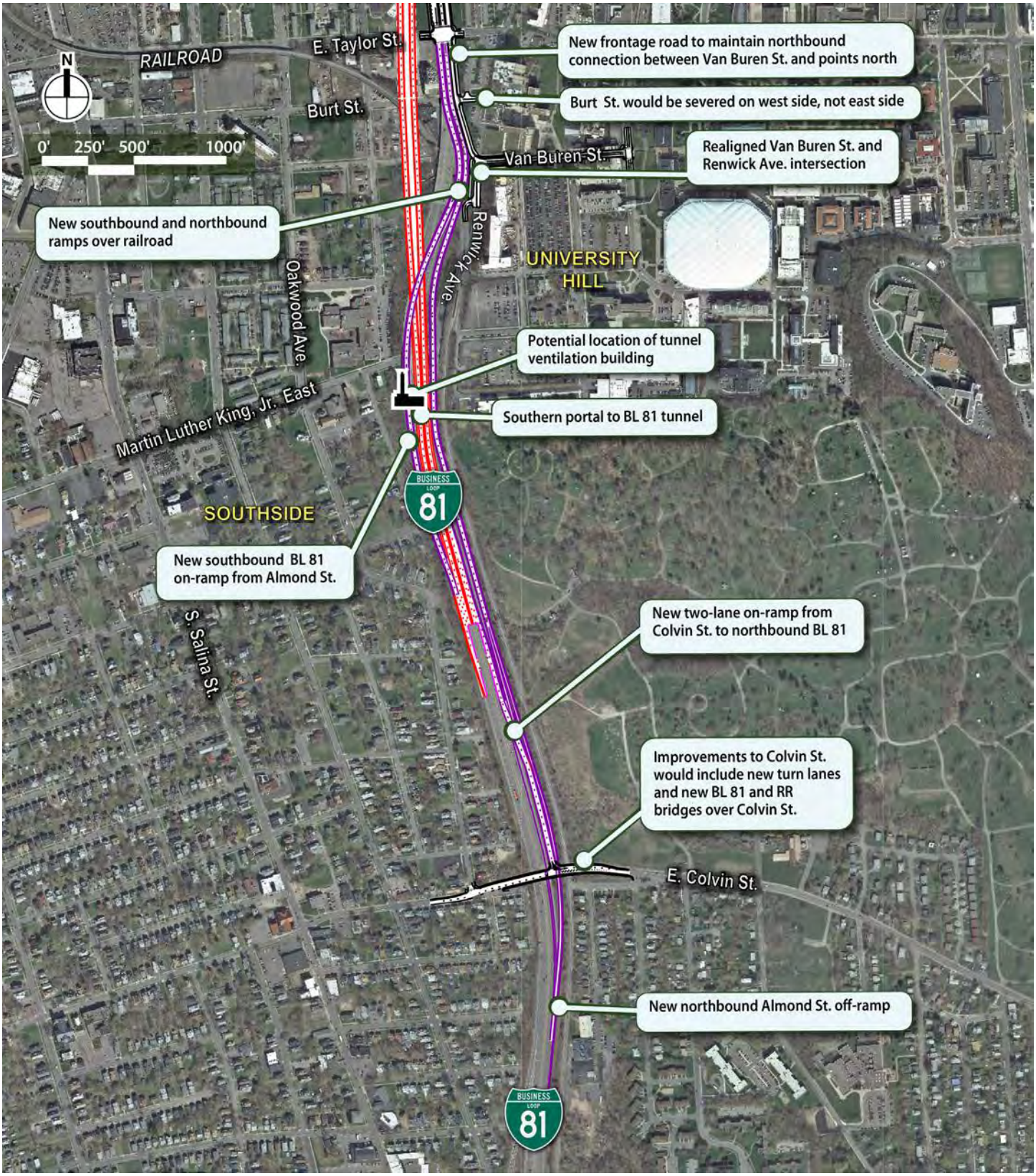
The portions of BL 81 between the southern I-81/I-481 interchange and the NYS&W Railway bridge, and between the I-81/I-690 interchange and the northern I-81/I-481 interchange, would remain an at-grade controlled access highway (with no traffic signals or intersections), and the portion between the NYS&W Railway bridge and the I-81/I-690 interchange would be a controlled access highway tunnel.

In the southern project area, BL 81 would transition from an at-grade highway to a depressed highway north of Colvin Street as it descends into the southern portal between East Kennedy Street and MLK, Jr. East (**Figures 1-7, 1-8, and 1-9** are renderings showing close-up and contextual views of the potential southern portal). The BL 81 tunnel would then cross under MLK, Jr. East and run west of and parallel to the existing I-81 viaduct until Madison Street, where the tunnel would turn northwesterly and ascend as it approaches the I-690 interchange. The northern portal would be located just south of James Street and the I-81/I-690 interchange (**Figures 1-10 and 1-11** are renderings showing close-up and contextual views of the potential northern portal). North of the I-690 interchange, BL 81 would be widened to four lanes in each direction, and the Butternut Street, Spencer Street, Court Street, and Bear Street bridges would be demolished and reconstructed.

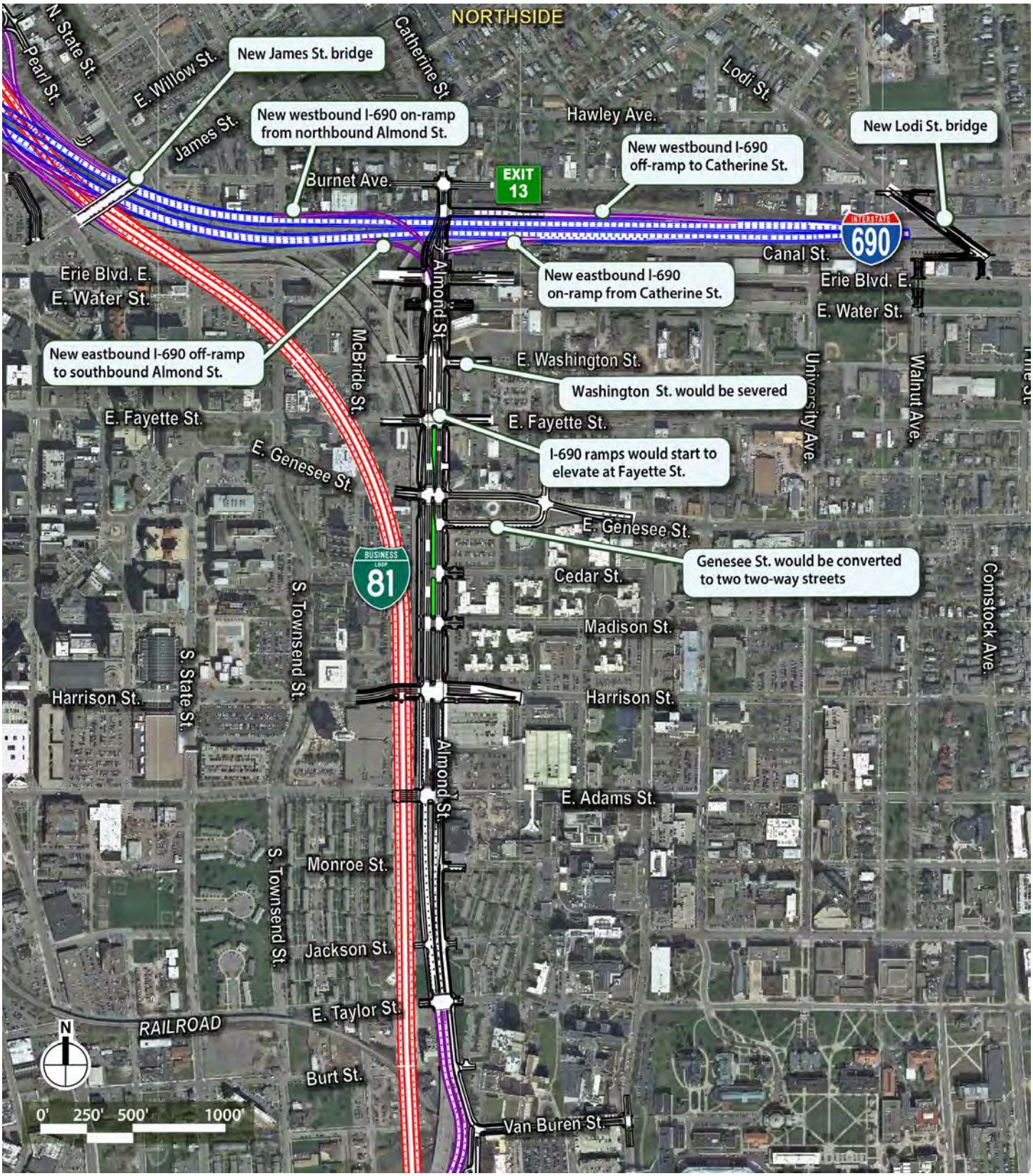
Almond Street (Catherine Street north of I-690) would be reconstructed between Van Buren Street and Burnet Avenue, carrying three lanes and turning lanes as needed in each direction, as described below (**Figure 1-12** shows a cross-section of Almond Street between Jackson and Taylor Streets, and **Figure 1-13** shows a cross-section of Almond Street between Cedar and Madison Streets).

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[1] According to the American Association of State Highway and Transportation Officials (AASHTO), a business route is "a route principally within the corporate limits of a city which provides the traveling public an opportunity to travel through that city, passing through the business part of the city, while the regular number is used to obviate passing through the congested part of the city." A "business loop" is a route that leads into a downtown business district and returns to the freeway at the other end. The designation of BL 81 would be subject to review and approval by AASHTO. In addition, interstate changes are subject to approval by the Federal Highway Administration (FHWA).



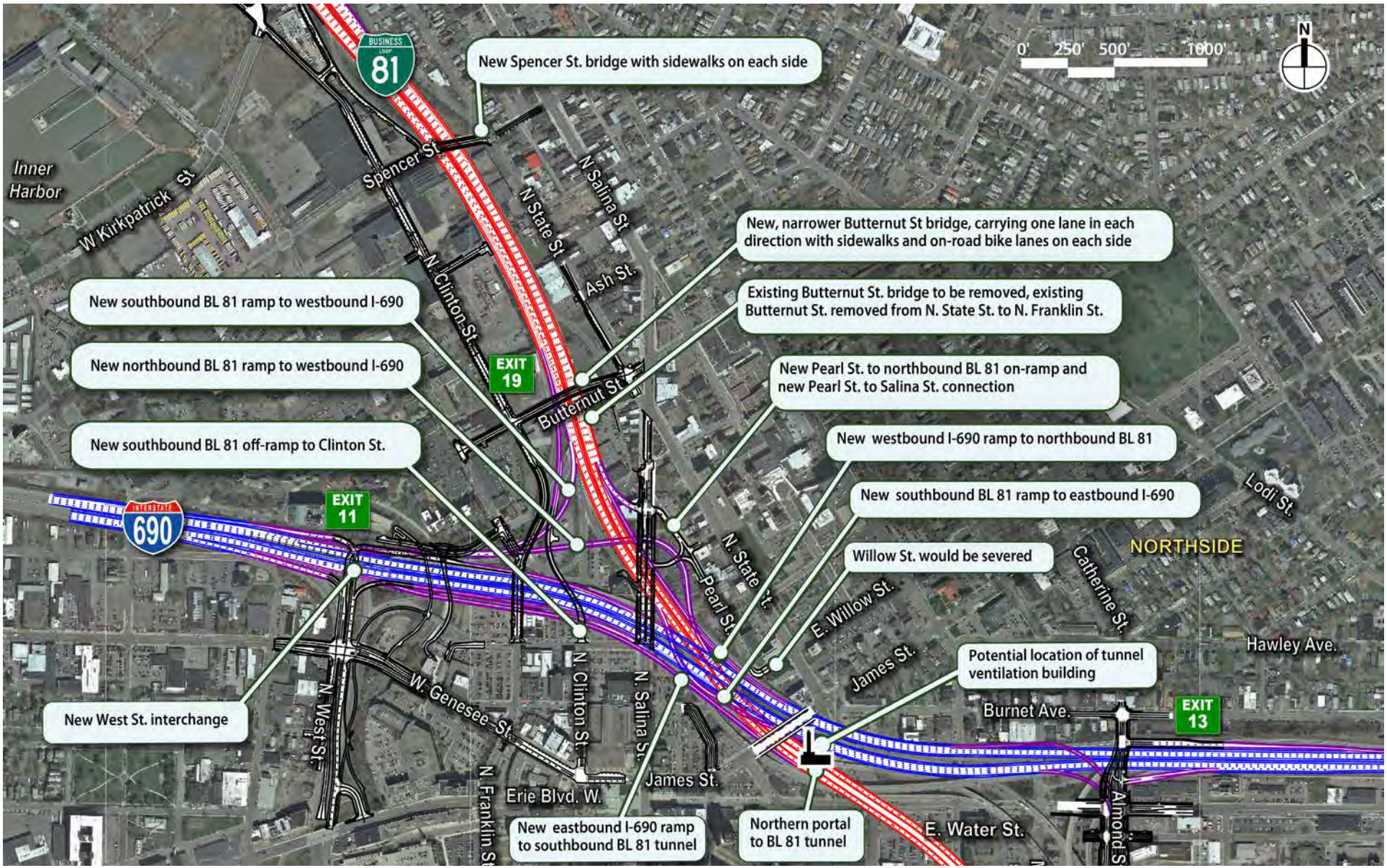
Orange Tunnel Concept Overview: Partial Interchange
Colvin Street to Taylor Street
Figure 1-1



Orange Tunnel Concept Overview: Partial Interchange
Taylor Street to Willow Street

I-81 Viaduct Project

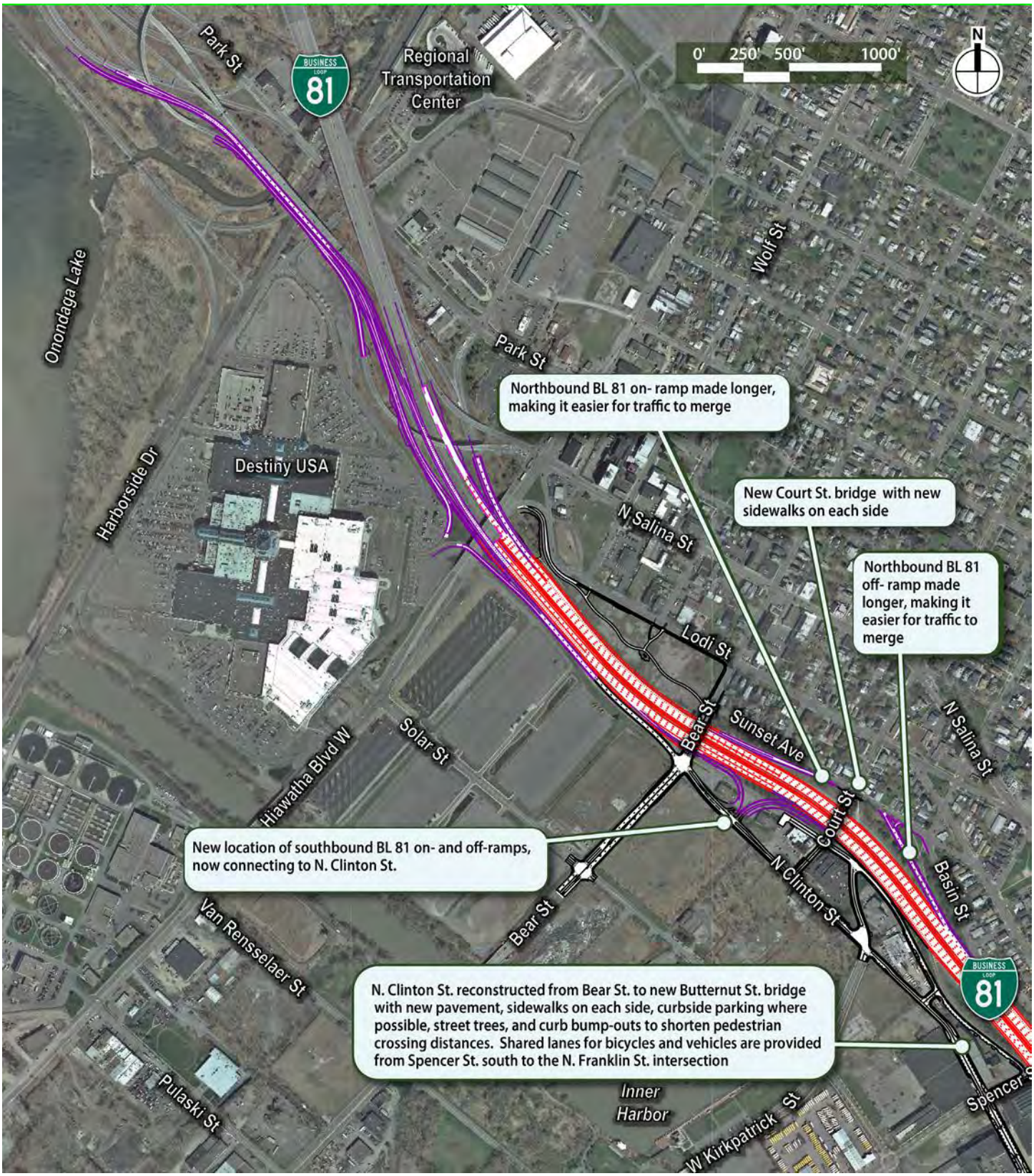
Figure 1-2



Orange Tunnel Concept Overview: Partial Interchange
Water Street to Spencer Street

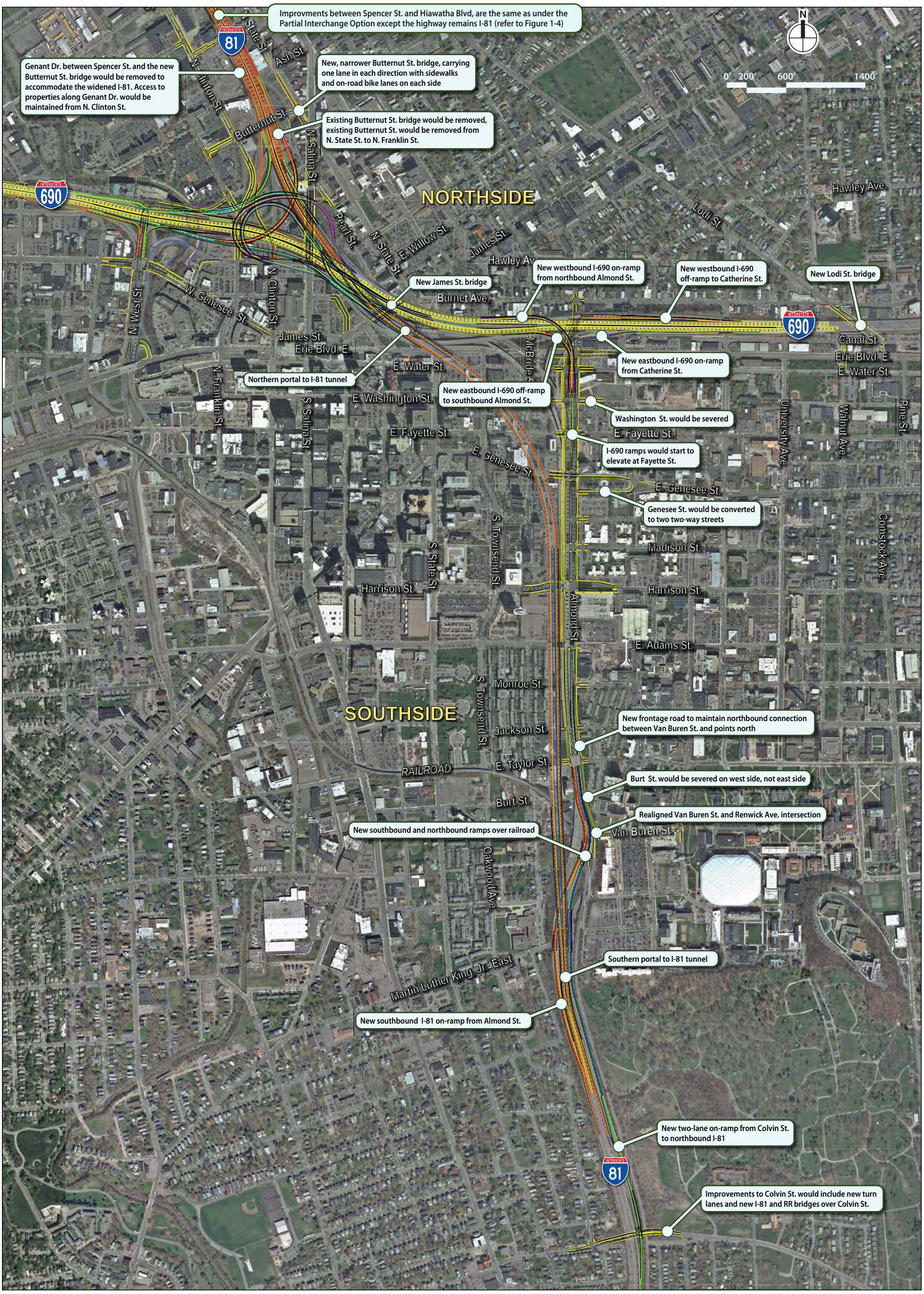
I-81 Viaduct Project

Figure 1-3



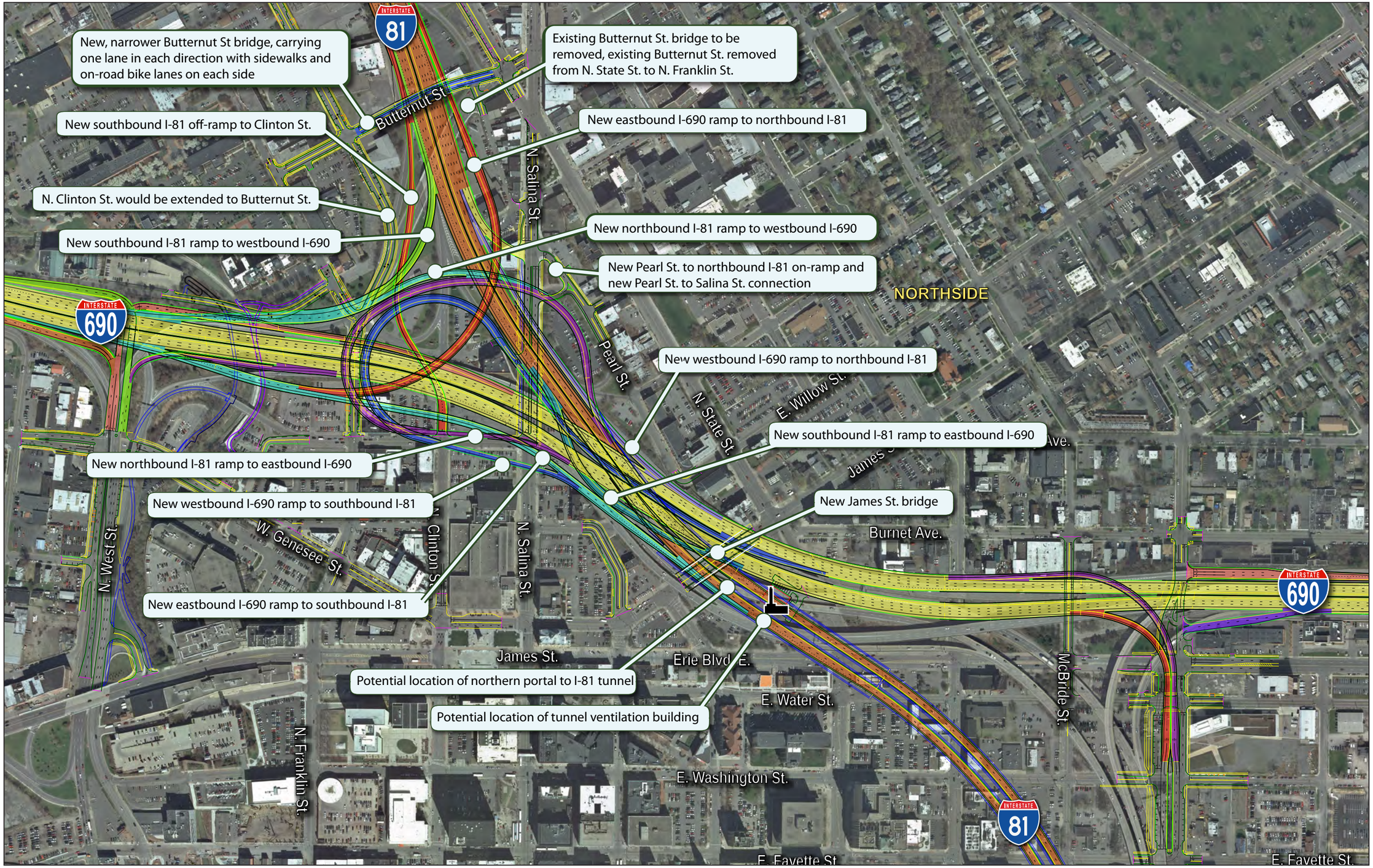
Orange Tunnel Concept Overview: Partial Interchange
Spencer Street to Hiawatha Boulevard
Figure 1-4

I-81 Viaduct Project



Orange Tunnel Concept Overview: Full Interchange
Colvin Street to Spencer Street

Figure 1-5



Orange Tunnel Concept Overview: Full Interchange, I-81 / I-690 Interchange Improvements



Orange Tunnel Concept:
Southern Tunnel Portal Area Between MLK, Jr. East and East Kennedy Street
Figure 1-7





Orange Tunnel Concept:
View North at BL 81 Southern Tunnel Portal Area
Figure 1-8

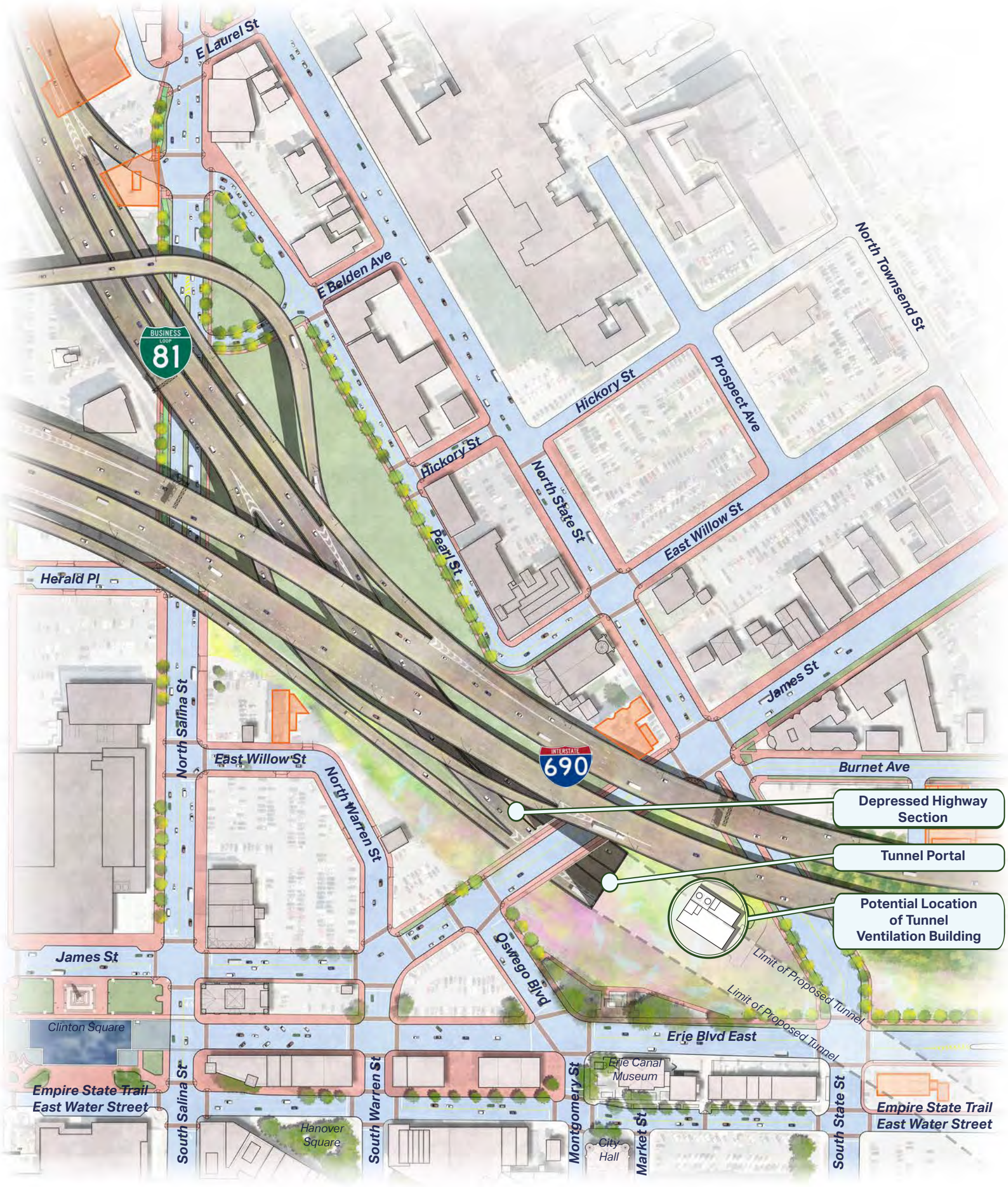
I-81 Viaduct Project





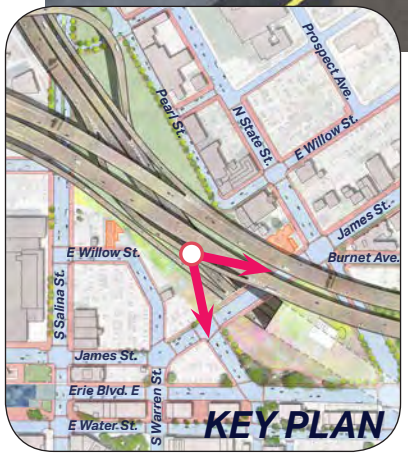
Orange Tunnel Concept:
View North Looking Into BL 81 Southern Tunnel Portal
Figure 1-9

I-81 Viaduct Project



Orange Tunnel Concept:
Partial Interchange
Northern Tunnel Portal South of James Street
Figure 1-10

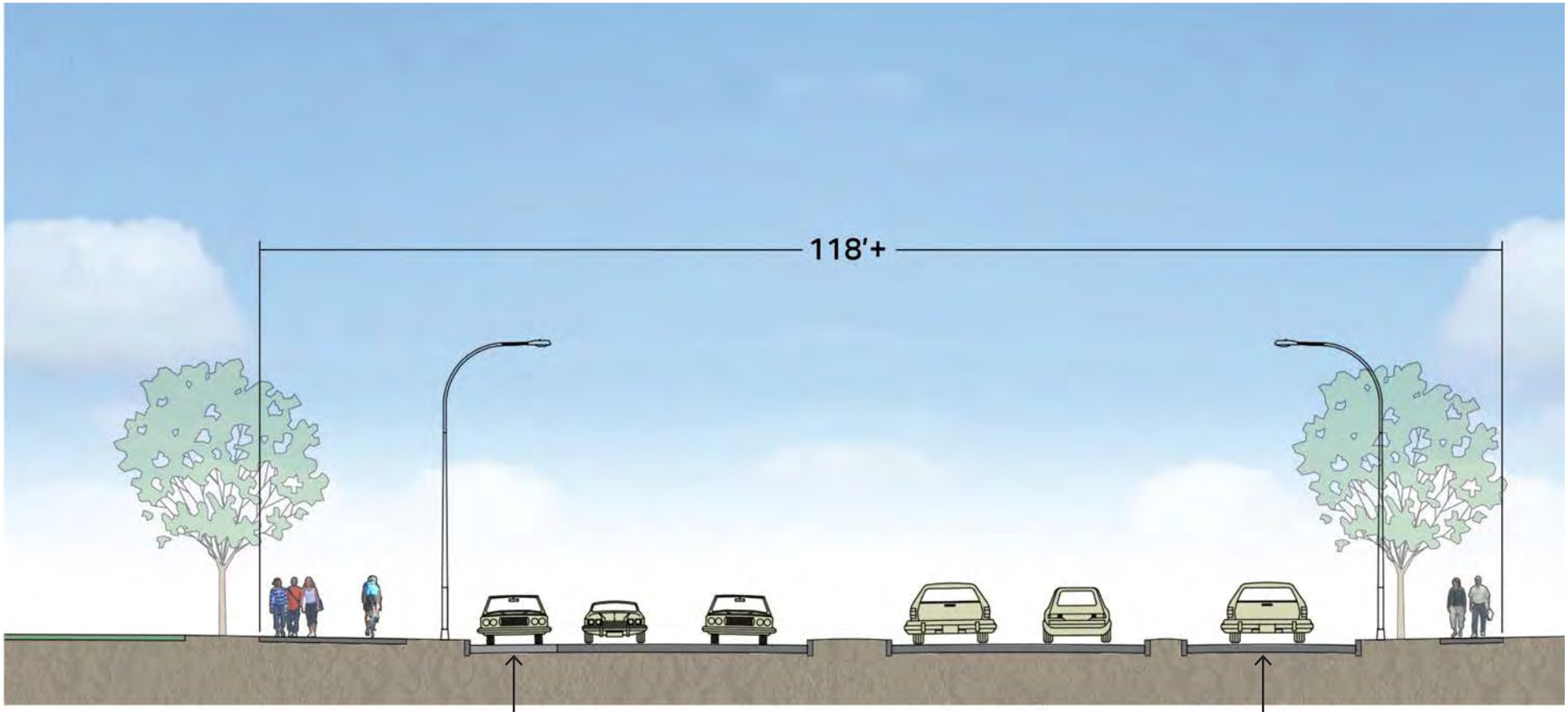




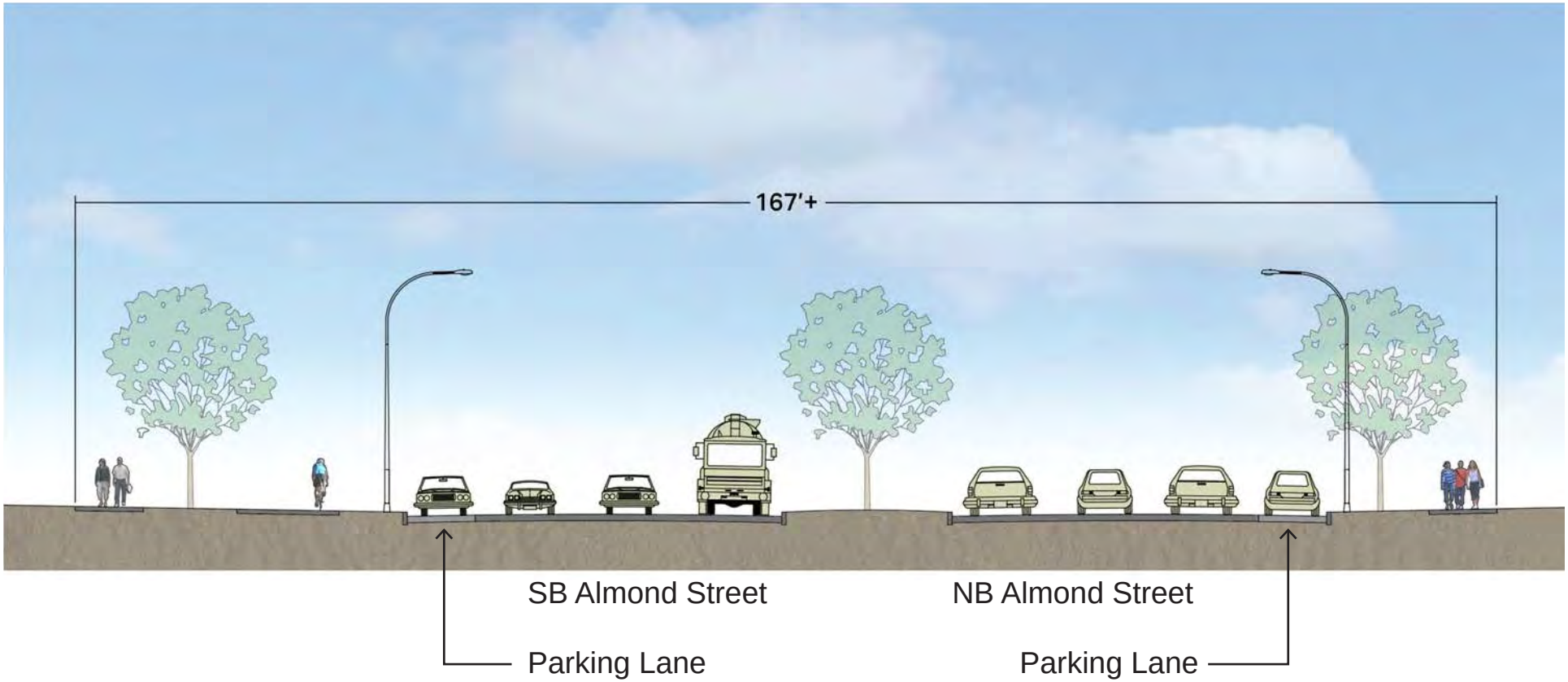
Orange Tunnel Concept:
Partial Interchange
View South Looking at New James Street Bridge with BL 81 Northern Tunnel Portal Beyond

I-81 Viaduct Project

Figure 1-11



Orange Tunnel Concept:
Section Looking North Along Almond Street Between Jackson Street and Taylor Street



Orange Tunnel Concept:
Section Looking North Along Almond Street Between Cedar Street and Madison Street

I-81 Viaduct Project

Figure 1-13

Conversion of I-481 to I-81

I-481 would be designated as the new I-81 and would carry a minimum of four travel lanes (two in each direction) of through traffic.

The change in highway designation and associated changes in traffic volumes would require modifications to the new I-81. These modifications would include:

I-81/I-481 South Interchange (Interchange 16A)

Reconstruction of this interchange would involve re-routing existing I-81 to connect with existing I-481, which would serve as the new I-81. The new I-81 (former I-481) would meet 70 mph design standards. The existing ramps that connect northbound I-81 to northbound I-481 and southbound I-481 to southbound I-81 would be demolished, and these movements would be made on the main line of the new I-81. The East Brighton Avenue bridge over the interchange and East Glen Avenue would be reconstructed, and the intersection of East Brighton Avenue and Rock Cut Road would be maintained.

I-81/I-481 North Interchange (Interchange 29)

This interchange would be reconstructed to connect the re-designated I-81, which would meet 70 mph design standards, with the existing I-81. The existing ramps that connect northbound I-481 to northbound I-81 and southbound I-81 to southbound I-481 would be demolished, and these movements would be made on the main line of re-designated I-81.

Other modifications to existing I-481:

- A third southbound (auxiliary) lane would be provided between Kirkville Road (Interchange 5 southbound on-ramp) and I-690 (Interchange 4 southbound off-ramp), requiring a widening of the southbound bridge over the CSX railroad tracks.
- A third northbound (auxiliary) lane would be provided between I-690 (Interchange 4 northbound on-ramp) and Kirkville Road (Interchange 5 northbound off-ramp), requiring a widening of the northbound bridge over the CSX railroad tracks.
- A third northbound (auxiliary) lane would be added between Kirkville Road (Interchange 5 northbound on-ramp) and I-90 (Interchange 6 northbound off-ramp).
- A third southbound (auxiliary) lane would be added between Interchange 9 (I-81/I-481 north interchange) and Northern Boulevard (Interchange 8 southbound off-ramp).
- I-481 signage would be replaced with I-81 signage, and interchanges would be renumbered to correspond to the sequencing of I-81 interchanges south and north of Syracuse.

In addition, foundation work would be done adjacent to the CSX rail tracks, and work on widening and rehabilitation of the existing structures would occur over the rail yard.

Improvements in the Central Study Area

Major elements of the Orange tunnel concept (partial interchange option), including interchange modifications, bridge replacements, and other features, are described below and depicted in

Figures 1-1 through 1-4. In addition, conceptual highway plans, profiles, and typical sections are included in **Section 13.2;** conceptual bridge location plans are included in **Section 13.3;** conceptual tunnel plans, profiles, and sections are included in **Section 13.4**; and conceptual tunnel systems plans, sections, and elevations are included in **Section 13.5**.

Once I-481 has been re-designated as I-81, former I-81 would be re-designated as BL 81. Accordingly, all existing interchanges along former I-81 would receive new numbers with the BL 81 designation.

East Colvin Street and Southern Almond Street Areas

South of the southern portal, BL 81 would provide connecting ramps to and from Almond Street. Motorists would be able to enter southbound BL 81 via an on-ramp near the Almond Street/Taylor Street intersection, and they would be able to exit northbound BL 81 via an off-ramp to Almond Street that starts south of East Colvin Street and meets Almond Street at Taylor Street. The East Colvin Street on-ramp would be widened to two lanes to meet an anticipated increase in traffic, and a connection to the northbound BL 81 to northbound Almond Street ramp would be provided. East Colvin Street would be reconstructed to add a left turn lane in the eastbound direction and to add a right turn lane in the westbound direction. This work would require the replacement of both the BL 81 bridge over East Colvin Street and the NYS&W Railway bridge over East Colvin Street.

To accommodate the ramps from BL 81 to Almond Street, the intersection of Van Buren Street and Renwick Avenue would be reconfigured and the intersection of Fineview Place and Renwick Avenue would be realigned. A new northbound frontage road, parallel to the east of the connective ramps, would be constructed from north of Van Buren Street to north of Monroe Street. However, the southbound section of Almond Street, between Burt Street and Van Buren Street, would be severed, including the connection to Burt Street.

Reconstruction of I-690 and Former I-81/I-690 Interchange

As mentioned earlier, I-690 would be reconstructed from Leavenworth Avenue to Lodi Street, and for the purpose of this study, a partial BL -81/I-690 interchange was assumed. Under this partial I-81/I-690 interchange option, five of the possible eight connections between BL 81 and I-690 would be provided: from northbound BL 81 to westbound I-690, from southbound BL 81 to eastbound I-690, from southbound BL 81 to westbound I-690, from eastbound I-690 to southbound BL 81, and from westbound I-690 to northbound BL 81. The existing ramps between existing northbound I-81 to eastbound I-690 and between westbound I-690 and existing southbound I-81 would be eliminated.

Connections from local streets to I-690 would also be provided. A new Catherine Street interchange would connect to I-690. A new on-ramp from Catherine Street to eastbound I-690 and a new westbound I-690 off-ramp to Catherine Street would replace the existing ramps at McBride Street and Townsend Street. In addition, an on-ramp to westbound I-690 and an off-ramp from eastbound I-690 would be built above Erie Boulevard and Water Street and connect to Almond Street at Fayette Street. Washington Street would be severed due to lack of vertical clearance with these elevated ramps.

New bridges would be constructed over all the north-south city streets, including North Franklin Street, North Clinton Street, North Salina Street, James Street, State Street, Townsend Street, McBride Street, Catherine Street, Crouse Avenue, and Lodi Street.

All of the new and reconstructed ramps would include adequate shoulders, longer acceleration and deceleration lanes, and improved stopping sight distance.

Access to and from Northern Segment of BL 81

Motorists traveling on the local streets near Downtown who want to head north would use a reconfigured ramp from Pearl Street or the new ramp at Almond Street/Fayette Street to connect to the BL 81 northern segment. Motorists traveling southbound on the BL 81 northern segment would have the option to use the new Clinton Street off-ramp or connect to Almond Street via the new off-ramp from eastbound I-690.

BL 81 from Existing Interchange 19 (Clinton Street/Salina Street) and Existing Interchange 20 (Franklin Street/West Street)

Existing southbound exits 19 and 20 would be combined into a single exit to Clinton Street to reduce a weaving segment and meet current standards that dictate how far apart ramps should be spaced.

Butternut Street Bridge

The Butternut Street overpass must be rebuilt as part of the reconstruction of the existing I-81/I-690 interchange, which would shift highway and ramp locations. The new bridge would be built just north of the existing bridge, which would be demolished. The west side of the bridge would connect to Genant Drive.

North Clinton Street Reconstruction and Extension

North Clinton Street and portions of intersecting streets would be reconstructed from Bear Street to existing Genant Drive. In addition, to provide a direct connection and alternate north-south route to Downtown, North Clinton Street would be extended to North Franklin Street.

BL 81 from Existing Interchange 20 to Existing Interchange 24

To improve capacity and traffic operations, BL 81 from I-690 to Hiawatha Boulevard would be widened from three lanes to four lanes in each direction. Genant Drive would be closed from Spencer Street to North Clinton Street.

The Court Street interchange (Interchange 21) would be reconstructed. The two northbound BL 81 entrance and exit ramps would be lengthened, and the two southbound ramps would be relocated to connect to North Clinton Street between Court Street and Bear Street.

The Court Street bridge, which is now on a skewed angle over existing I-81, would be replaced with a new bridge that would pass straight over the highway, at a 90-degree angle, and connect to North Clinton Street. The existing Bear Street and Spencer Street bridges would be replaced with new structures.

The Route 370 (Onondaga Lake Parkway) on-ramp (Interchange 24A) and Old Liverpool Road on-ramp (Interchange 24B) to southbound BL 81 would be consolidated into a single ramp.

Removal of the West Street Overpass and I-690 Interchange 11/12 (West Street/West Genesee Street)

NYSDOT would replace the existing, free-flow Interchange 11/12 with a new interchange, controlled by a traffic signal on West Street. I-690 would pass over West Street, rather than beneath it as it does today. Just south of the new interchange, West Street would be lowered to meet West Genesee Street, which would be reconstructed with continuous sidewalks on both sides. The ramp from West Street to Herald Place, and the ramp from North Franklin Street to West Street, would be removed. The eastbound I-690 off-ramp to West Genesee Street (Interchange 12) would be combined with the eastbound I-690 exit (Interchange 11) to West Street.

Bicycle, Pedestrian, and Other Improvements to Local Streets

Bicyclists would continue to be prohibited on the interstate and freeway segments, including I-81, I-690, I-481, and BL 81. For the non-freeway segments of the project, the Orange tunnel concept would include new bicycle and pedestrian facilities to improve connectivity between existing and proposed facilities within the project limits, as well as local street improvements in the Central Study Area.

Newly created bicycle facilities along Almond Street would connect to existing bicycle facilities at Water Street (Empire State Trail) and East Genesee Street (Connective Corridor) and allow future connections to bicycle facilities identified in the Syracuse Bicycle Plan: A Component of the Syracuse Comprehensive Plan at Burnet Avenue, Fayette Street, Fineview Place, and Raynor Avenue.

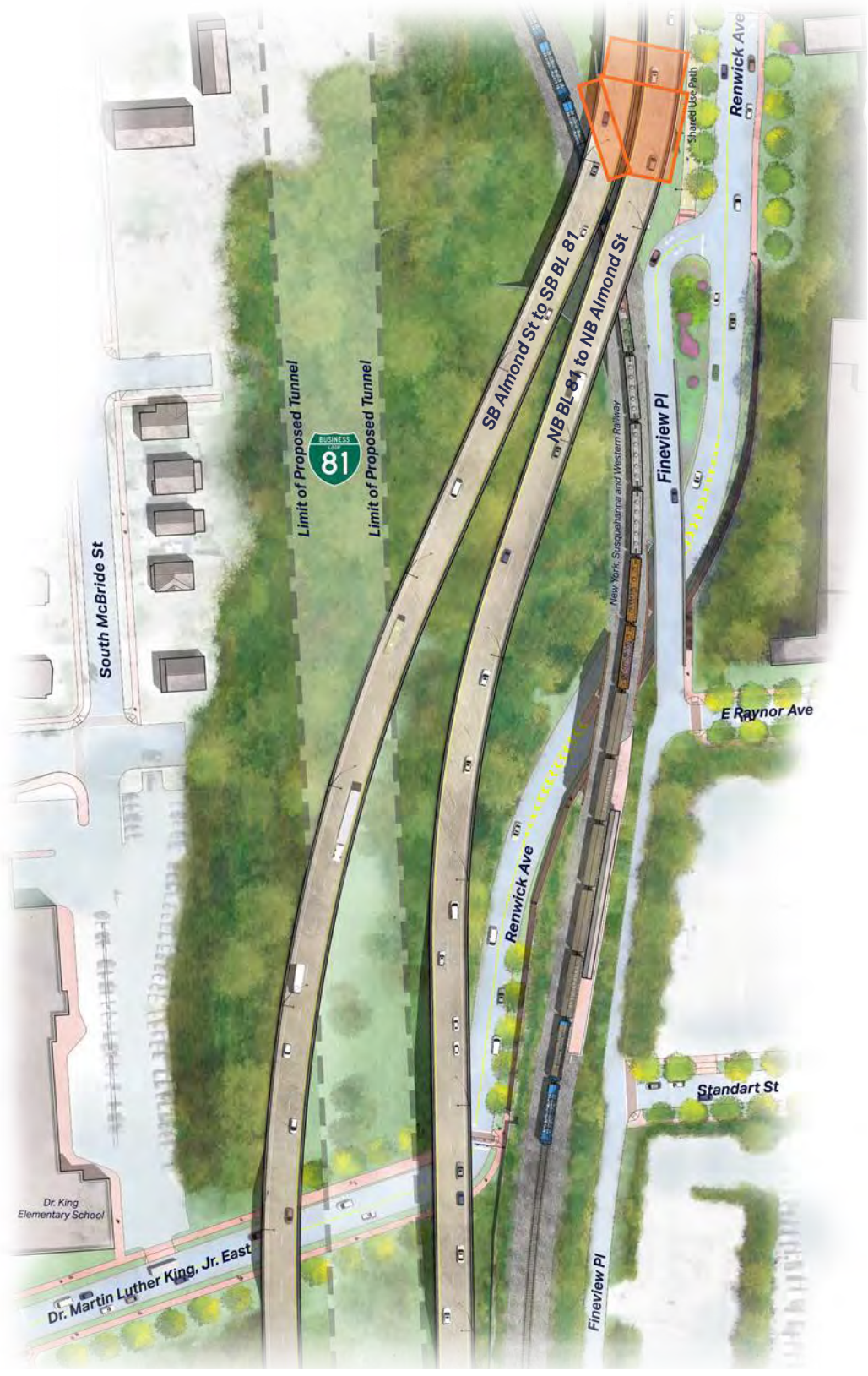
Specific local streets improvements would include the following:

Almond Street: Almond Street would be reconstructed, continuing to serve as a primary north-south corridor with ramps connecting it to and from I-690 and BL 81 (**Figures 1-14 through 1-18** illustrate the reconstructed Almond Street).

Between Burnet Avenue and Taylor Street, Almond Street (Catherine Street north of I-690) would follow its existing alignment, though some portions would shift to accommodate the connective ramps to and from I-690 and BL 81. From Van Buren Street to Taylor Street, Almond Street would be a single-lane, northbound frontage road to the east of the connective ramps.

To accommodate ramps connecting Almond Street to BL 81 to and from the north and south and to I-690 to and from the west, local street through traffic would be severed at Washington, Jackson, and Burt Streets. No vehicular, bicycle, or pedestrian through travel would be possible from these streets. Access from these local streets to Almond Street would be maintained via a three-way intersection where only right turns in and out of the intersection would be permitted. Burt Street west of Almond would become a dead-end street.

A shared use (bicycle/pedestrian) path would extend along the west side of Renwick Avenue from Fineview Place to Van Buren Street, on the east side of Almond Street from Van Buren Street to Taylor Street, and on the west side of Almond Street from Taylor Street to Adams Street.



Buildings to be Acquired

N

0′ 60′
20′ 120′

Orange Tunnel Concept:
Renwick Avenue Between Van Buren Street and MLK, Jr. East

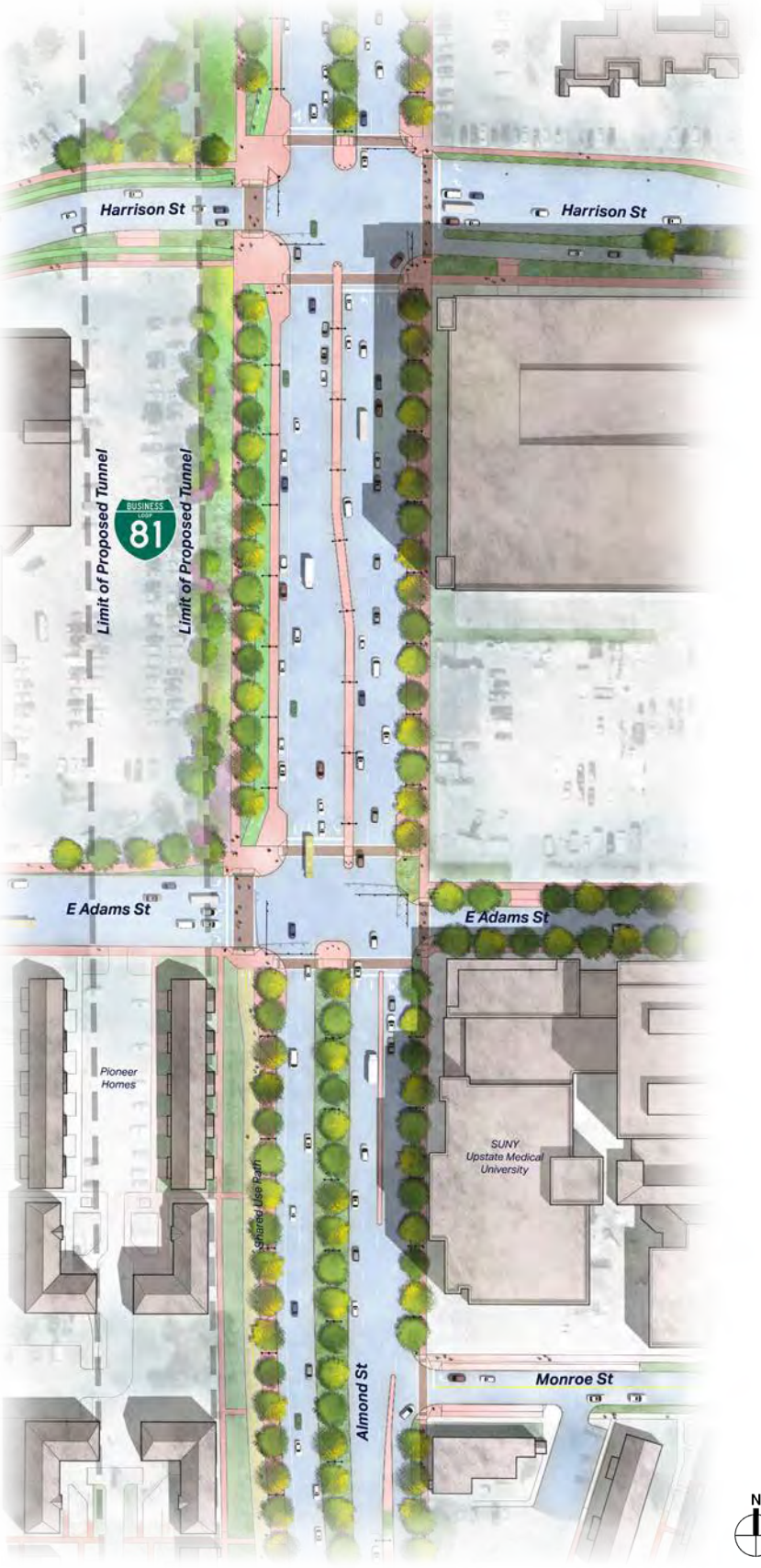
I-81 Viaduct Project

Figure 1-14



Orange Tunnel Concept:
Almond Street Between Jackson Street and Van Buren Street
Figure 1-15

I-81 Viaduct Project



Orange Tunnel Concept:
Almond Street Between Harrison Street and Monroe Street

I-81 Viaduct Project

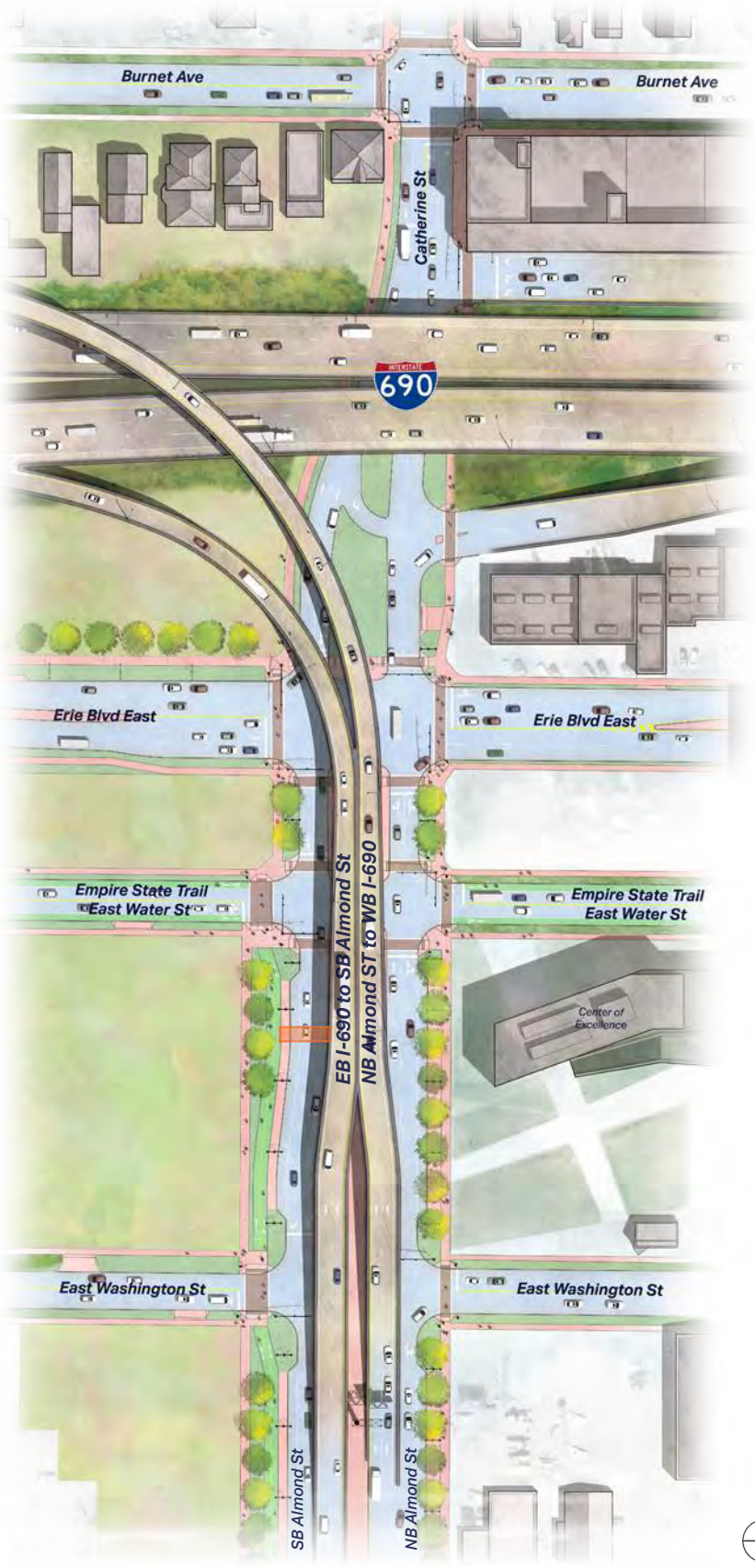
Figure 1-16



Orange Tunnel Concept:
Almond Street Between East Fayette Street and Madison Street

I-81 Viaduct Project

Figure 1-17



Buildings to be Acquired

Orange Tunnel Concept:
Partial Interchange
Almond Street Between Burnet Avenue and East Washington Street
Figure 1-18

The shared use (bicycle/pedestrian) path would be 14 feet wide but would narrow to 12 feet at some sections to avoid or reduce property impacts. Between Adams Street and Water Street, a raised cycle track and adjacent sidewalk would be located on the west side of Almond Street. Between Water Street and Burnet Avenue, a sidewalk would be located on the west side of Almond Street. On the east side of Almond Street, a sidewalk would be provided from Taylor Street to the north side of Erie Boulevard. Between Erie Boulevard and Burnet Avenue, a sidewalk would be provided on the west side only because of the need to accommodate the intersections with the new eastbound I-690 entrance ramp and the new westbound I-690 exit ramp. The bicycle facilities on Almond Street would connect to the Empire State Trail on Water Street and the Connective Corridor on Genesee Street.

As depicted in **Figure 1-19**, intersections would be configured to incorporate pedestrian and bicycle design best practices, including "bump-outs," or extensions of sidewalk corners, where feasible, to narrow roadway crossing distances for pedestrians. Raised center medians, which would function as protected areas for pedestrians, would be provided along Almond Street from Adams Street to Erie Boulevard.

To improve traffic flow, traffic signals would be added or modified along Almond Street and cross streets (from Van Buren Street to Erie Boulevard) with the exception of three intersections. Burt Street would be severed from northbound Almond Street due to the new connecting ramps to and from the south and at Almond Street. At the Washington Street intersection, through movements and left turn movements would be severed due to the new connecting ramps to and from the north. Additionally, to improve traffic operations, left turns and through movements would be prohibited at the intersection of Almond and Jackson Streets. As a result, east-west movement of vehicles, bicycles, and pedestrians at these three intersections would not be provided.

Fineview Place: Shared lanes, used by both bicycles and vehicles, would be provided on Fineview Place between the terminus of the shared use (bicycle/pedestrian) path on Almond Street and Raynor Avenue.

East Genesee Street: Both legs of the one-way loop around Forman Park would be converted to two-way operation between Almond Street and Forman Street, substantially simplifying pedestrian and bicycle crossings of Almond Street. Additionally, the East Genesee Street intersection would experience an increased number of left turns due to the restrictions at Fayette Street. The proposed conversion of East Genesee Street from one-way to two-way operation would also help to clarify traffic movements and improve traffic operations at the intersection.

Lodi Street under I-690: Bicycle lanes would be installed on Lodi Street between Burnet Avenue and Canal Street. Shared (bicycle and vehicle) lanes would be installed on Canal Street between Lodi Street and Walnut Street, and new curbs and sidewalks would be constructed on Walnut Street between Canal Street and Water Street (the latter would connect the Lodi Street bicycle facility with the Empire State Trail).

McBride Street: New curbs, sidewalks, and bicycle lanes would be constructed on McBride Street between the Empire State Trail on Water Street and Burnet Avenue.



Orange Tunnel Concept:
Proposed Pedestrian / Bicycle Enhancements
Figure 1-19

State Street: Shared (bicycle and vehicle) lanes would be provided on State Street between Butternut Street and Salina Street to provide connectivity between the proposed bicycle facilities on Salina Street and Butternut Street.

Onondaga Creekwalk Improvements: A new path would be built along the west bank of Onondaga Creek between Erie Boulevard and Evans Street. Two ramps between northbound West Street and an elevated portion of Erie Boulevard would be replaced with a single connector roadway. The additional space would be used to accommodate a shared use (bicycle/pedestrian) path and sidewalk along the east side of West Street from Erie Boulevard to West Genesee Street.

North Franklin Street: Between Evans Street and Herald Place, North Franklin Street would narrow to one vehicular lane in each direction. Sidewalks, street trees, and parallel parking lanes would be provided where feasible. Shared (bicycle and vehicle) lanes would be provided on North Franklin Street between Genant Drive and the extension of North Clinton Street.

Evans Street: Evans Street would be reconstructed and realigned from just west of Onondaga Creek to its intersection with North Franklin Street. The bridge crossing Onondaga Creek would be replaced. A new sidewalk would be constructed along the north side of Evans Street and a new shared use (bicycle/pedestrian) path would be constructed on the north side of Evans Street connecting North Franklin Street to the Creekwalk. In addition, shared (bicycle and vehicle) lanes would be provided on Evans Street between Franklin Street and Plum Street.

Salina Street: Salina Street would be rehabilitated where it passes beneath the former I-81 and I-690. Between Herald Place and East Laurel Street, a two-way raised cycle track and an adjacent sidewalk would be provided on the west side of Salina Street, and a sidewalk would be provided on the east side. Shared (bicycle and vehicle) lanes would extend from East Laurel Street to State Street.

Butternut Street Bridge: The new Butternut Street bridge would include sidewalks on both sides, as well as bicycle lanes that would extend east on Butternut Street to Salina Street and west on Genant Drive to Franklin Street.

Butternut Street/State Street Streetscape: The number of vehicular lanes on the portion of State Street from Butternut Street to Ash Street would be reduced from three lanes to two lanes. New sidewalks would be provided along the west side of State Street from Butternut Street to north of Ash Street. On State Street between Butternut and Salina Streets, shared (bicycle and vehicle) lanes would be provided.

North Clinton Street and Extension: North Clinton Street, and portions of intersecting streets, would be reconstructed from Bear Street to existing Genant Drive and North Clinton Street would be extended between Genant Drive and North Franklin Street. North Clinton Street would include shared (bicycle and vehicle) lanes between Spencer Street and North Franklin Street.

Spencer Street Bridge: The new Spencer Street bridge would include sidewalks on both sides as well as bicycle lanes that would extend east on Catawba Street (to Salina Street) and west (to North Clinton Street).

Court Street: The new Court Street alignment would include sidewalks on both sides that would extend east to Sunset Avenue and west to North Clinton Street.

Bear Street/Lodi Street: A portion of the parcels bounded by former I-81, Bear Street, and Lodi Street would be improved with the addition of a shared use path that would lead to an overlook with a view of the surrounding region. New sidewalks would be added around the site and on both sides of Bear Street between Solar and Lodi Streets.

Orange Tunnel Concept Environmental Enhancements

Important points of entry from the proposed Interstate Highway system to the street network could be enhanced as gateways. Gateway enhancements could be developed to create a distinct and identifiable sense of entry and sense of place. These enhancements could include establishment of a consistent theme or motif, use of specialty materials and site elements, historical elements, landscaping, signage, aesthetic earth forms, and sculptural elements to mark the entrance to the city. Potential gateways have been identified at the new West Street and Genesee Street intersection, the Clinton Street exit, and at the north and south ends of Almond Street.

The West Street and Genesee Street Gateway would be achieved by the elimination of the elevated highway infrastructure, bringing West Street to surface, and the creation of a surface intersection. Pedestrian, bicycle, and visual connectivity across West Street would be substantially enhanced as a result of these improvements. Aesthetic treatments would be used at this intersection to create a heightened sense of arrival into the city. Pedestrian areas at the intersections could be enlarged to accommodate more amenities and improve visual conditions. Sculptural lighting elements could serve as vertical markers, reinforcing a sense of arrival. Color could be used to enliven and punctuate the space. Sculptural sign walls, landscape and seat walls, and enhanced landscaping could all be used to define a gateway area. Specialty pavements and patterning could be used on sidewalks and interpretative markers explaining the history of the location could be incorporated into the pavements and plazas. Signage could orient visitors to the Onondaga Creekwalk, Downtown, and surrounding neighborhoods.

As described earlier, the removal of the highway infrastructure in this location also would allow for the creation of shared-use (bicycle and pedestrian) paths along the west side of Onondaga Creek and the creation of an overlook at the historic Erie Canal aqueduct under Erie Boulevard. A historic canal theme that builds on the newly visible Erie Canal aqueduct would provide the basis for the design vocabulary at this location. Canal-themed materials could include rustic stone and wood, as well as other industrial themed materials. Consideration of existing Onondaga Creekwalk elements, such as lighting, interpretive signage, furnishings, and pavement materials would be included to integrate with existing adjacent Onondaga Creekwalk segments north and south of the Project Area.

The Clinton Street Gateway is a gateway to the heart of the Downtown business district. Gateway enhancements would include landscape, low site walls, and aesthetic landforms just before passing under the elevated I-690. Other components of the gateway could include lighting and sculptural elements. Aesthetic enhancements to the I-690 bridge would reinforce the sense of gateway and arrival. Gateway enhancements could be continued south to Herald Place on Clinton Street to further reinforce the gateway experience and establish a rhythm of street trees and streetlights to transition to the city streets beyond the project limits.

Almond Street between the connections to BL 81 at Fayette Street on the north and Jackson Street on the south is a gateway district to Downtown, University Hill, and the Southside. Almond Street would be enhanced to create a sense of gateway and arrival. Treatments could include the use of a planted median, specialty pavements, signage, and sculptural elements, as well as enhancements to the ramp and bridge architecture to create a distinct sense of place. Pedestrian areas at the intersections could incorporate similar amenities. Sculptural lighting elements could serve as vertical markers, reinforcing a sense of arrival.

The **Northern Gateway** along the northern segment of BL 81, between James Street and Hiawatha Boulevard, would be achieved with landscape enhancements and aesthetic treatments to structures. Reconstructed bridges, abutments, and retaining walls would receive aesthetic enhancements. Plantings along the highway would be provided to improve the travel experience and create a sense of arrival.

Proposed improvements to BL 81 between Bear Street and Hiawatha Boulevard would include the replacement of an existing concrete retaining wall with a planted embankment adjacent to the highway. The new embankment would allow for the creation of a shared-use (bicycle and pedestrian) path and overlook on the east side of BL 81. The overlook would interpret the history of the site related to the Oswego Canal, industrial past, and Northside neighborhood. Elements such as lighting, interpretive signage, furnishings, and pavement materials would be included to integrate the path and overlook with the adjacent Washington Square Park area.

Railroad Modifications

As mentioned earlier, the Orange tunnel concept would require foundation work to be done adjacent to the CSX rail tracks to widen and rehabilitate the existing I-481 bridges over the rail yard. In addition, the reconstruction of East Colvin Street would require the replacement of the NYS&W Railway bridge over East Colvin Street. Coordination with the individual railroads would be required to ensure that the replacement of these bridges would minimize impacts to the railroads during construction.

Connectivity

To accommodate ramps connecting southern Almond Street to BL 81 (to and from the south) and ramps connecting northern Almond Street to I-690 (to and from the west), local street through traffic would be severed at Washington, Jackson, and Burt Streets, as well as southbound Almond Street between Van Buren Street and Burt Street.

Building Acquisitions

The Orange tunnel concept would require 17 building acquisitions with the partial interchange option and 22 building acquisitions with the full interchange option (see **Figure 1-20**).

Responsibility for Tunnel Operations and Maintenance

The Orange tunnel concept would require the creation of a fully funded and staffed tunnel authority or similar agency that would be responsible for the operation and maintenance of the tunnel.



I-81 Viaduct Project

Orange Tunnel Concept:
Potential Building Acquisitions
Figure 1-20

Construction Duration and Cost

As detailed in **Section 4** of this appendix, the construction of the Orange tunnel concept would take approximately 11 years and be phased over five construction stages. The estimated construction cost of the Orange tunnel concept would be $4.9 billion with either the partial or the full I-81/I-690 interchange (see **Section 12** of this appendix for additional cost information).

2. MODIFICATIONS TO THE ORANGE ALTERNATIVE

The Orange Alternative, as presented in the I-81 Independent Feasibly Study, was reviewed for non-standard and non-conforming features and other design features that were uncovered during the higher-level engineering studies undertaken by NYSDOT. Efforts were then made to mitigate and address non-standard and non-conforming features, as well as other design features, where practical. In addition, elements that are critical to the overall operational and functionality of the entire highway and local street system, as well as elements that are common to the Viaduct and Community Grid Alternatives, were integrated into the concept. The design features and revisions are presented below ("Orange Alternative" refers to the original design presented in the I-81 Independent Feasibility Study, and "Orange tunnel concept" represents the modified design). Design criteria tables are included in Section 13 of this appendix.

Unacceptable Level of Service (LOS) at the BL 81 Weaving Segment near Colvin Street

Northbound BL 81 Weaving Segment near Colvin Street

- Issue: As proposed in the report, the Orange Alternative would provide an unacceptable level of service (LOS) on the BL 81 weaving segment between the Colvin Street on-ramp and the Almond Street off-ramp due to heavy traffic demand. Additionally, the existing single-lane ramp would not be able to accommodate the heavy volumes in the afternoon peak period.
- Action: The design was modified to separate the northbound ramps and eliminate the weave. Additionally, Colvin Street was widened and the northbound on-ramp from Colvin Street was widened to two lanes to accommodate the traffic demand and provide acceptable levels of service.

Intersection of Pearl Street/Northbound BL 81 On-Ramp

- Issue: As proposed in the report, the intersection of Pearl Street and the northbound on-ramp to BL 81 would provide an unacceptable level of service (LOS).
- Action: The design was modified to provide a configuration that provides for acceptable LOS.

Intersection of Fayette Street/Almond Street/I-690 Ramps

- Issue: As proposed in the report, the intersection of Almond Street, Fayette Street, and the new ramps to westbound I-690 and from eastbound I-690 would provide an unacceptable LOS.
- Action: The design was modified to provide a configuration that provides for acceptable LOS.

Intersection Insufficient Queue Storage Capacity at the Intersection of Almond Street and Adams Street

- Issue: As proposed in the report, insufficient queue storage capacity was provided at the Almond Street and Adams Street intersection, which would have resulted in an unacceptable LOS.
- Action: The design was modified to provide a configuration that provides for acceptable LOS.

Right-of-Way (ROW) Impacts

Southern Portal Area

- Issue: As presented in the report, the Orange Alternative would result in the full acquisition of 13 parcels containing seven buildings in the southern tunnel portal area, primarily due to the cut and cover limits of construction.
- Action: The design was modified to deepen the southern portion of the tunnel and move the interface between the cut and cover section and the bored rock section farther south, thereby avoiding direct impacts to the seven buildings. Additionally, cut and cover construction techniques were refined to avoid the need for full property acquisitions. Temporary easements for construction would still be required, but permanent acquisitions were avoided.

Unidentified ROW Impacts

- Issue: As proposed in the report, the Orange Alternative would impact a number of other buildings and properties that were not identified in the report.
- Action: Where possible, the design was modified to avoid additional building acquisitions, but a number of building impacts could not be avoided. A total of 17 buildings would be taken under the partial BL 81/I-690 option, as well as one partial taking (a smokestack at 706 North Clinton Street). These unavoidable impacts have been identified and used as the basis for the ROW cost estimate.

Compatibility with Interstate Standards

- Issue: As proposed in the report, the Orange Alternative provided a partial interchange with I-690, which would not meet interstate standards. A partial interchange configuration would not satisfy FHWA policy, and as a result, would require I-481 to be re-designated as I-81. The cost of the modifications that would be required before I-481 could be re-designated as I-81 was not included in the estimated cost of the Orange Alternative.
- Action: As described earlier, two Orange tunnel concept options were developed: a partial interchange option (see **Figures 1-1 through 1-4**) that includes re-designation of I-481 to I-81 and the introduction of the 81business loop through the city of Syracuse, and a full I-81/I-690 interchange option (see **Figures 1-5 and 1-6**). Multiple concepts for a full interchange were developed, and the concept that provided the required connections with the least impact was advanced for further evaluation. Under the partial interchange option, the refined design and construction cost estimate include the work associated with re-

designation of I-481 to I-81. Under the full interchange option, the permanent conversion of I-481 to I-81 would not be required, as I-81 would be maintained through the city of Syracuse via the proposed tunnel. Both the partial interchange concept and the full interchange concept were found to be technically feasible (see **Section 12**, Cost Estimate). A comparison of construction cost and ROW impacts is included in **Table 12-1**.

Connectivity

Impacts to Connectivity

- Issue: As proposed in the report, the Orange Alternative would sever a number of local streets. Disconnecting major streets is not consistent with the project objective to "maintain or enhance the vehicular, pedestrian, and bicycle connections in the local street network within the project limits in and near Downtown Syracuse to allow for connectivity between neighborhoods, business districts, and other key destinations." The following streets were severed in the original design:
    - East Willow Street, between Warren Street and Pearl Street
    - James Street, between Warren Street and Pearl Street
    - East Washington Street at Almond Street (between McBride Street and Forman Avenue)
    - Water Street and Empire State Trail at Almond Street (between McBride Street and Forman Avenue)
    - Jackson Street (through traffic only) at Almond Street
    - Burt Street at Almond Street
    - Southbound Almond Street, between Van Buren Street/Renwick Avenue and Taylor Street
- Actions
    - East Willow – No design modification made. The impact to East Willow Street would be caused by the northern approach to the tunnel portal and the impact could not be avoided.
    - James Street – Design modified. The north tunnel portal was moved south, and a bridge carrying James Street over the depressed highway approach was added to avoid severing this major city street.
    - East Washington Street – No design modification made as the impact could not be avoided. The impact to East Washington Street would be caused by the new ramps to westbound I-690 and from eastbound I-690.
    - Water Street and Empire State Trail at Almond Street – Design modified. The I-690 ramp bridges over Erie Boulevard were extended over Water Street and the

profiles refined to allow Water Street to remain open to vehicular, pedestrian, and bicycle traffic.

- Jackson Street – No design modification made as the impact could not be avoided. Jackson Street would have access to Almond Street, but through traffic would not be permitted due to intersection capacity reasons.
- Burt Street – No design modification made as the impact could not be avoided. The impact to Burt Street would be caused by the new ramps to southbound BL 81 and from northbound BL 81.
- Southbound Almond Street – No design modification made as the impact could not be avoided. The impact to southbound Almond Street between Van Buren Street/Renwick Avenue and Taylor Avenue would be caused by the new ramps to southbound BL 81 and from northbound BL 81.

Non-Standard Features

Critical Design Elements That Do Not Meet Design Criteria – As proposed in the report, the Orange Alternative would result in several non-standard features that would need to be retained or redesigned. Below is a summary of the non-standard features identified in the Orange Alternative and the actions taken to correct or improve the design where possible.

- Design Speed
    - Ramp SE (southbound BL 81 to eastbound I-690) design was based on a design speed of 30 mph. However, this is a direct connector ramp between two non-tunnel freeways, and therefore the minimum design speed should be 40 mph. The design was modified to meet 40 mph design standards.
    - Ramp SW (southbound BL 81 to westbound I-690) design was based on a design speed of 30 mph, and since this is a direct connector ramp between two non-tunnel freeways, the minimum design speed should be 40 mph. The design was modified to meet 40 mph design standards.
- Horizontal Curvature – The following ramps have a non-standard horizontal curve radius (R):
    - Ramp SE, Curve 1 (R=300 ft) is non-standard (minimum R=485 ft). Design modified to meet minimum curve radius criteria.
    - Ramp SE, Curve 2 (R=310 ft) is non-standard (minimum R=485 ft). Design modified to meet minimum curve radius criteria.
    - Ramp SW (R=418 ft.) is non-standard (minimum R=485 ft). Design modified to meet minimum curve radius criteria.
- Stopping Sight Distance – The following ramps have non-standard horizontal stopping sight distance (HSSD):
    - Tunnel, NB Curve NB-1 (approximate Sta. T 16+50), HSSD = 404 ft. (minimum HSSD = 425 ft.). The non-standard HSSD was caused by the cut and cover tunnel

width and the related minimum right-side shoulder and curb widths and cannot be avoided.

- Tunnel, SB Curve SB-1 (approximate Sta. T 16+75), HSSD = 410 ft. (minimum HSSD = 425 ft.). The non-standard HSSD was caused by the cut and cover tunnel width and the related minimum left-side shoulder and sidewalk widths. The design was modified to provide a uniform sidewalk width on the inside of this southbound curve, resulting in an improved HSSD.
- Tunnel, NB Curve NB-3 (approximate Sta. T 90+00), HSSD = 399 ft. (minimum HSSD = 425 ft.). The non-standard HSSD was caused by the cut and cover tunnel width and the related minimum right-side shoulder and curb widths. The design was modified to shift the tunnel portal southward and relocate the deceleration ramp for Ramp NW, thereby removing the obstruction and satisfying HSSD criteria.
- Ramp NW (northbound tunnel to westbound I-690). The original design included a non-standard HSSD = 141 ft. (minimum = 200 ft.). Design modified to provide standard stopping sight distance.
- Ramp SW (southbound BL 81 to westbound I-690). The original design included a non-standard HSSD = 232 ft. (minimum = 305 ft.). Design modified to provide standard stopping sight distance.
- Ramp SE (southbound BL 81 to eastbound I-690). The original design included a non-standard HSSD = 155 ft. (minimum = 305 ft.). Design modified to provide standard stopping sight distance.
- Ramp ANW (westbound I-690 on-ramp from northbound Almond Street). The original design included a non-standard HSSD = 182 ft. (minimum = 200 ft). Design modified to provide standard stopping sight distance.
- Ramp EAS (eastbound I-690 off-ramp to Almond Street). The original design included a non-standard HSSD = 141 ft. (minimum = 200 ft). Design modified to provide a standard shoulder width of six feet to increase HSSD to 154 feet. (A 15-foot-wide shoulder is needed to provide standard minimum HSSD of 200 feet, which might be mistaken by motorists as an additional driving lane, thus, it was not provided.)
- Ramp WE (West Street to eastbound I-690). The original design included a non-standard HSSD = 166 ft. (minimum = 200 ft). Design was modified as part of the redesign of the West Street interchange, and standard stopping sight distance provided.
- Ramp WWA (eastbound I-690 to West Street). The original design included a non-standard HSSD = 186 ft. (minimum = 200 ft). Design was modified as part of

the redesign of the West Street interchange, and standard stopping sight distance provided.

- Ramp WWB (West Street to westbound I-690). The original design included a non-standard HSSD = 186 ft. (minimum = 200 ft). Design was modified as part of the redesign of the West Street interchange, and standard stopping sight distance provided.

- Lane Width – The following ramps as proposed in the I-81 Independent Feasibility Study report have non-standard lane widths:

    - Ramp ANW (westbound I-690 on-ramp from northbound Almond Street). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). No design modification was made because it would have resulted in additional property impacts.

    - Ramp EAS (eastbound I-690 off-ramp to southbound Almond Street). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

    - Ramp EW (eastbound I-690 off-ramp to West Street). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

    - Ramp LN (Pearl Street on-ramp to northbound BL 81). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

    - Ramp SE (southbound BL 81 ramp to eastbound I-690). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

    - Ramp NW (northbound BL 81 ramp to westbound I-690). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

    - Ramp SL (southbound BL 81 ramp to Clinton Street). The original design included a non-standard ramp lane width of 12 ft. (minimum = 15 ft.). Design modified to meet criteria.

    - Ramp SW (southbound BL 81 ramp to westbound I-690). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

    - Ramp WE (West Street on-ramp to eastbound I-690). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

  - Ramp WW (westbound I-690 off-ramp to West Street). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.
  - Ramp WWB (West Street on-ramp to westbound I-690). The original design included a non-standard ramp lane width of 12 ft. (minimum = 16 ft.). Design modified to meet criteria.

- Shoulder Width – The following ramps have non-standard shoulder widths:
  - Ramp ANW. The original design included a non-standard right shoulder width of 4 ft. (minimum = 6 ft.). Design modified to meet criteria.
  - Ramp EAS. The original design included a non-standard right shoulder width of 4 ft. (minimum = 6 ft.). Design modified to meet criteria.
  - NB BL 81. The original design included a non-standard left shoulder width of 3 ft. (minimum = 4 ft.) in the vicinity of T96+00 to T118+00. Design modified to meet criteria.
  - SB BL 81. The original design included a non-standard left shoulder width of 3 ft. (minimum = 4 ft.) in the vicinity of T96+00 to T118+00. Design modified to meet criteria.
- Vertical Clearance – The following ramps have non-standard vertical clearance:
  - Eastbound I-690 over Ramp SE. The original design included a non-standard vertical clearance of less than 11 ft. (minimum = 14.5 ft.). The design was modified to provide minimum vertical design clearance.
  - Westbound I-690 over Ramp SE. The original design included a non-standard vertical clearance of less than 10 ft. (minimum = 14.5 ft.). The design was modified to provide minimum vertical design clearance.
  - Ramp NW over Ramp WN. The original design included a non-standard vertical clearance of less than 10 ft. (minimum = 14.5 ft.). The design was modified to provide minimum vertical design clearance.
  - Ramp WWB over Ramp NW. The original design included a non-standard vertical clearance of less than 3 ft. (minimum = 14.5 ft.). The design was modified to provide minimum vertical design clearance.
  - Ramp SE over Salina Street. The original design included a non-standard vertical clearance of less than 13 ft. (minimum = 14.5 ft.). The design was modified to provide minimum vertical design clearance.

Non-Conforming Features

Design Elements That Do Not Meet Recommended Design Standards – As proposed in the report, the Orange Alternative would result in several non-conforming features that would need to be

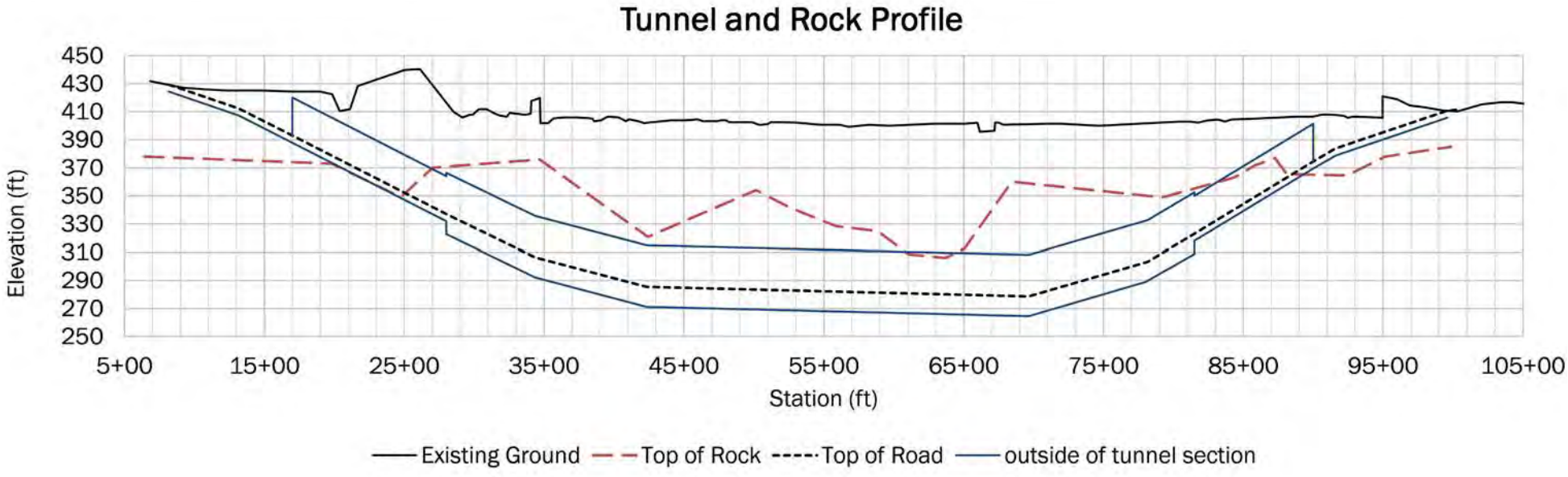
retained or redesigned. Below is a summary of the non-conforming features identified in the Orange Alternative and actions taken to correct or improve the design where possible.

- Ramp spacing, westbound I-690 between Almond Street on-ramp and northbound BL 81 off-ramp. The original design included a non-conforming ramp spacing of 977 ft. (minimum = 2000 ft.). Due to the physical location of Almond Street and BL 81, the spacing could not be improved, so the original design was retained. However, a traffic analysis was conducted to demonstrate that this weaving section would operate at an acceptable LOS.
- Ramp spacing, westbound I-690 between off-ramp to northbound BL 81 and West Street off-ramp. The original design included a non-conforming ramp spacing of 832 ft. (minimum = 1000 ft.). The design was modified to provide minimum ramp spacing.
- Ramp spacing, westbound I-690 between southbound/northbound BL 81 on-ramp and West Street on-ramp. The original design included a non-conforming ramp spacing of 234 ft. (minimum = 1000 ft.). The design was modified to provide 843 ft. of space, which would still be non-conforming, but a traffic analysis concluded that the weaving section would operate at an acceptable LOS with the modified spacing.
- Ramp spacing, eastbound I-690 between West Street on-ramp and southbound BL 81 off-ramp. The original design included a non-conforming ramp spacing of 973 ft. (minimum = 2000 ft.). The design was modified, as part of the redesign of the West Street interchange reconfiguration, to solve this weaving problem and provide spacing that meets standards.
- Ramp spacing, eastbound I-690 between southbound BL 81 on-ramp and Almond Street off-ramp. The original design included a non-conforming ramp spacing of 1375 ft. (minimum = 2000 ft.). Due to the physical location of Almond Street and BL 81, the spacing could not be improved, so the original design was retained. However, a traffic analysis was conducted to assure that this weaving section would operate at an acceptable LOS.

3. TUNNEL CONSTRUCTION

Overview

The “Orange Alternative” described in the Independent Feasibility Study report has been modified during this conceptual design study and is hereafter referred to as the Orange tunnel concept. The modifications included deepening and lengthening of the bored segment of the tunnel concept to minimize construction disruption. **Figure 3-1** presents a generalized longitudinal profile of the Orange tunnel concept along with the top of rock profile developed for this concept based on historic and recent geotechnical borings. A detailed plan and profile of the Orange tunnel concept are presented in **Section 13** of this appendix. As shown in **Table 3-1**, of the approximately 1.7 total length in miles, approximately one mile would be a bored tunnel, 0.35 miles would be a cut-and-cover tunnel, and about 0.35 miles would be depressed highway tunnel approaches.



Orange Tunnel Concept:
Generalized Longitudinal Profile
Figure 3-1

Table 3-1
Length of Different Types of Tunnel Construction for the Orange Tunnel Concept

Location	Station Range	Length in miles (feet)	Type of Tunnel Construction
E. Kennedy St. to 400 ft. south of MLK, Jr. East	Sta. 8+00 – Sta. 17+00	0.17 (900)	South Depressed Roadway
to 400 ft. south of MLK, Jr. East to E. Raynor Ave.	Sta. 17+00 – Sta. 28+00	0.21 (1100)	South Cut-and-cover Tunnel
E. Raynor Ave. to E. Water St.	Sta. 28+00 – Sta. 82+50	1.03 (5450)	Bored Tunnel
E. Water St. to James St.	Sta. 82+50 – Sta. 90+00	0.14 (750)	North Cut-and-cover Tunnel
James St. to Hickory St.	Sta. 90+00 – Sta. 99+50	0.18 (950)	North Depressed Roadway
	TOTAL	1.73 (9150)	

The extent of the depressed roadway, cut-and-cover, and bored tunnel segments was decided based on surface and subsurface ground conditions and construction considerations.

The subsurface conditions in the Orange tunnel concept area consist of overburden soils including miscellaneous fill, as well as natural cohesive and granular glacial soils, underlain by shale and dolostone bedrock. The groundwater table is relatively shallow and assumed at about Elevation 390 to 400 feet based on limited subsurface data, which is approximately 5 to 15 feet below the ground surface at the north side and 25 to 35 feet below surface at the south side (see **Section 5** of this appendix for a detailed description of the subsurface conditions). This high groundwater table is an important consideration in the selection of the support of excavation system. Additionally, the groundwater in the Orange tunnel concept area is saline, which accelerates reinforcing steel corrosion. Concrete mix design and the specification of steel reinforcement for permanent structures should include corrosion protection measures. Based on published literature, the bedrock at the site has high horizontal stresses associated with time dependent deformation that can transmit additional forces on permanent and temporary structures. These high horizontal stresses would also need to be considered during design and construction of the support of excavation systems and the permanent structures. Finally, the bedrock is potentially gassy and known to contain noxious and explosive gases (hydrogen sulfide and methane). An explosion-proof tunnel boring machine (TBM) would be required and gas monitoring and mitigation measures would have to be employed during construction.

For this conceptual study, NYSDOT conducted five geotechnical borings, which are discussed in detail in Section 5. As part of this conceptual design, the modifications made to the original Orange Alternative presented in the I-81 Independent Feasibility Study include:

- Based on a review of historic and 2018 test borings, the bored tunnel in the original Orange Alternative would encounter mixed face (both soil and rock) conditions during excavation. Tunnel excavation in mixed face conditions is more challenging and would require a TBM capable of boring through both soil and rock. Tunnels bored within soils or mixed face typically result in greater settlement of the surface structures. In addition, future structures

built at surface can negatively impact tunnels constructed in soft ground. Therefore, in the conceptual design developed for the Orange tunnel concept, the vertical alignment of the bored tunnel was lowered by up to 40 feet so that the tunnel would remain within bedrock for most of its length. The greater depth of the bored tunnel would reduce or eliminate the mixed face condition during tunnel boring, which would result in faster tunnel construction and lower tunnel construction risks. Nonetheless, some mixed face conditions may be expected at the south and north ends of the bored tunnel and within the central portion of the alignment where bedrock is the deepest. In addition, by deepening the bored segment, all cross-passage tunnels would be constructed in rock.

- Construction of cut-and-cover tunnel sections within the northern portion of the original Orange Alternative alignment as presented in the independent report would necessitate demolition of existing buildings and roads and excavations within bedrock. Cut-and-cover tunneling in general is more disruptive than bored tunneling, especially in an urban environment. Based on a review of the plan and profile developed using NYSDOT 2018 test borings, the north and south limits of the bored tunnel were extended northward and southward by about 575 and 225 feet, respectively. Lengthening of the bored segment in the revised alignment would help reduce the length of cut-and-cover tunneling, which would have required deeper excavations in rock and acquisition and demolition of more structures at surface. Extending and deepening of the bored tunnel also would reduce the impact of construction on existing surface structures, such as the New York, Susquehanna and Western Railway crossing near Burt Street.

Depressed Highway Cut-and-Cover Tunnels

Under the Orange tunnel concept, depressed highways and cut-and-cover tunnels would be constructed on both southern and northern portions of the alignment. Depressed highways would be necessary until the depth of excavation, including the minimum backfill above the tunnel roof, is sufficient to accommodate a cut-and-cover tunnel. As summarized in **Table 3-1**, a total of about 0.35 miles of depressed highway is planned for Orange tunnel concept between East Kennedy Street (Sta. 8+00) to 400 feet south of MLK, Jr. East (Sta. 17+00) and James Street (Sta. 90+00) to Hickory Street (Sta. 99+50) along the south and north approaches, respectively. Depressed roadways shallower than about eight feet below surface would be constructed by making an “open cut” in the area, sloping the sides with 2 (Horizontal): 1(Vertical) slopes, and constructing a cast-in-place concrete wall as the final structure within the cut. When the excavation is more than eight feet deep, excavation support systems would be required to retain both sides of excavation for construction of the depressed roadway and cut and cover tunnel structure. The height of the open cut (retained ground) excavation for the depressed roadway, which would require excavation support systems, would be up to 45 feet deep under the Orange tunnel concept.

The cut and cover tunnels would be constructed in deep excavations ranging between 37 feet to 100 feet. This construction would require both temporary and permanent easements along the alignment and demolition of any existing structures within the alignment. The existing I-81 viaduct approach embankment would cross the alignment of the Orange tunnel concept approximately between MLK Jr. East (Sta. 21+00) and E. Raynor Avenue (Sta. 28+00). The cut-and-cover tunnel design assumed that the existing I-81 embankment would be lowered

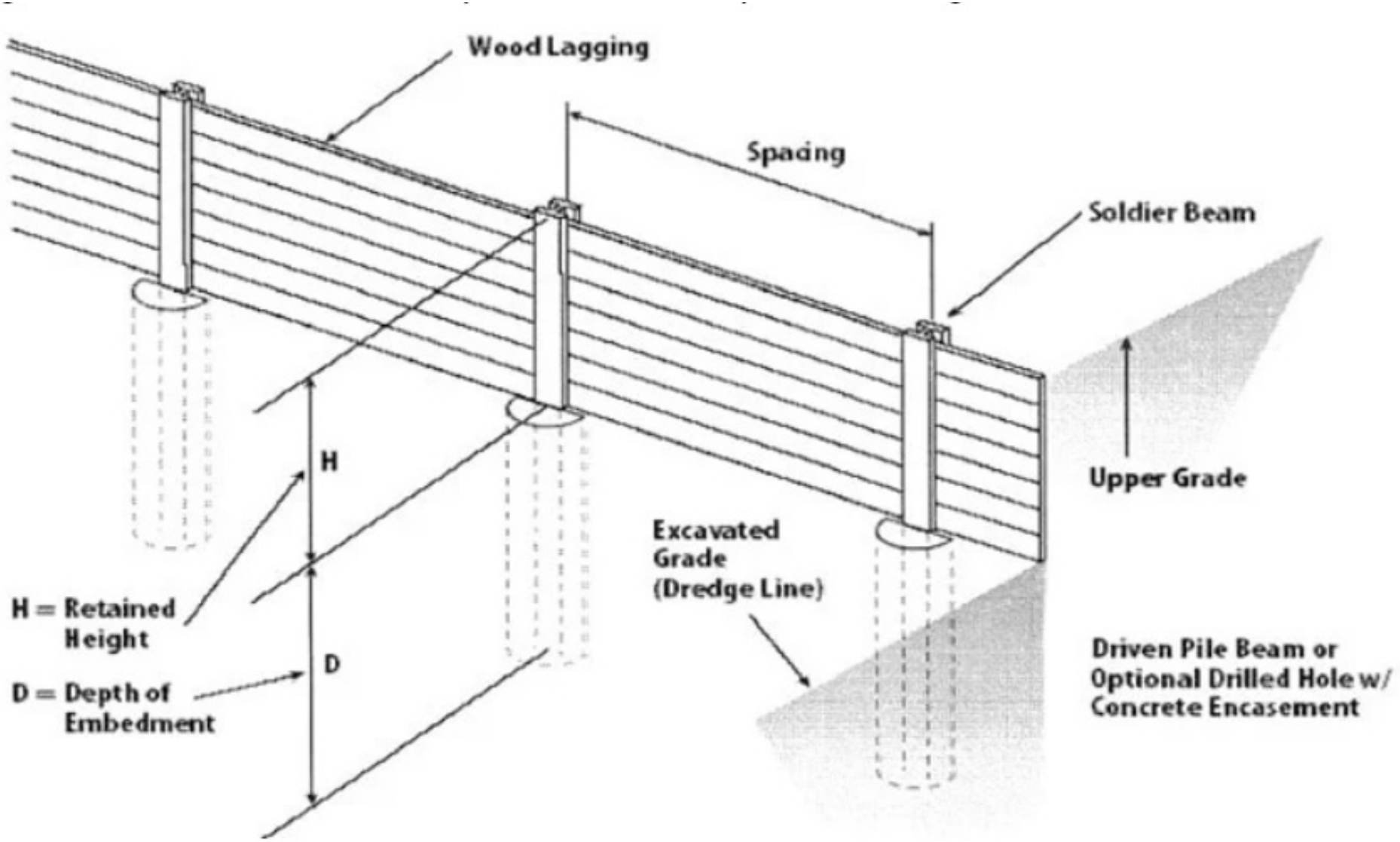
approximately 30 feet to original ground elevation, which would reduce the height of the excavation and the required support system for the excavation. A total of approximately 0.35 miles of the Orange tunnel concept alignment would be cut-and-cover tunnel as listed in **Table 3-1**.

The support of excavation (SOE) walls for both depressed roadway and cut-and-cover tunnels would be constructed using bottom-up construction. Using this approach, the final structure would be independent of the SOE retaining walls. Utilities would be relocated outside of the structure footprint or supported in place. The general construction sequence for SOE walls would involve the following steps:

1) Identifying all existing utilities within or crossing the alignment. These utilities would need to be rerouted prior to performing any excavation.
2) Identifying all existing utilities outside the alignment but within the influence zone of the excavations. These utilities would need to be monitored during construction for excess movements. Any utilities showing excess movement would need to be provided with additional support to prevent further movement.
3) Installing the SOE walls on both east and west sides of the alignment.
4) Performing excavation between the SOE walls sequentially to allow installation of wales, tiebacks, lagging, etc.
5) Pouring six-inch mudmat when the excavation reaches the required depth to protect the subgrade from any deterioration from construction traffic and weather.
6) Installing water proofing membrane on the interior face of the SOE walls and before casting the final structures.
7) The final tunnel structures would be cast in place concrete. The depressed roadway construction would involve casting the roadway slab and the sidewalls. The cut-and-cover tunnel construction would involve constructing the box structure that includes bottom slab, interior and exterior walls, and a roof slab. Finally, backfill would be placed above the cut-and-cover tunnel to establish surface grades at or near the original pre-construction levels.

The temporary SOE structure would not contribute to the long-term load carrying capacity of the final structure. After completion of the construction, the SOE walls and tiebacks could be left in place and abandoned. For the purposes of this conceptual design, it was assumed that due to the saline ground water condition, the tiebacks would corrode and be unable to provide long-term support for the structure. Use of temporary SOE walls would allow for waterproofing to be installed on the outside face of the final tunnel structure.

The selection of the SOE system was based on the depth of excavation and the presence of groundwater. For excavations performed above the water table, which would remain dry, the SOE system would consist of Soldier Pile Lagging (SPL) walls, either with or without tiebacks, as shown in **Figure 3-2**. Sheet pile walls would not be suitable because of the presence of boulders



Orange Tunnel Concept:
Typical Soldier Pile Lagging Wall Insulation
Figure 3-2

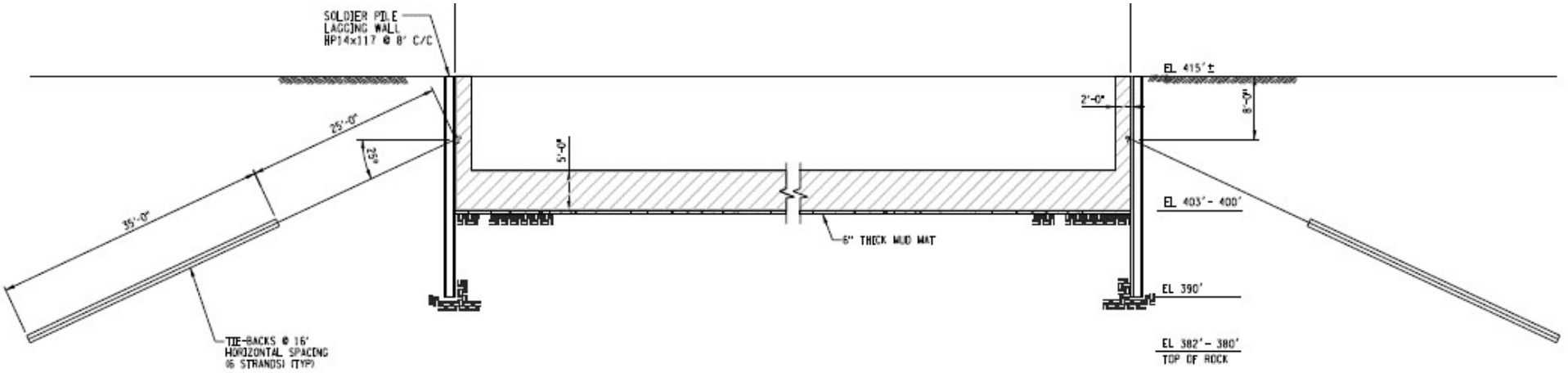
and cobbles in the fill and glacial soils and because of the limitation of their structural properties for deeper walls with tiebacks.

The proposed SPL wall construction for the Orange tunnel concept would involve installing soldier piles within predrilled holes spaced eight feet apart, concreting the holes to the proposed bottom of excavation level with concrete, and then backfilling the remainder of the drilled holes with low strength grout. Excavations between the SPL walls would occur in stages, while installing timber lagging and tiebacks where required, until the excavation reaches the desired depth. SPL walls would primarily be used within the depressed roadway portions of the alignment where the excavation is anticipated to remain above ground water table. **Figure 3-3** shows a typical cross-section of a depressed highway with SPL SOE wall.

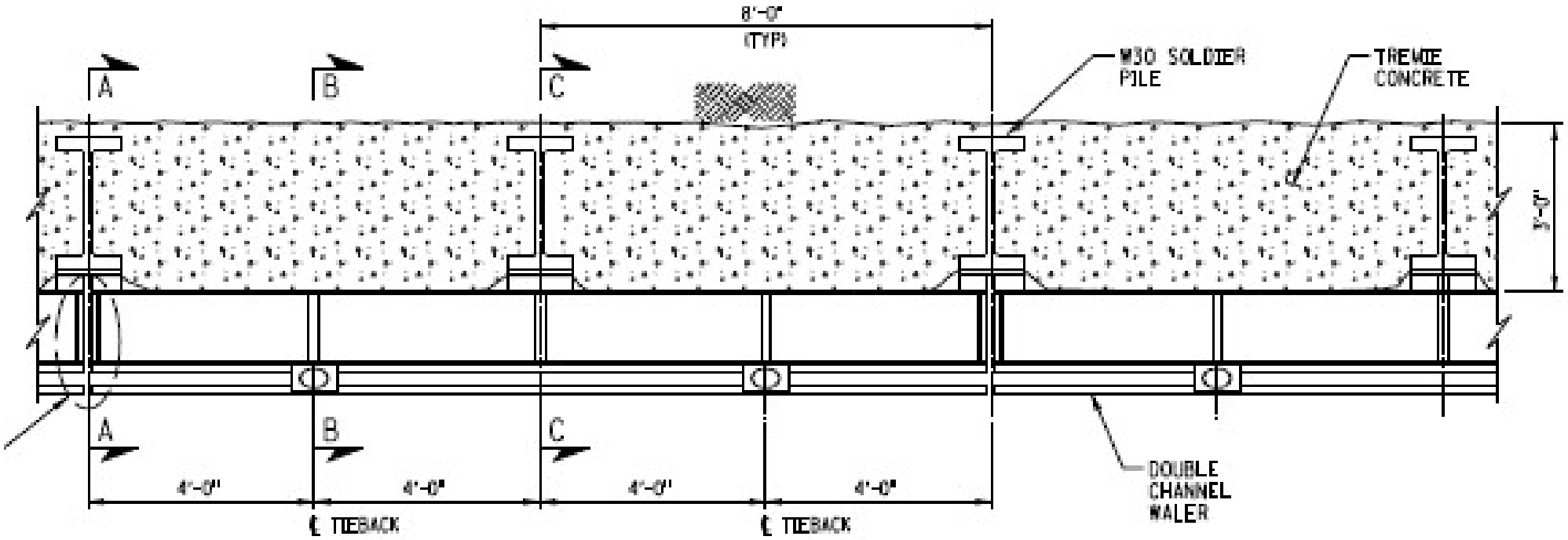
A water tight SOE system would be required in areas where the bottom of excavation would be below the water table and considerable amount of groundwater seepage would be anticipated. A Soldier Pile Tremie Concrete (SPTC) wall with tiebacks would be used in areas where excavation would extend below the water table. Alternately, conventional slurry walls or secant pile walls could be constructed for SOE walls for the depressed roadway and cut-and-cover tunnels. The SPTC walls would be preferable as they typically require smaller staging areas. Secant pile walls could be used instead of SPTC walls when going around utilities or underground foundations. Use of relatively water tight SPTC walls would avoid the need for large scale dewatering of the site, which would also avoid inducing settlements on the surrounding buildings and facilities. Using this method for support of excavation would limit dewatering to the excavated areas and between the SOE walls, which would be key given the saline ground water at the site and the environmental concerns with its disposal.

Considering the potentially high horizontal stresses within the bedrock upon excavation, SPTC walls would be extended only about five feet below the top of the bedrock. Any excavations within bedrock would be performed in stages after stabilizing the excavation face with grouted rock bolts and shotcrete. The construction of SPTC walls would involve performing a three-foot-wide excavation to a depth of about five feet below the top of the rock. The excavation would be performed in alternating panels with each panel extending up to 12 feet in length. The excavation would be performed under a bentonite slurry to maintain its stability. Soldier piles would then be installed at design spacing and then tremie concrete would be introduced while displacing the slurry inside the excavation. The intermediate panels would be constructed after the concrete in adjacent panels gains sufficient strength. Upon completion of the wall installation on both sides, excavation would be performed in stages to allow for tieback installation. One row of tiebacks would be installed near the toe of the SPTC wall, which would be embedded in rock. A typical plan view and cross section of the proposed cut-and-cover tunnel with SPTC walls are shown in **Figures 3-4 and 3-5**, respectively. The use of tiebacks would provide an open excavation zone for construction activities, resulting in a shorter construction period. The installation of tiebacks could require temporary underground easements.

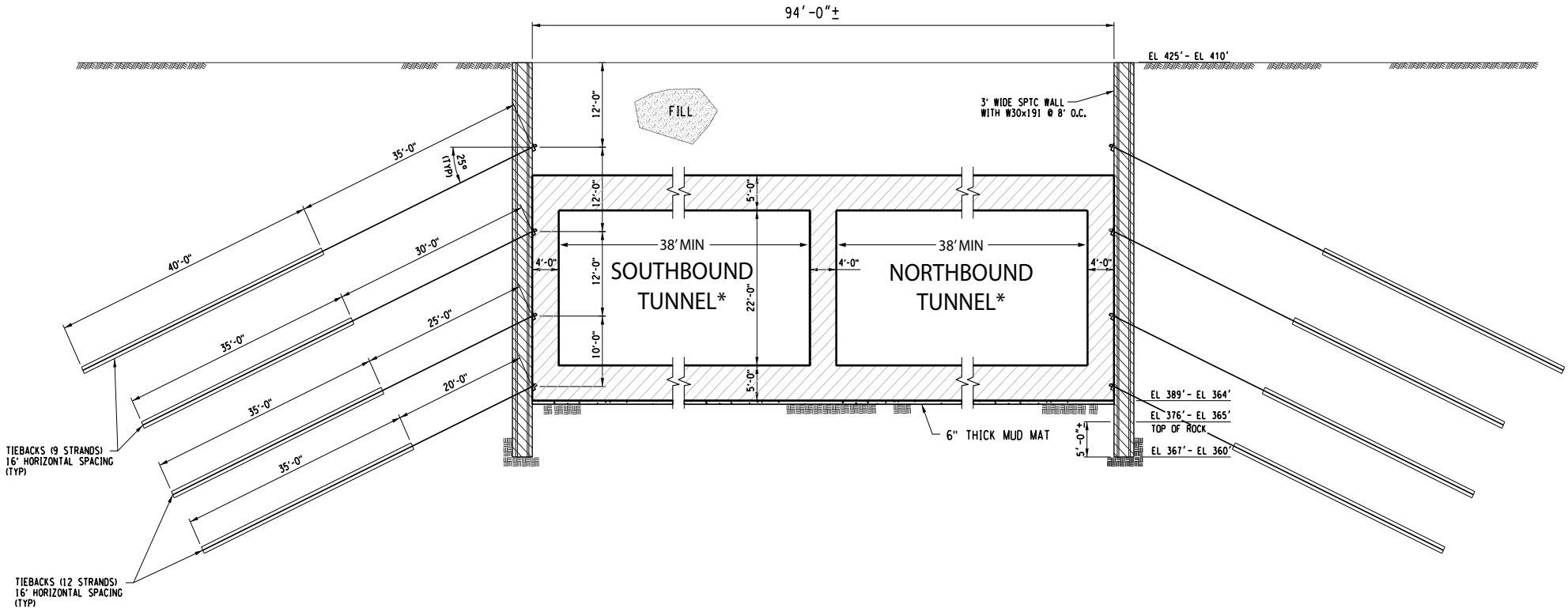
In areas where the excavation would extend into bedrock, a series of grouted rock bolts would be installed at 5 feet by 5 feet grid spacing. A four-inch-thick shotcrete layer also would be applied on the excavation face to provide additional stability and prevent the rock from raveling. The excavation of the cut-and-cover tunnels in rock would likely be performed by mechanical excavators and hydraulic hammers given the relatively low strength of the rock. A typical cross-



Orange Tunnel Concept:
Typical Depressed Highway Cross-Section with SPL Walls
Figure 3-3



Orange Tunnel Concept:
Typical SPTC Wall Plan View
Figure 3-4



* For roadway, shoulder, sidewalk widths, and configurations refer to plans and typical sections in Appendix B-4, Part 1, Section 13

Orange Tunnel Concept:
Typical Cut and Cover Tunnel Cross-Section with SPTC Walls
Figure 3-5

section of the cut-and-cover tunnel with both SPTC walls and rock bolts is presented in **Figure 3-6**.

The permanent structure construction for the depressed highway sections of the Orange tunnel concept alignment would involve the construction of a roadway slab and sidewalls, as illustrated in **Figure 3-3**. The permanent structures for the cut-and-cover tunnel would involve constructing the roadway slab, exterior and interior walls, and roof slab, then backfilling above the roof, as depicted in **Figures 3-6 and 3-7**. The cut-and-cover box tunnel within bedrock might be subjected to horizontal stresses due to the time dependent deformation of the rock. Construction of the final tunnel structure in bedrock would be delayed as much as possible to allow most of the rock time dependent deformation and lateral squeezing to dissipate. If needed, a 12-inch-thick compressible grout layer could be placed in between the shotcrete facing of the rock bolted excavation face and the cut-and-cover permanent box structure. The compressible grout subjected to the high horizontal stresses would undergo deformation and would considerably reduce or eliminate the horizontal stresses.

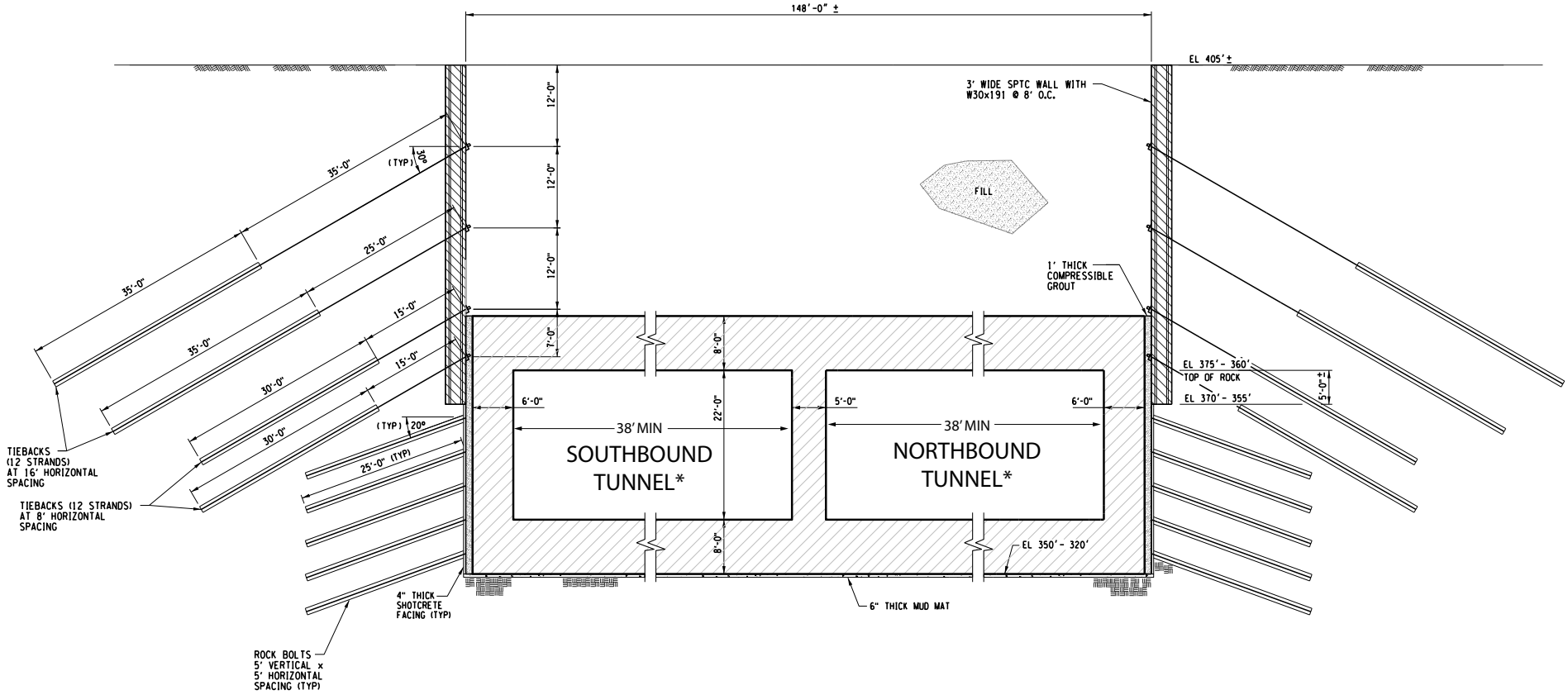
Although the SPTC walls would be relatively water tight, some water seepage from the bottom of the excavation would be anticipated. Additionally, water seepage would be anticipated from the excavation face within bedrock. It is anticipated that any seepage encountered within excavations would be handled by dewatering using sump pumps.

Considering the shallow water table, the roadway of both the depressed highway and the cut-and-cover tunnels would be subjected to uplift pressures. The cut-and-cover tunnel would provide greater resistance to uplift pressures than would the depressed highway because of the weight of the cut-and-cover box structure and the backfill above it. However, the cut-and-cover tunnel would be constructed only when the excavation depth exceeds the total height of the tunnel and the minimum backfill required above it. The weight of the box tunnel structure and the backfill above the roof of the cut-and-cover tunnel structure would be adequate to prevent uplift due to buoyancy forces for the Orange Alternative as presented in the WSP report. However, the invert slab had to be thickened along the north depressed roadway to provide adequate resistance against uplift pressures. **Table 3-2** summarizes the areas where a thicker slab would be required as reflected in the conceptual design drawings found in **Section 13** of this appendix.

Table 3-2
Required Roadway Slab Thickness to Resist Uplift Pressures

Location	Station Range	Required Slab Thickness (feet)
South side of James St.	Sta. 90+00 – Sta. 91+00	12
North side of James St.	Sta. 91+00 – Sta. 92+00	9

Both SPL and SPTC walls would consist of multiple rows of tiebacks with lengths of up to 75 feet and extending beyond the right-of-way of the Orange tunnel concept. The final design of the SOE walls would need to consider the potential interference of the existing structures and utilities with the tiebacks. An instrumentation and monitoring program would be developed and a list of existing structures that need to be monitored would be prepared. Construction of the depressed

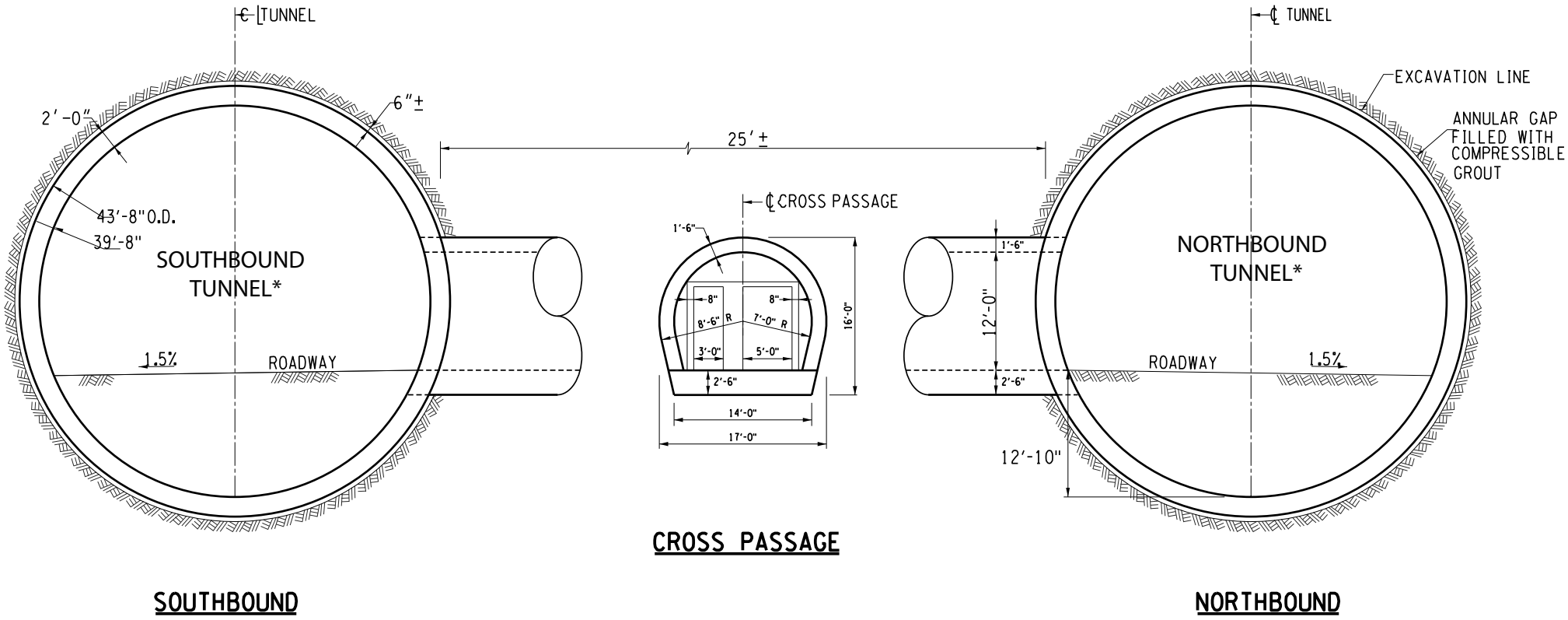


* For roadway, shoulder, sidewalk widths, and configurations refer to plans and typical sections in Appendix B-4, Part 1, Section 13

Orange Tunnel Concept:
Typical Cut and Cover Tunnel Cross-Section with SPTC Walls and Rock Bolts

I-81 Viaduct Project

Figure 3-6



CROSS PASSAGE

SOUTHBOUND **NORTHBOUND**

* For roadway, shoulder, sidewalk widths, and configurations refer to plans and typical sections in Appendix B-4, Part 1, Section 13

roadways and cut-and-cover tunnels along the south and north approaches would take place concurrently (for more information, see the discussion of construction sequencing in the next section).

The depressed roadway and cut-and-cover tunnel in the northern segment of the Orange tunnel concept alignment would intersect existing I-690. Underpinning of various foundations beneath I-690 would be required, which would necessitate ground improvements such as jet grouting. The southern segment of the cut-and-cover tunnel would be within 100 feet of several existing buildings between East Raynor Avenue and Rose Avenue. The tiebacks for the SOE system would be potentially below some of these structures. Installation of tiebacks under these structures would require the property owners' approval and permanent easements. Additional details about these residential structures, including foundation type and depth, presence of a basement and its depth, and exact offset distance from the SOE system, would need to be obtained to further define the potential conflicts of the proposed construction with the existing structures and the impact of construction on them. A construction impact analysis and evaluation would be performed using the obtained data to identify the need for any ground improvements to protect these buildings.

During construction, several streets crossing the cut-and-cover tunnel or depressed roadway would need to remain open to traffic. Ground improvements, in conjunction with other types of tunneling techniques, would be required at these locations.

Bored Tunnel Construction

The bored tunnel segment of the Orange tunnel concept would consist of two parallel tubes with one-way traffic in each tube. Each tube would carry two lanes with shoulders and safety walks. Considering the geometrical requirements, the proposed inside and outside diameters of the tubes would be 39'-8" and 43'-8", respectively, assuming a lining thickness of two feet. **Figure 3-7** presents a cross section of a two-lane double tube bored tunnel for the Orange tunnel concept. The actual distance between the tubes would depend on the strength and quality of the rock. Based on the information available, the proposed minimum distance between the tubes would be about 25 feet. The bored tunnels would be connected with cross-passages at about 800 feet spacing along their length as shown in **Figure 3-7**.

The bored tunnels would be excavated simultaneously with two tunnel boring machines (TBM). An Earth Pressure Balance (EPB) TBM would be used to excavate the bored portion of the Orange tunnel concept alignment. The EPB machine would be able to bore through the bedrock and the limited amount of mixed face conditions that may be present along the bored segment. The pressurized face of an EPB TBM would help balance the water pressure at the face of the excavation. The TBM would need to be able to operate both in open and closed modes. **Figure 3-8** shows a 42.3-foot-diameter EPB TBM, which was used on the Port of Miami project.

The bored tunnel would be lined with precast segmental concrete lining. The segments can be reinforced with conventional reinforcement or steel fibers. Fiber reinforced segmental liners are recommended to provide a higher level of durability for the tunnel structure, as discussed later in this section.



Orange Tunnel Concept:
The 42.3-foot-diameter EPB Tunnel Boring Machine Used on the Port of Miami Project

Nine segments and a key segment would make up a completed ring. The segments and the resulting ring are tapered in width which allows for alignment control during construction, since the ring would be rotated to "turn" slightly in any direction desired. The segments are cast in a plant off site and then transported to the site in sets which make a completed ring. **Figure 3-9** presents a view of concrete segments stored at the Rondout project site in New York. **Figure 3-10** shows a photograph of typical precast concrete tunnel segments.

The bedrock under the alignment is considered "potentially gassy" and may contain hydrogen sulfide and methane gas. Therefore, gas monitoring would be required during boring operations to ensure that gas level in the tunnel would stay below a level mandated by the Occupational Safety and Health Administration (OSHA). The TBM would be equipped with gas monitors. If the gas level in the tunnel exceeds a limit mandated by OSHA, work would be stopped, and the tunnel would be ventilated until the gas level drops below the specified limit. At that point, boring operations would resume. Ventilation systems would be installed to reduce elevated gas levels during excavation. The TBM would need to be a Class 1, Division 2 machine.

It is proposed to fill the annular gap between the excavated rock face and the tunnel liner (estimated about 6 inches) with compressible grout to avoid high forces from the excavated rock on the liner. The tunnel liner would be installed with no delay during the boring operation and therefore there would not be sufficient time for dissipation of time dependent deformation of the rock mass. To avoid high rock forces acting on the liner, compressible grout would be introduced in the gap between the over-excavated rock face and the installed liner. The grout would deform under rock forces and the final liner would not be impacted by rock forces due to time dependent deformation. The grout would have sufficient stiffness at low stress levels to support the tunnel liner but low enough stiffness at higher stresses to accommodate large time dependent deformation of the rock. The compressible grout mix would be designed to provide sufficient compressibility in the hardened state based upon the anticipated time dependent deformation of the rock. The compressible grout could be injected behind the precast concrete segments through the grout sockets or from the TBM tail shield. In addition to avoiding overstressing of the tunnel liner due to time dependent deformation, the compressible grout also would reduce water leakage and penetration of gases into the tunnel (DiMillo et al., 2016).

The two TBMs would be expected to be launched from the south approach for both the northbound and the southbound tunnels, and to progress simultaneously toward the north. Launch walls would be constructed at each end of the bored segment. The space between the SOE walls at the connection between the cut-and-cover and bored segments would be used as launching and receiving pits for the TBMs. The cut-and-cover segments connecting to the bored segment would have a total width of about 128 and 148 feet at their connection to the bored tunnels at the south and north approaches, respectively, determined based on the merging traffic lanes connecting to the tunnel and the minimum width of excavation required at each launch wall.

At the deepest point of the bored segment, the tunnel invert would be approximately 135 feet below ground surface as shown in **Figure 3-1**. This depth corresponds to a water pressure of about 3.7 bars (7700 psf), assuming ground water at 10 feet below ground.



Orange Tunnel Concept:
Concrete Segments Stored at Rondout Project Site in New York State
Figure 3-9



Orange Tunnel Concept:
Completed Tunnel Liner Made of Precast Concrete Segments at Rondout Project Site in New York State

The tunneling operations for depressed roadway, cut-and-cover tunnels, bored tunnels, and cross-passages would generate large volumes of spoil or muck that would be removed and transported out of the site. Plans for proper disposal of the spoils would be developed in accordance with local and state regulations.

An instrumentation program would be developed and implemented to monitor ground movements and changes in ground conditions (such as changes to the water table) during construction. In addition, construction-induced noise and vibration would be monitored during construction. Instruments would also be placed on the existing structures and facilities within the influence zone to monitor their response to construction activities. Pre- and post-construction surveys of these structures would be required as part of the monitoring program.

Cross-Passage Tunnel Construction

The cross-passage tunnels would connect the bored tunnels and would be constructed in rock. A total of seven cross-passage tunnels for fire egress and one cross-passage tunnel for the pumping station would be proposed to connect the twin bored tunnels. The cross-passages for fire egress would be spaced about 800 feet apart. The pumping station would be located approximately at the deepest point of the bored tunnel alignment. The cross-passages would be approximately 25 feet long and would be constructed after the bored tunnels are lined. In cross section, the cross-passage tunnels would be horseshoe-shaped, about 16 feet high and 17 feet wide at the spring line.

Prior to the excavation, several liner segments would have to be removed from the bored tunnels to facilitate excavation of the cross-passage tunnels. A steel framing will be required to support the bored tunnel liners at the location of the openings. Local reinforcement of the rock around the openings after removal of the segments would be required using the temporary support elements (grouted rock dowels, split sets, swellex bolts, etc.) shown on the drawings (see Section 13). Once the openings are made, water inflow would be expected. If the amount of water inflow is relatively small, it would be handled by pumping it out of the tunnel. Probe hole drilling would be performed before opening the bored tunnel segments to measure water inflow and decide if the inflow water can be pumped out. If large volume of inflow water is measured by probe drilling, pre-excavation grouting would be recommended prior to excavation and removal of the bored tunnel segments to control water inflows. The water inflow measurements would be used to determine the groutability of the rock mass and the consistency of the grout to be used. Pre-excavation grouting would involve drilling several holes at the cross-passage tunnel location for the entire length of the tunnel and injecting grout in the holes. The number and layout of the holes would be designed based on the permeability of the rock mass and rate of water inflow measured during probe drilling.

The Sequential Excavation Method (SEM) would be used for the excavation and support of the cross-passages. Depending upon the strength and quality of the rock, drill and blast technique or mechanical excavation using a roadheader would be employed for the cross-passage tunnels excavated in rock by SEM. The drill and blast technique basically would involve drilling a pattern of small-diameter holes, loading them with explosives, and then detonating the explosives to remove the rock. The blasted and broken rock (muck) would then be removed and the rock surface would be supported by rock dowels and shotcrete so that the whole process can be

repeated to advance the opening in rock. A carefully designed blasting plan would be needed to make sure vibration and noise levels remain below acceptable limits.

Another commonly used approach for SEM tunneling in competent rock is the use of a roadheader. Excavation of a tunnel face with a roadheader would result in an opening closer to the actual required section of the tunnel. The basic cutting tool for a roadheader is a large milling head mounted on a boom, which in turn is mounted on tracks or within a shield.

The minimum initial support consisting of rock dowels and a layer of shotcrete as depicted in the design drawings would be installed immediately after excavation of each segment of tunnel. Construction of the final liner would be delayed to allow the majority of the time dependent rock deformation to occur. A layer of water proofing membrane would be placed over the shotcrete face and before construction of the final liner. The final liner of the cross passage would consist of an 18-inch-thick layer of cast-in-place reinforced concrete along the tunnel walls and crown and a 2.5-foot-thick layer of cast-in-place reinforced concrete at the tunnel invert. **Figure 3-11** shows a lined cross-passage tunnel.

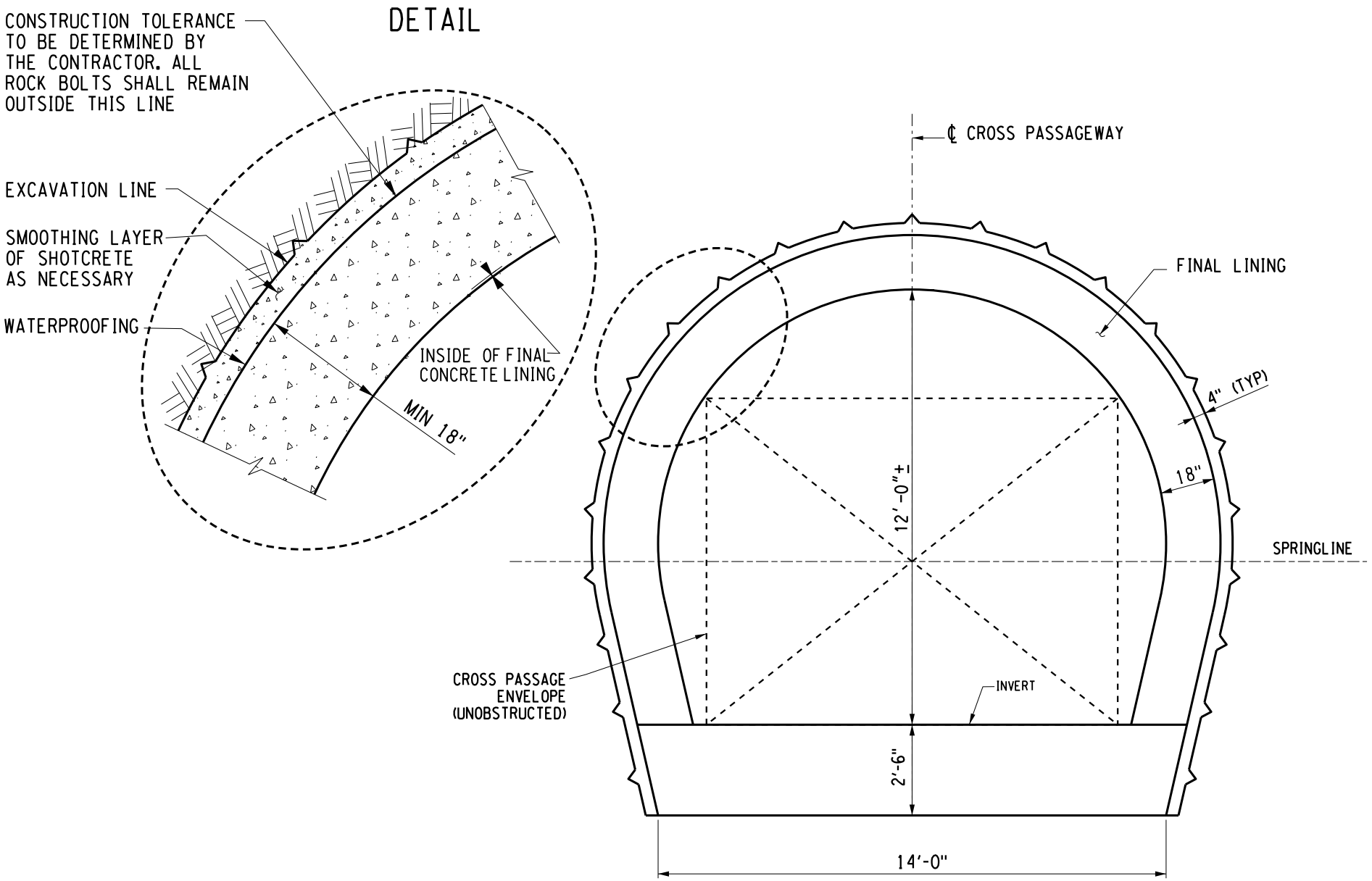
Structural Durability

Design specifications for the Orange concept cut-and-cover tunnel structures and precast concrete segmentally lined tunnels would require a minimum service life of 100 years (except for equipment and roadway paving), per the WSP report. In addition, specifications would require that tunnel concrete, for both cut-and-cover and segmentally lined tunnels, meet the requirements of AASHTO and ACI (American Concrete Institute) 350 requirements for durability design.

The service life design for the structures would consider the internal exposure to storm water carried into the tunnel by vehicles and the external exposure to groundwater. The long-term durability of the concrete structures would depend on the structural design, structural detailing, concrete mix design, concrete production, concrete placement, construction techniques, site environment, and maintenance.

Reference standards for design of durable concrete structures include:

- AASHTO LFRD (Bridge Design Specification; Durability 5.14)
- AASHTO TP 64-03 (TP 64-03 – Predicting Chloride Penetration of Hydraulic Cement Concrete by the Rapid Migration Procedure)
- ACI 201.2R-08 (Guide to Durable Concrete)
- ACI 210R-93 (Erosion of Concrete in Hydraulic Structures)
- ACI 222.3R-11 (Guide to Design and Construction Practices to Mitigate Corrosion of Reinforcement in Concrete Structures)
- ACI 224R-01 (Control of Cracking in Concrete Structures)
- ACI 308R-01 (Guide to Curing Concrete)
- ACI 318-14 (Building Code Requirements for Structural Concrete)



Orange Tunnel Concept:
Cross-Section of a Lined Cross-Passage Tunnel
Figure 3-11

- ACI 350-06 (Code Requirements for Environmental Engineering Concrete Structures)
- ACI 350.5-12 (Specifications for Environmental Concrete Structures)
- ACI 365.1R-00 (Service Life Prediction)

The design of reinforced concrete structures to ensure adequate durability would require an integrated process. Because water is involved in almost every form of concrete degradation, concrete impermeability would be very important. Use of a combination of higher strength and higher performance concrete, provision of higher or sacrificial concrete cover depths and additional area of structural steel, and proper mix designs are some of the basic factors considered to prolong the design life of concrete materials. Waterproofing the structures to prevent the introduction of water and chloride ions would be the most important corrosion mitigation tool.

Corrosion Risks

The corrosion of both cut-and-cover and precast segmental tunnel concrete structures would be initiated by:

- Diffusion of chloride ions to the depth of reinforcing bars, or
- Carbonation reducing the pH of the concrete in contact with the reinforcing bars, or
- Combination of chloride ions and carbonation, or
- Rate of penetration of aggressive chemicals such as Cl- ions, CO2, and sulfate ions.

These corrosion mechanisms would require the presence of oxygen. The greatest source of corrosion of the Orange tunnel would be water bearing chloride ions, either brought internally into the tunnel by vehicles or externally forced into the lining by the external groundwater pressure.

1) Groundwater

Chloride ions, in solution with water and oxygen, can cause rusting of steel. The rust occupies a greater volume than the steel, expanding and spalling the concrete. Additionally, the reinforcing steel loses section, weakening the structure. The Orange tunnel structure would be at risk of being continually saturated with groundwater, since the exterior hydrostatic pressure would constantly act to drive water into the lining.

Based on USGS water quality data, the actual salinity distributions and concentrations are at present unknown. However, based on proximity to historical salt production from groundwater, the groundwater in the Orange tunnel concept alignment area is expected to be saline. Data from USGS (July 2000) shows that at depths of 400 feet salinity is around 5 percent. The concentration of salt in seawater is typically around 35 parts per thousand, or 3.5 percent. The level of protection required would be similar to that required in coastal and seawater environments and would be determined by further groundwater testing if needed.

Groundwater corrosivity would be evaluated by testing the following minimum parameters:

- pH

- Sulfates
- Chlorides
- Resistivity

Table 3-3 gives general recommendations for corrosion potential. Based on the anticipated conditions at the Orange tunnel project area, the corrosion potential would be high to very high.

Table 3-3
Potential for Chemical Attack on Buried Steel Elements

Soil Resistivity (ohm-cm)	Soluble Chlorides in Soil (ppm)	Soil pH	Corrosion Potential
0–1000	>500	0–4.5	Very High
1000–2000	>500	4.5–5.5	High
2000–5000	<500	5.5–6.5	Moderate
>5000	<500	>6.5	Mild

Note: Does not consider passivating effects of concrete on embedded reinforcing steel.
Source: Palmer, J.D., Soil Resistivity Measurements and Analysis, Materials Performance, Vol. 13, January 1974.

If the Orange tunnel concept were to be constructed, detailed analyses would be performed using standard approaches such the Guide to Durable Concrete (ACI- 201.2), Guide to Design and Construction Practices to Mitigate Corrosion of Reinforcement in Concrete Structure (ACI-222.3R), and predictive software such as Life 365 to establish expected corrosion rates and design life. The British Tunneling Standards BS 8110, Part 1 Table 6.4 (BS EN 206-1:2000, Part 1, Table 10) recommend a maximum chloride content allowable standard of 0.4 percent. Based on this allowable standard, the service life with regard to chloride saturation for the tunnel lining would be defined as the time duration required for chlorides in the groundwater to saturate the lining to a level exceeding 0.4 percent.

2) Road Salts

The annual average snowfall of Syracuse is approximately 124 inches per year, requiring road salt to be applied to roadways. The approaches to the tunnel would require road salt, and these salts would be tracked into the bored tunnels by vehicles.

Protective Membrane and Gaskets

Both the cut-and-cover tunnels and the bored segmentally lined tunnels would be exposed to a constant external hydrostatic groundwater pressure. This pressure would drive the chloride ion laden groundwater into unprotected concrete, causing the corrosive effects previously discussed. To mitigate this, and to provide for serviceability of the tunnel, waterproofing systems would be used to prevent groundwater infiltration into the structure.

Typically, cut-and-cover structures are waterproofed with an external membrane that is placed around the structure as it is constructed. There are several options for this membrane including high density polyethylene, PVC, and mastic/bentonite panels. Waterproofing of the cut-and-cover structures is essential to their durability. It would be much better to prevent the corrosion

mechanisms from acting in the first place than to simply resist these mechanisms with more durable materials. Accordingly, the Orange tunnel concept cut-and-cover tunnel structure would be required to have an external waterproofing membrane system. The proposed construction for the cut-and-cover and depressed roadways would allow placement of the waterproofing membrane on the outside face of the final structure, as discussed in this section.

The bored tunnel would also be subject to the external groundwater pressure driving chloride ions into the tunnel lining. Water leakage through the joints of the precast segmentally lined tunnel would be prevented by a carefully designed gasket system on all the joints. These gaskets would be designed and tested for the site hydrostatic pressures and the expected segment construction tolerances. These systems, along with mitigation grouting of any leaks found, have traditionally functioned well in preventing infiltration into bored tunnels. These systems would be required in the segmental tunnel lining design. In addition, injection of compressible grout between liner segments and excavated ground would help preventing water leakage through the joints.

Additionally, the bored tunnel exterior lining surface, just like the cut-and-cover structures, would be exposed to groundwater pressures. To mitigate chloride intrusion, the exterior surface of the segments would be coated with an impermeable sealer. Several products are available for this including epoxies that have an ability to penetrate the concrete surface. During erection of the segments within the tunnel boring machine, the back of the segments slides against the inner surface of the tail shield, so the exterior coating would need to be resistant to mechanical abrasion.

Design Factors Influencing Durability

1) Structural Design

To reduce the permeability of the structural concrete tunnel linings, structures would be designed to control crack widths by minimizing strain in tensile rebar. Typically, this is achieved by designing the structure as an environmental concrete structures in accordance with ACI 350, which states that “below-grade structures…which may be exposed to external groundwater pressures generally are designed as environmental concrete structures.”

2) Steel Fiber Reinforcement

The choice of reinforcement for the precast concrete tunnel segments would be extremely important to durability. In recent decades steel fiber has been increasingly used as the sole reinforcement of precast concrete segments. Fiber reinforced concrete is much more resistant to chloride ion induced corrosion because fibers do not provide the same electrical connectivity as a rebar grid. The fibers therefore are less likely to experience the electrochemical reactions necessary for corrosion. ACI 544.1R indicates that the depth of corrosion is typically limited to 0.10 inches.

The steel fiber reinforced concrete (SFRC) segments would be designed to safely resist the final loads and loads induced by handling and erection. Handling and erection loads are often the controlling load, since the tunnel liner once installed would become an extremely strong compression ring. The segmental tunnel liner would be reinforced primarily with steel fiber. Rebar reinforcement would only be used if it is necessary to carry handling and erection loads.

References

DiMillo et al. (2016). Development of a grout mix to be used as annular fill behind pre-cast concrete segments installed in tunnel with time dependent deformation character. Tunneling Association of Canada, 2016 Annual Conference, October 16-18, 2016; Ottawa, Ontario, Canada.

WSP (2017). I-81 Independent Feasibility Report, November 2017.

4. CONCEPTUAL CONSTRUCTION PHASING PLAN

Based on the current, conceptual level of engineering design, discussions with construction specialists, and experience on similar projects, NYSDOT has established an 11-year construction duration for the Orange tunnel with partial interchange concept. The phasing and schedules ultimately implemented if the Orange tunnel concept were to be constructed may vary to some degree from those presented here; however, the process described below presents a plausible scenario for construction of the Orange tunnel concept. The initial construction schedule for this concept is presented in **Figure 4-1.**

The preliminary construction phasing plan for the concept assumes five phases, described below, over the 11-year duration. Potential road closures and detours for each phase are also described.

Phase 1

The primary objective of this phase would be to complete all work necessary to re-designate I-481 as I-81, which would need to be done before the closure and demolition of existing I-81 can begin. Once I-481 is re-designated as I-81, former northbound I-81 could be shut down to complete preparation work necessary to allow construction of the tunnel's cut and cover sections in the next phase. Phase 1 would also include other miscellaneous improvements needed to facilitate future phases of construction. Phase 1 is anticipated to be completed within 36 months.

The work would include:

- The conversion of existing I-481 to I-81 with associated improvements (reconstruction of the existing I-81/I-481 north and south interchanges and miscellaneous improvements in the East Study Area);
- Construction a new eastbound I-690 on-ramp from Almond Street;
- Construction of a new northbound I-81 off-ramp to Almond Street. The new ramp would need to be on a temporary alignment between Van Buren and Taylor Streets to allow existing northbound I-81 to remain open until the new northbound off-ramp connecting to existing Almond Street is opened to traffic.
- Construction of a new northbound on-ramp from Colvin Street to I-81;
- Reconstruction of Colvin Street, including replacement of the New York, Susquehanna and Western (NYS&W) Railway bridge over Colvin Street and the new BL 81 bridge over Colvin Street;

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
PHASE 1 - I-481 Conversion to I-81 and Preparation for Tunnel Approach Construction											
Construct I-481 South Interchange											
Construct I-481 North Interchange											
Construct I-481 East Corridor widening											
I-481 Re-Designated as I-81		◆									
Northern Segment											
Reconstruct Butternut and Court St. bridges; begin mainline widening											
Reconstruct Spencer and Bear St. bridges; mainline widening											
Reconstruct N Clinton St.											
Construct Northern Segment ramp consolidation & mainline widening											
Construct temporary/permanent NB on-ramp from Pearl St.											
Almond St./Catherine St.											
Construct NB I-81 off-ramp to Almond St.											
Construct EB I-690 on-ramp from Almond/Catherine St.											
Reconstruct Almond St., Fayette St. to I-690											
Construct temporary widening to facilitate shutdown of NB viaduct											
Local Streets											
Replace I-81 and RR bridges over Colvin St.											
Reconstruct Colvin St. and Colvin St. on-ramp to NB I-81											
Construct James Street bridge over future depressed highway											
Construct temporary MLK, Jr. East bridge over future tunnel											
Former I-81 (Colvin St. to I-690)											
Construct portion of new SB on-ramp from Almond St., including temporary bridge over future tunnel and temporary connection to SB I-81											
Construct portion of new SB I-81 to EB I-690 ramp between Salina St. and E. Willow St. (for use as temporary 81 SB bypass)											
Demolish NB off-ramp to Adams St., and NB on-ramp from Harrison St.											
Other											
Remove existing EB I-690 on-ramp from McBride St.											

Preliminary Construction Schedule
Orange Tunnel Concept, Partial Interchange Option

Figure 4-1 (page 1 of 3)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
PHASE 2 - Tunnel Approach Construction											
Northern Cut/Cover & Depressed Highway Section											
Utility relocations, install SOE walls, cut-and-cover excavation, invert construction											
Cut-and-cover structure concrete (N)											
Construct Temporary I-81 and I-690 Bridge Column Underpinning											
Southern Cut/Cover Section											
Utility relocations, install SOE walls, cut-and-cover excavation, invert construction											
Cut-and-cover structure concrete (S)											
TBM launch preparation											
Tunnel Bore											
Procure and manufacture TBM											
Other											
Temporary/permanent improvements to local streets needed for Phase 3 detour											
Temporary widening of EB off-ramp to West St.											
Construct WB I-690 bypass at West St.											
W. Genesee St. rehabilitation											
PHASE 3 - Tunnel Boring; I-690 & West St. Interchange Reconstruction											
Tunnel Bore											
Assemble and commission TBM at site											
Drive bore of northbound tube (south to north)											
Drive bore of southbound tube (south to north)											
Mine cross passages											
Tunnel finishes, systems and commissioning											
Reconstruct I-690											
Open and maintain Phase 3 Detour											
Reconstruct eastbound I-690 and associated ramps											
Reconstruct westbound I-690 and associated ramps											
West Street Interchange											
Reconstruct I-690 West Street interchange											
West/Genesee St. intersection reconstruction											
West St. reconstruction											
Evans St. realignment											
Almond Street											
Complete construction of north portion of Almond St., Fayette St. to Burnet Ave.											

Preliminary Construction Schedule
Orange Tunnel Concept, Partial Interchange Option

Figure 4-1 (page 2 of 3)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
PHASE 4 - Tunnel Approach Construction											
Tunnel											
Complete construction of the cut-and-cover tunnel sections (north and south ends)									■	■	
Complete tunnel finishes										■	
Open tunnel to traffic										◆	
Northern Segment											
Complete reconstruction of Northern Segment, Butternut St. to Hiawatha Blvd.									■	■	
Complete reconstruction of BL 81 connections to the new tunnel										■	
Almond Street Corridor											
Shut down and demolish former I-81 viaduct									■		
Complete construction of the new southbound ramp from Almond St. to BL 81										■	
Local Streets											
Remove temporary bridge and complete reconstruction of MLK, Jr. East										■	
PHASE 5 - Tunnel Boring; I-690 & West St. Interchange Reconstruction											
Almond Street Corridor											
Once tunnel is opened to traffic, complete reconstruction of Almond St.											■
Other											
Complete ramp consolidation at Butternut St. area											■
Complete all other misc work, landscaping, finishes, etc.											■

Preliminary Construction Schedule
Orange Tunnel Concept, Partial Interchange Option

Figure 4-1 (page 3 of 3)

- Construction of a new, permanent bridge to carry James Street;
- Construction of a new Pearl Street on-ramp to northbound I-81 and local approaches;
- Reconstruction of four bridges (Butternut, Spencer, Court, and Bear Street bridges) over I-81 between Butternut Street and Hiawatha Boulevard.
- Completion of ramp consolidation work along I-81's Route 370 and Old Liverpool Road ramps;
- Completion of local street improvements along North Clinton Street and adjacent area;
- Permanent and temporary local street improvements (mostly along Almond Street, between Renwick Avenue and Erie Boulevard) to accommodate traffic movement during subsequent phases; and
- Completion of building demolition activities and start of utility relocations, drainage improvements, and Intelligent Transportation System (ITS) improvements.

Preparatory work would also be necessary to allow the construction of the tunnel's cut and cover sections during the next phase. These tasks include:

- Construction of a combination of permanent and temporary portions of the new southbound ramp from Almond Street to southbound existing I-81, including a temporary southbound existing I-81 bypass connection. This connection would span the proposed southern tunnel excavation trench (to be constructed in the next phase), allowing southbound existing I-81 to remain open through Phase 4;
- Construction of a short southbound existing I-81 bypass, approximately between Salina Street and East Willow Street, to allow construction of the northern cut and cover section in the next phase;
- Construction of a temporary bridge to carry Dr. Martin Luther King, Jr. East (formerly East Castle Street; MLK, Jr. East) over the proposed southern tunnel excavation trench; and
- Demolition of the existing eastbound I-690 on ramp from McBride Street once the new eastbound I-690 on ramp from Almond Street is opened to traffic.

Road Closures and Detours

The following major detours and road closures are assumed during this phase.

- Existing I-81 (both directions) would remain open and fully functional until existing I-481 has been re-designated as I-81;
- The existing northbound I-81 to eastbound I-690 ramp would be closed to enable construction of a new eastbound I-690 on-ramp from Almond Street;
- Almond Street between Van Buren Street and Taylor Street would be severed to allow construction of the new northbound I-81 off-ramp to Almond Street. Southbound traffic on Almond Street between Taylor Street and Van Buren Street would be severed permanently. Northbound traffic from Van Buren Street to Almond Street would be restored later in Phase 5, upon completion of the frontage road; and

- The four northern segment bridges over I-81 would be closed and reconstructed two at a time while maintaining east-west traffic on the other two bridges;
- During the second half of this phase, once existing I-481 has been re-designated as I-81, former northbound I-81 and all associated ramps between Colvin Street and Butternut Street would be closed to traffic. Interstate traffic would be accommodated on the newly re-designated I-81. Local traffic would be detoured onto the new northbound exit to Almond Street, with access to the existing city street system from Almond Street. Local traffic would use the new Pearl Street on ramp and existing Butternut/State Street on ramp to access former northbound 81;
- During the second half of this phase, once existing I-481 has been re-designated as I-81, former southbound I-81 and all associated ramps between Colvin Street and Butternut Street would remain open to traffic, except for a short term closure. The closure would be used to complete connections and shift traffic to the short southbound bypass, approximately between Salina Street and East Willow Street.;
- MLK, Jr. East would be shifted to allow construction of a temporary bridge, which would be used to span the proposed tunnel excavation trench to be constructed in the next phase. The temporary bridge would allow MLK, Jr. East to remain open during tunnel construction; and
- East Willow Street between Warren Street and Pearl Street would be closed and permanently severed once the new James Street bridge is completed.

Phase 2

The primary objective of this phase would be to begin tunnel cut and cover construction and complete all work necessary in preparation for the reconstruction of I-690 and the tunnel boring work in the next phase. The reconstruction of I-690 would not be able to start until the Phase 3 detour is in place and could not be completed until a portion of the northern cut and cover tunnel section is completed in this phase. Phase 2 is anticipated to be completed within 18 months. The work would include:

- Construction of portions of the approach to the northern portal, including the tunnel's soldier-pile-tremie-concrete (SPTC) walls and excavation, which would allow access for construction vehicles. The existing I-690 and former I-81 columns would be protected and would need to remain in place during this phase;
- Construction of portions of approach to the southern portal, including SPTC walls and excavation, to allow access for construction vehicles; and
- Preparation of temporary works necessary to facilitate I-690 reconstruction in next phase, including:
    - Westbound I-690 bypass by Evans Street: a two-lane temporary westbound bypass between North Franklin Street and Leavenworth Avenue would be constructed to accommodate westbound I-690 through traffic in the next phase;

- Widening eastbound I-690 off ramp to Genesee Street: the existing eastbound off-ramp to West Street would be temporarily widened to two lanes; and
- Preparation of local streets for Phase 3 eastbound I-690 detour: permanent and temporary local street improvements (mostly along Genesee Street and Erie Boulevard and nearby streets) would be implemented to accommodate traffic detours when eastbound I-690 between West Street and Almond Street is closed.

Road Closures and Detours

The following major detours and road closures are assumed during this phase.

- Former northbound I-81, and all associated ramps between Colvin Street and Butternut Street, would remain closed to traffic. Traffic would be detoured onto the new northbound exit to Almond Street, and it would access the existing city street system from Almond Street;
- Former southbound I-81, and all associated ramps between Colvin Street and Butternut Street, would remain open to traffic;
- Erie Boulevard would remain open during construction using special construction techniques;
- MLK, Jr. East would remain open using the temporary bridge over the tunnel cut/cover construction area; and
- At the West St. interchange area, no ramp closures are warranted at this stage, but the West Street on/off ramp to westbound I-690 would need to be reduced to one lane; and the on-ramp would be widened to accommodate two lanes of traffic during the next phase.

Phase 3

The primary objective of this phase would be to complete tunnel boring construction and complete reconstruction of I-690, including the West Street interchange. The reconstruction of eastbound I-690 and the reconstruction of westbound I-690 would be done in two sub-phases, Phase 3A and Phase 3B. The entire Phase 3 is anticipated to be completed within 42 months.

The work would include:

- Phase 3A would involve bored tunnel construction of both the southbound and northbound tubes, as well as completion of eastbound I-690 between Leavenworth Avenue and Lodi Street, including the following ramps:
    - Eastbound I-690 to West Street off ramp,
    - Eastbound I-690 on ramp from West Street, and
    - Eastbound I-690 to Almond Street off ramp.
- Phase 3B would involve the completion of the southbound and northbound bored tunnel sections and the complete reconstruction of westbound I-690 between Leavenworth Avenue and Lodi Street, including the following ramps:

  - Westbound I-690 to West Street off ramp,
  - Westbound I-690 on ramp from West Street,
  - Westbound I-690 to Almond Street off ramp,
  - Westbound I-690 on ramp from Almond Street,
  - Westbound I-690 to northbound BL 81 ramp,
  - Northbound BL 81 to westbound I-690 ramp,
  - Southbound BL 81 to westbound I-690 ramp, and
  - BL 81 off ramp to Clinton Street.
- In addition, the following work would be completed during Phase 3B:
  - Conversion of Genesee Street/West Street intersection to an at-grade intersection,
  - Reconstruction of West Street between Genesee Street and Erie Boulevard,
  - Realignment of Evans Street (completed toward end of this sub-phase),
  - Start of the reconstruction of the BL 81 mainline from Butternut Street to Hiawatha Boulevard toward the end of this phase; and
  - Completion of the reconstruction of Almond Street between Genesee Street and Burnet Avenue.

Road Closures and Detours

The following major detours and road closures are assumed during this phase.

- Former northbound I-81, and all associated ramps between Colvin Street and Butternut Street, would remain closed to traffic. Traffic would be detoured onto the new northbound exit to Almond Street, then it would access the existing city street system from Almond Street.
- Former southbound I-81 and all associated ramps between Colvin Street and Butternut Street would remain open to traffic.
- Eastbound I-690 Phase 3 Detour: The detour route primarily would follow West Street to West Genesee Street, to James Street, to Oswego Boulevard, to Erie Boulevard, to Almond/Catherine Street, at which point traffic could re-enter eastbound I-690 via the new on-ramp. This detour route would also support eastbound I-690 traffic heading into Downtown and Downtown traffic headed back to the west via a temporarily reconfigured westbound I-690 on-ramp at West Street.

- During Phase 3A, existing eastbound I-690 would be closed and traffic would use the exit ramp to West Street and follow the local street Phase 3 detour that was prepared in the prior phase. Existing westbound I-690 would remain open to traffic.
- During Phase 3B, existing westbound I-690 would be closed and westbound traffic would be detoured onto the newly constructed section of eastbound I-690. Eastbound I-690 traffic would continue to be detoured over the local street Phase 3 detour that was prepared in the prior phase.
- Westbound I-690 exit ramp to West Street would be closed as soon as westbound I-690 traffic switches to the temporary bypass. Vehicles traveling from the east would use either the exit to Teall Avenue or Geddes Street, and then follow the local street system to various Downtown destinations.
- West Street entrance ramp to eastbound I-690: This ramp, together with the spur to Herald Place, would be closed starting early in Phase 3A. Motorists would generally use the same detour routes described in the above discussion of eastbound I-690 traffic.

Phase 4

The primary objective of this phase would be to complete tunnel construction, complete BL 81 mainline reconstruction along the northern section (from Salina Street to Hiawatha Boulevard), and complete all remaining tunnel work (tunnel cut and cover sections, finishes, systems, ventilation, and commissioning) necessary for the tunnel to be opened to traffic. Phase 4 is anticipated to be completed within 24 months.

The work would include:

- Completion of the demolition of the I-81 viaduct: Once the new ramps connecting I-690 to Almond Street are open, former southbound I-81 would be closed to traffic and the remaining portion of the existing viaduct over Almond Street would be demolished;
- Completion and opening of the new southbound Almond Street to southbound BL 81 ramp, with removal of temporary works;
- Completion of the reconstruction of the BL 81 northern segment mainline from Butternut Street to Hiawatha Boulevard;
- Completion of the northern cut and cover section (from approximately Erie Boulevard to James Street) after removing all columns from the existing structure;
- Completion of the southern cut and cover section (from approximately the railway bridge near Renwick Avenue to MLK, Jr. East) after removing the temporary southbound bypass bridge and the temporary MLK, Jr. East bridge;
- Completion of tunnel finishes, systems, ventilation building, and commissioning;
- Completion of construction of northbound BL 81 between the tunnel and Butternut Street;
- Completion of construction of southbound BL 81 between the tunnel and Butternut Street;
- Southbound BL 81 to eastbound I-690 ramp; and

- Eastbound I-690 to southbound BL 81 ramp to the tunnel.

Road Closures and Detours

The following major detours and road closures are assumed during this phase.

- Motorists on former northbound I-81 between Colvin Street and Butternut Street would continue to use the new northbound exit to Almond Street, then access the existing city street system from Almond Street. Local traffic would continue to use the new Pearl Street on-ramp and existing Butternut/State Street on-ramp to access former northbound 81 or access I-690 at the new westbound on-ramp at Fayette Street or eastbound ramp at Catherine Street;
- Former southbound I-81 traffic would use the new exit ramp to Clinton Street and existing ramp to Franklin Street. Alternatively, once the new southbound BL 81 to eastbound I-690 ramp is completed and open later in this phase, southbound I-81 motorists could detour to eastbound I-690 and use the new Almond Street off-ramp and a combination of local streets through the Downtown area; and
- MLK, Jr. East would be temporarily closed to remove the temporary bridge, install the tunnel sections, and replace the at-grade roadway section.

Phase 5

The primary objective of this phase would be to complete reconstruction of Almond Street and all remaining work necessary for completion of the project (once the tunnel is open to traffic). Phase 5 is anticipated to be completed within 12 months.

The work would include:

- Completion of reconstruction of the Almond Street corridor;
- Completion of ramp consolidation work in Butternut Street area (removal of the existing Butternut/State Street on-ramp to former northbound I-81 and of the former southbound I-81 off-ramp to Franklin and Clinton/Salina Street) and completion of any remaining local streets work in these areas.
- Completion of the realigned Clinton Street off-ramp from southbound I-81. The realigned Clinton Street off-ramp would be completed at the ramp exit area once the existing Franklin Street off-ramp from southbound I-81 is removed;
- Completion and opening of the southbound I-81 to westbound I-690 ramp. This new ramp would be completed at the ramp exit area and opened to traffic once the existing Clinton/Salina Street off-ramp from southbound I-81 has been removed and the realigned Clinton Street ramp has been completed.

Road Closures and Detours

No major detours or road closures are assumed during this phase, but minor lane shifting would be implemented, as needed, on Almond Street and Clinton Street during their reconstruction.

5. GEOTECHNICAL CONDITIONS

Site Geology

The City of Syracuse lies between lake plains on the north and the Alleghany plateau on the south, and its physiography is intensified by glacial action. The soils within the Syracuse topographic quadrangle consist of mixed glacial clays, sand, and gravel in the uplands, and muck, marl, alluvium, lacustrine deposits, sand, gravel, and boulder clay in the lowlands. The bedrock in the Orange tunnel concept alignment area consists of Paleozoic era shale, dolostone, gypsum and salt. Based on a review of the historic test borings, the subsurface conditions in the alignment area consist of surficial manmade fill soils underlain by natural cohesive and granular soils of glacial origin (outwash and lake deposits) and Paleozoic era bedrock.

Historic Borings

Several test borings were performed between 1958 and 1961 along or in the vicinity of the Orange tunnel concept alignment. Boring logs for test borings performed near the Orange Alignment (mostly along the existing I-81 Viaduct) were obtained and reviewed from NYSDOT Soil Borings from ArcGIS map file (Region 3 Soil Boring Locations). These test borings were performed with SPT (Standard Penetration Test) sampling within overburden soils with a 300-lb hammer and a drop height of 18 inches. According to ASTM (American Society for Testing and Materials) D1586, the drop height for a SPT hammer is 30 inches and the hammer weight is 140 pounds. The blow counts reported on the historic boring logs were not corrected for hammer efficiency and lower energy resulting from the 18-inch drop height. Upon encountering spoon refusal, rock coring was performed at some of the test borings. The boring logs provided recovery and number of pieces obtained. The description of rock on the boring logs did not include information about weathering, bedding, fracturing, and hardness. Also, data such as compressive strength, rock quality designation (RQD) values, and rock core photographs were not available to characterize the bedrock. Therefore, the historic test borings were useful only in establishing the top of the bedrock and identifying the soil types anticipated along the alignment. Groundwater levels encountered during drilling operations were also reported on the historic borings. However, groundwater levels based on monitoring well data were not available.

Subsurface Exploration

NYSDOT performed five widely spaced test borings (FH-X-15 to FH-X-19) in 2018 along or in the vicinity of the Orange tunnel concept. The test borings were advanced with soil sampling every five feet until refusal was reached in conjunction with the SPT testing using an automatic hammer. The obtained soil samples were stored in glass jars. Upon encountering refusal, rock coring was performed using an NQ size core barrel, which yields approximately two-inch diameter rock cores. Obtained rock core samples were stored in boxes while measuring the recovery and RQD values. Both soil and rock samples were shipped to a laboratory for additional testing. Select soil samples were tested for grain size distribution and Atterberg Limits (liquid limit and plastic limit). Point load strength tests were performed on the majority of the rock core samples. No monitoring wells were installed at the completed borings; however, the depth to groundwater was reported for two borings (FHX-15 and FHX-17) after completion.

Subsurface Conditions in the Orange Tunnel Concept Alignment Area

The conditions encountered in the 2018 test borings are generally consistent with those encountered in the historic test borings and consist of existing fill and natural glacial soils underlain by shale and dolostone bedrock. A geotechnical plan and profile developed using the historic and 2018 test borings is included in the drawings in this **Section 13** of this appendix. The general subsurface strata, in descending order, includes Fill, Soft Clay/Silt, Sand/Silt/Gravel, Weathered Rock, and Bedrock, as described below.

Fill: The Fill stratum is composed of loose to medium dense sand and gravel with some silt and clay mixed with construction and foreign material such as cinders and fragments of concrete. The thickness of the fill stratum can be up to 50 feet, but it generally extends to a depth of about 5 to 15 feet below the existing ground.

Soft Clay/Silt: This stratum consists of very soft to soft silt and clay with some peat, muck, and marl at some locations. When encountered, this stratum was observed below the Fill stratum, and its thickness ranged from a few feet to more than 60 feet between 300 feet south of Jackson Street and 200 feet south of E. Genesee Street (stations 45+00 and 66+00).

Sand/Silt/Gravel: This stratum consists of a dense to very dense mix of sand, silt, and gravel and occasional weathered rock. This stratum was encountered below Fill or Soft Clay/Silt strata, and its thickness ranged from a few feet to over 60 feet near Jackson Street (STA 42+00) and between 450 feet and 250 feet south of East Genesee Street (stations 63+50 and 65+50).

Weathered Rock: Weathered Rock stratum consists of weathered and decomposed shale and dolostone mixed with sand, silt, and gravel. When encountered, this stratum was observed below the Sand/Silt/Gravel Stratum and varied in thickness from a few feet to about 20 feet near STA 92+00. The determination of the top and bottom of this layer was difficult due to the nature of the material and limited information provided in the historic boring logs.

Bedrock: This stratum was encountered below Weathered Rock or Sand/Silt/Gravel Strata. The depth to the top of bedrock varies approximately between 25 feet and 100 feet along the entire alignment. Bedrock appears to be the deepest between STA. 61+00 and STA. 65+00 at an approximate elevation of 305 (depth of about 100 feet). The bedrock consists of shale and dolostone of Syracuse formation with inclusions of gypsum. Based on the 2018 test borings, the bedrock in the alignment area was visually identified as gray to black dolomitic shale with gypsum seams and occasional inclusions and clay filled zones. The bedrock samples showed very thin-bedded horizontal bedding with very intense to intense fracturing and sub-horizontal and sub-vertical fracture angles. The degree of weathering of the bedrock was quite variable, ranging from completely weathered to fresh. The dolomitic shale was predominantly described as moderately soft in terms of hardness, while the gypsum and clay seams were described as very soft.

Table 5-1 summarizes the encountered subsurface conditions at the five borings drilled in 2018. All the soil and rock test data and boring logs for these borings are provided in the attachments to this section.

Table 5-1

Summary of Subsurface Conditions at 2018 Test Borings

Test Boring	Surface Elevation (ft)	Water Table		Existing Fill		Glacial Soils (Soft Clay/Silt and Sand/Silt/Gravel)		Bedrock	
		Depth (ft)	Elevation (ft)	Top Elevation (ft)	Thickness (ft)	Top Elevation (ft)	Thickness (ft)	Top Elevation (ft)	Depth Cored (ft)
FH-X-15	403.9	15.1	388.8	403.9	5.0	398.9	50.0	348.9	55.0
FH-X-16	403.5	N/E	N/E	403.5	10.0	393.5	33.4	360.1	43.4
FH-X-17	401.0	7.6	393.4	401.0	8.0	393.0	64.5	328.5	72.5
FH-X-18	400.8	N/E	N/E	400.8	5.0	395.8	75.0	320.8	80.0
FH-X-19	403.2	N/E	N/E	403.2	15.0	388.2	25.5	362.7	40.5

Note: N/E= Not Encountered

Overburden Soil Geotechnical Properties

The Atterberg limits and sieve test results for the 2018 borings are shown in **Table 5-2**. The glacial overburden soils in the five borings are generally of low to moderate plasticity and contain varying amounts of fines (silt and clay). Some samples contain gravel or are predominantly sand and silt, especially those from Borings FH-X-18 and 19. Some samples, especially in Borings FH-X-15, 16, and 17, have in-situ water contents that are greater than the liquid limit.

Table 5-2

Soil Lab Data – Atterberg Limits, Water Content, Percent Fines, and Soil Description

Sample	Depth (ft.)	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing No. 200 Sieve	Soil Description from Boring Log
15-1	0–1.5	7					Brown Silty SAND, Gravelly W/ Asphalt Pieces and Root Fibers
15-2	5–6.5	20	31	19	12	87.8	Brown Silty CLAY
15-3	10–11.5	22	18	14	4		Gray Clayey SILT
15-4	15–16.5	23	20	14	6	93.9	Gray Clayey SILT, Sandy
15-5	20–21.5	25	21	14	7		
15-6	25–26.5	27	25	16	9	98.4	Gray Silty CLAY
15-7	30–31.5	22					Gray Fine Sandy SILT
15-8	35–36.5	29	28	16	12	98.1	Gray Silty CLAY
15-9	40–41.5	27	21	14	7		Gray Silty CLAY, Sandy
15-10	45–46.5	29	30	16	14	97.2	
15-11	50–51.5	28	29	16	13		
16-1	0–1.5	25					Dark Brown Sandy Silty, W/ Root Fibers, Concrete and Glass Pieces
16-2	5–6.5	26				49.2	
16-3	10–11.5	20					Gray Fine Sandy SILT
16-4	15–16.5	20	18	12	6	84.9	Gray Fine Sandy SILT, Clayey
16-5	20–21.5	24					Gray Silty Fine SAND
16-6	25–26.5	25	21	13	8	85.8	Gray Fine Sandy CLAY, Silty
16-7	30–31.5	15					Gray and Brown Gravelly Silty, Sandy
16-8	35–36.5	15				49.1	Gray Fine Sandy SILT, Gravelly
16-9	40–41.5	13					

Table 5-2 (cont'd)

Soil Lab Data – Atterberg Limits, Water Content, Percent Fines, and Soil Description

Sample	Depth (ft.)	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing No. 200 Sieve	Soil Description from Boring Log
17-1	0–1.5	15					Gray Fine Sandy SILT, Gravelly
17-2	5–6.5	18	25	18	7	31.4	Brown and Gray Silty CLAY, Sandy w/ Gravel Pieces
17-3	10–11.5	22	21	16	5		Brown and Gray Silty CLAY, w/ Gravel Pieces
17-4	15–16.5	22	25	16	9	91.2	
17-5	20–21.5	23	27	17	10		Gray Silty CLAY
17-6	25–26.5	36	32	18	14	99.6	
17-7	30–31.5	28	27	17	10		
17-8	35–36.5	22	19	16	3	99.4	Gray Clayey SILT
17-9	40–41.5	28	25	16	9		Gray Silty CLAY
17-10	45–46.5	29	27	17	10	100	
17-11	50–51.5	28	27	16	11		
17-12	55–56.5	29	30	17	13	99.3	
17-13	60–61.5	28	20	14	6		
17-14	65–66.5	23	27	15	12	99.9	
17-15	70–71.5	20	20	13	7		Gray Clayey SILT, Sandy
18-1	0–1.5	15	24	21	3		Brown Sandy SILT, Clayey w/ Gravel Pieces and Root Fibers
18-2	5–6.5	18	28	17	11	82.1	Brown and Gray Clayey SILT, w/ gravel pieces
18-3	10–11.5	21	27	20	7		Brown and Gray Clayey SILT, w/ fine gravel pieces
18-4	15–16.5	12	19	16	3	34.3	Gray Clayey SILT, Coarse Sandy w/ Gravel Pieces
18-5	20–21.5	14	17	15	2		Gray Silty SAND, Clayey w/ Gravel Pieces

Table 5-2 (cont'd)

Soil Lab Data – Atterberg Limits, Water Content, Percent Fines, and Soil Description

Sample	Depth (ft.)	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing No. 200 Sieve	Soil Description from Boring Log
18-6	25–26.5	17	14	12	2	18.6	Gray Silty SAND, Clayey w/ Gravel Pieces
18-7	30–31.5	20					Gray Silty SAND
18-8	35–36.5	16				13.7	
18-9	40–41.5	14					Gray Silty SAND, w/ Gravel Pieces
18-10	45–46.5	12	14	11	3	35	Gray Silty CLAY, Fine Sandy w/ Gravel Pieces
18-11	50–51.5	6					Gray Sandy GRAVEL, Silty
18-12	55–56.5	7				21	Gray Gravelly SAND, Silty
18-13	60–61.5	7					Gray Gravelly SILT
18-14	65–66.5	8	16	11	5	46.4	Brown and Gray Gravelly CLAY, Silty
18-15	70–71.5	8	16	12	4		Brown and Gray Clayey SILT, sandy w/ gravel pieces
18-16	75–76.5	7	22	14	8	35	Gray Clayey SILT, Gravelly
18-17	80–81.5	1					Gray Silty Gravel, Sandy (decomposed rock)
19-1	0–1.5	18					Brown Sandy SILT, w/ Gravel, Brick, Wood Pieces and Root Fibers

Table 5-2 (cont'd)

Soil Lab Data – Atterberg Limits, Water Content, Percent Fines, and Soil Description

Sample	Depth (ft.)	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing No. 200 Sieve	Soil Description from Boring Log
19-2	5–6.5	21	27	22	5	48	Brown Fine Sandy SILT, w/ Brick Pieces and Root Fibers
19-3	10–11.5	18					Brown Gravelly SILT, Sandy w/ Brick Pieces
19-4	15–16.5	10	16	12	4	47.7	Brown Gravelly CLAY, Silty
19-5	20–21.5	16	15	12	3		Brown Silty Coarse SAND, Clayey w/ Gravel Pieces
19-6	25–26.5	8	17	12	5	54.4	Brown Gravelly SILT, Clayey
19-7	30–31.5	6	14	10	4		
19-8	35–36.5	12	18	15	3	47.2	
19-9	40–41.5	6	26	18	8		Gray Gravelly SILT, Clayey (decomposed rock)

Bedrock Geotechnical Properties

Table 5-3 shows the range and averages of rock core recovery, RQD, and Uniaxial Compressive Strength (UCS), converted from point load index, for the five 2018 borings. The rock cores were also classified using the RMR (rock mass rating) and Q system methods, those results are also shown in **Table 5-1**. A complete summary of the RMR and Q classifications are shown in the attachments to this section.

Table 5-3
Summary of Rock Core Data for 2018 Borings

Test Boring	Elevation of Top of Core (ft)	Depth of Cored Rock (ft)	Unconfined Compressive Strength* (psi)			Recovery (%)			RQD (%)			RMR Rating			Average Q Rating
			Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
FH-X-15	348.9	55–100	1157	25695	8065	84	100	97	0	66	34	31	47	40	0.8
FH-X-16	360.1	43.4–135.2	1101	27921	6683	79	100	97	0	63	21	27	44	34	0.5
FH-X-17	328.5	72.5–171.5	532	25808	5436	23	100	85	0	84	23	27	48	34	0.5
FH-X-18	320.7	80.1–170.1	224	18577	4251	70	100	97	0	66	37	27	44	36	0.9
FH-X-19	362.7	40.5–170.2	452	51854	5269	78	100	98	0	100	49	31	47	39	1.2
Note: *UCS from point load test.															

The variability of rock mass quality and strength is illustrated in **Figure 5-1**, where a core sample at about elevation 300 feet is shown at each of the five 2018 boreholes.

The RMR classification can be used to arrive at rock mass classification between very poor to very good. The Q system may be used to classify rock mass from exceptionally poor to exceptionally good. **Table 5-4** shows the RMR and Q value ranges corresponding to these descriptions.

Table 5-4
RMR and Q Classification Ranges and Corresponding Descriptions

RMR	Q	Description
-	0.001 to 0.01	Exceptionally Poor
-	0.01 to 0.1	Extremely Poor
<20	0.1 to 1	Very Poor
21 to 40	1 to 4	Poor
41 to 60	4 to 10	Fair
61 to 80	10 to 40	Good
81 to 100	40 to 100	Very Good
-	100 to 400	Extremely Good
-	400 to 1000	Exceptionally Good

Based on these ranges, and the classification results shown in **Tables 5-3 and 5-4**, the classification for the bedrock at the alignment area is poor to fair based on RMR system and very poor to poor (mostly very poor) based on the Q system.

Attachments to Section 5

1. 2018 Boring Logs
2. 2018 Rock Core Descriptions
3. 2018 Rock Core Strength Data

Borehole/Run	FH-X-15/9
Elevation (ft)	308.9 - 303.9
Recovery	100
RQD	62
Pt. L. Index (psi)	529
UCS average (psi)	11638
UCS range (psi)	1848 - 25696
RMR	47



Borehole/Run	FH-X-16/7
Elevation (ft)	303.1 - 293.1
Recovery	99
RQD	9
Pt. L. Index (psi)	258
UCS average (psi)	5676
UCS range (psi)	1100-15818
RMR	31



Borehole/Run	FH-X-17/6
Elevation (ft)	304.5 - 299.5
Recovery	68
RQD	0
Pt. L. Index (psi)	234
UCS average (psi)	5148
UCS range (psi)	5148
RMR	31



Borehole/Run	FH-X-18/3
Elevation (ft)	305.7 - 295.7
Recovery	100
RQD	41
Pt. L. Index (psi)	230
UCS average (psi)	5060
UCS range (psi)	924-9768
RMR	39



Borehole/Run	FH-X-19/7
Elevation (ft)	303.7 - 293.7
Recovery	100
RQD	23
Pt. L. Index (psi)	270
UCS average (psi)	5940
UCS range (psi)	726-51854
RMR	31



Orange Tunnel Concept:
Rock Core Photos and Properties for Core Runs at About 300 Feet
Figure 5-1

I-81 Viaduct Project

4. 2018 Soil Test Results
5. 2018 Rock Mass Classification Summary

6. VENTILATION AND FIRE SUPPRESSION

Tunnel Ventilation

Effective ventilation is necessary to maintain a safe environment within a roadway tunnel. During normal and congested traffic conditions, exposure to pollutants such as carbon monoxide is harmful to the health of motorists and is life threatening if threshold levels are exceeded. Contaminated air discharged through a tunnel portal can potentially increase ambient pollution levels outside the tunnel to unacceptable levels in cases where the required dispersion is not achieved. In the event of a fire emergency, provision of a safe motorist evacuation path requires mechanical ventilation to control the flow of smoke and gases produced by the fire.

A mechanical tunnel ventilation system performs the following functions:

- Dilutes vehicle emissions during normal and congested tunnel operations to maintain a safe environment inside the tunnel.
- Limits the amount of contaminated air that is discharged through a portal.
- Controls heat and smoke to allow for safe evacuation of motorists and facilitate firefighting operations in the event of an emergency condition involving a fire.

At this stage of design for the Orange tunnel concept, it has been assumed that ventilation buildings would be required to ensure that the ventilation system would not negatively affect the area in the vicinity of the tunnel portal.

Tunnel ventilation systems for the Orange tunnel concept would be designed in accordance with the applicable local and national codes and regulations. Pollutant concentrations within the tunnel would comply with the following EPA criteria:

- Carbon Monoxide (CO): 120 parts per million (ppm) for up to 15 minutes
  65 ppm for up to 30 minutes
  45 ppm for up to 45 minutes
  35 ppm for up to 60 minutes
- Oxides of Nitrogen (NOx): Nitric Oxide (NO) 25 ppm
  Nitrogen Dioxide (NO2) 3 ppm
- Haze: K = 0.005 meter-1 where K is an extinction coefficient

Fire life safety provisions would comply with the requirements of the authority having jurisdiction (AHJ), typically the local fire department and the current version of National Fire Protection Association (NFPA) 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways. Per NFPA 502, the ventilation system in unidirectional tunnels must maintain "tenability" and prevent "backlayering"—the movement of smoke and hot gases counter to the direction of the ventilation airflow—by producing a longitudinal air velocity that is calculated on

the basis of critical velocity in the direction of traffic flow. A tenable environment in a road tunnel is defined in NFPA 502 as "an environment that permits evacuation or rescue, or both, of occupants for a specific period of time." Backlayering will not occur if the air velocity in a tunnel exceeds the minimum, critical velocity.

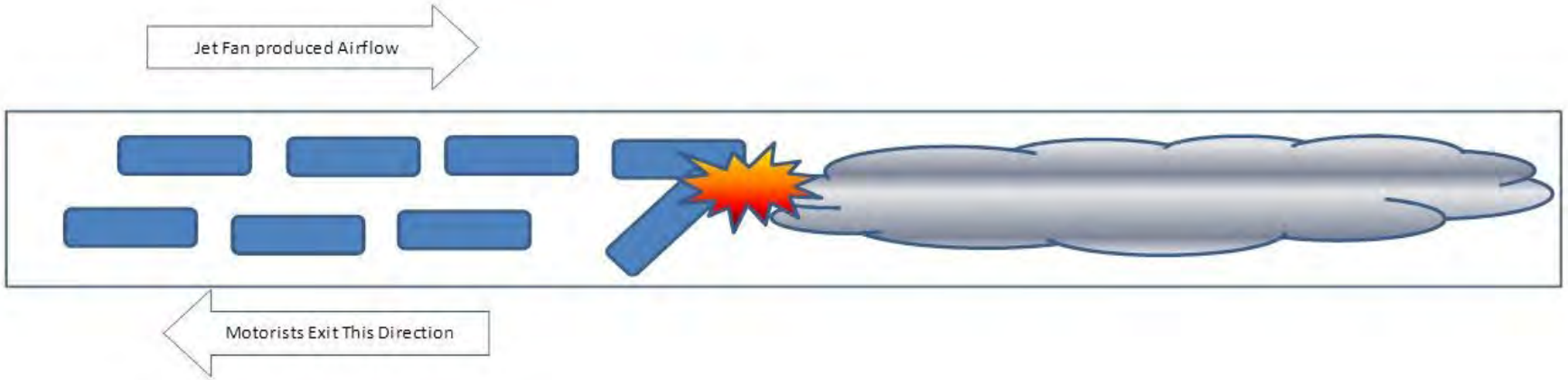
For the Orange tunnel concept, a jet fan–based longitudinal ventilation system in each tube is assumed. This type of system employs a series of axial flow fans that are typically mounted at the ceiling level of the tunnel roadway. Jet fans are factory fabricated units designed to produce a high-velocity discharge that in turn induces longitudinal airflow throughout the length of the tunnel. Air is drawn in from the entrance portal and discharged through the exit portal. Pollutant concentrations reach maximum levels in the vicinity of the exit portal. This type of system is relatively simple to install, maintain, and operate and also tends to minimize the number of components. For example, no dampers are required.

The tunnel jet fans would be provided with sound attenuators selected to reduce jet fan noise such that sound levels would not exceed 85 dbA at a height of five feet above the tunnel roadway when all jet fans are operating.

Typically, during normal free-flowing traffic conditions, piston action induced airflow would be sufficient to maintain tunnel emission concentrations at acceptable levels. In the event of traffic congestion, jet fans would operate to produce airflow in the same direction as traffic flow to limit emission concentrations to acceptable levels. During both free-flowing and congested traffic conditions, portal ventilation fans would operate to limit the amount of contaminated air that is discharged through the tunnel portals. To minimize any adverse effects on adjacent occupancies, these ventilation buildings would exhaust air to the atmosphere through stacks that are sufficiently tall to ensure effective dispersal of pollutants.

In the event of an emergency condition, jet fans would operate to produce the required flow rate in the direction of traffic flow as shown in **Figure 6-1**. In this scenario, vehicles located downstream (i.e., between the fire and the exit portal) of the incident would continue out of the tunnel. Motorists trapped upstream (between the entrance portal and the incident) would evacuate toward the entrance portal into a stream of outdoor air. The estimated critical velocity that would be required to prevent backlayering and support motorist evacuation is 644 feet per minute. The resulting airflow rate is estimated as 568,000 cubic feet per minute. These figures are preliminary and would require updating if the tunnel proceeds to a detailed design phase. The design fire heat release rate would be 90 megawatts and represent a heavy goods vehicle fire that has been suppressed by a fixed, water-based firefighting system. Without a suppression system installed in the tunnel, the fire heat release rate would be 200 megawatts per NFPA 502.

Each tube would be served by approximately 20 jet fans, mounted in pairs in the upper region of the tunnel cross section. To provide redundancy, the final design would allow for a pair of jet fans to be disabled in each tunnel tube while still providing required airflow to control smoke and heat during a fire. In addition, jet fan sizing also would need to account for adverse winds acting on the exit portal. The tunnel jet fans and their related components would be designed to remain operational while exposed to an environment and an air stream temperature of 482ºF for one hour. The jet fans would be reversible to allow the airflow direction in the non-incident



Orange Tunnel Concept:
Longitudinal Ventilation with No Traffic Congestion
Figure 6-1

tube to be changed during a fire emergency. This is important since the non-incident tube would be intended to provide a point of safety for motorists evacuating from the incident tube. If the airflow direction in the non-incident remained opposite to the flow direction in the incident tube, cross contamination could occur at the portals.

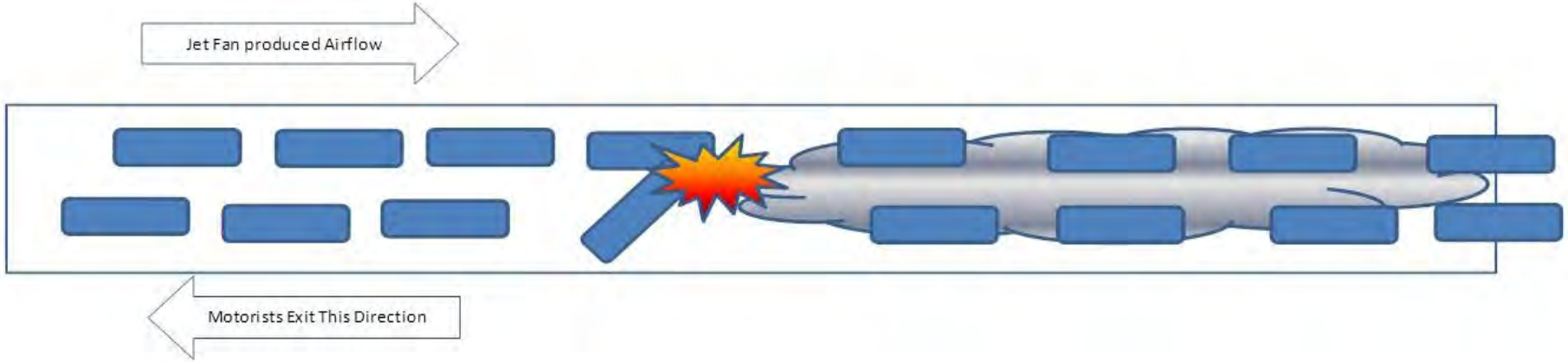
The jet fan system described above would be suitable for cases in which tunnel congestion is typically not experienced. If congestion would result in vehicles being stopped on both sides of a fire site as shown on **Figure 6-2**, an alternative to a longitudinal system would need to be identified. The alternative system would likely result in the need for ducts running the full length of each tunnel tube. Ducts would be equipped with multiple dampers uniformly spaced throughout the tunnel. Dampers would be selectively opened in the vicinity of a fire to extract smoke.

The tunnel ventilation control system for the Orange tunnel concept would allow for remote jet fan operation and monitoring via the tunnel supervisory control and data acquisition (SCADA) system. Tunnel ventilation fan operating modes would be identified and programmed into the control system, as necessary, to limit tunnel pollutant concentrations. Time weighted average measurement data for carbon monoxide would be used for monitoring and initiating the necessary ventilation system response to meet the carbon monoxide levels and exposure durations. Tunnel environmental monitoring equipment/sensors would be furnished and installed at suitable locations throughout each tunnel tube. The sensors would monitor and record carbon monoxide (CO) concentration, nitrogen oxides (NOx) concentration, tunnel temperature, and tunnel visibility/haze. The output signals from these systems would be incorporated in the tunnel ventilation control system and used to maintain the tunnel environmental conditions as required. Emergency (fire) condition fan operating modes would be identified and programmed into the tunnel ventilation control system as needed to meet NFPA 502 requirements regarding prevention of backlayering. The emergency ventilation control system would be integrated with the automated operation of all required fire/life safety systems.

The tunnel ventilation concept for the Orange tunnel concept is illustrated on drawings M-1 through M-9 in **Section 13.5**.

Tunnel Fire Suppression System

The tunnel would be equipped throughout with a wet standpipe and a water-based fixed firefighting system (FFFS). Standpipes are mandated by NFPA 502 and simplify firefighting operations by providing a piping system with uniformly spaced hose connections that allow first responders to manually apply water to a fire. The FFFS for the Orange tunnel concept would consist of a deluge type sprinkler system. Deluge systems use open sprinkler heads and are connected to a water supply through a deluge valve that is opened by the operation of a heat detection system. The length of each tube would be subdivided into sprinkler zones. The fire detection system would also be zoned to match the sprinkler zones. When the detection system in a particular zone is activated, water discharges through all of the sprinkler heads in that zone. The entire piping system would be wet with the exception of the piping between the deluge valve and the sprinkler heads. The standpipe and deluge sprinkler system would use the same water supply, fire pumps, and fire main. The system would be equipped with two fire pumps, with one pump serving as stand-by. A jockey pump would also be provided to account for any



Orange Tunnel Concept:
Longitudinal Ventilation with Traffic Congestion
Figure 6-2

piping system leakage. The proposed fire suppression system for the Orange tunnel concept is illustrated on drawings M-3, M-5, M-6, M-7, M-8, and M-9 in **Section 13.5**.

Per NFPA 502, fire suppression systems must be connected to an approved water supply that is capable of supplying the system demand for a minimum of one hour. It has been verified that the local water utility can accommodate the required flowrate. If this were not the case, it would be necessary to provide a suitably sized water storage tank on site.

The standpipe system would be equipped with hose connections, which would be uniformly spaced at maximum 275-foot centers in each tube. In addition, hose connections would be positioned so that no location on the protected roadway would be more than 150 feet from a hose connection. The estimated flow rate would be 500 gallons per minute, which represents two fire hoses operating at 250 gallons per minute each. The standpipe system is also required to have a minimum of two fire department connections that are remotely located from each other. Fire department connections must be accessible to fire department vehicles and must also be protected from vehicular damage by means of bollards or other approved barriers. It is also necessary that a fire hydrant be located in vicinity of the fire department connections. Installation of new fire hydrants may be required to meet local jurisdictional requirements.

FFFS are a conditionally mandatory NFPA 502 requirement. Fire suppression systems of this type are intended to limit the rate of fire growth and reduce the heat output. FFFS improve the ability of first responders to fight fires and assist in motorist evacuations. If activated early enough in the incident, an FFFS may improve the time available and the ability of motorists to evacuate. A reduction in fire heat release rate (HRR) also results in a corresponding decrease in required emergency ventilation flow rates. Reductions in heat various release rates are shown in **Table 6-1**, excerpted from 2017 NFPA 502, Table A.11.4.1.

Table 6-1
Heat Release Rates

Vehicles	Experimental Heat Release Rate (HRR)		Representative Heat Release Rate		Experimental Heat Release Rate with FFFS	
	Peak HRR (mw)	Time to Peak HRR (min)	Peak HRR (mw)	Time to Peak HRR (min)	Peak HRR (mw)	Time to Peak HRR (min)
Passenger car	5–10	0–54	5	10	-	-
Multiple passenger cars	10–20	10–55	15	20	10–15	35
Bus	25–34	7–14	30	15	20	-
Heavy goods truck	20–200	7–48	150	15	15–90	10–30
Flammable/ combustible liquid tanker	200–300	-	300	-	10–20	-

To reduce water demand, each tunnel tube would be in subdivided into discrete zones. The estimated zone length would 82 feet, which would result in approximately 89 zones per tunnel tube. An allowance for two zones to be activated simultaneously would be made. The estimated application density would be 0.25 gallons per square foot, resulting in an overall flow of 820

gallons per minute per zone. The total FFFS flow rate for all activated zones would be 1,640 gallons per minute.

Per 2017 NFPA 502, freeze protection is required. In this case, the suppression system would be designed to circulate warm water through the piping system to prevent freezing. Piping in the cross passages and the deluge valve enclosures would be heat traced. The water heating and circulation system would consist of the following components:

- Three boilers with associated hot water pumps. Two boilers and associated hot water pumps would operate in a lead-lag mode, and the third boiler and associated hot water pump would serve as stand-by. Lead and lag boilers and pumps would alternate after each operating cycle.
- A heat exchanger to isolate the heating system from the fire main.
- Two circulation pumps, with one pump serving as stand-by.

The FFFS would operate upon a signal from the fire detection and alarm system. In addition, the FFFS would also require integration with the tunnel ventilation and traffic control systems. The SCADA system would also be used to monitor system performance and readiness.

Emergency Egress

Tunnel cross passages would be used for motorist evacuation in accordance with NFPA 502 requirements. People in the incident tube would exit into the adjacent tube via uniformly spaced cross passages. Per NFPA 502 requirements, cross passage spacing cannot exceed 1,000 feet. The actual spacing would be subject to AHJ approval of a NFPA 502 mandated analysis that addresses the following issues:

- Category, including types and classes of tunnels.
- Design fire size and fire/smoke development.
- Egress analysis.
- Fire life safety systems analyses to provide tenable environment within the tunnel, including the type and operation of tunnel ventilation, detection, fire protection, and control systems.
- Traffic management system.
- Emergency response plan.
- Consideration of uncertainties of people's behavior during a fire event and of those who are unable to self-rescue.

There is insufficient information available at the current stage of the tunnel design to complete this analysis. For the purpose of developing a cost estimate, cross passage spacing was conservatively assumed to be 800 feet.

In addition to spacing, NFPA 502 also requires the following design features:

- Traffic control systems designed to stop all traffic operation in the adjacent non-incident tunnel.

- One and one-half hour fire rated emergency exit door assemblies.
- The force required to open the doors may not exceed 50 pounds under the worst-case ventilation differential pressure.
- Emergency exit doors and associated hardware designed to withstand positive and negative pressures created by passing vehicles.
- Pressurization of emergency exits.

In cases where tunnel portals are below surface grade, the surface would be made accessible by a stair, vehicle ramp, or pedestrian ramp.

The emergency egress concept is illustrated on drawings M-1, M-2, and M-8 in **Section 13.5**.

Ventilation Buildings Urban Design Considerations

Tunnel ventilation buildings are required near both the north and south tunnel portals. The buildings would each include an approximately 30-by-40-foot ventilation structure, atop which would stand two, 12-foot diameter, 60-foot-tall ventilation stacks (**Figure 6-3** illustrates a potential ventilation building and includes a photograph of an existing ventilation building for the Alaskan Way Viaduct Replacement Program tunnel). The buildings would provide ventilation to the tunnels as well as serve as a hub from which electrical and fire-suppression utilities would be distributed throughout the tunnels and cut-and-cover roadway segments.

Each tunnel ventilation building would be constructed in the vicinity of the tunnel portal on the outbound-traffic-end of the tunnel it serves. The buildings would include a small engineering, operations, and maintenance staff for whom a small amount of parking would be provided.

The aesthetic treatment, building materials, facades, street-frontage, and site design for the tunnel ventilation buildings would be influenced by final site location. Architectural style would be context-sensitive in relation to existing structures and programs in the area and include regionally-appropriate building materials.

Tunnel ventilation buildings have been successfully integrated into the urban fabric of many cities. In some instances, ancillary functions such as retail, commercial, parking, or hospitality have been used to wrap the core ventilation structure. Appropriate architectural treatments will depend on final siting and the building's relationship to city streets and surrounding context per local zoning and other design considerations. Refer to the following conceptual plans contained in **Section 13.5.**

M-1 Tunnel Ventilation System Schematic – 1

M-2 Tunnel Ventilation System Schematic – 2

M-3 Tunnel Fire Suppression System Schematic

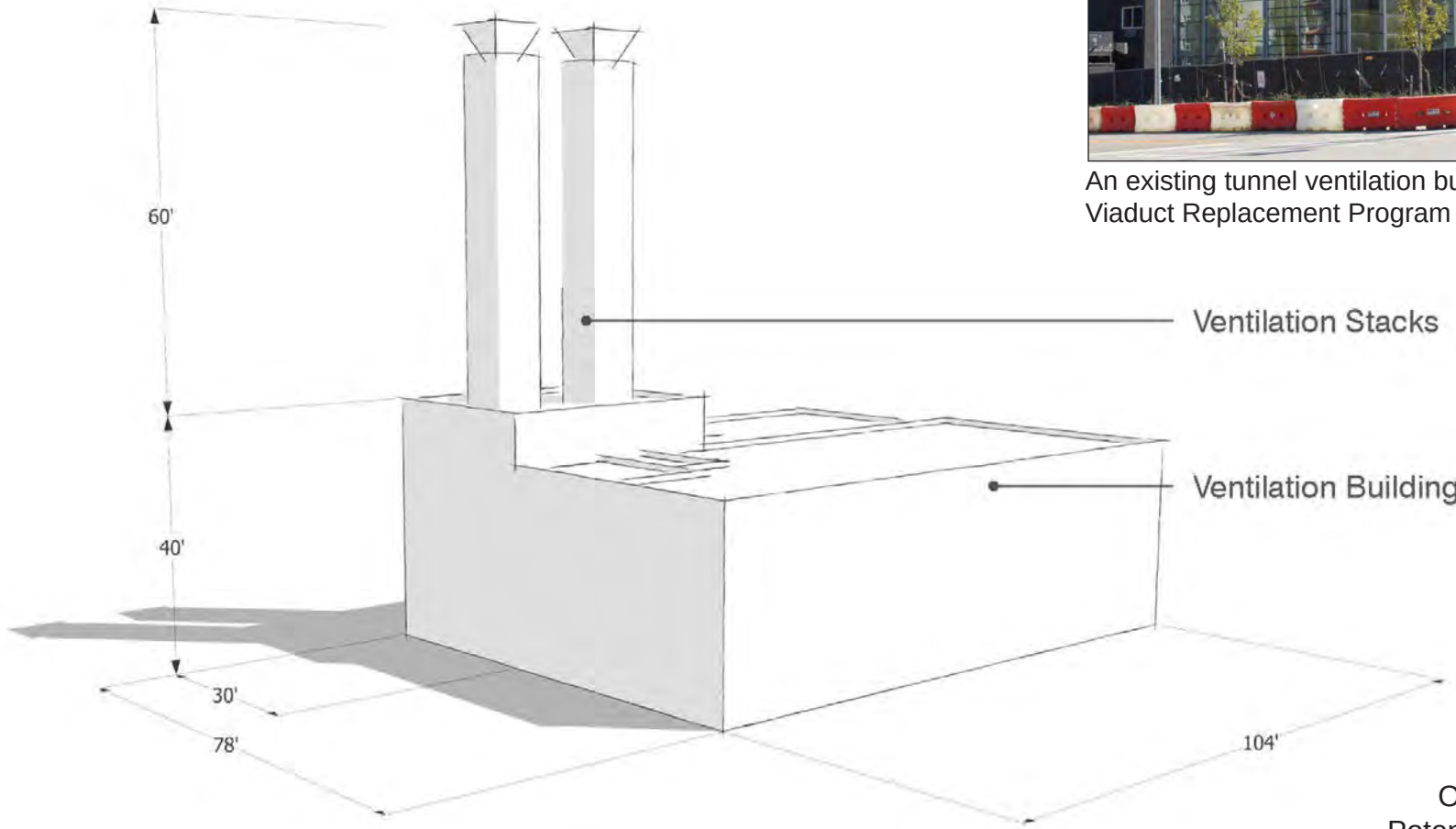
M-4 Tunnel Drainage System Schematic

M-5 North Ventilation Building Partial Plan – Mechanical

M-6 South Ventilation Building Partial Plan – Mechanical



An existing tunnel ventilation building for the Alaskan Way Viaduct Replacement Program tunnel in Seattle, WA



Orange Tunnel Concept:
Potential Ventilation Building
Figure 6-3

M-7 North Ventilation Building Section – Mechanical

M-8 Typical Tunnel Section – 1

M-9 Typical Tunnel Section – 2

7. DRAINAGE

Overview

The existing storm sewer systems that serve the I-81 and I-690 highway segments within the Central Study Area are tributary to Onondaga County and City of Syracuse combined sewers and since the area of disturbance would be greater than one acre, the project is subject to the requirements of the New York Department of Environmental Conservation's (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002). A Stormwater Pollution Prevention Plan (SWPPP) with the appropriate stormwater management and sediment and erosion control measures would be developed for the Project during final design.

The existing combined sewer systems are overburdened during wet weather events and do not meet current design standards. As such, the combined sewer system is vulnerable to overflows and the entire Central Study Area is under substantial restrictions to control water quantity and quality, including a consent order to the county, requiring a reduction of flows to the combined sewer system.

As part of the Orange tunnel concept, a reduction in flow to the existing combined sewer system can be accomplished for the portion of the Central Study Area that is south of Butternut Street by installing a new separated drainage system consisting of large diameter storm sewer trunk lines along I-81 and I-690. This proposed drainage system is the same concept as developed for the Viaduct and Community Grid Alternatives and is presented in more detail in the **Chapter 5** and **Appendix A-1** of the DDR/DEIS. A description of the drainage facilities specific to the tunnel segment of this concept follows.

Tunnel Drainage

A drainage pumping station would be required due to the existence of a low point within the tunnel. NFPA 502 requires a drainage system of sufficient capacity to receive the rate of flow from all design roadway sources without causing flooding of the roadway. The minimum design flow rate must account for the following:

- The design spill rate for fuel or other hazardous liquids,
- The standpipe system discharge rate,
- The fixed water based firefighting system discharge rate, and
- Environmental sources such as rain or snow.

To prevent the spread of hazardous or flammable liquids and limit flame propagation, NFPA 502 also requires a drainage collection system that is designed to capture spills of hazardous or flammable liquids. In this case, the drain inlets locations would be coordinated with the deluge

sprinkler zones in a manner that diverts any fuel or other liquid spill to the main drain before the spill can spread to an adjacent fire zone.

The pumping station would consist of two primary pumps, each sized for 100 percent of the maximum inflow, and a third pump sized for routine day to day operations. The capacity of the third pump would likely be substantially smaller than that of the primary pump since the maximum inflow that would be experienced during a fire event would likely be very much larger than routine day to day drainage inflows.

A separator and storage tank would be necessary to protect the local utility from hazardous and flammable liquid spills. The separator would be required to meet codes and requirements of the local jurisdiction and water/sewer utility. Storage tanks, wet wells, and service chambers of pumping stations would be designed as hazardous locations in accordance with NFPA 70 and NFPA 820.

The tunnel drainage concept is illustrated on drawings M-4, M-8, and M-9 in **Section 13.5**.

8. ELECTRICAL POWER DISTRIBUTION

The electrical system for the Orange tunnel concept would supply power to provide safe, efficient, and continuous operation of the entire system. The design of the electrical system would be coordinated with the requirements of the local power company providing power services to the system. Primary permanent power services would be located at two ventilation facility buildings:

- South Ventilation Facility (SVF), located near the Orange tunnel concept's southern portal, and
- North Ventilation Facility (NVF), located near the northern portal.

The temporary tunnel boring machine (TBM) power service facilities would be located as required to support TBM operations at both TBM launch sites.

Electrical power would be supplied to all the equipment in the fan plants, the tunnel ventilation system and associated smoke/fire dampers in the tunnels, cross-passageways (caverns), pumps, fire, security, and other alarm communication systems in tunnels, and to all tunnel and facility lighting systems. Electrical standard requirements and applicable local codes would be used to supplement these criteria.

The facilities electrical design would ensure that the electrical service is properly sized and that electrical equipment spaces are properly located and sized to facilitate the installation and maintenance of equipment. The design of the facilities electrical system would provide for their safe, reliable, and continuous operation. Accessibility would be provided to permit removal and replacement of major equipment. It is intended to promote uniformity in the design approach and to standardize the type of equipment and its location throughout the entire electrical distribution and lighting system. The electrical system would include facilities electrical requirements for the following:

- Electrical service and distribution systems

- Facility and tunnel lighting
- Facility and tunnel fire alarm system
- Heating, ventilating, and air conditioning systems (HVAC)
- Emergency power generation, storage, and distribution systems
- Tunnel ventilation system and smoke/fire dampers in tunnels
- Drainage pumping
- Cross-passageways (caverns)
- Illuminated signing
- Grounding systems
- Lightning protection system
- Power to control, communications, and security systems

Emergency Loads

The following loads would be connected to the generators and/or Uninterrupted Power Supply (UPS) emergency power systems:

- Plant fan room access shaft emergency lighting
- Emergency exit stair lights
- DC/battery system inverters for critical AC loads (not powered by built-in, stand-alone UPSs)
- Closed-circuit television (CCTV), intrusion alarm, facility access, and other security systems
- Telephone systems
- Radio system
- Supervisory control and data acquisition (SCADA) systems
- Equipment in control and communication cabinets
- Fan plant auxiliary AC emergency loads
- Fire/life safety systems
- Sump pumps
- Fire alarm control and management panels
- Communications rooms
- Field equipment needed for life safety systems

Reliability

The incoming electric service design would be based on two incoming power sources, one normal and one reserve. The redundancy levels would ensure a high service availability that in turn

would allow electrical services to operate the tunnel ventilation and other life safety systems at 100 percent capacity under emergency conditions with the loss of either one service feeder. Local utility company service power feeders at one facility location would originate from two utility substations. Service feeders from utility sources that are not in-phase would be isolated from each other through normally open tie breakers.

Based on the high electrical service reliability and redundancy levels throughout the system, emergency backup generator power would not be required for the tunnel fan ventilation loads, per NFPA 130. An emergency generator at the NVF and the SVF buildings would be provided as a back-up power supply to critical/life safety systems, with the exception of the large fan loads. These generator loads would include drainage pumps, emergency lighting, and critical communication and controls as indicated on one-line diagrams.

Additionally, selected control, communication, lighting, and other critical or life safety systems would also be supported by UPS system(s) to prevent unwarranted system disruptions or interruptions during power outages or between power off and generator start-up sequencing. UPS would be provided for emergency and stair lighting and system-wide communications equipment in the electrical and mechanical rooms. Stand-alone UPS systems, separate from the 125V DC battery system (e.g., chargers and batteries incorporated within emergency exit lights), may also be included as needed.

Incoming Electric Utility Services

It is anticipated that the incoming service nominal voltage for the two (NVF and SVF) facilities would be 13.2kV Medium Voltage (MV, sometimes called “High Tension”) from the local utility company for all permanent services at the designated locations. Design of power facilities for 13.2kV services would comply with local codes and local utility requirements as well as all the applicable national (ANSI) and IEEE codes. The service facilities design would follow local utility Customer Substation Requirements (CSR) design documentation guidelines.

Electric Service Connections

The permanent tunnel power service facilities (the service substations), comprising 13.2kV switchgear, 4.16 kV switchgear, and the step down/isolation power transformers, would be located inside the SVF and NVF.

All utility feeders would be capable to be loaded continuously, each up to the maximum capacity of the facility loads, for a maximum 24-hour period on an emergency basis. Each 13.2kV service feeder would require 15kV cables and would be routed underground through existing and/or new duct and manhole systems. Service substation design would minimize potential switching interruptions upon the loss of one or two feeders to maximize service availability and to minimize possible disruptions of critical emergency life safety systems (such as the tunnel ventilation system).

The service substation design at the NVF and SVF buildings would be a radial type service, with service feeders not to be paralleled at any time in compliance with the local utility guidelines. The service feeder arrangement is based on a Normal-Reserve arrangement. All the new utility

service feeders would be routed to the NVF and SVF buildings through new underground duct/conduit systems in new underground duct bank systems to reach the new ventilation buildings. The service substation electrical equipment related to the primary service feeders would need to be reviewed and approved by the local utility to ensure compliance with its requirements. Service metering equipment would be owned by the utility company (current transformers, or CTs/potential transformers, or PTs). Telephone line connections would be provided for utility metering data collection.

NVF and SVF Service Power

A minimum of two utility service feeders in a Normal-Reserve arrangement with an in-between Normally Open (N.O.) tie would be the preferred service configuration, subject to utility availability. The primary incoming service feeders would be connected via primary 13.2kV (15kV class) breakers and step-down 13.2kV/4.16kV transformers supplying a secondary 4.16kV (5kV class) double-ended switchgear split bus. The 4.16kV tie breakers would be interlocked so that no primary feeders are paralleled in compliance with the utility requirement.

Two utility service feeders originating from separate substation sources would be provided in a primary service switchgear with bus tie configuration. Two branch service feeders would be connected via 13.2kV (15kV class) primary breakers and isolation/step-down 13.2kV/4.16kV transformers supplying a secondary ring bus/collector bus 4.16kV (5kV class) switchgear split bus. The 4.16kV collector bus/ring bus tie breakers would be interlocked normally open to prevent the two sources from paralleling.

For the primary network system configuration, the primary breakers would need to be fitted with a transfer trip connection to be synchronized with the substation feeder breaker protection system. This additional protection control and communication system would require additional underground duct and conduit system routed to the utility facilities for transfer trip communication wiring and remote monitoring.

Critical and Emergency Loads

Emergency Backup Generators

The diesel-driven emergency generators would consist of the generator, switchboard, transfer switch, fuel supply, fuel storage, accessories, and wiring as required to provide emergency power for loads including:

- Egress stair lighting for emergency ventilation fan and electrical rooms
- Communication, SCADA, and fire detection and alarm systems
- Building emergency ventilation fans (not tunnel ventilation fans) and HVAC equipment for critical equipment rooms including communication UPS and other critical equipment rooms
- Tunnel emergency lighting
- Drainage pump stations

Generator Rating

The emergency generator output would be 480/277 volts, 60 Hertz, three-phase, four-wire, with kW capacity as determined by the design calculations. Both the prime mover and the generator would be capable of satisfactorily carrying a load of 10 percent over the net continuous rated generating capacity.

Fuel System

The emergency generator would operate on diesel fuel. Sufficient tank storage would be provided to support 36 hours of operation at rated full load output. Below grade storage tanks would conform to state and local code requirements and NFPA 110, 130, 30, and 37.

UPS Systems

The UPS system would be completely solid-state except for a maintenance by-pass switch, which would be electro-mechanical. The UPS system would be designed for unattended operation including automatic restart and automatic retransfer, monitoring, and remote monitoring capabilities. The UPS system would be 1+1 redundant type with paralleling and maintenance bypass output. The paralleling cabinet would provide additional redundant operation/configuration for the two real-time in-phase synchronized, load sharing UPS modules, each with a dedicated battery string.

The UPS systems would include a predictive on-line battery monitoring and data management system (BMDMS) with test, analysis, and remote monitoring control capabilities. Unless noted otherwise, the BMDMS vendor would provide all required hardware and software integrated to the UPS hardware and software systems. The UPS equipment cabinets (except batteries) would be housed in a dedicated room with protected environment. The UPS batteries would be in a separate, properly environmentally conditioned and monitored dedicated room.

The UPS system would consist of the following sub-systems:

- Two UPS modules with isolation/step down transformers.
- Two battery disconnect switches
- Storage batteries
- Paralleling cabinet with isolation/step down transformer and maintenance bypass.
- Battery monitoring and data management system for each battery string.

The UPS units would consist of the following major components:

- Rectifier/charger with input filter
- Inverter
- Static bypass switch
- Maintenance bypass switch

- Protective circuit breakers coordinated with the upstream and downstream distribution system.

Auxiliary DC Distribution System

The DC distribution system would comprise redundant battery banks, inverters-battery chargers, DC distribution panel(s), and rectifiers for certain critical AC loads requiring uninterrupted power supply. Monitoring for a ground connection of the DC system would be continuous. The battery banks would be in separate battery rooms. Battery chargers for each of the two battery banks would be fed from separate emergency AC feeds.

125V DC Control Power

Control power would be ungrounded 125 volts DC and would be fed from redundant battery banks via DC ATS. The auxiliary control power of the 13.2kV service substations supplied by primary area networks (parallel type services) would comprise a fully redundant charger, battery and DC power panel systems with inter-switchable AC power sources (via two AC ATS units), and DC battery string systems (via two DC ATS units).

125V DC Storage Batteries

Storage batteries would be UPS cycle duty type, industrial flooded lead acid cells, of minimum 20-year life cycle under normal conditions. Each battery string associated with a battery charger would be in a separate battery room. Each battery string would consist of a series of 60 battery cells. The discharge capacity of the battery charger systems would be compliant with the utility requirements. Batteries would be rated on the DC load profile with their ability to supply a constant DC current for eight hours for protection, control, and SCADA. The batteries would have sufficient capacity to simultaneously trip and then operate the spring charging motors for a single fault maximum number of circuit breakers in the substation with a single battery in service while carrying the substation steady state DC load without the aid of the battery chargers.

Each battery room would be monitored for H2 level and properly ventilated. The ventilation fan would run continuously from a power source backed up by emergency generation power. H2 level exceeding the limit, and/or fan not running, would result in both the local alarm and the SCADA alarm. Additionally, where required by local jurisdiction, an interlock to charger would be provided to prevent operation if the room ventilation fan is not operating.

Provision for System Growth

AC power service facilities—including all switchboards, distribution transformers, feeders, panelboards, and motor control centers—would be designed to permit an increase of 20 percent in load. Space would be provided at each unit substation for the installation of one additional switchboard cubicle.

9. LIGHTING

Overview

The fan plants, tunnels, and facilities areas for the Orange tunnel concept would be designed to facilitate safe, efficient, and continuous operation, and the lighting would reinforce these goals.

The lighting would acknowledge and incorporate concerns for architectural context, visual acuity, facility identity and image enhancement, energy conservation, ease of maintenance, and capital cost.

Design implementation requirements (such as illuminance and uniformity criteria, parameters for luminaire selection and/or development, luminaire location parameters, light sources, documentation, calculation requirements) are addressed below.

Sustainability

Energy efficient technologies are mandated to achieve compliance with all applicable sustainability directives, both state and federal, such as being more energy efficient, environmentally aware and reducing energy intensity under Federal Executive Order 13423; and use of energy efficient products under Federal Executive Order 13221.

The lighting power density (watts per sq. ft.) allowed for each area or room would not be greater than the maximum imposed by the state energy codes.

LED light sources would be utilized wherever feasible. The use of recycled materials in all-new lighting system components would be encouraged.

Lighting and Wayfinding

The lighting would be designed to enhance way finding by a variety of means, including:

- Providing emphasis at transitions. For example, higher light levels at stair top and bottom landings, as well as areas of potential hazard
- Providing emphasis on directional signage indicating egress paths as well as informational signage to allow for quick recognition of decision points and the perception of danger
- Providing for a sense of lit destination, for example, by emphasizing vertical surfaces at entrances and corridor nodes
- Adjusting for visual transition and adaptation throughout the course of the day.

Maintenance

Ease of maintenance for lighting fixtures and system components would be a major consideration for the lighting design. Specific strategies would include:

- Location of luminaires and lighting system components for feasible, safe, and convenient maintenance.
- Location of luminaires to maximize personnel safety and minimize the potential for deliberate vandalism and/or inadvertent damage.
- Tool-less access to luminaires and lighting system components would be provided wherever feasible.

Facility Area Lighting Considerations

The lighting design would provide the intended quality and quantity of light required for each individual area to address security requirements and to consider all design factors.

Power sources for lighting would be redundant, transferring to the alternate supply feeder or transformer in the event of loss of the primary power source. Standby emergency power generation and/or uninterruptible power source (UPS) would supply all emergency lighting, including tunnel lighting in the event of loss of both power supplies.

Facility Lighting

For all facility areas, sufficient lighting for specific tasks would be provided. In control and equipment rooms, as well as substations, special attention would be given to the illumination of vertical surfaces such as control panels, switches, and meters. Emergency lighting would be provided in all critical areas.

Where tasks requiring high vertical illuminance occur, luminaires would be located and shielded to provide sufficient light on task without causing glare on equipment or computer screens. In general, luminaires would be placed so that the potential for disabling glare is completely avoided.

Illuminated LED type, with sealed emergency battery pack and standard deep cycle battery conditioning, self-test and self-diagnostic circuitry exit signs would be strategically located to indicate egress paths in facility buildings.

Exterior Lighting

The primary function of site lighting is to provide illumination for safety and security at exterior areas of ventilation and other facilities. The design would consider pedestrian walks, parking areas, vehicular circulation, and facility entrances. In addition to lighting for safety, perceived security and vandalism deterrence would be prime considerations.

Tunnel Lighting

Illumination of tunnel roadways would be sufficient for the safety of personnel performing normal maintenance. Emergency exit lights would be fed from the emergency power system. Approximately 50 percent of the lighting fixtures in egress exit shafts and stairways would be connected on emergency circuits. Emergency lighting for stairs would be designed to emphasize illumination on the top and bottom steps and landings.

Special consideration would be given to the location and frequency of luminaires at cross passages to provide for additional lighting while reducing the potential for interference with normal operations. Luminaires would be located above the roadway shoulder and several feet below the crown of the tunnel to minimize the possibility of obstruction by stratified smoke during a fire. Luminaire locations would be selected to avoid critical flicker frequencies (5 to 10 Hertz) and to prevent the potential for direct horizontal glare and obscuration by smoke.

Additional lighting would be provided near the portals for daytime use only. These luminaires would be used to reduce the apparent contrast between daylight and tunnel lighting from the vehicle driver's perspective. Portal lighting fixtures would be energized during daylight hours by

means of a photocell-controlled contactor located to provide an unobstructed view of the sky. A recommendation for a lighting level within the threshold, transition, and interior zones based on calculated data would be used to aid in visual adaptation.

Luminaires would attain an ingress protection rating of not less than IP 65 or NEMA 12 and would utilize energy-efficient, long-life sources.

Emergency Lighting

In the event of normal power failure, the emergency lighting would define a path of egress to assist in safe and orderly evacuation. All areas of the fan plant would have emergency lighting. Emergency lighting for stairs would emphasize illumination on the top and bottom steps and landings (five foot-candles at points of egress). Emergency lighting would also be provided for fan rooms; facility electrical, communication, or computer equipment rooms; maintenance facilities; and electrical substations.

Roadway tunnels would have emergency lighting sufficient for safe evacuation of patrons in conformance with NFPA 130. The same luminaires would supply normal lighting and emergency lighting in the tunnel. Tunnel emergency exits for egress to points of safety would be illuminated in accordance with all applicable codes. The power sources of tunnel lighting loads would be backed up by the emergency generator.

Design Implementation Requirements

Determination of Applicable Light Loss Factor

Light loss factors (LLFs) are used in the design process to adjust for the performance of luminaires to account for degradation of lumen output over time, as well as capturing certain factors relating to ballast, power, and other considerations. Light loss factors are input into calculations as modifiers to lamp lumen output, luminaire output, and surface reflectance. The performance of any lighting system, and calculations that attempt to describe such systems, would provide unrealistically high values if not modified by accurate LLFs.

Based upon factors normally present in roadway facility environments and luminaire and source characteristics recommended for use in such facilities, a light loss factor of 0.60 would be utilized; for tunnels, and a LLF of 0.75 would be used at all other facility areas.

Illuminance and Uniformity Criteria

Criteria for normal and emergency light levels are as recommended by IESNA. These criteria have been based upon lighting criteria and practice from national and international systems. The following factors would be considered:

- General illumination levels and uniformity criteria, provided for areas differentiated by program and function
- Horizontal and vertical illuminance requirements

- Day and night appearance, in terms of time (daytime to nighttime considerations) and in terms of accommodation (transition from bright to less-bright areas, and vice versa)
- Safety and security, including emergency lighting levels and uniformity requirements
- Potential liability concerns, especially with regards to perceived opportunities for slip and fall incidents and vandalism deterrence
- The impact of sustainability directives on lighting levels, particularly, the establishment of appropriate lighting power limits (lighting power allowance, as expressed in watts per foot).
- Uniform light levels at walking surfaces and at transition areas such as changes at grade (i.e., stairs) are mandated for reasons of public safety. Relative visual uniformity is an acknowledged contributor to perceived safety. However, architectural enhancement is normally created by contrast. An effort would be made to provide visual contrast without compromising safety or orientation.

10. UTILITIES

Overview

Because of the urban nature and size of the Project Area, there are an extensive number and network of utilities, both private and public, aboveground and below ground. A summary of the utilities and utility owners within the Project Area is included in **Table 10-1**.

Table 10-1
Existing Utilities

Owner	Type
Onondaga County Department of Environmental Protection (OCDWEP)	Sanitary Sewers, Combined Sewers, Sanitary Force Mains, and Storm Sewers
Onondaga County Water Authority (OCWA)	Water Transmission mains
City of Syracuse	Sanitary Sewer, Combined Sewers, Storm Sewers, Water
Syracuse University	Underground Telephone
Syracuse University	Underground Steam, Condensate and Chilled Water Service, and Return Lines
Alliance	Natural Gas Pipelines
National Grid	Natural Gas Pipelines, Underground Electric, and Overhead Electric
AT&T	Underground Fiber Optic
Verizon	Underground Fiber Optic Underground Telephone
Windstream	Underground Fiber Optic
Elantic	Underground Fiber Optic, Overhead Fiber Optic
Light Tower	Underground Fiber Optic, Underground Telephone
Level 3 Com	Underground Fiber Optic
Time Warner Cable	Underground Cable TV

Potential Utility Conflicts and Relocations

A summary of the major utilities, the utility owners, and the potential conflicts associated with the Orange tunnel concept is included in **Table 10-2**. For the purposes of this evaluation, major

utilities are defined as: all underground electric, fiber optic, or steam facilities (not including services), overhead fiber optic, underground gas lines (8 inches diameter or larger), water mains 16 inches in diameter or larger, and sanitary sewer and storm sewer trunk lines 24 inches in diameter or larger. Utilities of unknown size are also included. Because the depth of many underground utilities is not known, and because the depth of impacts from proposed construction is uncertain, impacts are assumed for any major underground utility in a reconstruction area.

There would be many more impacts to non-major utilities within the Project Area that are not included in this table, including such items as hydrants, valves, and services. The impacts to those items will need to be addressed as design advances. It is anticipated that some utility relocations would be reimbursable, and an estimate of costs has been included in the construction cost estimate for this tunnel concept.

Table 10-2
Potential Utility Conflicts – Orange Tunnel Concept

Legend:
I: Impacted due to construction.
NI: Not Impacted by construction.
U: Unknown.
Yes*: It is assumed the utility is a Transportation Corporation and would therefore be eligible for reimbursement. The actual corporation status will be determined at the time of relocation based on a review of current New York State Department of State records.

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
I-81: Southern Project Limits to E. Washington Street – Utility Impacts					
OCWEP	Sanitary Sewer 24” to 72”	24”-line crossing under I-81 at the center of E. Castle St. from the west project limit of E. Castle St. to line terminus	1,054	I	Yes
		48”-line crossing east-west through project limits at E. Raynor Ave.	275	I	Yes
		East Side of Almond St. from E. Taylor St. to Dyer Ct, and from Monroe Street to Cedar St.	1,943	I	Yes
		48" to 66" line on South side of Harrison St., crossing I-81 and Almond St. from West to East project limit	970	I	Yes
		36” line center of E. Genesee St. EB from Almond St. to end of base mapping	80	I	Yes
		Center of Madison St. from Almond St. to East Project Limits	135	I	Yes
		Crossing Cedar St. approximately 25 feet east of Almond St.	60	I	Yes
		24” line crossing under I-81 at the center of E. Castle St. from the west project limit of E. Castle St. to line terminus	1,054	I	Yes
OCWEP	Sanitary Sewer Force Main 4” to 14”	South side of Van Buren St. from Almond Street to Stadium Pl, with branch crossing Van Buren St. near Henry St.	1436	I	Yes
OCWEP	Storm Sewer 24” to 36” x 60"	24" on East Side of Almond St. from Dyer Ct to Monroe St., then crossing west across Almond St.	570	I	Yes
		East side of Almond St. from Cedar St. to E. Genesee St.	413	I	Yes
		48" line at center of Fayette running E-W within project limits	282	I	Yes
		Center of E. Washington St. east of Almond Street, discharging to manhole at Almond St.	293	I	Yes
		Approx. 140' south of E. Genesee St	117	I	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
I-81: Southern Project Limits to E. Washington Street – Utility Impacts (cont'd)					
City of Syracuse	Water 16" to 30"	Western limits on Sizer St., across I-81, north along Renwick through Van Buren Intersection	834	I	Yes
		Center of Monroe St., to Almond St., north up east side of Almond St. to Harrison St., east to project limits	1,473	I	Yes
		Under Harrison Street within project limits, crossing Almond St.	968	I	Yes
		Center of E. Genesee St. from project limit on West End to base mapping extent	419	I	Yes
OCWA	Water 20" to 30"	West extent of work on MLK, crossing I-81, south for approx. 600' before crossing tracks	828	I	Yes
		Crossing Colvin Ave	72	I	Yes
		20" and 24" lines south of Oakland	606	I	Yes
Alliance	Gas 12"	Southern extent of basemapping linework on Renwick, continuing north along the east side of Almond St. to E. Taylor St. crossing over to west extent of Almond work	966	I	Yes*
		Crossing Almond St. at Burt St., south side two parallel lines	247	I	Yes*
National Grid	Gas 8" to 12"	South side of Burt St. south along East side of Almond St., along north side of Van Buren east to project limits	1,186	I	Yes, on Almond St. only
		South side of Monroe St. within project limits, north along east side of Almond St. to north side of E. Adams St., west across Almond St. to project limits	760	I	Yes
		West limits on Harrison St., east through Almond intersection, east to limits on Harrison St.	912	I	Yes
		North side of E. Genesee St. within project limits	461	NI	Yes
		North side of Fayette within project limits	288	I	Yes
AT&T	Underground Fiber Optic	Parallel to NYSW RR tracks, across E. Colvin St.	187	I	Yes
		Parallel to NYSW RR tracks, from ~1,200' south of MLK north across I-81 to project limits	2,405	I	Yes
		Piece 1: South side of Burt St., across Almond. Piece 2: East of Almond,	492	I	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
		across north side of Van Buren to project limits			
		Crossing Almond St. south of E. Washington St.	165	I	Yes
		Two locations crossing E. Adams St. and Almond St.	355	I	Yes
Elantic	Underground Fiber Optic	North side of Burt St., west side of Almond St., and south side of Taylor St.	617	I	Yes*
Light Tower	Underground Fiber Optic	East side of Almond St. from Van Buren St. (at UP #NM13) to E. Taylor St. (UP# NYT22 NG25)	753	I	Yes*
		East side of Almond St. from pole 100' north of Monroe St. running north to Adams St.	302	NI	Yes*
		North and south sides of E. Fayette St. from west project limits crossing Almond St.	566	I	Yes*
Syracuse University	Underground Fiber Optic	North side of Burt St., north approx. 85', crossing Almond St., south to UP# NM13 on Van Buren St.	743	I	Yes
Telergy	Underground Fiber Optic	North side of Burt Street, crossing Almond St. to vault east side of Almond St.	110	I	Yes
Charter/ TWC	Overhead Fiber Optic	South side of Harrison St.	325	NI	No
Upstate	Underground Fiber Optic	North side of Harrison St., crossing Almond St. from west to east project limits	534	I	Yes
Unknown	Underground Fiber Optic	Crossing Adams east of Almond intersection	75	NI	Yes
Verizon	Underground Fiber Optic	Along east Almond St. from Adams north to	2,630	I	Yes
Light Tower/ Elantic	Overhead Fiber Optic	South side of Taylor St. from east to west project limit, extending north along east side of Almond to Adams St.	1,455	I	Yes*
		South side of Monroe	117	NI	Yes*
National Grid	Underground Electric	Multiple locations along Almond St., Van Buren St., Burt St., E. Taylor St., Jackson St. / Dyer Ct., Monroe St., E Adams St., and Harrison St.	20,602	I	Yes
	Underground Electric Duct bank	Multiple locations along Almond St. and Van Buren St.	1,450	I	Yes
	Underground Electric 2.4-13.2 kV	East side of Almond St. from E. Adams St. to Madison St. Two locations crossing Almond St. at E. Adams St.	1,795	I	Yes
		Crossing Almond St. at E. Genesee St.	270	I	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
	Underground Electric 34.5kV	South sidewalk of Burt St., crossing Almond St. from west to east project limit	133	I	Yes
		Crossing Almond St. north of E. Genesee St. within project limits	101	I	Yes
	Underground Electric 115 kV	North side of E. Taylor St. at west project limit to a manhole in the center of Almond St., continuing southwest to SU Steam Station	219	I	Yes
		South sidewalk of E. Fayette St. within project limits	285	I	Yes
National Grid	Duct bank	Middle of Van Buren, north up Almond to Burt St. and along Burt St.	739	I	Yes
Charter Communications/ TWC	Underground Cable TV	Circling from north side of E. Genesee St. EB, to east side of Almond St.	110	I	No
Light Tower	Underground Telephone	South side of E. Adams St. within project limits	371	I	Yes*
Verizon	Underground Telephone	East side of Almond St. from south side of E. Adams St. to north side of Cedar St.	1300	I	Yes
Verizon	Underground Telephone	South sidewalk of Burt St., from west to east project limits	128	I	Yes
Syracuse University	Chilled Water Service and Return 18" to 24"	Crossing Almond from SU steam station	145	I	Yes
Syracuse University	Steam (12" to 14") and Condensate (8" to 10")	West side of Almond St. from Van Buren St. to Taylor St.	865	NI	Yes
		South side of Van Buren St. from Almond St. to east project limits.	290	I	Yes
Syracuse University	Steam	North and south sidewalks of Taylor St. within project limits	500	I	Yes
I-81: Hiawatha Blvd. to Butternut St. – Utility Impacts					
OCWEP	Sanitary Sewer 24" to 48"	Crossing I-81 approx. 140 ft. south of Hiawatha Blvd.	265	I	Yes
		24" East Side of I-81 NB west of Wolf St.	80	I	Yes
		Approx. 160' south of Hiawatha Blvd. W from eastern project limits to middle of I-81 SB	137	I	Yes
City of Syracuse	Sanitary Sewer 24" to 36" and unknown	Middle of Genant Drive approx. 370' north of Butternut St. to approx. 770' north of Butternut St.	400	I	Yes
		Middle of Genant Drive from approx. 200' north of Court St. north to limit of base mapping alignment.	260	NI	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
City of Syracuse	Water 20" and unknown	West side of N. State St. crossing Spencer St.	90	I	Yes
		Middle of N. State St. crossing Butternut St., with a line coming from Salt St.	976	I	Yes
OCWA	Water 24"	2 parallel lines crossing I-81 approx. 200' south of Hiawatha Blvd	550	I	Yes
National Grid	Gas 16"	West side of I-81 SB on ramp near Destiny USA	310	I	Yes
	Gas Unknown Size	Various Locations	2,621	I	Yes
Elantic	Underground Fiber Optic	Crossing I-81 approx. 650 ft. north of Butternut Street	380	I	Yes*
		West side of N. Clinton Street within project limits at Genant Drive	425	I	Yes*
Level 3 Com	Underground Fiber Optic	West side of I-81 SB starting at approx. 150' south of Hiawatha Blvd. W. extending to Bear St.	1,527	I	Yes*
		South side of Bear St. within project limits	447	I	Yes*
		Middle of Genant Dr. from Bear St. to Spencer St	2,729	I	Yes*
Verizon	Underground Fiber Optic	Middle of N. Clinton St. from Spencer St. to end of base mapping alignment	556	I	Yes
		Crossing I-81 approx. 400 ft. north of Butternut St.	374	I	Yes
		West side of Genant, south for 335' then across I-81 to intersection of Butternut and N. State St.	697	I	Yes
		Middle of Butternut at N. State St. intersection	79	I	Yes
National Grid	Underground Electric	Various Locations	12,137	I	Yes
	Underground Electric 115 KV	North side of W. Division St. from western project limits crossing I-81	493	I	Yes
I-690: Leavenworth Ave. to Franklin St. – Utility Impacts					
OCWEP	Sanitary Sewer 52"x78"	"Butternut Combined Sewer" East side of Onondaga Creek heading northeast to eastern project limits at Butternut St.	2,010	I	No
	Sanitary Sewer 72"	"Burnet Combined Sewer" East side of Onondaga Creek heading east to project limits on N. Salina St., and impact on Pearl St.	1,406	I	Yes
	Sanitary Sewer 72"	"Main Interceptor Sewer" Varies approx. 30–100' on the east side of Onondaga Creek from northern project limits to Herald Pl.	470	I	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
City of Syracuse	Sanitary Sewer 30" and varies	Approx. 440 ft. west of West St., crosses West St. to I-690 WB Ramp	214	I	Yes
City of Syracuse	Water 16" to 20"	From intersection of W. Genesee St. and West St. across parking lot to project limits on Herald Pl.	838	I	Yes
		Crossing West St. north of Erie Blvd.	134	I	Yes
National Grid	Gas	West side of West St. from Tracy St. to approx. 180 ft. north of Park Ave. and along south side of Park Ave. to western project limits.	290	I	Yes
		Crossing north of Erie Blvd.	117	I	Yes
Elantic	Underground Fiber Optic	Middle of Genesee St. from Wallace St. to N. West St.	586	I	Yes*
		N. Franklin St. from Genesee St. to northern project limits	890	NI	Yes*
Unknown	Underground Fiber Optic	Crosses Genesee St. in between N. Clinton St. and N. Salina St.	46	NI	Yes
Verizon	Underground Fiber / Telephone	Approx. 400 ft. west of West St. running N/S, crossing all I-690 lanes	226	I	Yes
National Grid	Underground Electric	Middle of N. Clinton St. from southern limits to approx. 110 ft. north of Genesee St.	140	NI	Yes
OCWA	18" Pipe in 24" casing	Mounted on north side of Herald Pl. bridge over Onondaga Creek	86	I	Yes
National Grid	Electric	Various Locations	4785	I	Yes
I-690: Franklin St. to Almond St. – Utility Impacts					
OCWEP	Sanitary Sewer 60" and 7.5' x 10.5'	Middle of Burnet Ave. from western to eastern project limits	146	I	Yes
		7.5' x 10.5' line on the south side of Erie Blvd. from eastern to western project limits	743	I	Yes
City of Syracuse	Sanitary Sewer Size Unknown	Multiple Locations	1,323	I	Yes
OCWEP	Sanitary Sewer 72"	Across James St. at approximate Tunnel alignment station 91+10	166	I	Yes
OCWEP	Storm Sewer 24" to 36"	Multiple Locations	252	I	Yes
	Storm Sewer 42"	Approx. 50 ft. east of VIP Structures from middle of N. Salina St. to VIP parking lot	105	I	Yes
	Storm Sewer 7' x 4.5'	"Erie Blvd. Combined Sewer" North side of Erie Blvd. at State St.	426	I	Yes
City of Syracuse	Water 16" to 24"	Middle of N. State St. from Burnet Ave. to Erie Blvd. E (2 lines), includes piece northeast of Erie Blvd. and Oswego Blvd. intersection	805	I	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
		South side of E. Water Street within project limits	388	I	Yes
		Northside of Burnet Ave. within project limits	147	I	Yes
		Between Franklin St. and Clinton St. south of I-690 EB	360	I	Yes
National Grid	Gas 8" to 12"	Multiple locations on N. Salina St., Townsend St., N. State St., Almond St. and Catherine St.	2,881	I	Yes
	Gas 16"	Multiple locations on west side of N. Franklin St., north side of Erie Blvd. and north side of James St.	687	I	Yes
	Gas 20"	Middle of N. Franklin St. from approx. 250 ft. north of Butternut St. to Herald Pl.	776	I	Yes
Elantic	Underground Fiber Optic	South side of E. Water St. within project limits	312	I	Yes
		West side of Clinton St.	848	I	Yes
Elantic / AT&T	Underground Fiber Optic	North side of E. Water St. within project limits	312	I	Yes
G4S	Underground Fiber Optic	North side of E. Willow St. from State St. to Erie Blvd. approx. 90 ft. north of the southern project limits at E. Water St.	572	I	Yes
Charter Communications	Underground Fiber Optic	East side of N. State St. from Burnet Ave. to Erie Blvd.	304	I	No
		Project limits at Catherine/Burnet	150	I	No
Verizon and AT&T	Underground Fiber Optic	Middle of N. Salina St., branches off north of I-690 WB	1,393	I	Yes
Verizon	Underground Fiber Optic	North side of Willow St., turning south on Warren St. meeting another line at James St.	481	I	Yes
		Middle of State St. from Burnet Ave. to southern project limits	475	I	Yes
		East side of Almond from south of Water St. to Burnet Ave.	963	I	Yes
		Middle of Erie Blvd. near Almond St. intersection	378	I	Yes
Wind-stream	Underground Fiber Optic	South side of Erie Blvd. near Almond St. intersection	664	I	Yes
MCI	Underground Fiber Optic	South side of James St. within project limits	503		
Verizon	Underground Fiber Optic	West side of Warren St. near Willow St. intersection	125	I	Yes
Unknown	Overhead Fiber Optic	East side of Salina St.	827	I	Yes
National Grid	Underground Electric Major Crossing	South side of Water St. within project limits	593	I	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
National Grid	Underground Electric 115 KV	Middle of N. Franklin St. from Herald Pl. north to north of Butternut intersection, included piece east of Clinton St. intersection	861	I	Yes
National Grid	Underground Electric	Various Locations	8,013	I	Yes
I-690: Almond St. to Pine St. including Irving Ave. and Crouse Ave. – Utility Impacts					
OCWEP	Sanitary/Combined Sewers 24" to 60"	East side of Crouse Ave. from Canal St. north to project limits	222	I	Yes
City of Syracuse	Water 16" to 30"	West side of Crouse Ave. from Burnet Ave. south to project limits	133	I	Yes
		Lodi St. at Canal St. intersections	172	I	Yes
National Grid	Gas 8" to 12"	North side of Canal Street and west side of Lodi Street within project limits	1040	I	Yes
Elantic	Underground Fiber Optic	Southside of Burnet Ave. crossing Lodi St.	206	NI	Yes*
Charter Communications	Overhead Fiber Optic	West side of Lodi St. north of I-690 and crossing Burnet Ave. intersection	293	I	No
National Grid	Underground Electric	Crouse Ave. from Canal St. to Burnet	138	I	Yes
		Multiple Locations	3,667	I	Yes
I-81 / I-481 Southern Interchange – Utility Impacts					
OCWEP	Storm Sewer 24" to 36"	Multiple locations along I-81 at Seneca Tpk. and E. Glen Ave., and at Brighton Ave.	990	I	Yes
	Storm Sewer 60"	Along east side of I-81 SB, between bridges	385	NI	Yes
		Along east side of I-81 SB, between bridges approximately 875 ft. north of Seneca Tpk.	115	I	Yes
	Storm Sewer 5' x 3' box	Double culverts along east side of I-81 SB, between bridges	80	NI	Yes
OCWA	Water 24"	West side of Brighton Ave. from southern limits to north side of Rock Cut Rd. intersection, then east on Rock Cut Rd. to project limits	1680	I	Yes
National Grid	Gas	Crossing I-81 at Seneca Tpk.	530	I	Yes
		Crossing I-81 at E. Glen Ave.	295	NI	Yes
		Along south side of Rock Cut Rd. and east side of Brighton Ave. south of intersection	500	NI	Yes
Verizon	Underground Fiber Optic	Crossing I-81 at Seneca Tpk.	625	I	Yes
		Along west side of I-81 SB from approximately 1200 ft. north of Seneca Tpk. to E. Glen Ave.	1390	NI	Yes
		Crossing I-81 at E. Glen Ave.	190	NI	Yes

Table 10-2 (cont'd)
Potential Utility Conflicts – Orange Tunnel Concept

Owner	Type	Location	Length (FT)	Impact	Reimbursable?
National Grid	Electric, Underground	Varying locations along 81 at Seneca Tpk. and E Glen Ave. and at Brighton Ave.	1355	I	Yes
I-481 / I-690 Eastern Interchange – Utility Impacts					
National Grid	Gas	Crossing 481 at Manlius Center Rd. south side of bridge	100	I	Yes
Charter Communications	Optical Cable TV, Overhead	Crossing 481 at Manlius Center Rd. north side of bridge	190	I	No
I-81 / I-481 Northern Interchange – Utility Impacts					
OCWEP	Storm Sewer 24" to 36"	Crossing I-81 and I-481 at various locations within the project limits	1115	I	Yes
	Storm Sewer 60"	Crossing I-81 approx. 200 ft. north of I-481 NB	210	I	Yes
		Crossing I-81 SB approx. 175 ft. north of I-481 NB	100	I	Yes
		Crossing I-81 NB approx. 175 ft. north of I-481 NB	110	I	Yes
	Storm Sewer 84"	Crossing I-81 BS ramp to I-481 NB approx. 260 ft. north of I-481 NB	120	I	Yes
		Crossing I-481 NB ramp to I-81 NB approx. 285 ft. north of I-481 NB	100	I	Yes
		Crossing I-481 and I-481 NB ramp to I-81 NB approx. 1350 ft. west of Thompson Rd.	280	I	Yes
	Storm Sewer Unknown Size	I-481 approx. 500 ft. east of Thompson Rd.	260	I	Yes
National Grid	Gas	Crossing I-81 on south side of S. Bay Rd. bridge	310	I	Yes
		Crossing I-481 at west side of Thompson Rd.	220	NI	Yes
OCWA	Water	Crossing I-81 north of S. Bay Rd. bridge	300	I	Yes
		Crossing I-481 at east side of Thompson Rd.	220	NI	Yes
Verizon	Underground Fiber Optic	Crossing I-81 north of S. Bay Rd. bridge	320	I	Yes
		Crossing I-481 at east side of Thompson Rd.	220	NI	Yes
Elantic	Underground Fiber Optic	Crossing I-81 approx. 100 ft. north of I-481 NB	220	I	Yes*
		Crossing I-81 NB ramp to I-481 NB, I-481 NB ramp to I-81 NB, and open area between ramps	1350	I	Yes*

11. OPERATIONS AND MAINTENANCE

An estimate was performed to determine an order of magnitude annual operations and maintenance cost for those elements that are unique to a tunnel. This estimate does not include routine maintenance of other project elements that would be common to the other build alternatives. The estimate includes the costs associated with tunnel management and

supervision, specialized equipment procurement, tunnel systems energy costs, and the costs related to tunnel maintenance and operations. A summary of these costs is provided in **Table 11-1.**

Table 11-1
Operations and Maintenance Cost Summary

Item	Average Annual Cost (Thousands) [1, 2]
Administrative/Support Personnel	$4,085
Materials/Specialized Equipment	$191
Energy Costs	$2,238
Maintenance Costs	$9,986
Total	**$16,500**

1) Average annual O&M costs based on 50-year horizon.
2) O&M cost estimate does not include major equipment replacement costs.

The administrative and support personnel estimate covers costs associated with the staff required manage and supervise tunnel operations. This category includes a tunnel manager and administrative staff, as well as additional in-house staff to provide support on an as needed basis. Systems such as SCADA, fire detection alarm, and CCTV systems require specialized maintenance and in this case were assumed to be best serviced under contract to the original equipment suppliers. Staff has been included to supervise the maintenance contract and verify the adequacy of the contractor's work.

The material and special equipment category includes specialized vehicles such as tunnel cleaning trucks and heavy-duty wreckers and covers supplies and materials required for routine tunnel operations.

Annual energy costs associated with operation of the various tunnel systems include operating costs for items such as the tunnel ventilation system, tunnel lighting, drainage pumps, and tunnel systems such as CCTV, radio, fire detection and alarm, and SCADA. These costs were calculated on the basis of an assumed cost of $0.09 per kilowatt hour and estimated yearly operating hours and electrical loads.

Maintenance costs include the various systems and equipment items to be maintained; the frequency and effort required to perform the required visual inspections and maintenance functions; and the corresponding staffing levels to accomplish the required work. In addition, to strictly maintenance related activities, this category also includes tunnel operation functions such as a safety patrol, wrecker service, and control center staff to continuously monitor tunnel conditions and coordinate emergency response with local jurisdiction when necessary.

As noted, this cost estimate only includes maintenance costs associated with the tunnel. Costs associated with roadside assets, traffic assets, roadway drainage assets, and roadway and shoulder assets were not included since these costs would be incurred whether the tunnel was built or not built. It is also considered that sufficient monies have been included to cover the

expenses associated with Biannual National Tunnel Inspection Standards (NTIS). The NTIS require tunnel owners to establish a program for the inspection of highway tunnels, to maintain a tunnel inventory, to report the inspection findings to FHWA, and to correct any critical findings found during these inspections.

12. COST ESTIMATE

Overview

Construction of the Orange tunnel concept would take an estimated eleven years, including work on the new route (i.e., I-481) to carry I-81. The estimated construction cost of the Orange tunnel concept is $4.9 billion for either the partial or the full interchange option (including right-of-way), as shown in **Table 12-1**.

Table 12-1

Summary of Option Costs – Thousand Dollars (Calculated Year)

Construction Activities	Orange Tunnel Partial Interchange Option	Orange Tunnel Full Interchange Option
Enabling Projects	$95,260	$90,654
WZTC	$78,000	$78,000
Demolition	$21,665	$29,642
Embankment	$68,230	$30,098
Tunnel	$1,330,000	$1,330,000
Elevated Structures	$525,104	$470,853
Retaining Walls and Noise Barriers	$76,745	$75,147
On Grade Highways	$77,723	$42,055
Local Streets	$20,562	$20,562
Lighting, Signage and Traffic Signals	$132,382	$132,382
Landscaping	$123,740	$115,239
Trunk Drains	$73,877	$72,561
Railroad	$2,479	$2,479
Contaminated Soil Removal	$3,000	$3,000
Wetlands Mitigation	$1,000	$0
Stormwater/SPDES	$1,454	$1,479
Temporary Work	$11,085	$11,085
Miscellaneous (10%)	$264,230	$250,523
Subtotal	$2,906,500	$2,755,800
Contingency (2)	$436,000	$551,200
Subtotal (2018 $)	$3,342,500	$3,307,000
Inflation to Midpoint of Construction (3% per year)	$601,700	$595,300
Midpoint (3)	2024 $	2024 $
Construction Cost	$3,944,200	$3,902,300
Construction Cost (Rounded to nearest $100M)	$3,900,000	$3,900,000
Design Build to include Force Account, CI, Final Design, QC, Site Mobilization (25%)	$975,000	$975,000
Award Cost	$4,875,000	$4,875,000
ROW (4)	$28,000	$31,000
TOTAL COST (Rounded to nearest $100M) (5)	$4,900,000	$4,900,000

Notes:

1) Based on Orange Tunnel Concept plans as of August 31, 2018 and construction cost estimates submitted to NYSDOT on August 28, 2018.
2) Estimate based on 15 percent contingency for partial interchange option and 20% for full interchange option to reflect level of detail developed for each option.
3) Based on start of construction on May 1, 2020 and an 11-year construction schedule.
4) ROW cost estimate based on Conceptual Relocation Plan and ROW 353C Project Estimates dated October 9, 2018.
5) This estimate does not include operations and maintenance costs specific to a tunnel; refer to **Table 11-1** for those costs.

13. DESIGN CRITERIA, CONCEPTUAL PLANS AND PROFILES

13.1: Design Criteria Tables: The design criteria tables applicable to those elements specific to the Orange tunnel concept are included in the following tables. Design

criteria tables consist of 11 critical design elements as described in the NYSDOT HDM (Chapter 2). Design criteria for other roadway segments that are not unique to the Orange tunnel concept are included in **Appendix C-6.**

TABLE 13.1.1

DESIGN CRITERIA FOR INTERSTATE TUNNEL					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		I-81 (tunnel segment), East Kennedy Street to East Willow Street		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Interstate
% Trucks:		13%		**Terrain:**	Rolling
ADT (2050):		134,500		**Truck Access/ Qualifying:**	Qualifying Highway
	DESIGN ELEMENT	**STANDARD CRITERIA**	**EXISTING CONDITION (2)**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	50 mph (1)	Posted 45 and 55 mph (2)	50 mph	HDM § 2.7.1.1.A
2	Travel Lane Width (Min.)	12 ft.	12 ft.	12 ft.	HDM § 2.7.1.1.B, AASHTO § 4.16.4
3	Wall Clearance (Min.) Sidewalk (Min.) Shoulder Width Right Shoulder Width Left	30 ft. min. 1.5 ft. min both sides 10 ft. desired, 1.5 ft min (3) 4 ft. desired, 1.5 ft min (3)	n/a n/a 2-4ft.* 2-4ft.*	38 ft. Varies 1.5 ft. to 4.5 ft. (4) 4 ft. 4 ft.	AASHTO § 4.16.4
4	Grade (Max.)	6%	4 %	6%	HDM § 2.7.1.1.G Exhibit 2-2
5	Horizontal Curve Radius (Min. Radius)	758 ft. min. @ 8%	1054 ft	1242 ft.	HDM § 2.7.1.1.D Exhibit 2-2
6	Superelevation (Max.)	8% Max.	7.5%	8% Max.	HDM § 2.7.1.1.E
7	Stopping Sight Distance (Min.)	425 ft.	259 ft.*	404 ft * (5)	HDM § 2.7.1.1.F Exhibit 2-2
8	Vertical Clearance	16 ft. Min. (6, 7) 16.5 ft. Desired	14 ft. (Min.)	16 ft. Min. (6, 7)	HDM § 2.7.1.1.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.1.1.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	H20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.1.1.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1 The Regional Traffic Engineer has concurred that the use of a Design Speed of 50 mph for a tunnel facility is consistent with Section 2.7.1.1.A of the NYS Highway Design Manual.

2 Existing condition is based on existing I-81 which does not include a tunnel. Existing I-81 is currently posted 55 mph between southern I-81/I-481 interchange and Adams Street, then posted 45 mph between Adams Street and Butternut Street, then 55 mph between Butternut Street and Hiawatha Boulevard.

3 Minimum shoulder width based on minimum wall clearance (30 ft), less minimum curb area (2*1.5 ft), less minimum lane width (2*12 ft).

4 A minimum of 1.5 ft curb width to be provided on one side of roadway and 14.5 ft curb width on the other side of the roadway to provide for increased width for maintenance and increased HSSD on curves (also see note 6).

5 6% maximum grade allowed for tunnel section as an 'extreme case in urban areas", per Exhibit 2-2, Note 2 in the NYSDOT HDM.

6 Proposed Horizontal Stopping Sight Distance is non-standard in both directions, along the two curves, one curve in the south cut and cover section of the tunnel and one curve in the north cut and cover section of the tunnel. All other locations meet design criteria of 425 feet minimum.

7 The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

8 16-ft clearance exemption. I-481 is the designated 16-ft route.

TABLE 13.1.2

DESIGN CRITERIA FOR FREEWAY (NON-INTERSTATE) TUNNEL					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		Tunnel Segment, East Kennedy Street to East Willow Street		**Functional Classification:**	Urban Principal Arterial – Other Freeway/Expressway
Project Type:		Reconstruction		**Design Classification:**	Freeway/Expressway
% Trucks:		13%		**Terrain:**	Rolling
ADT (2050):		134,500		**Truck Access/ Qualifying:**	Qualifying Highway
DESIGN ELEMENT		**STANDARD CRITERIA**	**EXISTING CONDITION (2)**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	50 mph (1)	Posted 45 and 55 mph (2)	50 mph	HDM § 2.7.1.1.A
2	Travel Lane Width (Min.)	12 ft.	12 ft.	12 ft.	HDM § 2.7.1.1.B
3	Wall Clearance (Min.) Sidewalk (Min.) Shoulder Width Right Shoulder Width Left	30 ft. min. 1.5 ft both sides 10 ft. desired, 1.5 ft min (3) 4 ft. desired, 1.5 ft min (3)	n/a n/a 2-4ft.* 2-4ft.*	38 ft. Varies 1.5 ft. to 4.5 ft. (4) 1.5 ft. 1.5 ft.	AASHTO § 4.16.4
4	Grade (Max.)	6% (5)	4 %	6%	HDM § 2.7.1.1.G Exhibit 2-2
5	Horizontal Curve Radius (Min. Radius)	758 ft. @ 8%	1054 ft.	1242 ft.	HDM § 2.7.1.1.D Exhibit 2-2
6	Superelevation (Max.)	8% Max.	7.5%	8% Max	HDM § 2.7.1.1.E
7	Stopping Sight Distance (Min.)	425 ft.	259 ft.*	404 ft. * (6)	HDM § 2.7.1.1.F Exhibit 2-2
8	Vertical Clearance	16 ft. Min. (7, 8) 16.5 ft. Desired	14 ft. (Min.)	16 ft. Min. (7, 8)	HDM § 2.7.1.1.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.1.1.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	H20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.1.1.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1 The Regional Traffic Engineer has concurred that the use of a Design Speed of 50 mph for a tunnel facility is consistent with Section 2.7.1.1.A of the NYS Highway Design Manual.

2 Existing condition is based on existing I-81 which does not include a tunnel. Existing I-81 is currently posted 55 mph between southern I-81/I-481 interchange and Adams Street, then posted 45 mph between Adams Street and Butternut Street, then 55 mph between Butternut Street and Hiawatha Boulevard.

3 Minimum shoulder width based on minimum wall clearance (30 ft), less minimum curb area (2*1.5 ft), less minimum lane width (2*12 ft).

4 A minimum of 1.5 ft curb width to be provided on one side of roadway and 14.5 ft curb width on the other side of the roadway to provide for increased width for maintenance and increased HSSD on curves (also see note 6).

5 6% maximum grade allowed for tunnel section as an 'extreme case in urban areas", per Exhibit 2-2, Note 2 in the NYSDOT HDM.

6 Proposed Horizontal Stopping Sight Distance is non-standard in both directions, along the two curves, one curve in the south cut and cover section of the tunnel and one curve in the north cut and cover section of the tunnel. All other locations meet design criteria of 425 feet minimum.

7 The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

8 16-ft clearance exemption. I-481 is the designated 16-ft route.

TABLE 13.1.3

DESIGN CRITERIA FOR BL 81 (NON-TUNNEL SEGMENTS)					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		I-81, I-481 south interchange to Hiawatha Blvd., except Tunnel Segment		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Interstate
% Trucks:		13%		**Terrain:**	Rolling
ADT (2050):		134,500		**Truck Access/ Qualifying:**	Qualifying Highway
DESIGN ELEMENT		**STANDARD CRITERIA**	**EXISTING CONDITION**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	60 mph (1)	Posted 45 and 55 mph (2)	60 mph	HDM § 2.7.1.1.A
2	Travel Lane Width (Min.)	12 ft.	12 ft.	12 ft.	HDM § 2.7.1.1.B
3	Shoulder Width (Min.) Right Left (2-lanes per direction) Left (3-lanes per direction)	 10 ft. 4 ft. 10 ft.	 2-4ft.* 2-4ft.* 2-4ft.*	 7 ft. (3,6) * 4 ft. (3) 7 ft. (3,6) *	HDM § 2.7.1.1.C Exhibit 2-2
4	Grade (Max.)	4%	4 %	4%	HDM § 2.7.1.1.G Exhibit 2-2
5	Horizontal Curve Radius (Min. Radius)	1200 ft. @ 8%	1054 ft.*	1333 ft.	HDM § 2.7.1.1.D Exhibit 2-2
6	Superelevation (Max.)	8% Max.	7.5%	8% Max	HDM § 2.7.1.1.E
7	Stopping Sight Distance (Min.)	570 ft.	259 ft.*	>570 ft.	HDM § 2.7.1.1.F Exhibit 2-2
8	Vertical Clearance	14 ft. Min. (4, 5) 14.5 ft. Desired	14 ft. (Min.)	14.5 ft. Min. (4, 5)	HDM § 2.7.1.1.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.1.1.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	H20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.1.1.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1 The Regional Traffic Engineer has concurred that the use of a Design Speed of 60 mph is consistent with the anticipated off-peak 85th percentile speed within the range of functional class speeds for the terrain and volume.

2 I-81 is posted 55 mph between southern I-81/I-481 interchange and Adams Street, then posted 45 mph between Adams Street and Butternut Street, then 55 mph between Butternut Street and Hiawatha Boulevard.

3 On inside of horizontal curves, the proposed shoulder width varies to 12 feet maximum to meet Horizontal Stopping Sight Distance criteria.

4 The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

5 16-ft clearance exemption. I-481 is the designated 16-ft route.

6 A 10-ft. left side shoulder and 10-ft. right side shoulder to be provided in sections with 3 or more lanes, except at two locations between Butternut Street and Spencer Street. See Non-Standard Justification form in Appendix A-3 for more information.

TABLE 13.1.4

DESIGN CRITERIA FOR I-690					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		I-690, Leavenworth Ave. to Beech Street		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Interstate
% Trucks:		9%		**Terrain:**	Rolling
ADT (2050):		111,900(V), 127,400 (CG)-		**Truck Access/Qualifying:**	Qualifying Highway
	DESIGN ELEMENT	**STANDARD CRITERIA**	**EXISTING CONDITION**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	60 mph (1)	Posted 45 and 55 mph (2)	60 mph	HDM § 2.7.1.1.A
2	Travel Lane Width (Min.)	12 ft.	12 ft.	12 ft.	HDM § 2.7.1.1.B
3	Shoulder Width (Min.) Right Left (2-lanes per direction) Left (3-lanes per direction)	 10 ft. 4 ft. 10 ft.	 3.2 ft.* 1.8 ft.* 4 ft.*	 10 ft. (3) 4 ft. (3) 10 ft. (3)	HDM § 2.7.1.1.C Exhibit 2-2
4	Grade (Max.)	4%	4%	4%	HDM § 2.7.1.1.G Exhibit 2-2
5	Horizontal Curve Radius (Min. Radius)	1200 ft. @ 8%	1150 ft.*	1333 ft.	HDM § 2.7.1.1.D Exhibit 2-2
6	Superelevation (Max.)	8% Max.	6% *	8% Max.	HDM § 2.7.1.1.E
7	Stopping Sight Distance (Min.)	570 ft.	302 ft.*	503 ft. * (4)	HDM § 2.7.1.1.F Exhibit 2-2
8	Vertical Clearance	14 ft. Min. (5, 6) 14.5 ft. Desired	14 ft. (Min.)	14.5 ft. Min. (5, 6)	HDM § 2.7.1.1.I / NYSDOT Brg. Man. § 2.4.1, Table 2-2
9	Cross Slope Pavement (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.1.1.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	H20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.1.1.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1. The Regional Traffic Engineer has concurred that the use of a Design Speed of 60 mph is consistent with the anticipated off-peak 85th percentile speed within the range of functional class speeds for the terrain and volume.
2. I-690 is posted 55 mph between western project limit to West Street interchange, then posted 45 mph between West Street interchange and Lodi Street, then 55 mph from Lodi Street to eastern project limit.
3. On inside of horizontal curves, the proposed shoulder width varies to 12 feet maximum to meet Horizontal Stopping Sight Distance criteria.
4. Proposed Horizontal Stopping Sight Distance is non-standard along two curves in the I-81/I-690 interchange area (one eastbound and one westbound). See Non-Standard Feature Justification Forms. All other locations meet design criteria of 570 feet minimum.
5. 16-ft clearance exemption. I-481 is the designated 16-ft route.
6. The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

TABLE 13.1.5

DESIGN CRITERIA – NEW I-81 (FORMER I-481) (1)					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		Redesignated I-81 (Former I-481)		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Interstate
% Trucks:		6%		**Terrain:**	Rolling
ADT (2050):		56,800		**Truck Access/Qualifying:**	Qualifying Highway
DESIGN ELEMENT		**STANDARD CRITERIA**	**EXISTING CONDITION**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	70 mph (2)	Posted 55 and 65 mph (3)	70 mph	HDM § 2.7.1.1.A
2	Travel Lane Width (Min.)	12 ft.	12 ft.	12 ft.	HDM § 2.7.1.1.B
3	Shoulder Width (Min.) Right Left (2-lanes per direction) Left (3-lanes per direction)	 10 ft. 4 ft. 10 ft.	 10 ft. 4 ft. 4 ft. *	 10 ft. (4) 4 ft. (4) 10 ft. (7)	HDM § 2.7.1.1.C Exhibit 2-2
4	Grade (Max.)	4%	5.0%*	4%	HDM § 2.7.1.1.G Exhibit 2-2,
5	Horizontal Curve Radius (Min. Radius)	1815 ft. @ 8%	1572 ft.*	1912 ft.	HDM § 2.7.1.1.D Exhibit 2-2
6	Superelevation (Max.)	8% Max.	8% Max.	8% Max.	HDM § 2.7.1.1.E
7	Stopping Sight Distance (Min.)	730 ft.	389 ft.*	524 ft. * (5)	HDM § 2.7.1.1.F Exhibit 2-2
8	Vertical Clearance	16 ft. Min. (6) 16.5 ft. Desired	16 ft. (Min.)	16.5 ft. Min. (6)	HDM § 2.7.1.1.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.1.1.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	H20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.1.1.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1. Applies to the tunnel alternative option that does not provide for Interstate 81 to remain through downtown Syracuse.
2. The Regional Traffic Engineer has concurred that the use of a Design Speed of 70 mph is consistent with the anticipated off-peak 85th percentile speed within the range of functional class speeds for the terrain and volume.
3. Posted 55 mph between southern project limit and Rock Cut Road interchange on existing I-481, then posted 65 mph between Rock Cut Road interchange to northern project limit.
4. On inside of horizontal curves, the proposed shoulder width varies to 12 feet maximum to meet Horizontal Stopping Sight Distance criteria.
5. Proposed Horizontal Stopping Sight Distance is non-standard along two curves in the south interchange area (See Non-Standard Feature Justification Forms). All other locations meet design criteria of 730 feet minimum.
6. The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.
7. 10 ft. left side shoulder criteria does not apply to East Study Area improvements, as the 3-lane sections are less than 1 mile long and the third lane is primarily an auxiliary lane.

TABLE 13.1.6

DESIGN CRITERIA, INTERSTATE DIRECT CONNECTION RAMPS (NON-TUNNEL RAMPS)					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		Interstate Direct Connection Ramps-Non-Tunnel (1)		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Ramp (Direct Connection – Non-Tunnel) (2)
% Trucks:		Varies		**Terrain:**	Rolling
ADT (2050):		Varies		**Truck Access/Qualifying:**	Qualifying Highway
	DESIGN ELEMENT	**STANDARD CRITERIA**	**EXISTING (4) CONDITION**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	40 mph (3)	40 mph	40 mph	HDM § 2.7.5.3.A
2	Travel Lane Width (Min.)	16 ft. (1 lane) for R=485 ft. 15 ft. (1 lane) for R>500 ft. (5) 12 ft. (1 lane) for R>1000 ft.	16 ft.	16 ft. (1 lane) for R=485 15 ft. (1 lane) for R>500 (5) 12 ft. (1 lane) for R>1000 ft.	HDM § 2.7.5.3.B Exhibit 2-9
3	Shoulder Width (Min.) Right Left	 6 ft. 4 ft.	 5 ft.* 9 ft.	 Varies 6-12 ft. (6, 7) 4 ft. (7)	HDM § 2.7.5.3.C Exhibit 2-10a
4	Grade (Max.)	6%	1.5%	6%	HDM § 2.7.5.3.G Exhibit 2-10a
5	Horizontal Curve Radius (Min. Radius)	444 ft. @ 8%	460 ft.	300 ft. * Min.	HDM § 2.7.5.3.D Exhibit 2-10a
6	Superelevation (Max.)	8% Max.	6.5%	8% Max.	HDM § 2.7.5.3.E
7	Stopping Sight Distance (Min.)	305 ft.	225 ft.*	> 305 ft.	HDM § 2.7.5.3.F Exhibit 2-10a
8	Vertical Clearance	14 ft. Min. (9) 14.5 ft. Desired	14 ft. Min.	14.5 ft. Min. (8)	HDM § 2.7.5.3.I / NYSDOT Brg. Man. § 2.4.1, Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.5.3.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HS-20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.5.3.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1. This table applies to the direct connection ramps under the Orange Tunnel Alternative that do not connect directly to the tunnel segment, which includes; SB I-81 to EB I-690, SB I-81 TO WB I-690 and WB I-690 to NB I-81 under the partial interchange option, and to the SB I-81 to EB I-690, SB I-81 to WB I-690, WB I-690 to NB I-81 and EB I-690 to NB I-81 under the full interchange option.
2. Ramps to be designed with provision for passing a WB-67 stalled vehicle (Case IIC).
3. The Regional Traffic Engineer has concurred that the use of a Design Speed of 40 mph for Non-Tunnel Direct Connection ramps is consistent with Section 2.7.5.3.A of the NYS Highway Design Manual.
4. Existing values based on existing NB I-81 to EB I-690 connector ramp.
5. Lane width based on right and left shoulders being stabilized shoulders on both sides where shoulder widths meet or exceed the minimum shoulder widths from Exhibit HDM 2-9 and 2-10a for roadways connecting to the NHS system.
6. On inside of curves, the proposed shoulder width varies from 6 feet to 12 feet maximum to meet HSSD criteria or provide for incremental improvement.
7. Under both options, the left and right shoulder widths are reversed for the SB I-81 to WB I-690 ramp, per AASTO 10.9.6 to provide horizontal sight distance.
8. The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

TABLE 13.1.7

DESIGN CRITERIA, INTERSTATE DIRECT CONNECTION RAMPS (TUNNEL CONNECTION RAMPS)					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		Interstate Direct Connection Tunnel to Freeway Ramps (1)		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Direct Connection Tunnel to Freeway Ramps (2)
% Trucks:		Varies		**Terrain:**	Rolling
ADT (2050):		Varies		**Truck Access/Qualifying:**	Qualifying Highway
DESIGN ELEMENT		**STANDARD CRITERIA**	**EXISTING CONDITION**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	30 mph (3)	40 mph	30 mph	HDM § 2.7.5.3.A
2	Travel Lane Width (Min.)	16 ft. (1 lane) for R=231 ft. 12 ft. (1 lane) for R>1000 ft. (4, 5)	15 ft.	16 ft. (1 lane) for R=231 ft. 12 ft. (1 lane) for R>1000 ft. (4, 5)	HDM § 2.7.5.3.B, Exhibit 2-9
3	Shoulder Width (Min.) Right Left	 6 ft. 4 ft.	 3 ft.* 2 ft.*	 6 ft. Min. & varies (6) 4 ft. Min. & varies (6)	HDM § 2.7.5.3.C Exhibit 2-10a, Note 2
4	Grade (Max.)	7%	3.9%	< 7%	HDM § 2.7.5.3.G Exhibit 2-10a
5	Horizontal Curve Radius (Min. Radius)	214 ft. @ 8%	411 ft. & Varies*	231 ft. min.	HDM § 2.7.5.3.D Exhibit 2-10a
6	Superelevation (Max.)	8% Max.	6.4%	8% Max.	HDM § 2.7.5.3.E
7	Stopping Sight Distance (Min.)	200 ft.	180 ft. & Varies*	> 200 ft.	HDM § 2.7.5.3.F Exhibit 2-10a
8	Vertical Clearance	14 ft. Min. (7) 14.5 ft. Desired	14 ft.	14.5 ft. Min. (7)	HDM § 2.7.5.3.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%-	1.5% min, 2.5% max	HDM § 2.7.5.3.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HS-20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.5.3.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Notes

1. This table applies to the connection ramps under the Orange Tunnel Alternative that connect directly to the Tunnel segment, which include the NB I-81 to WB I-690 ramp and the EB I-690 to SB I-81 ramp under the partial interchange option and the NB I-81 to WB I-690 ramp, the NB I-81 to EB I-690 ramp, the EB I-690 to SB I-81 ramp and the WB I-690 to SB I-81 ramp under the full interchange option.
2. Ramp to be designed with provision for passing a WB-67 stalled vehicle (Case IIC).
3. The Regional Traffic Engineer has concurred that the use of a Design Speed of 30 mph for direct connection ramps between a 60-mph freeway and a 50-mph tunnel freeway is consistent with Section 2.7.5.3.A of the NYSDOT Highway Design Manual.
4. Lane width based on right and left shoulders being stabilized shoulders on both sides where shoulder widths meet or exceed the minimum shoulder widths from Exhibit HDM 2-9 and 2-10a for roadways connecting to the NHS system.
5. Traveled way width for R≥1000 ft. reduced to 12 ft., provided the combined left and right shoulder width is 4 ft. or wider.
6. On inside of curves, the proposed shoulder width varies up to a maximum of 12 feet to meet HSSD criteria along the horizontal curve and to match abutting highway shoulders.
7. The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft. greater.

TABLE 13.1.8

DESIGN CRITERIA FOR INTERSTATE DIRECT CONNECTION LOOP RAMPS						
PIN:		3501.60			**NHS (Y/N):**	Yes
Route No. & Name:		Interstate Direct Connection Loop Ramps (1)			**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction			**Design Classification:**	Ramp – Direct Connection Loop Ramps (2)
% Trucks:		Varies			**Terrain:**	Rolling
ADT (2050):		Varies			**Truck Access/Qualifying:**	Qualifying Highway
DESIGN ELEMENT		**STANDARD CRITERIA**	**EXISTING CONDITION**		**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	25 mph (3)	n/a		25 mph	HDM § 2.7.5.3.A
2	Travel Lane Width (Min.) (2, 4, 5)	16 ft. (1 lane) R=200 ft-499 ft. 12 ft. (2 lane) R=200 ft-299 ft.	n/a		16 ft. (1 lane) R=200 ft-499 ft. 12 ft. (2 lane) R=200 ft-299 ft.	HDM § 2.7.5.3.B Exhibit 2.9.
3	Shoulder Width (Min.) Right Left 2 Lane Ramp	 6 ft. (1 lane ramp) 4 ft. (1 lane ramp) Per HDM Exhibit 2-9	n/a		 6 ft. 4 ft. Per HDM Exhibit 2-9	HDM § 2.7.5.3.C Exhibit 2-10a
4	Grade (Max.)	7%	n/a		7%	HDM § 2.7.5.3.G Exhibit 2-10
5	Horizontal Curve Radius (Min. Radius)	134 ft. @ 8%	n/a		> 134 ft.	HDM § 2.7.5.3.D Exhibit 2-10
6	Superelevation (Max.)	8% Max.	n/a		8% Max.	HDM § 2.7.5.3.E
7	Stopping Sight Distance (Min.)	155 ft.	n/a		> 155 ft.	HDM § 2.7.5.3.F Exhibit 2-10
8	Vertical Clearance	14 ft. Min. (6) 14.5 ft. Desired	n/a		14.5 ft. Min. (6)	HDM § 2.7.5.3.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	n/a		1.5% min, 2.5% max	HDM § 2.7.5.3.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	n/a		AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.5.3.J NYSDOT Brg. Man. § 2.6.1

* Nonstandard feature

Note

1. Table applies to Freeway to Freeway Direct Connection Loop Ramps where the mainline design speed is > 50 mph.
2. Ramps to be designed with provision for passing a WB-67 stalled vehicle (Case IIC).
3. The Regional Traffic Engineer has concurred that the use of a Design Speed of 25 mph for Direct Connection Loop Ramps is consistent with Section 2.7.5.3.A of the NYSDOT Highway Design Manual.
4. Lane width based on right and left shoulders being stabilized shoulders on both sides where shoulder widths meet or exceed the minimum shoulder widths from Exhibit HDM 2-9 and 2-10a for roadways connecting to the NHS system.
5. Travel lane width for R≥1000 ft. reduced to 12 ft., provided the combined left and right shoulder width is 4 ft. or wider.
6. The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

TABLE 13.1.9

DESIGN CRITERIA FOR DIAGONAL RAMPS (LOCAL STREET CONNECTIONS)					
PIN:		3501.60		**NHS (Y/N):**	Yes
Route No. & Name:		Interstate Diagonal Ramps (1)		**Functional Classification:**	Urban Principal Arterial - Interstate
Project Type:		Reconstruction		**Design Classification:**	Ramp (Diagonal) (2)
% Trucks:		Varies		**Terrain:**	Rolling
ADT (2050):		Varies		**Truck Access/Qualifying:**	Qualifying Highway
DESIGN ELEMENT		**STANDARD CRITERIA**	**EXISTING CONDITION**	**PROPOSED CONDITION**	**REFERENCE**
1	Design Speed (Min.)	30 mph (3)	30 mph	30 mph	HDM § 2.7.5.3.A
2	Travel Lane Width (Min.)	12 ft. (1 lane) R>1000 ft., Tangent (4, 5)	12 ft.	12 ft. (1 lane) R>1000 ft., Tangent (4, 5)	HDM § 2.7.5.3.B Exhibit 2.9
3	Shoulder Width (Min.) Right Left	6 ft. 4 ft.	1ft & Varies*	6 ft. 4 ft.	HDM § 2.7.5.3.C Exhibit 2-10a
4	Grade (Max.)	6%	6%	6%	HDM § 2.7.5.3.G Exhibit 2-10a
5	Horizontal Curve Radius (Min. Radius)	214 ft. @ 8%	> 214 ft.	> 231 ft.	HDM § 2.7.5.3.D Exhibit 2-10a
6	Superelevation (Max.)	8% Max.	6%	8% Max.	HDM § 2.7.5.3.E
7	Stopping Sight Distance (Min.)	200 ft.	160 ft. & Varies*	> 200 ft.	HDM § 2.7.5.3.F Exhibit 2-10a
8	Vertical Clearance	14 ft. Min. (6) 14.5 ft. Desired	14 ft. Min.	14 ft. Min. (6)	HDM § 2.7.5.3.I / NYSDOT Brg. Man. § 2.4.1 Table 2-2
9	Cross Slope (Pavement) (Min.) / (Max.)	1.5% min, 2.5% max	1.5% / 2.0%	1.5% min, 2.5% max	HDM § 2.7.5.3.H
10	Design Loading Structural Capacity	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HS-20	AASHTO HL-93 and NYSDOT Design Permit Vehicle	HDM § 2.7.5.3.J NYSDOT Brg. Man. § 2.6.1
11	Americans with Disabilities (ADA Compliance)	Comply with PROWAG and HDM Chapter 18 (7)	At Ramp Terminal	Complies with PROWAG and HDM Chapter 18 (7)	HDM § 2.7.5.3.K

* Nonstandard feature

Note

1. Table applies to all diagonal ramps where the mainline design speed= 50 to 60 mph.
2. Ramps to be designed with provision for passing a WB-67 stalled vehicle (Case IIC).
3. The Regional Traffic Engineer has concurred that the use of a Design Speed of 30 mph is consistent with the anticipated off-peak 85th percentile speed within the range of functional class speeds for the terrain and volume.
4. Lane width based on right and left shoulders being stabilized shoulders on both sides where shoulder widths meet or exceed the minimum shoulder widths from Exhibit HDM 2-9 and 2-10a for roadways connecting to the NHS system.
5. Traveled way width for R≥1000 ft. reduced to 12 ft., provided the combined left and right shoulder width is 4 ft. or wider.
6. The minimum vertical clearance for sign structures and pedestrian bridges shall be 1-ft greater.

13.2: Conceptual Highway Plans, Profiles and Typical Sections

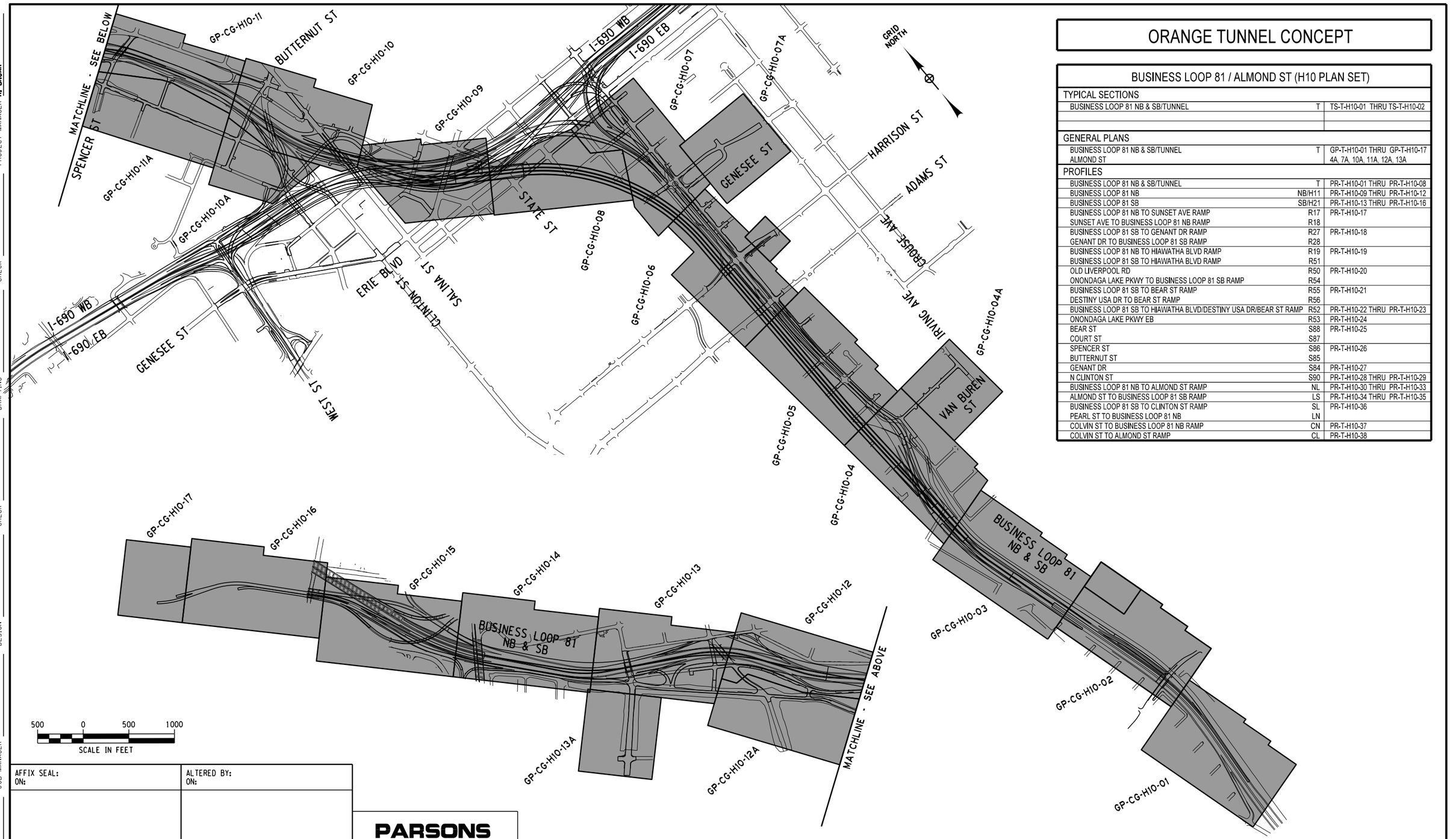
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DRAFTING
DESIGN
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JOB MANAGER
DESIGN SUPERVISOR

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ORANGE TUNNEL CONCEPT

BUSINESS LOOP 81 / ALMOND ST (H10 PLAN SET)

TYPICAL SECTIONS		
BUSINESS LOOP 81 NB & SB/TUNNEL	T	TS-T-H10-01 THRU TS-T-H10-02
GENERAL PLANS		
BUSINESS LOOP 81 NB & SB/TUNNEL	T	GP-T-H10-01 THRU GP-T-H10-17
ALMOND ST		4A, 7A, 10A, 11A, 12A, 13A
PROFILES		
BUSINESS LOOP 81 NB & SB/TUNNEL	T	PR-T-H10-01 THRU PR-T-H10-08
BUSINESS LOOP 81 NB	NB/H11	PR-T-H10-09 THRU PR-T-H10-12
BUSINESS LOOP 81 SB	SB/H21	PR-T-H10-13 THRU PR-T-H10-16
BUSINESS LOOP 81 NB TO SUNSET AVE RAMP	R17	PR-T-H10-17
SUNSET AVE TO BUSINESS LOOP 81 NB RAMP	R18	
BUSINESS LOOP 81 SB TO GENANT DR RAMP	R27	PR-T-H10-18
GENANT DR TO BUSINESS LOOP 81 SB RAMP	R28	
BUSINESS LOOP 81 NB TO HIAWATHA BLVD RAMP	R19	PR-T-H10-19
BUSINESS LOOP 81 SB TO HIAWATHA BLVD RAMP	R51	
OLD LIVERPOOL RD	R50	PR-T-H10-20
ONONDAGA LAKE PKWY TO BUSINESS LOOP 81 SB RAMP	R54	
BUSINESS LOOP 81 SB TO BEAR ST RAMP	R55	PR-T-H10-21
DESTINY USA DR TO BEAR ST RAMP	R56	
BUSINESS LOOP 81 SB TO HIAWATHA BLVD/DESTINY USA DR/BEAR ST RAMP	R52	PR-T-H10-22 THRU PR-T-H10-23
ONONDAGA LAKE PKWY EB	R53	PR-T-H10-24
BEAR ST	S88	PR-T-H10-25
COURT ST	S87	
SPENCER ST	S86	PR-T-H10-26
BUTTERNUT ST	S85	
GENANT DR	S84	PR-T-H10-27
N CLINTON ST	S90	PR-T-H10-28 THRU PR-T-H10-29
BUSINESS LOOP 81 NB TO ALMOND ST RAMP	NL	PR-T-H10-30 THRU PR-T-H10-33
ALMOND ST TO BUSINESS LOOP 81 SB RAMP	LS	PR-T-H10-34 THRU PR-T-H10-35
BUSINESS LOOP 81 SB TO CLINTON ST RAMP	SL	PR-T-H10-36
PEARL ST TO BUSINESS LOOP 81 NB	LN	
COLVIN ST TO BUSINESS LOOP 81 NB RAMP	CN	PR-T-H10-37
COLVIN ST TO ALMOND ST RAMP	CL	PR-T-H10-38



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

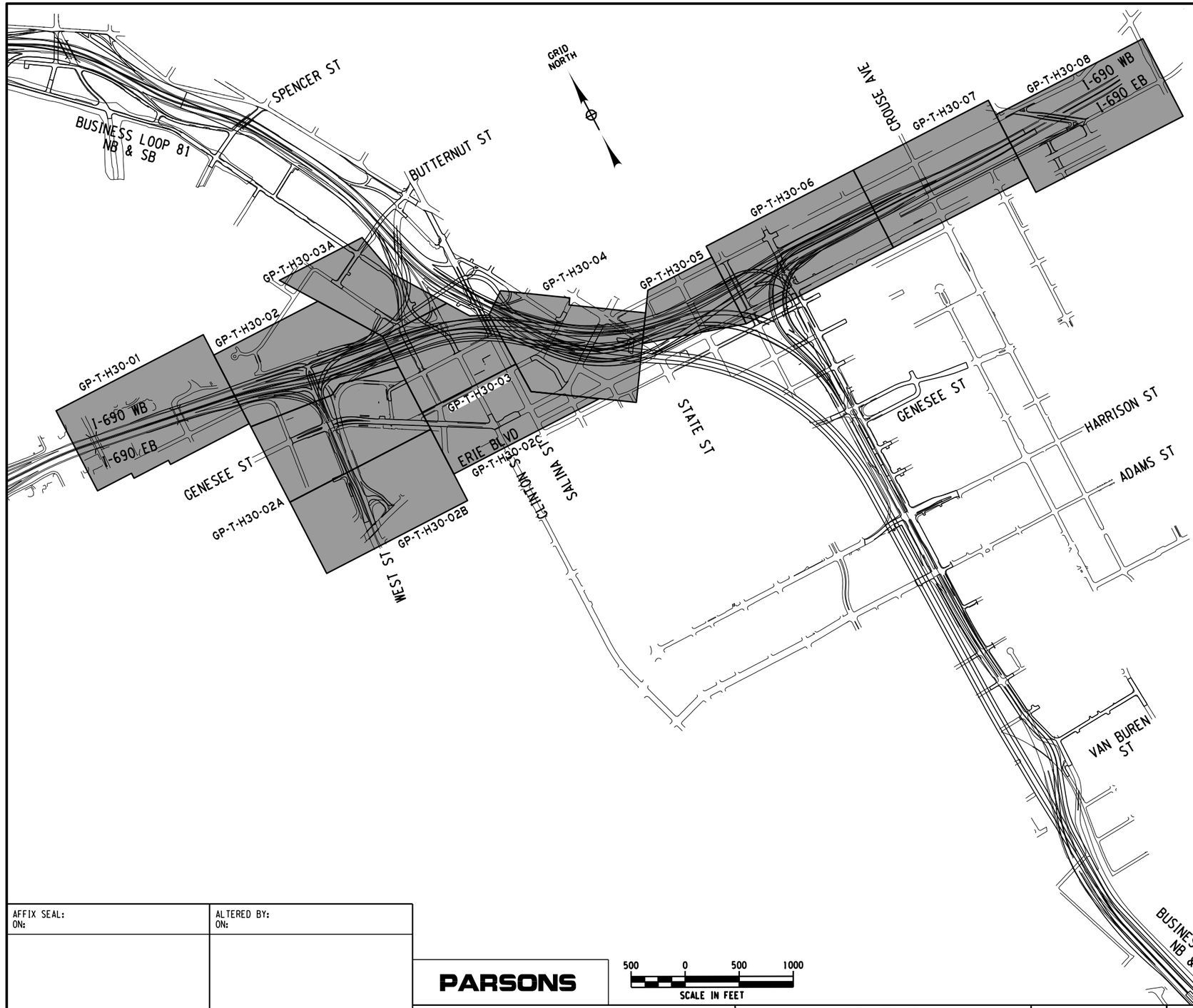
KEY PLAN & INDEX OF DRAWINGS
BUSINESS LOOP 81/ALMOND ST
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. KY-T-H10-01
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



ORANGE TUNNEL CONCEPT

I-690 EB & WB (T H30 PLAN SET)		
TYPICAL SECTIONS		
I-690 EB	H10	TS-T-H30-01
I-690 WB	H20	
GENERAL PLANS		
I-690 EB	H30	GP-T-H30-01 THRU GP-T-H30-08,
I-690 WB	H40	2A, 2B, 2C, 3A
PROFILES		
I-690 EB	H30	PR-T-H30-01 THRU PR-T-H30-04
I-690 WB	H40	PR-T-H30-05 THRU PR--H30-07
I-690 EB TO WEST ST RAMP	EW	PR-T-H30-08
WEST ST TO I-690 EB RAMP	WE	PR-T-H30-09
I-690 WB TO WEST ST RAMP	WW	PR-T-H30-10
WEST ST TO I-690 WB RAMP	WWB	PR-T-H30-11
I-690 EB TO ALMOND ST RAMP	EAS	PR-T-H30-12
ALMOND ST TO I-690 EB RAMP	AE	PR-T-H30-13
I-690 EB TO ALMOND ST RAMP	WA	
ALMOND ST TO I-690 WB	ANW	PR-T-H30-14 THRU PR-T-H30-15
BUSINESS LOOP 81 NB TO I-690 WB RAMP	NW	PR-T-H30-16
I-690 EB TO BUSINESS LOOP 81 SB RAMP	ES	PR-T-H30-17 THRU PR-T-H30-19
I-690 WB TO BUSINESS LOOP 81 NB RAMP	WN	PR-T-H30-20
BUSINESS LOOP 81 SB TO I-690 EB RAMP	SE	PR-T-H30-21
BUSINESS LOOP 8A SB TO I-690 WB RAMP	SW	PR-T-H30-22

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
JOB MANAGER
DESIGN
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

500 0 500 1000
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

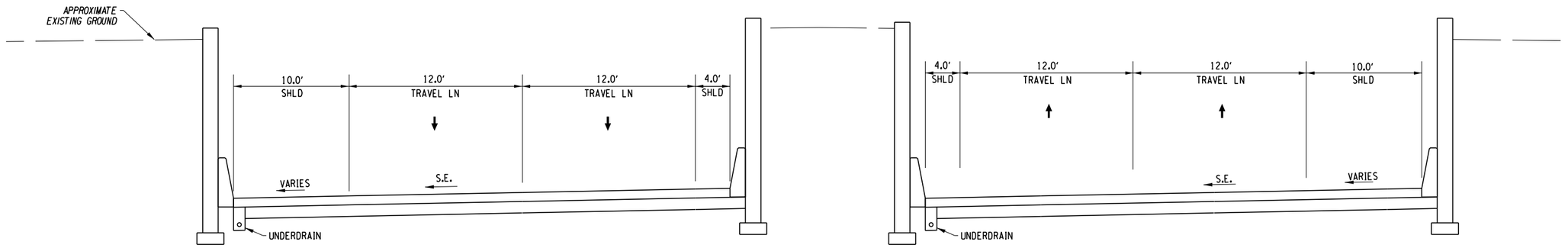
KEY PLAN & INDEX OF DRAWINGS
I-690 EB & WB
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

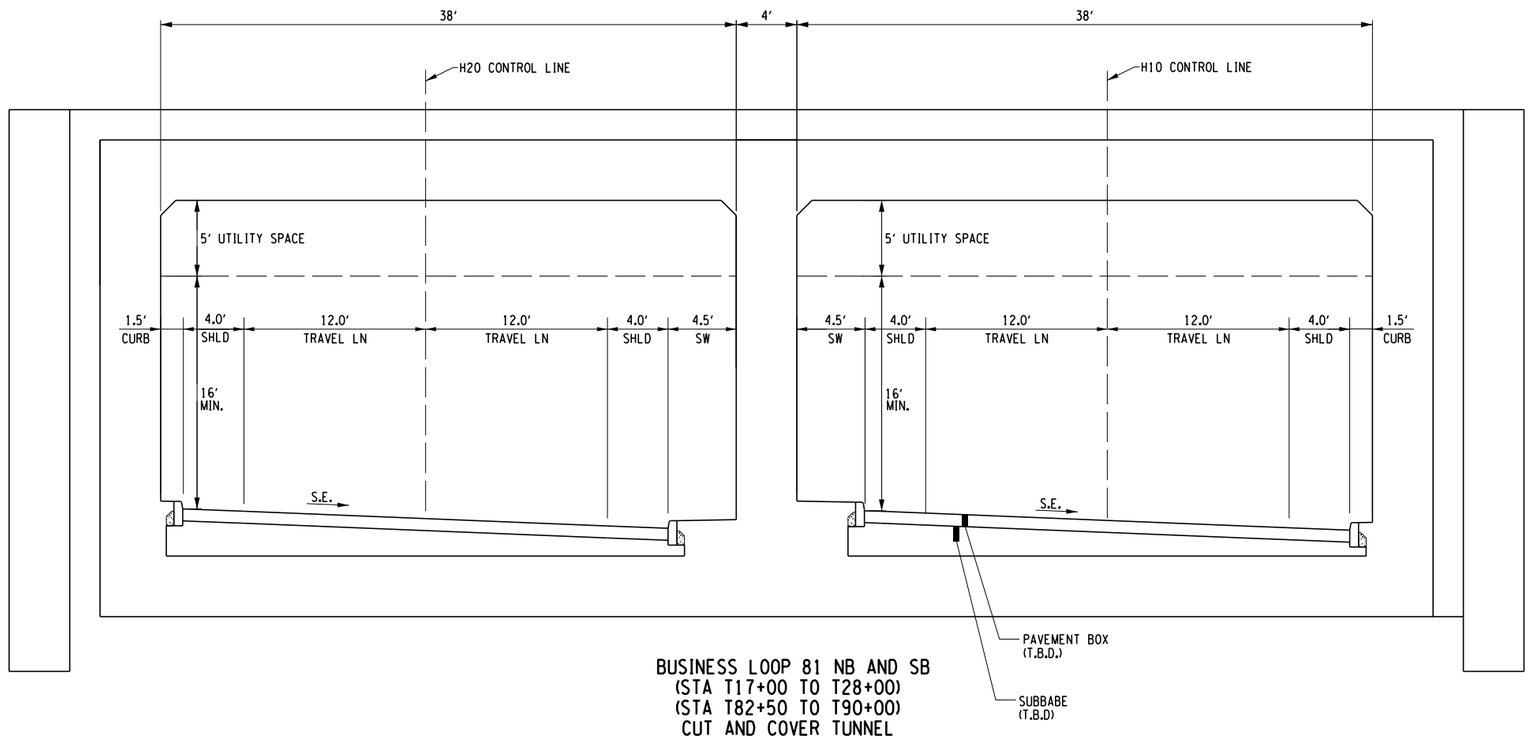
DRAWING NO. **KY-T-H30-01**
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 NB AND SB
(STA T8+00 TO T17+00)
(STA T90+00 TO T99+50)
DEPRESSED HIGHWAY



BUSINESS LOOP 81 NB AND SB
(STA T17+00 TO T28+00)
(STA T82+50 TO T90+00)
CUT AND COVER TUNNEL

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TYPICAL SECTIONS
I-81 NB & I-81 SB
ORANGE TUNNEL CONCEPT

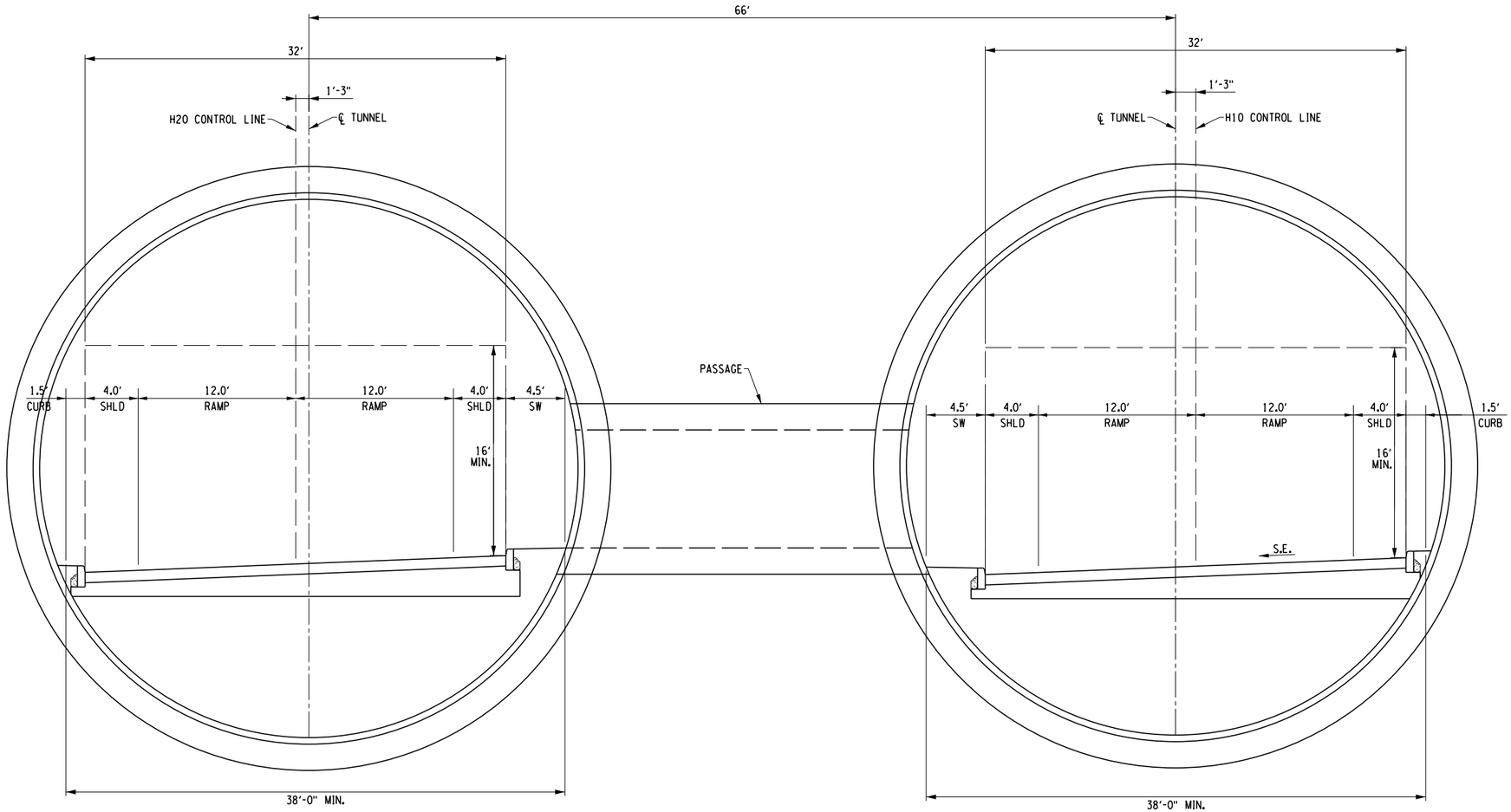
CONTRACT NUMBER

DRAWING NO. TS-T-H10-01

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 NB AND SB
(STA T28+00 TO T82+50)
BORED TUBE TUNNEL

PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TYPICAL SECTIONS
I-81 NB & I-81 SB
ORANGE TUNNEL CONCEPT

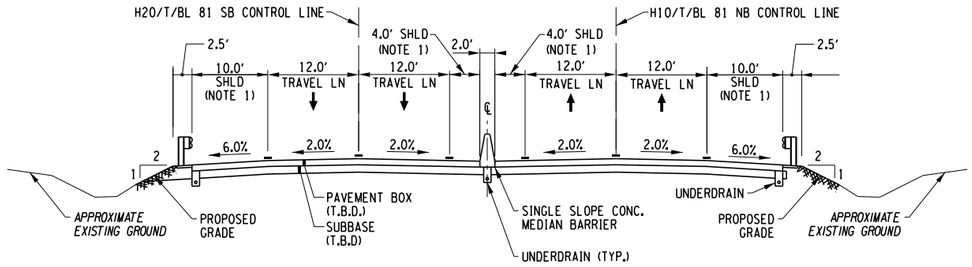
CONTRACT NUMBER

DRAWING NO. TS-T4-H10-02

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

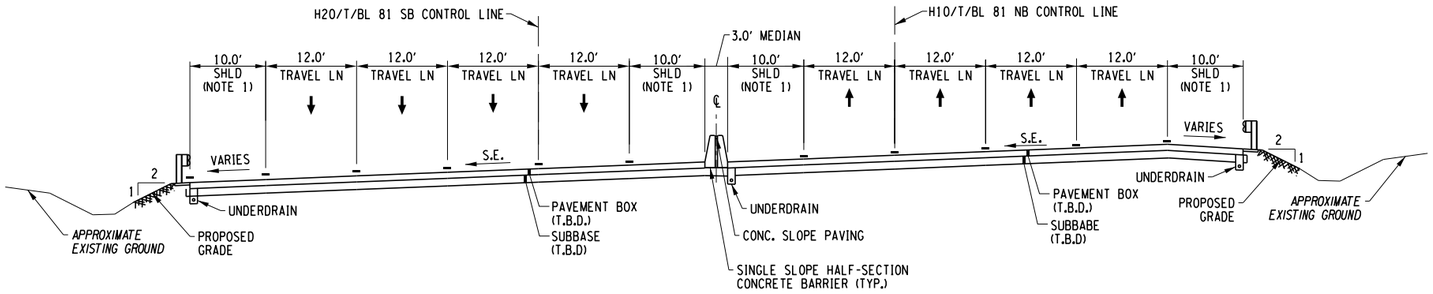
NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**



BL 81 SB (2 LANE SECTION)

BL 81 NB (2 LANE SECTION)

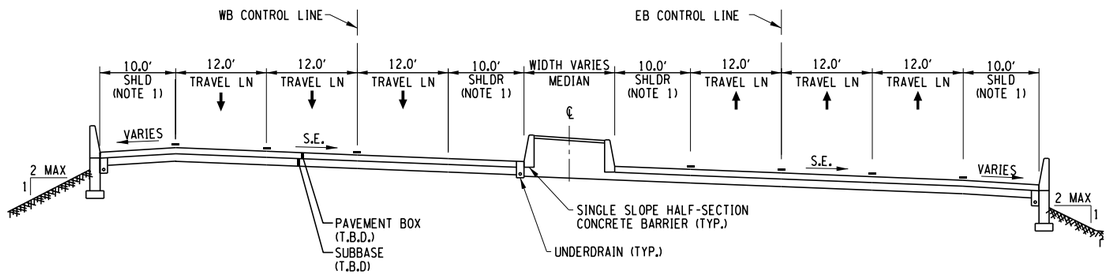
BL 81 SOUTHERN TUNNEL APPROACH SECTION



BL 81 SB (4 LANE SECTION)

BL 81 NB (4 LANE SECTION)

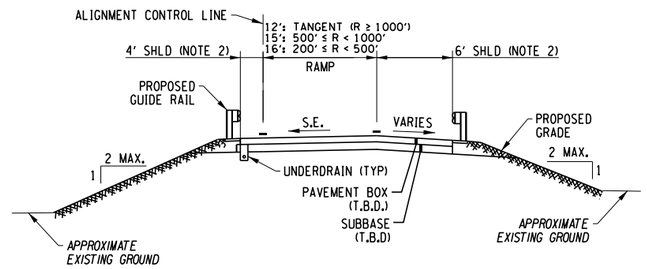
BL 81 NORTHERN SEGMENT SECTION



I-690 WB (3 LANE SECTION)

I-690 EB (3 LANE SECTION)

I-690 ROADWAY SECTION



DIRECT CONNECTION AND SEMI-DIRECT/DIAGONAL CONNECTION RAMP

NOTES:
1. SHOULDER WIDTH MAY INCREASE TO 12 FEET MAX FOR IMPROVED HORIZONTAL STOPPING SIGHT DISTANCE.
2. SHOULDER WIDTH MAY INCREASE TO 14 FEET MAX FOR IMPROVED HORIZONTAL STOPPING SIGHT DISTANCE.

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TYPICAL SECTIONS
BL 81, I-690 & RAMPS
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

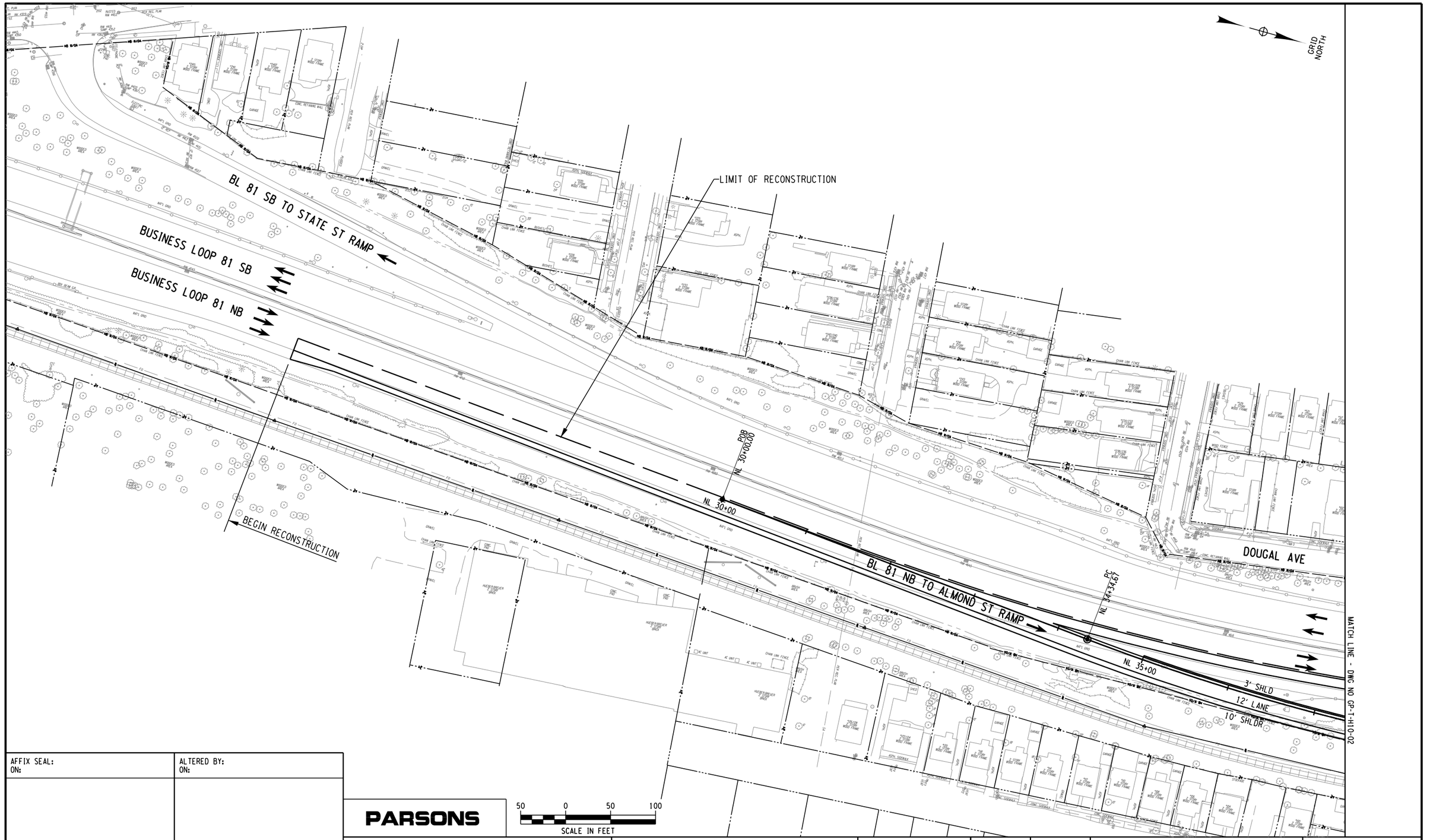
DRAWING NO. TS-T-H30-01

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR
FILE NAME = DGN$SPEC012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME012345678
USER = DGN$USERNAME



PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPECD\123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME$\123456
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP I-81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-01
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01123456
USER = DGN$USERNAME

MATCH LINE - THIS SHEET

DOUGAL AVE

COLVIN AVE

REPLACE BRIDGE

LIMIT OF RECONSTRUCTION

POB CN 100+00.00

CN 100+00

NL 40+00

POB LS 30+00.00

LS 30+00

LS 35+00

LS 40+00

BUSINESS LOOP 81 SB

BUSINESS LOOP 81 NB

PC CN 102+49.35

PT CN 103+72.59

PT NL 44+11.08

PC CN 105+92.52

PT CN 106+54.96

CN 105+00

COLVIN ST TO BL 81 NB

NL 45+00

POB CL 200+00.00

CL 200+00

CN 110+00

PC NL 48+22.26

BL 81 NB TO ALMOND ST RAMP

NL 50+00

CL 205+

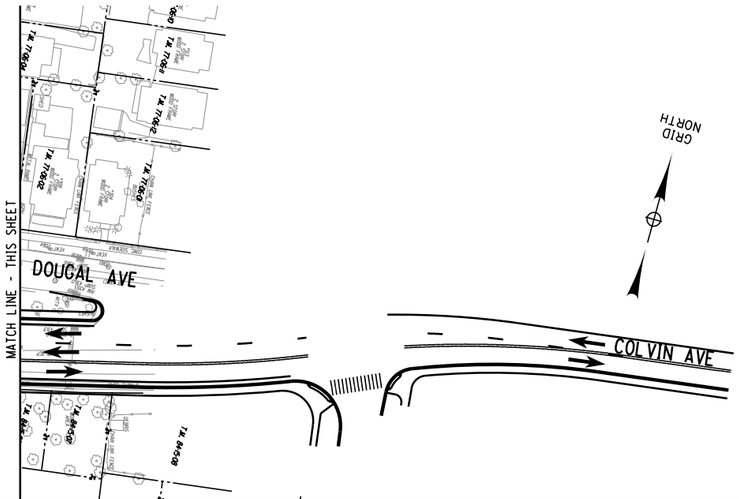
CONSTRUCT NEW BRIDGE

REPLACE RAILROAD BRIDGE

MATCH LINE - DWG NO GP-T-H10-01

MATCH LINE - DWG NO GP-T-H10-03

GRID NORTH



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

50 0 50 100
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

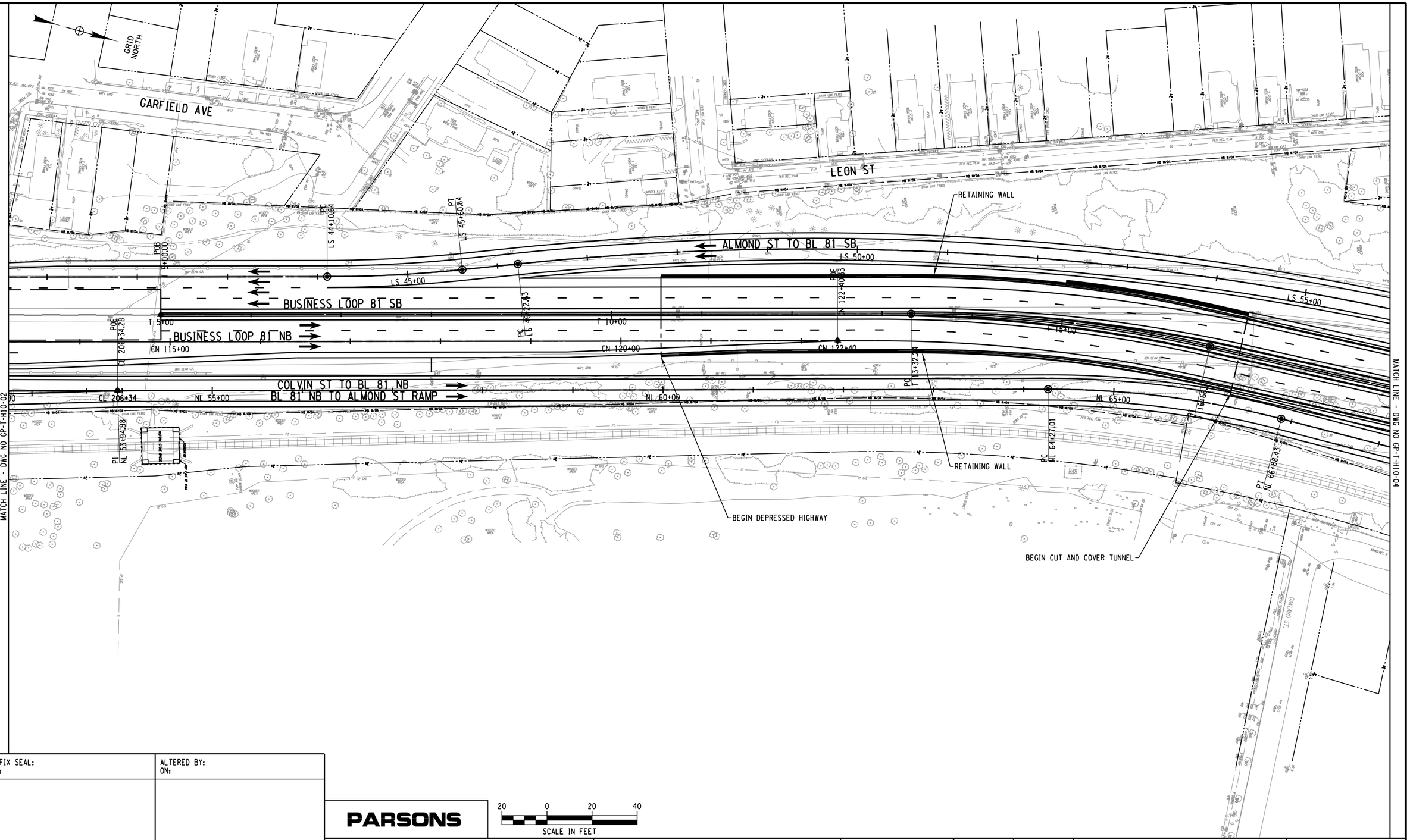
CONTRACT NUMBER

DRAWING NO. GP-T-H10-02
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

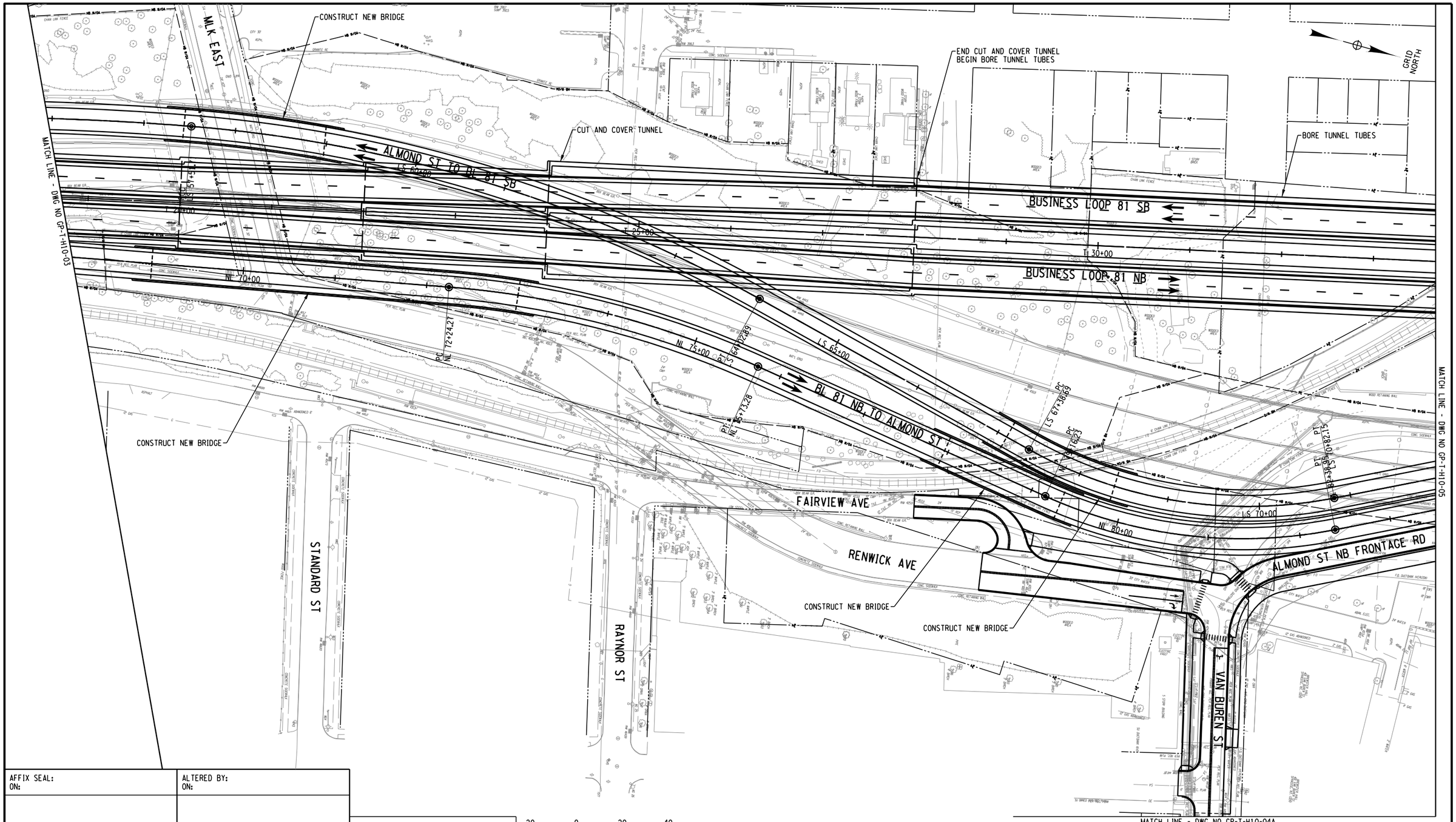
CONTRACT NUMBER

DRAWING NO. GP-T-H10-03
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME



PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$PEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

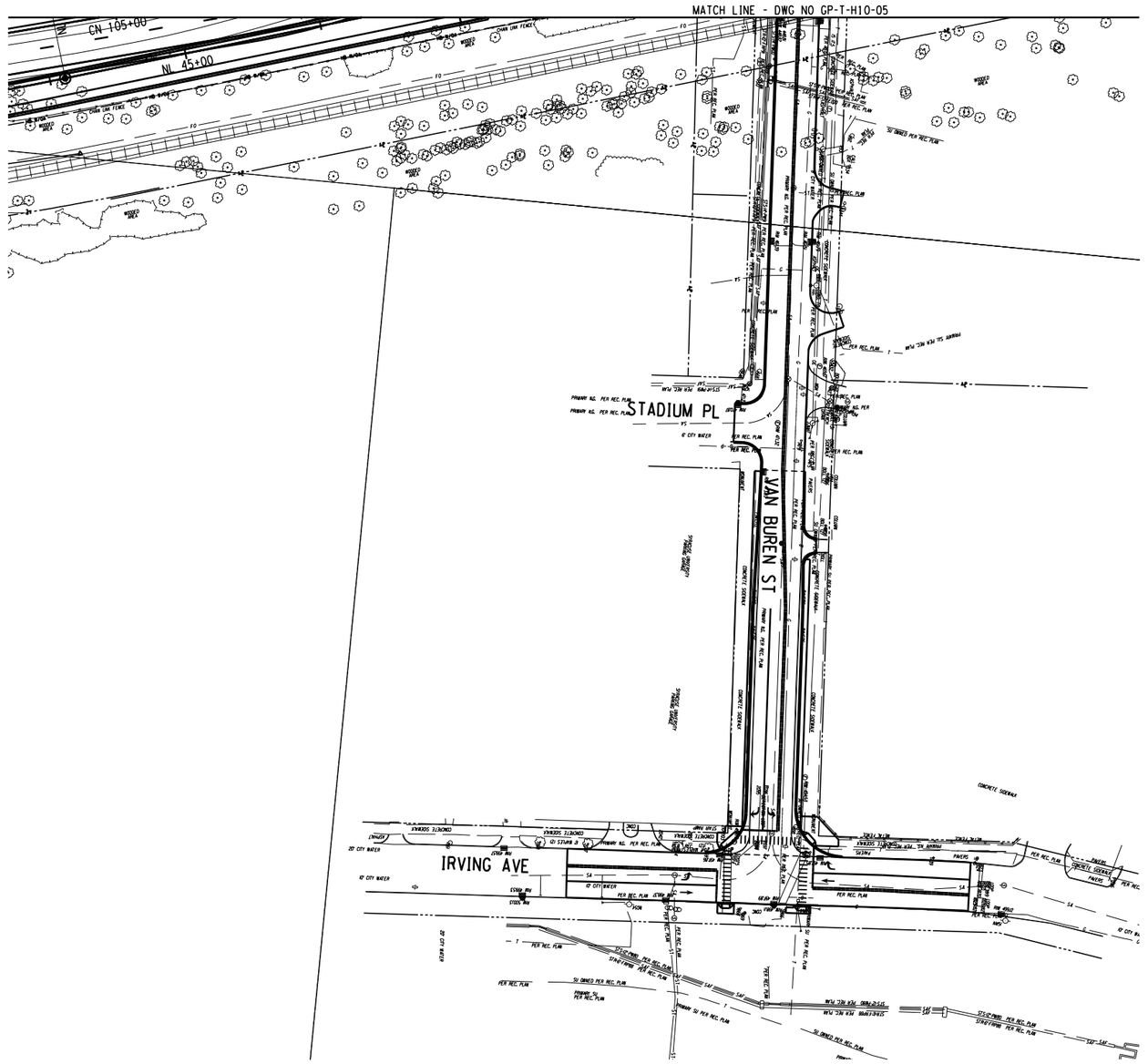
CONTRACT NUMBER

DRAWING NO. GP-T-H10-04

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIMEO123456
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

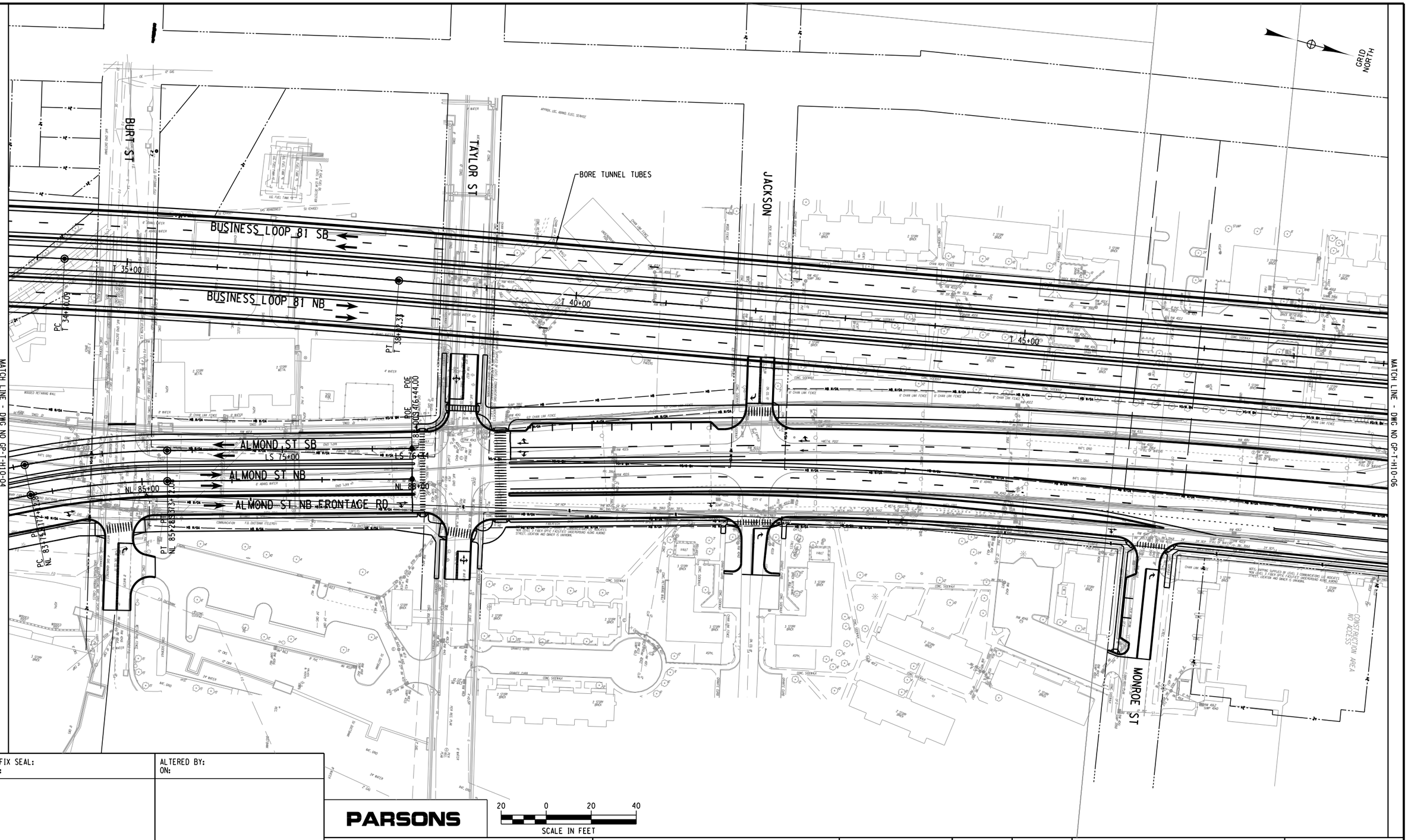
CONTRACT NUMBER

DRAWING NO. GP-T-H10-04A

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**



PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR
CHECK

FILE NAME = DGN$SPEC0123456789012345678901234567890123456
DATE/TIME = DGN$SYSTIME0123456
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-05
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN%SPEC01234567890123456789012345678901234
DATE/TIME = DGN%STIME01Z3456
USER = DGN%USERNAME

MATCH LINE - DWG NO GP-T-H10-05

MATCH LINE - DWG NO GP-T-H10-07

MATCH LINE - SEE BELOW

MATCH LINE - SEE ABOVE

ADAMS ST

HARRISON ST

BORE TUNNEL TUBES

BUSINESS LOOP 81 SB

BUSINESS LOOP 81 NB

ALMOND ST SB

ALMOND ST NB

MADISON ST

CEDAR ST

T 50+00

T 55+00

T 60+00

T 60+12.98 PC

GRID NORTH

20 0 20 40
SCALE IN FEET

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-06
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN:$PEC01234567890123456789012345678901234
DATE/TIME = DGN:$STTIME01Z3456
USER = DGN:$USERNAME

GRID NORTH

BORE TUNNEL TUBES

BUSINESS LOOP 81 SB

BUSINESS LOOP 81 NB

T 65+00

T 70+00

MATCH LINE - DWG NO GP-T-H10-08

MATCH LINE - DWG NO GP-T-H10-06

MATCH LINE - DWG NO GP-T-H10-6A

GENESEE ST

GENESEE ST

GENESEE ST

ALMOND ST SB

ALMOND ST NB

ANW 0+00

ANW 1+22.60

PT

ANW 5+00

MCBRIDE ST

FAYETTE ST

WASHINGTON ST

WATER ST

CONSTRUCT NEW BRIDGE

CONSTRUCT NEW RET WALLS

MATCH LINE - DWG NO GP-T-H10-06

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

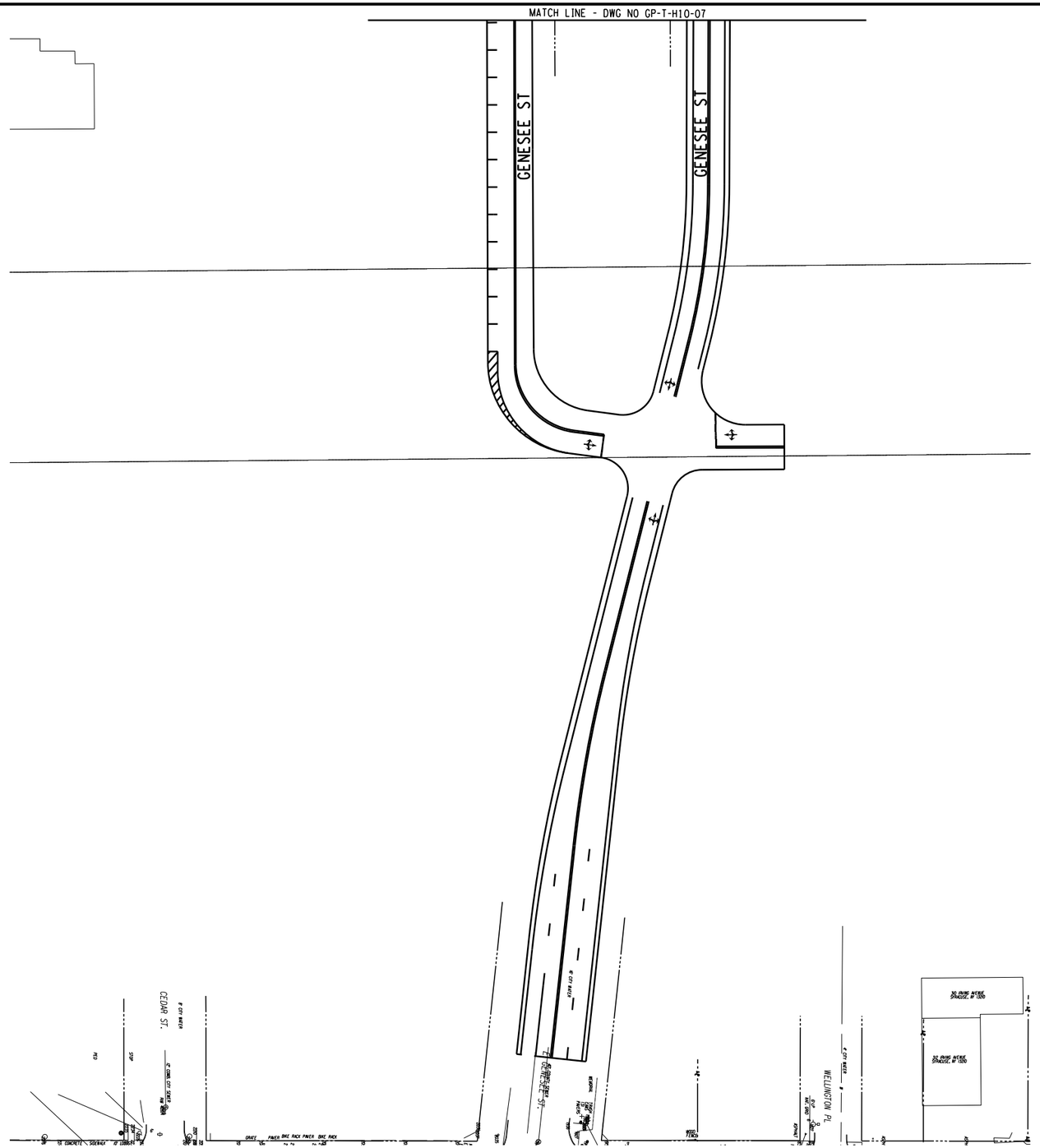
CONTRACT NUMBER

DRAWING NO. GP-T-H10-07
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

GRID NORTH



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-07A

SHEET NO.

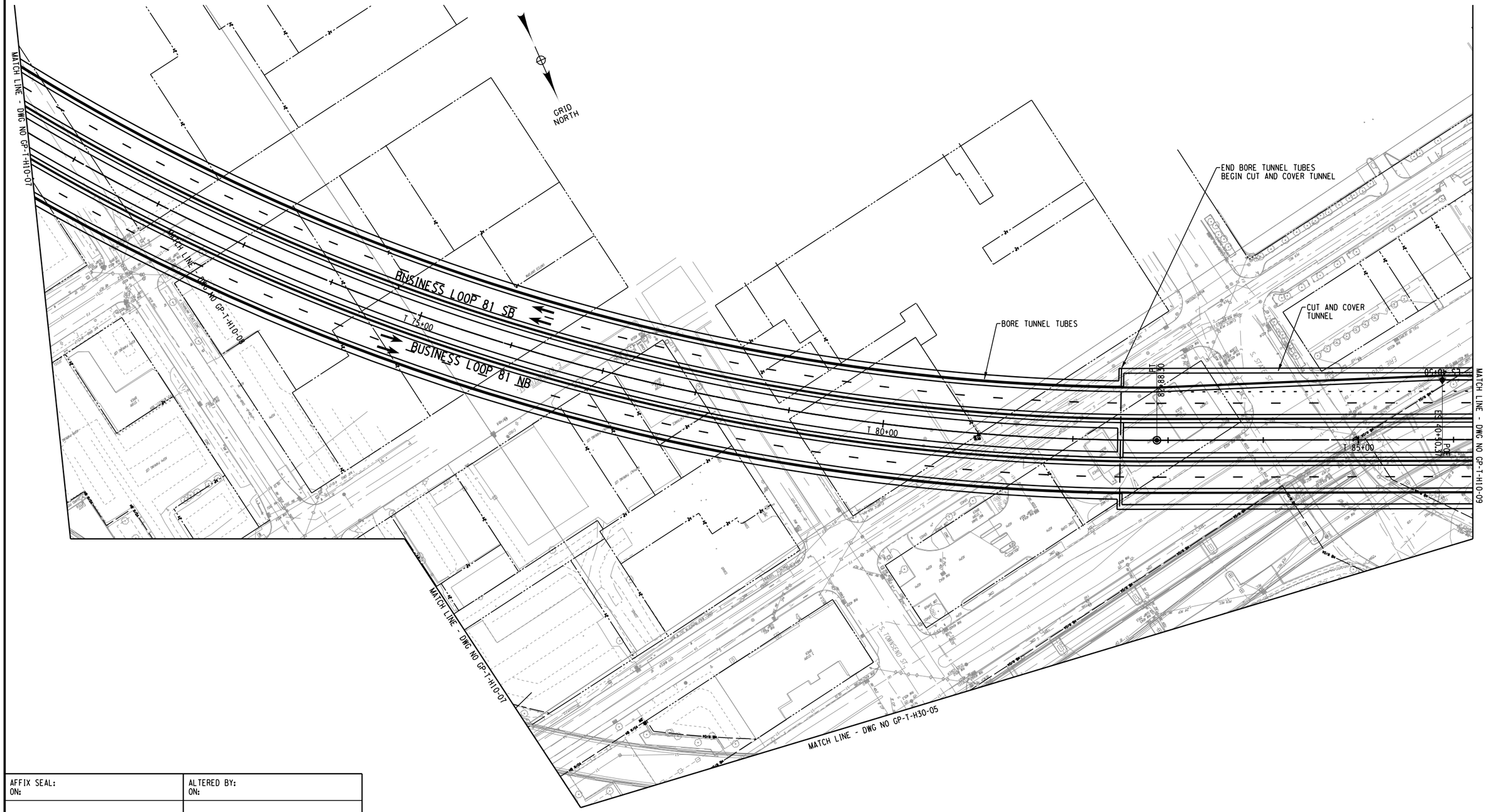
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**

DESIGN SUPERVISOR ____ DRAFTING ____ CHECK ____ DESIGN ____ JOB MANAGER ____ CHECK ____

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DATE/TIME = DGN$SYSTIME01234567890123456
USER = DGN$USERNAME



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

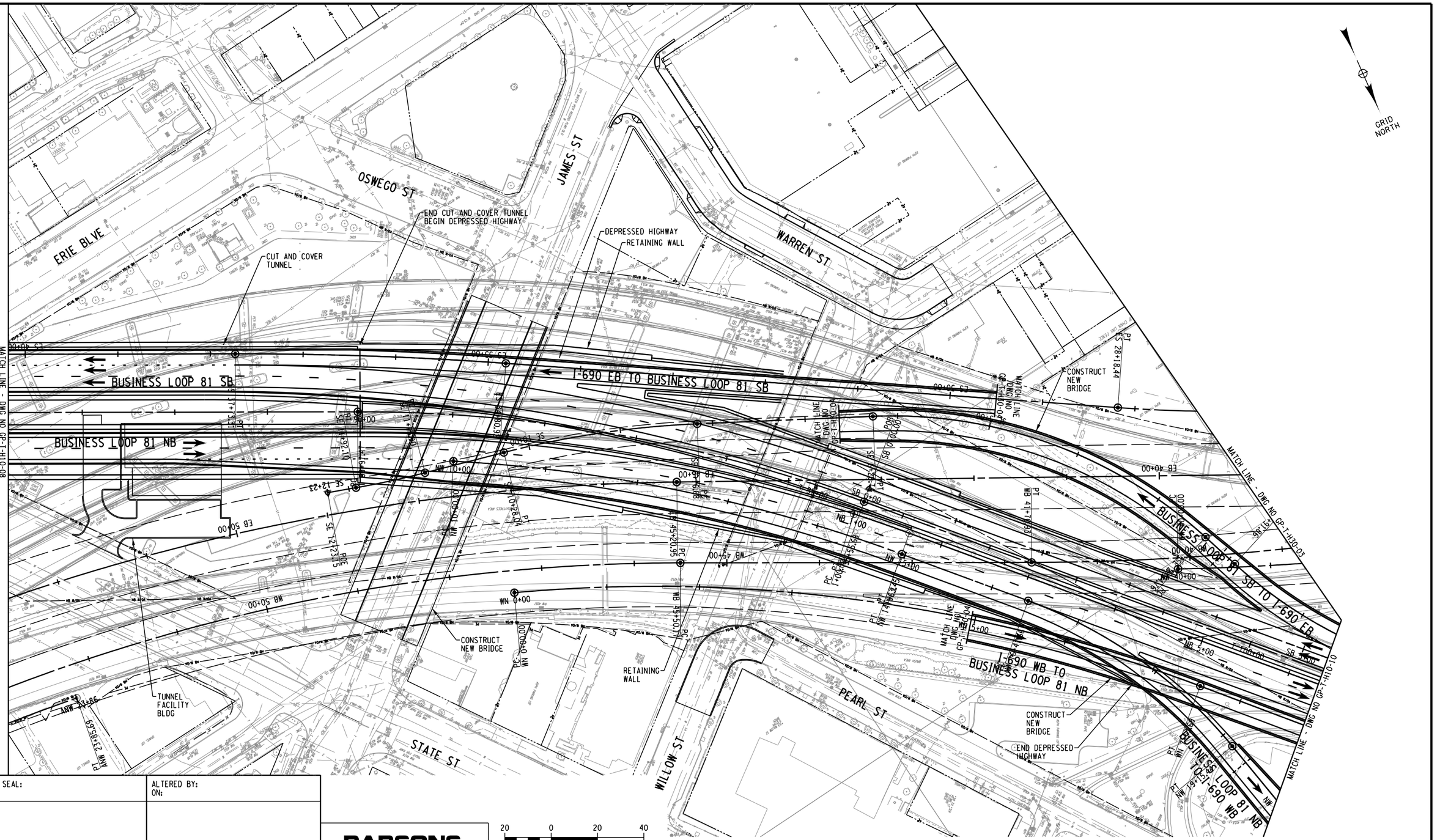
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SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME0123456
USER = DGN$USERNAME



PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
CHECK
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

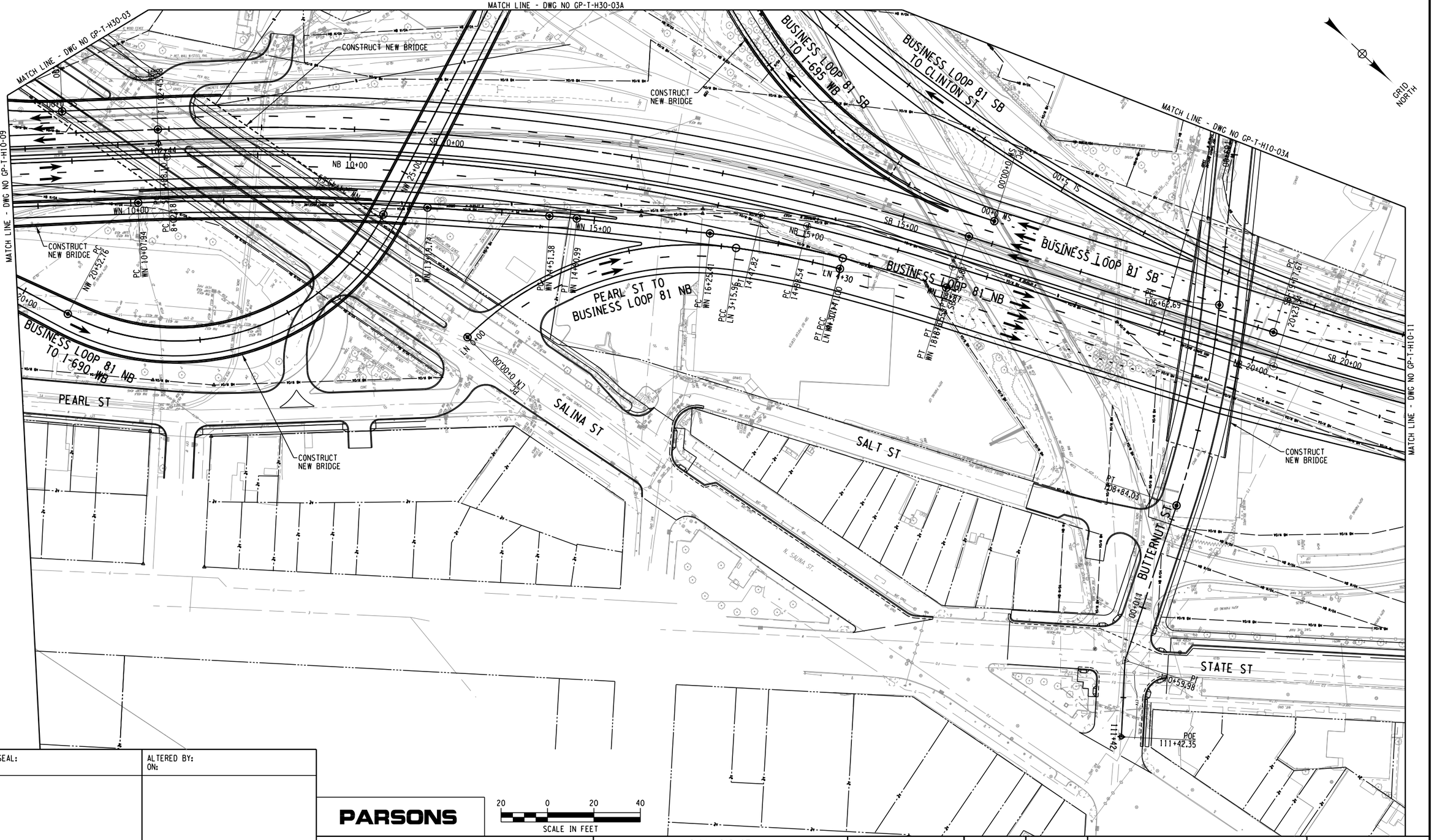
GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-09
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

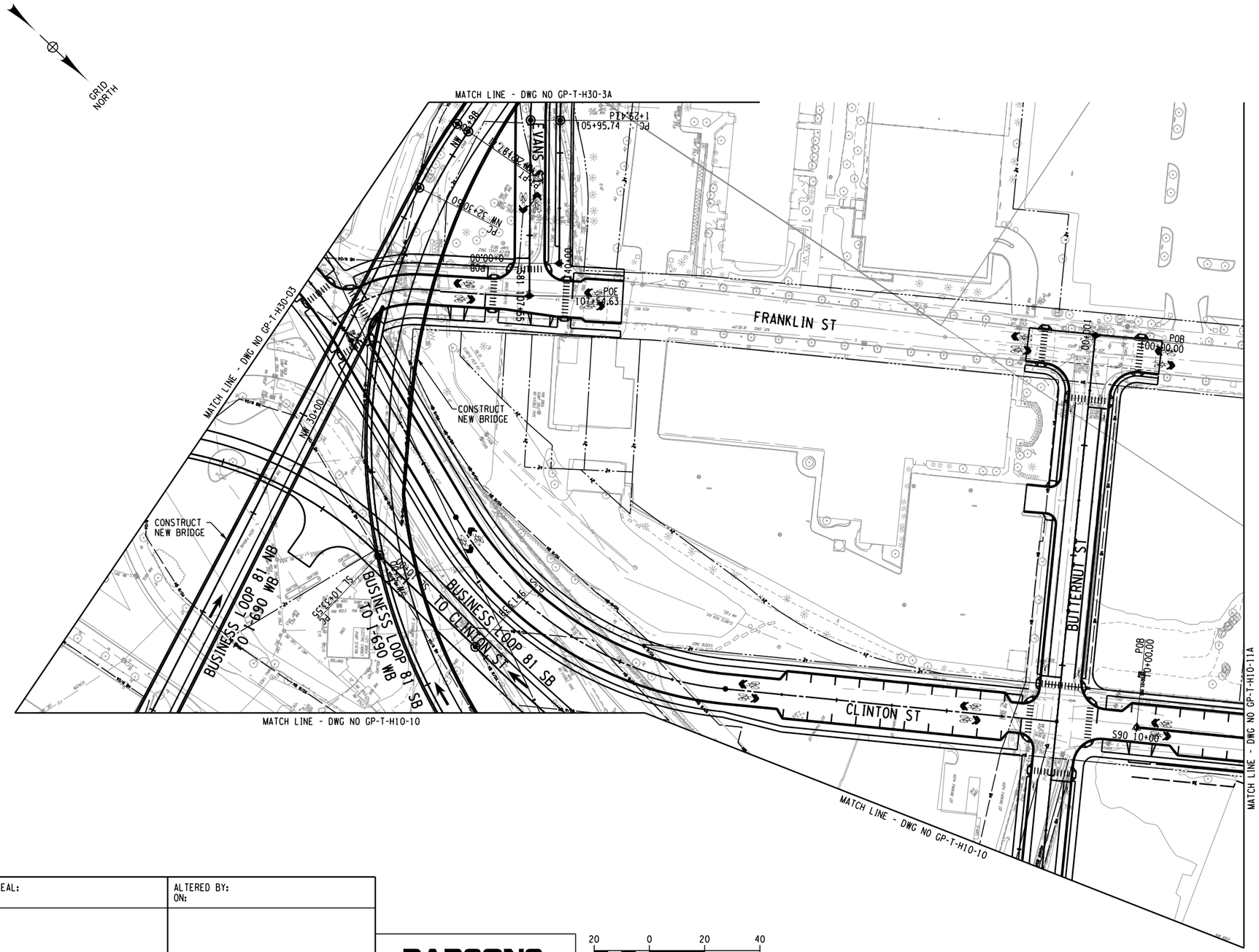
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SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
DRAFTING
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JOB MANAGER
DESIGN
CHECK
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567890123456789012345678901234
USER = DGN$USERNAME



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-81 NB & SB
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-10A
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DON$SPEC01234567890123456789012345678901234
DATE/TIME = DON$SYSTIME01234
USER = DON$USERNAME

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

GRID NORTH

MATCH LINE - DWG NO GP-T-H10-10

MATCH LINE - DWG NO GP-T-H10-11A

MATCH LINE - DWG NO GP-T-H10-12

PC 0+00.00
00+00 TS
SB 21+13.61
HCC
21+22.00

BUSINESS LOOP 81 NB
SB 25+00
NB 25+00
BUSINESS LOOP 81 NB
SB 30+00
NB 30+00
PT 30+01.08
PT 34+76.75
PT 13+51.47
SB 35+00
NB 35+00

DIVISION ST
PC 11+96.22
GENANT DR
CONSTRUCT NEW BRIDGE
ORANGE 985
SB 985
POE 15+67.48

STATE ST
ASH ST
DIVISION ST
SPENCER ST

20 0 20 40
SCALE IN FEET

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

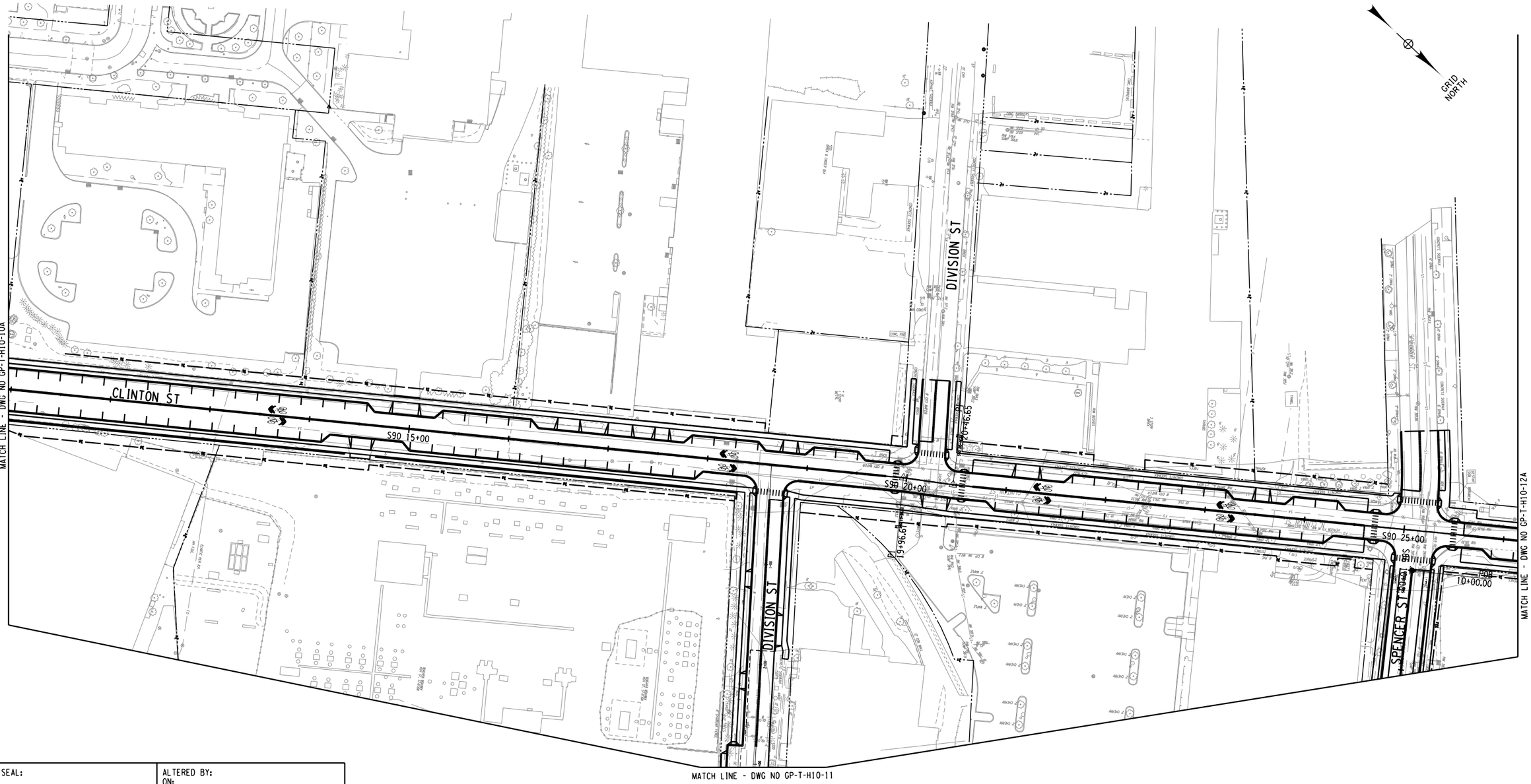
GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-11
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



PROJECT MANAGER **H. UNGAR**

DRAFTING _____ CHECK _____ DESIGN _____ JOB MANAGER _____ DESIGN SUPERVISOR _____ CHECK _____

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DATE/TIME = DON$SYTIME\0123456
USER = DON$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-11A
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DON$SPEC\0123456789012345678901234567890123456789012345678901234
DATE/TIME = DON$SYSTIME\0123456
USER = DON$USERNAME

GRID NORTH

MATCH LINE - DWG NO GP-T-H10-11

MATCH LINE - DWG NO GP-T-H10-12A

MATCH LINE - DWG NO GP-T-H10-13

KIRKPATRICK ST

GENANT DR

COURT ST

BUSINESS LOOP 81 SB

BUSINESS LOOP 81 NB

BUSINESS LOOP 81 NB TO SUNSET AVE RAMP

PC 20+53.12

PT 23+69.64

PRC 121+93.27

PRC 121+83.36

PC 39+59.90

PT 41+09.55

PC 103+00.09

PT 105+29.74

H21 125±00

H21 120±00

H11 125±00

H11 120±00

H21 114±00

H21 115±00

H11 114±00

H11 115±00

NB 40+00

NB 40+00.00

NB 40+42.11

SB 40+00

R17 100+00

R17 100+00.00

R17 105±00

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-12

SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

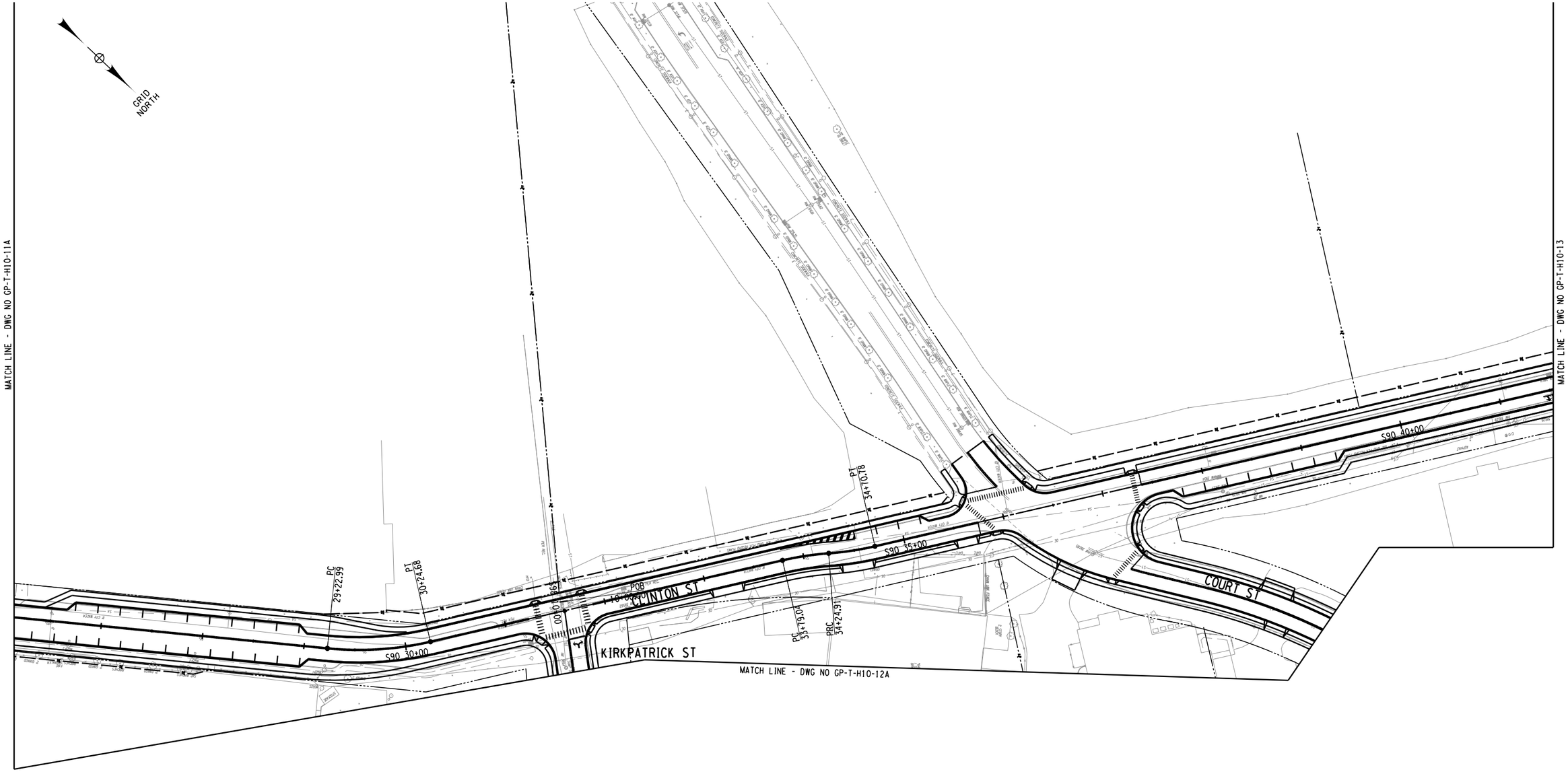
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DESIGN CHECK _____ DESIGN _____ JOB MANAGER _____ DESIGN SUPERVISOR _____

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MATCH LINE - DWG NO GP-T-H10-11A

GRID NORTH



MATCH LINE - DWG NO GP-T-H10-13

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

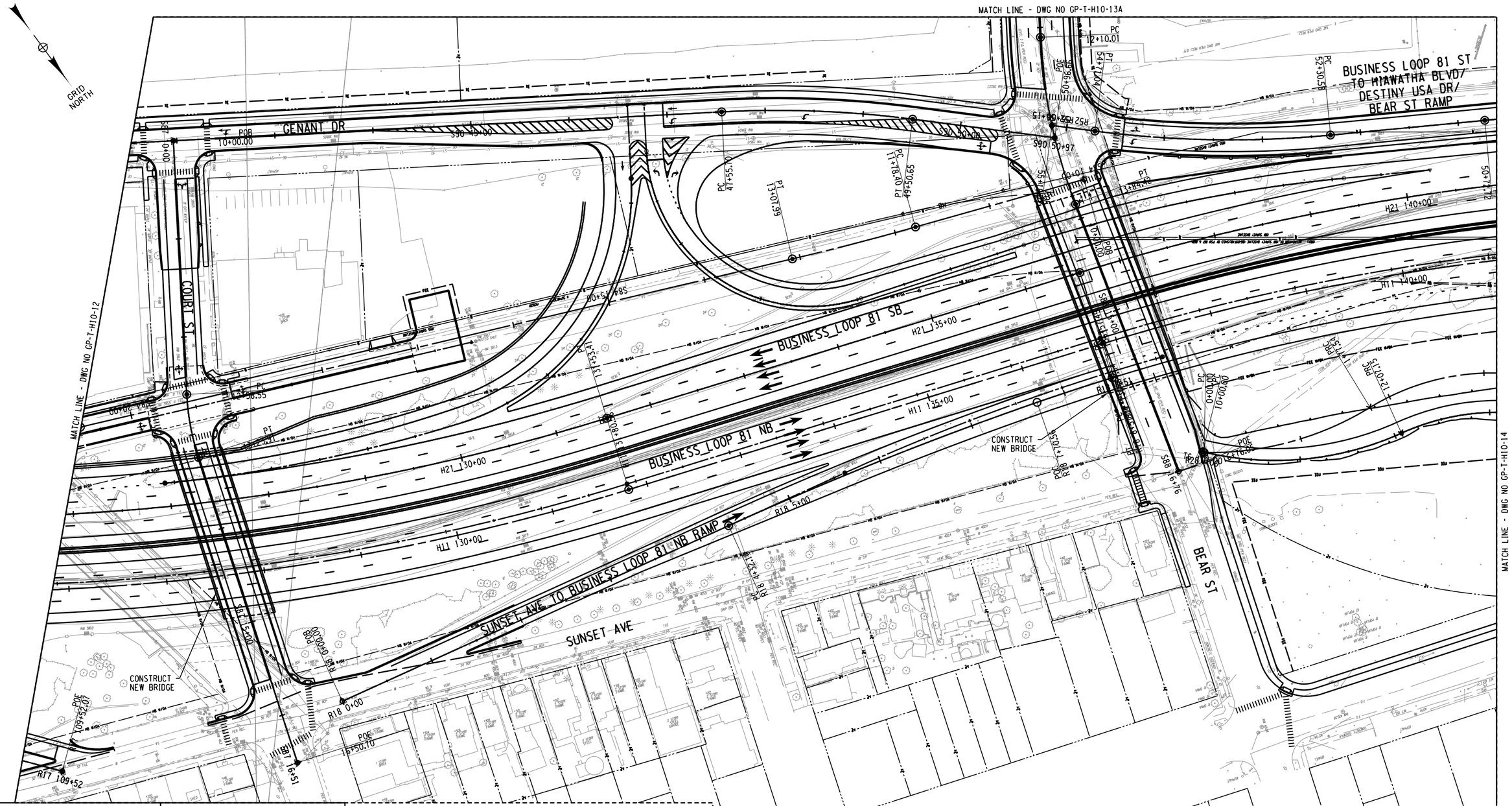
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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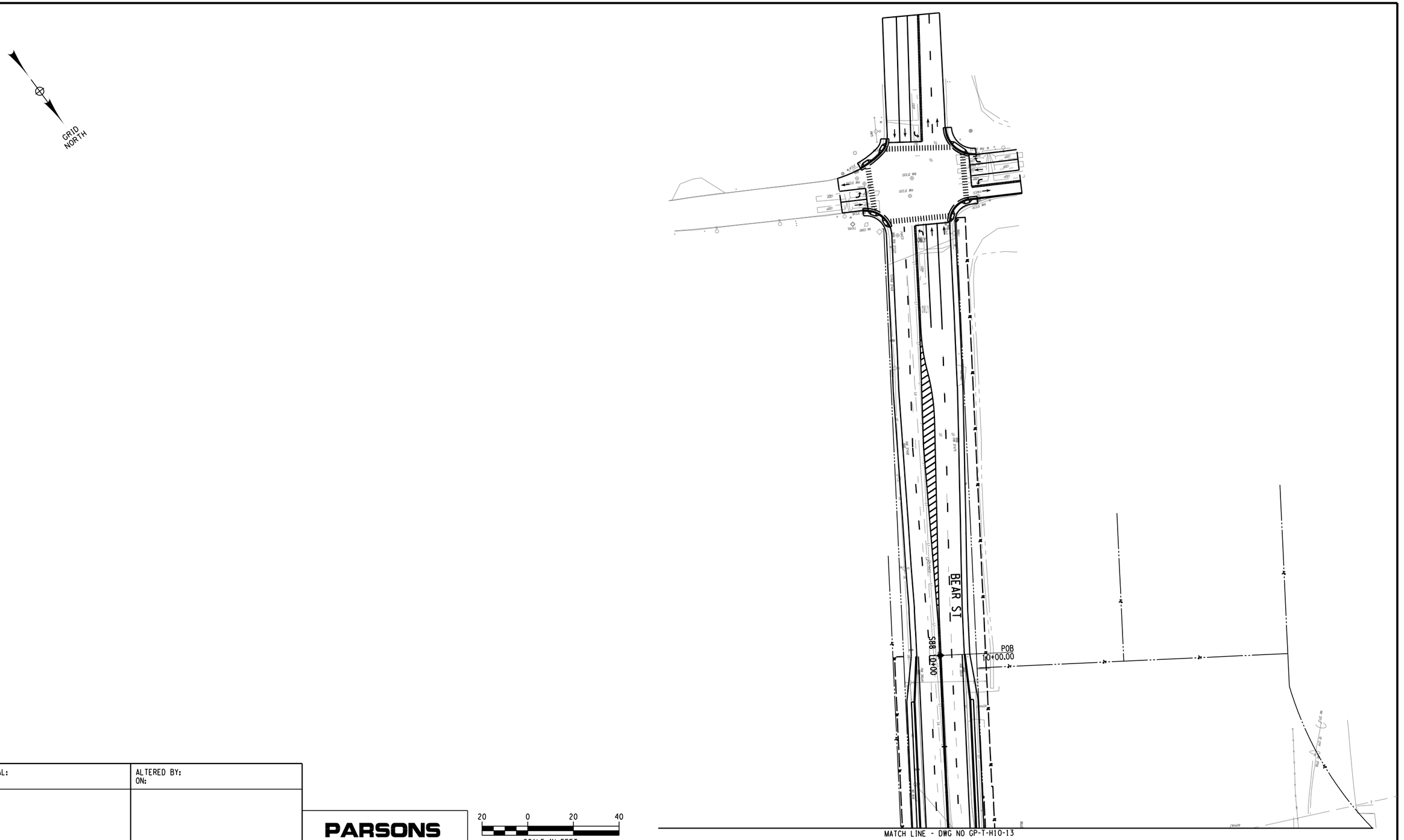
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

DESIGN SUPERVISOR ____ JOB MANAGER ____ DESIGN ____ CHECK ____ DRAFTING ____ PROJECT MANAGER H. UNGAR

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DATE/TIME = DGN%SYSTIME01123456
USER = DGN%USERNAME



PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYTIME01234567890123456789012345678901234
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
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I-81 VIADUCT

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CONTRACT NUMBER

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

MATCH LINE - DWG NO GP-T-H10-13

MATCH LINE - DWG NO GP-T-H10-15

BUSINESS LOOP 81 SB

BUSINESS LOOP 81 NB

HIAWATHA BLVD TO BUSINESS LOOP 81 SB RAMP

HIAWATHA BLVD

LODI ST

GRID NORTH

SCALE IN FEET

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-14

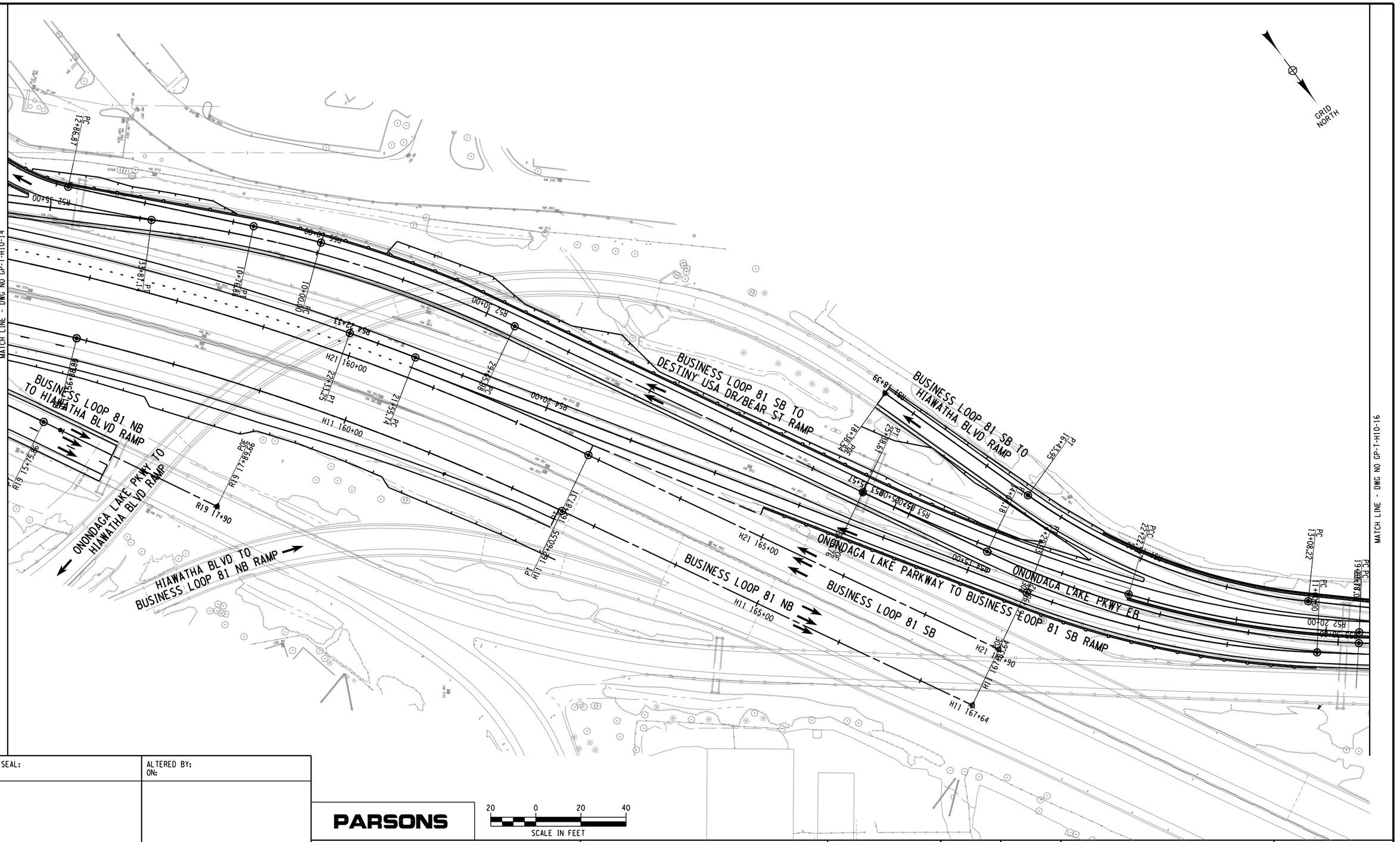
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIMEDGN$SYSTIMEDGN$SYSTIMED

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR



PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

GRID NORTH

MATCH LINE - DWG NO GP-T-H10-15

MATCH LINE - DWG NO GP-T-H10-17

ONONDAGA LAKE PKWY EB

ONONDAGA LAKE PKWY WB

HARBORSIDE DRIVE

PARK ST

HIAWATHA BLVD/DESTINY USA DR/BEAR ST RAMP

BUSINESS LOOP 81 SB TO

R51 10+00

R54 10+00

POB 10+00.00

R52 15+00

R49 23+00

PT 11+69.48

PT 21+30.10

PC 10+00.00

0+00

R52

R53 20+00

PT 16+58.26

R50 16+58

PC 17+58.26

R50 15+00

PC 17+20.53

R53 19+00

SCALE IN FEET 20 0 20 40

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

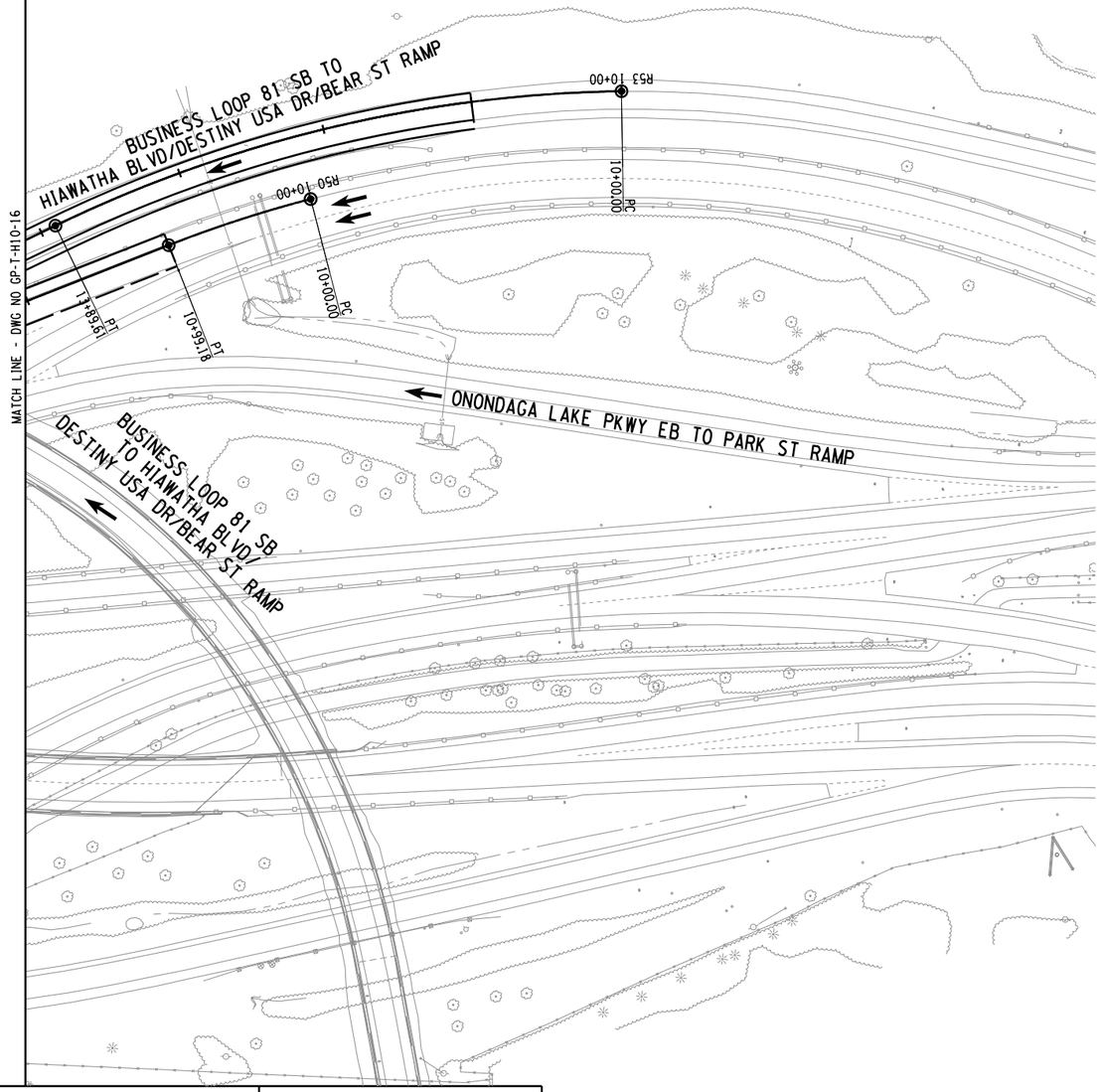
CONTRACT NUMBER

DRAWING NO. GP-T-H10-16

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**



GRID NORTH

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

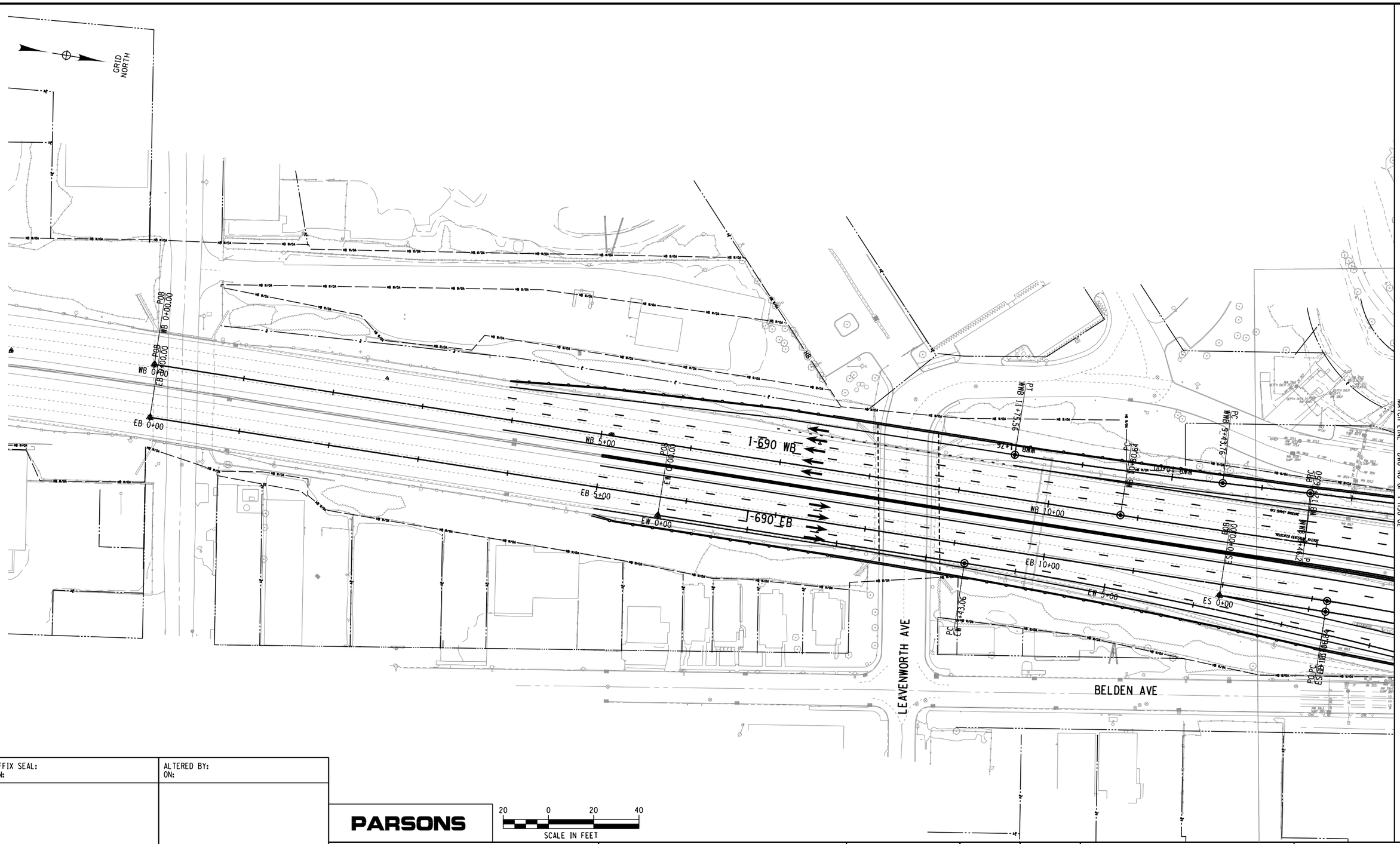
GENERAL PLAN
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H10-17
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



PROJECT MANAGER **H. UNGAR**

CHECK

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DESIGN

JOB MANAGER

DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

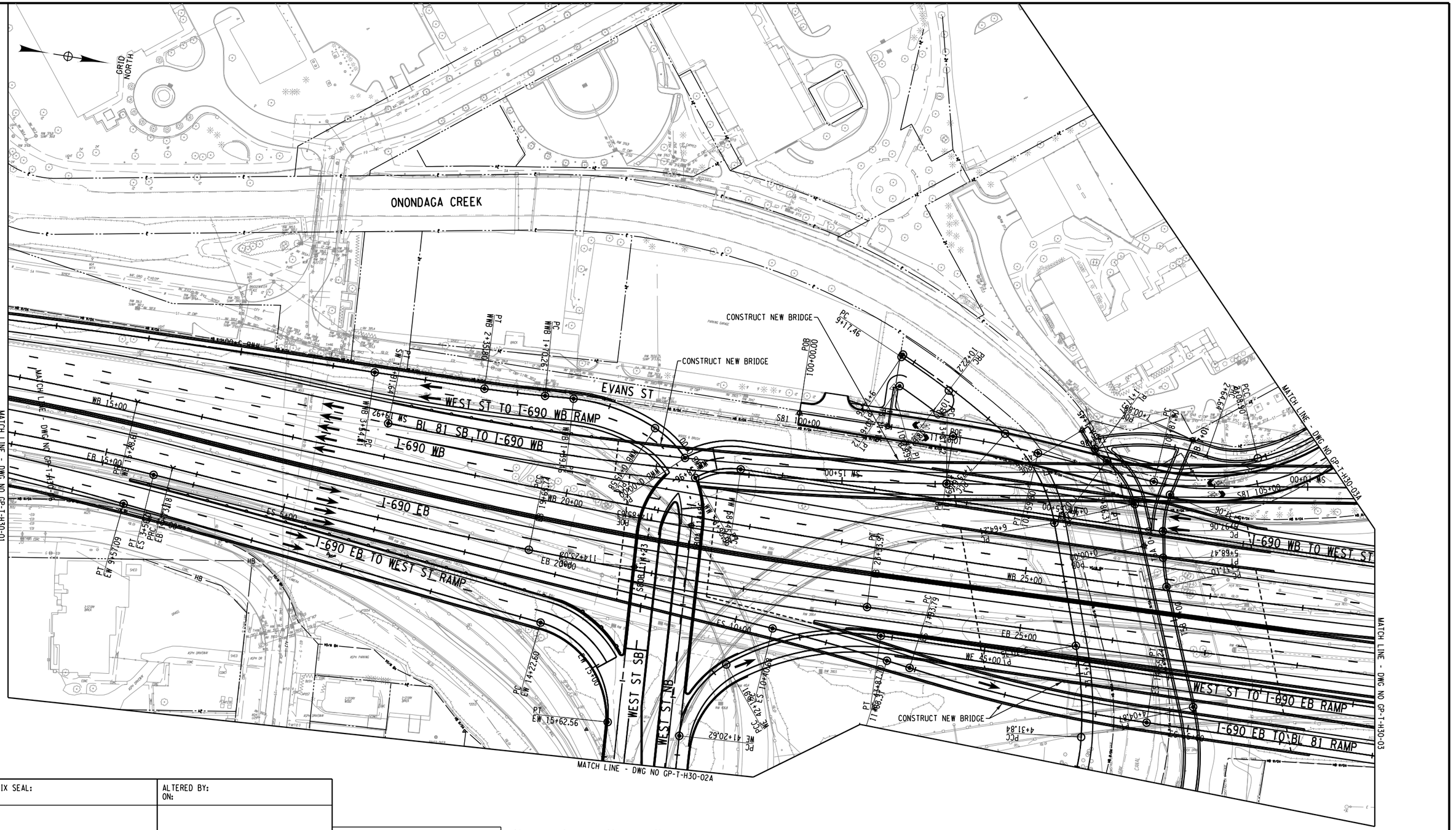
DRAWING NO. GP-T-H30-01

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

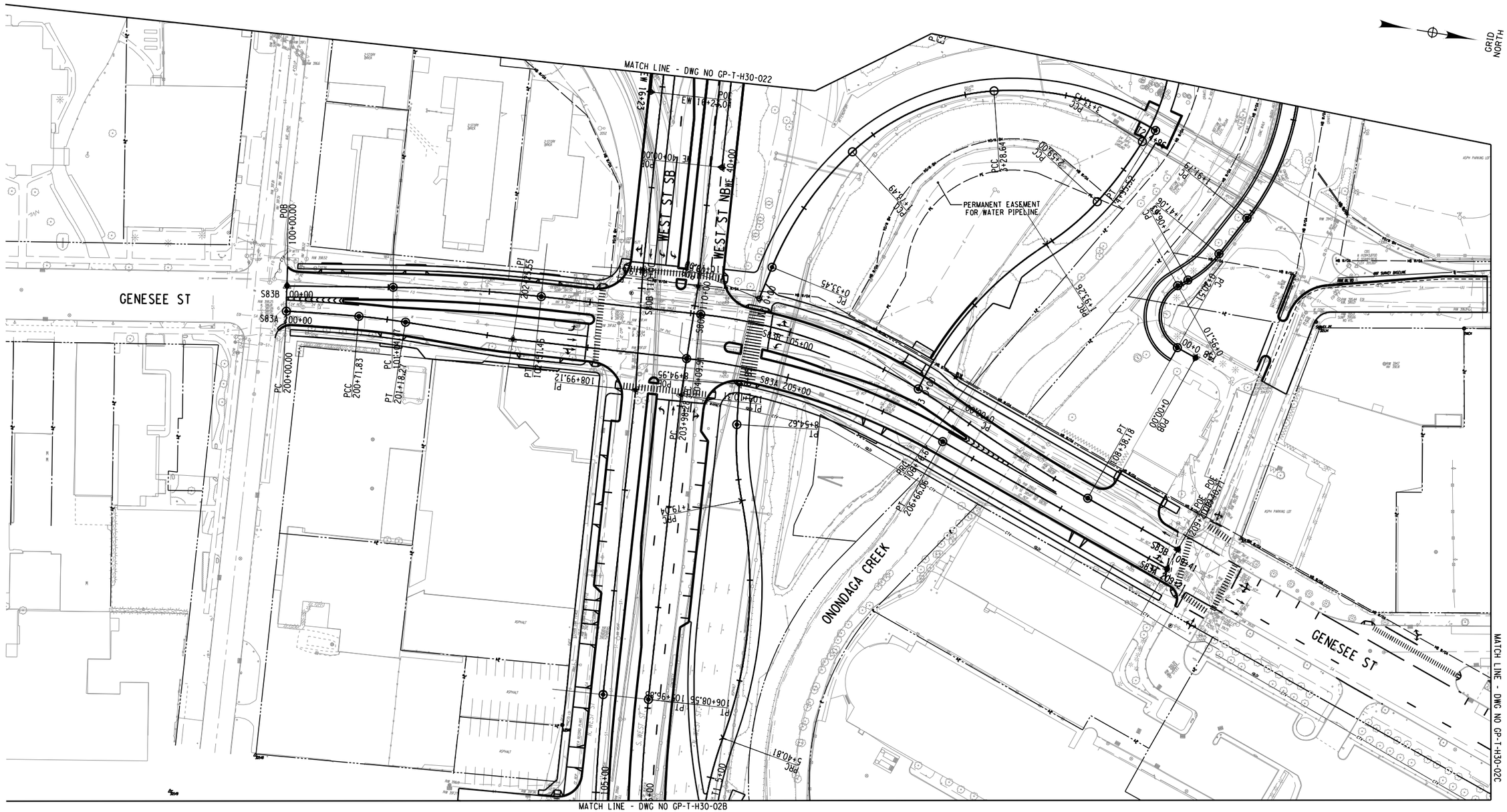
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DRAWING NO. GP-T-H30-02
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

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DATE/TIME = DGN$SYTIME01234567
USER = DGN$USERNAME



PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

FILE NAME = DGN$SPEC0123456789012345678901234567890123456789012345
DATE/TIME = DGN$SYSTIME0123456
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

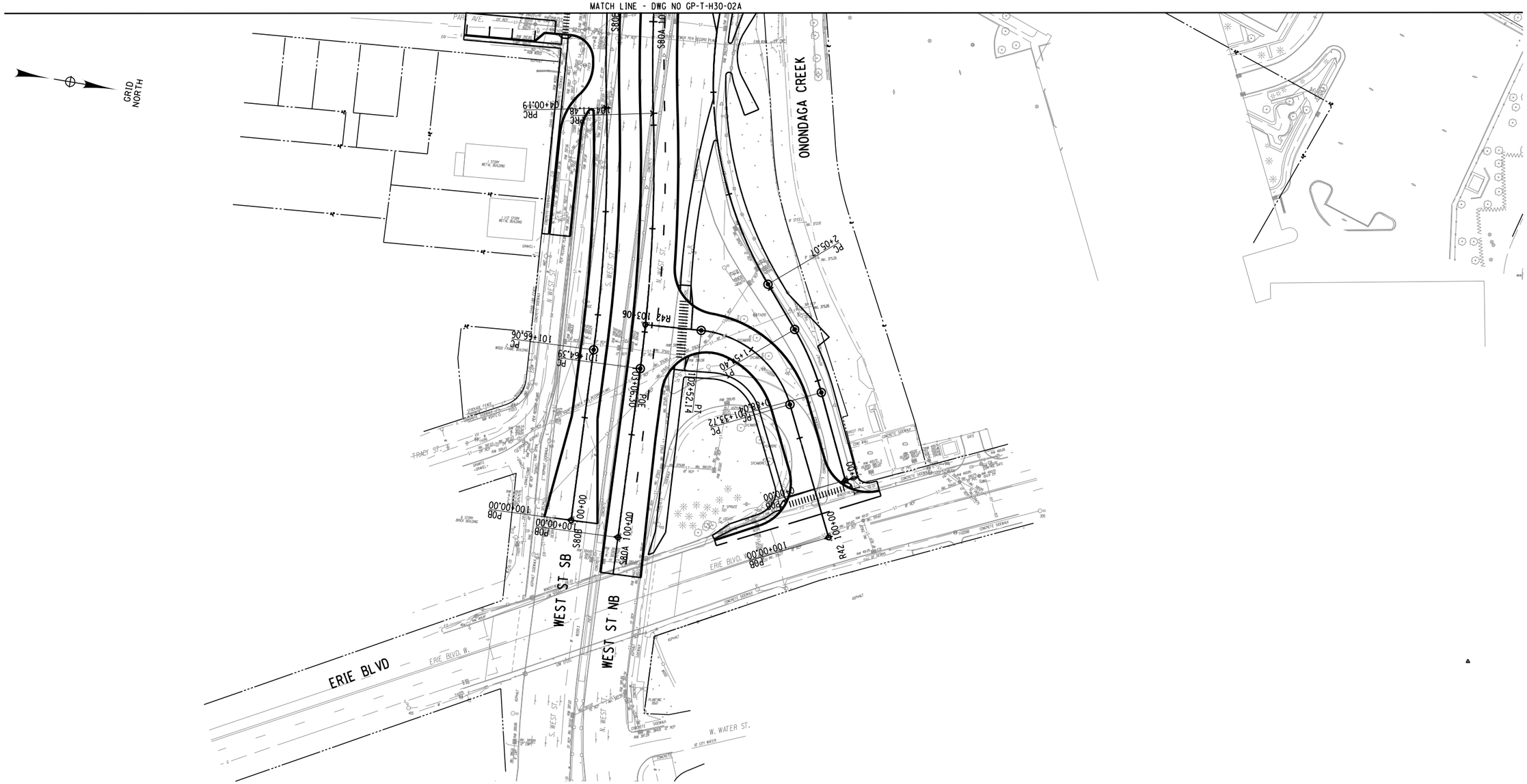
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DRAWING NO. GP-T-H30-02A
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

MATCH LINE - DWG NO GP-T-H30-02A


GRID NORTH
ONONDAGA CREEK
ERIE BLVD
ERIE BLVD. W.
WEST ST SB
WEST ST NB
S. WEST ST.
N. WEST ST.
TRACY ST.
W. WATER ST.
PARK AVE.
ERIE BLVD. E.
CONCRETE SIDEWALK
ASPHALT
GRAVEL
S80F
S80A
R42 100+00
R43 103+06
PC 2+05.01
PC 101+66.06
PC 101+64.39
PC 101+33.12
PC 1+53.40
POE 103+06.30
PT 102+52.14
POB 100+00.00
POB 100+00.00
POB 100+00.00

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC\0123456789012345678901234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME\0123456
USER = DGN$USERNAME

GRID NORTH

MATCH LINE - DWG NO GP-T-H30-03

MATCH LINE - DWG NO GP-T-H30-02A

MATCH LINE - DWG NO GP-T-H10-04

CLINTON ST

GENESEE ST

W. GENESEE ST.

SALINA ST

N. SALINA ST.

ERIE BLVD

ERIE BLVD. W.

S. CLINTON ST.

WARREN ST.

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

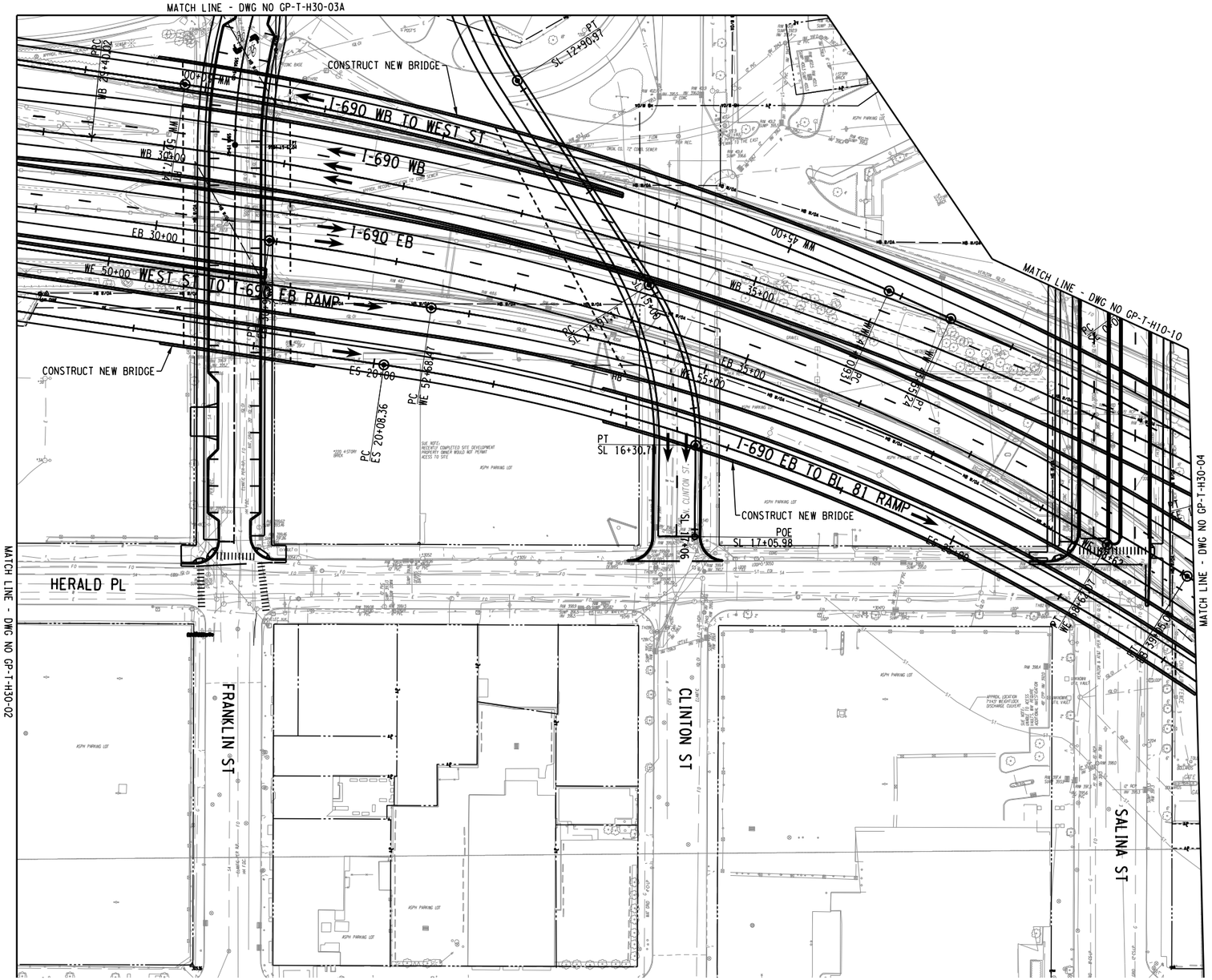
GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H30-02C
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

20 0 20 40
SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H30-03

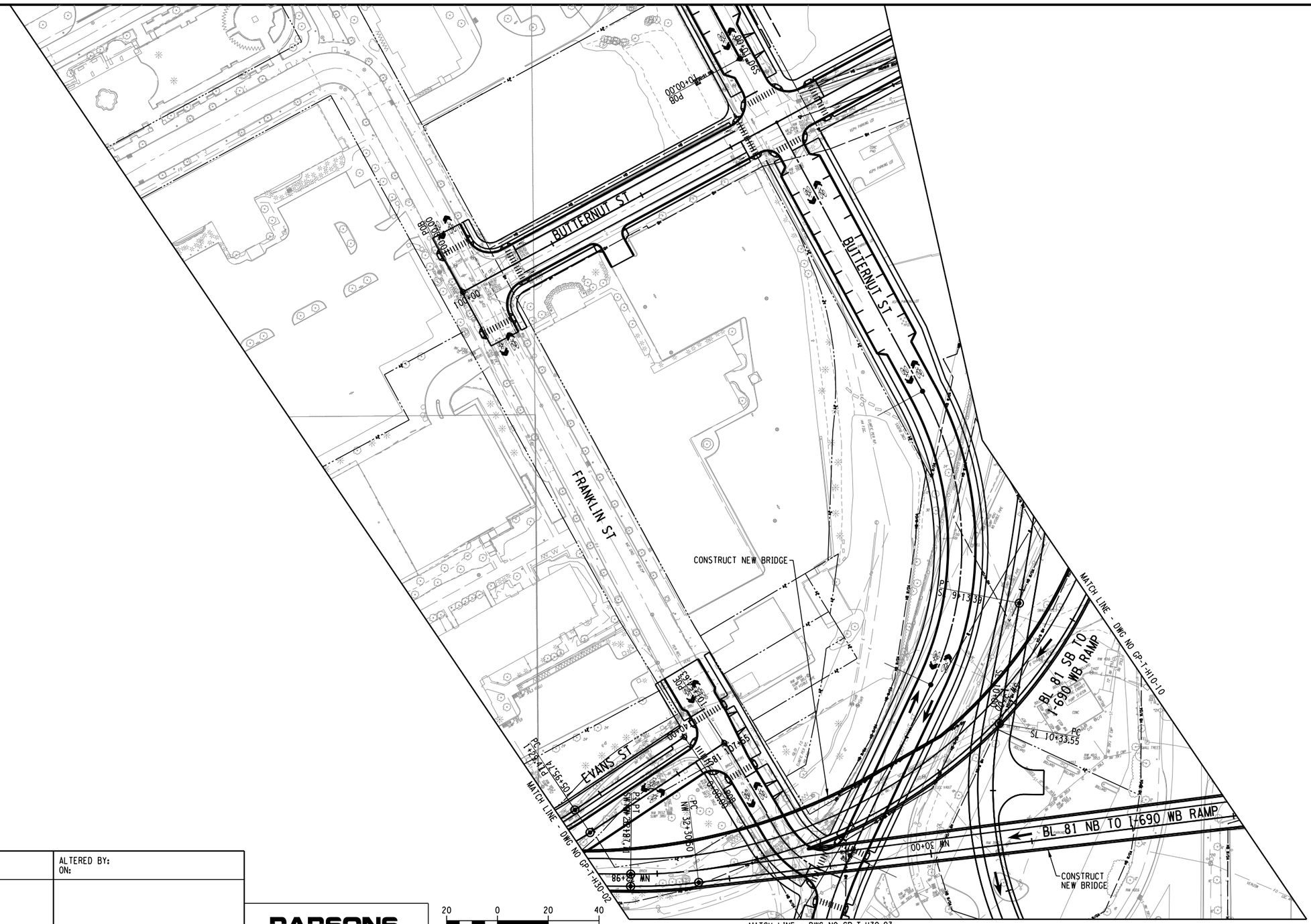
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NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

PROJECT MANAGER **H. UNGAR**
DRAFTING _____ CHECK _____
DESIGN _____ CHECK _____
JOB MANAGER _____
DESIGN SUPERVISOR _____

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DATE/TIME = DGN$SYTIME01234567890123456789012345678901234
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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H30-03A
SHEET NO.

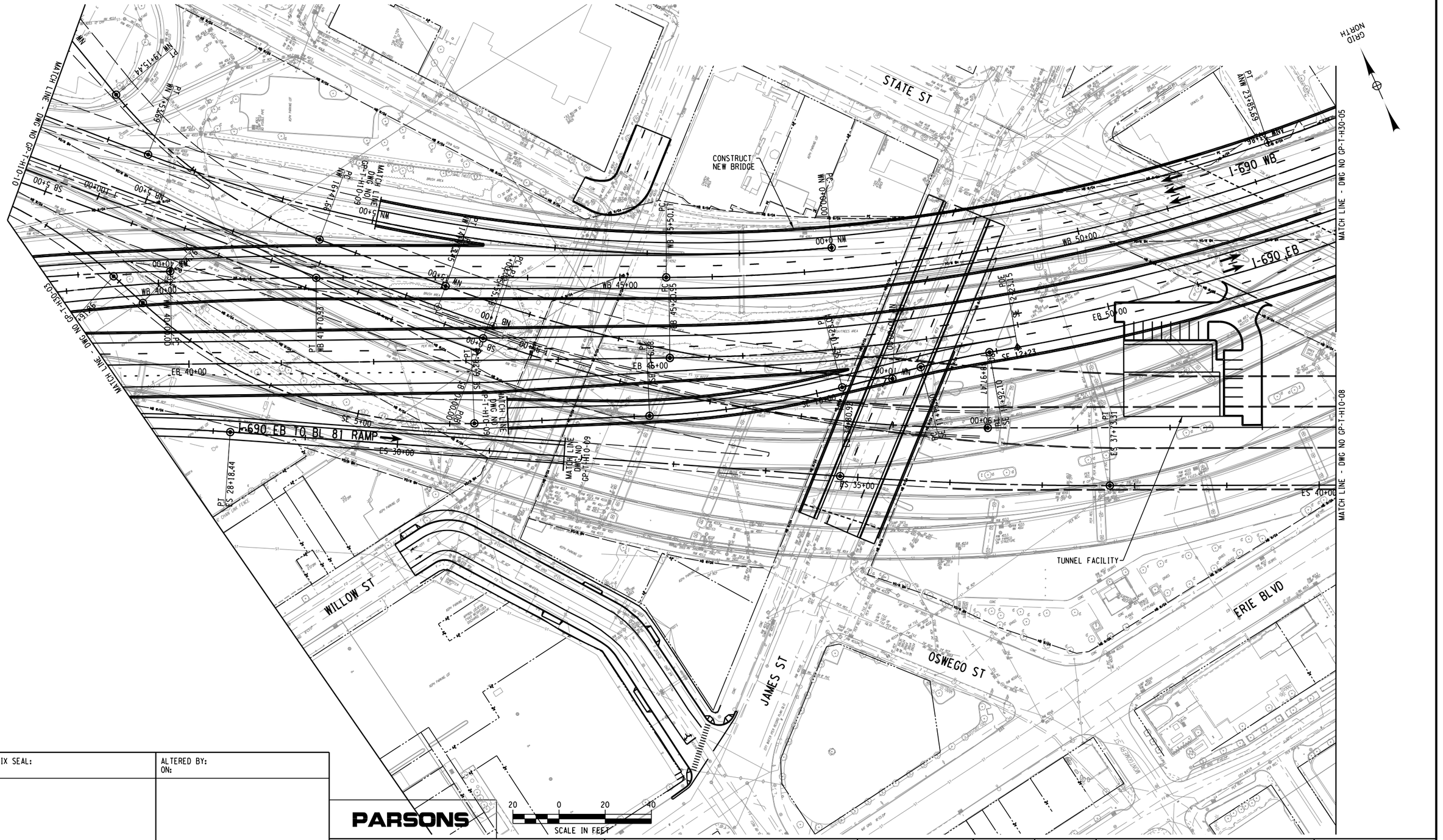
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

DESIGN SUPERVISOR ____ DRAFTING ____ CHECK ____ JOB MANAGER ____ DESIGN ____ CHECK ____ PROJECT MANAGER **H. UNGAR**

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DATE/TIME = DGN$SYSTIME01234567890123456789012345678901234
USER = DGN$USERNAME

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

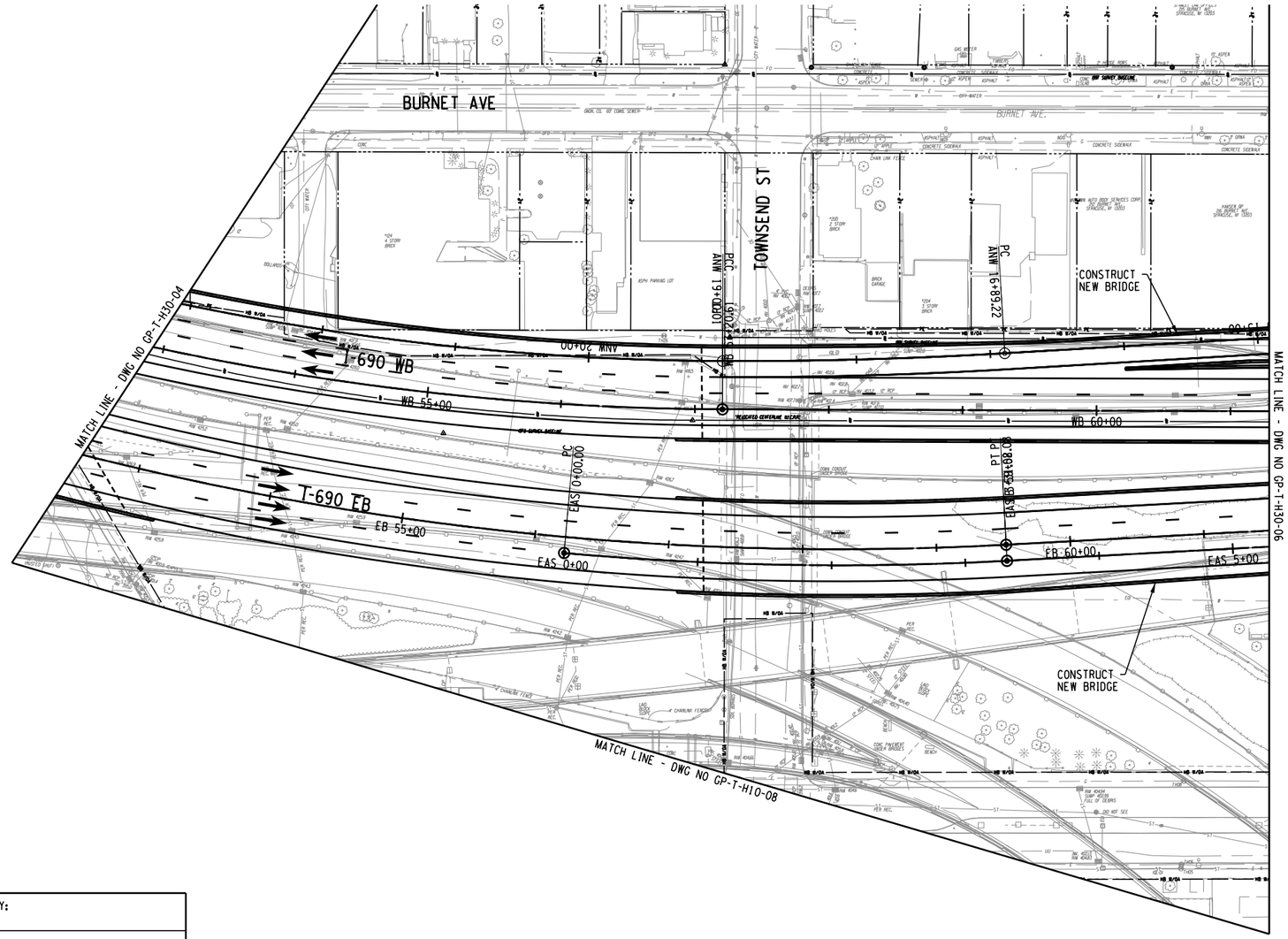
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SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

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GRID NORTH



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H30-05
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

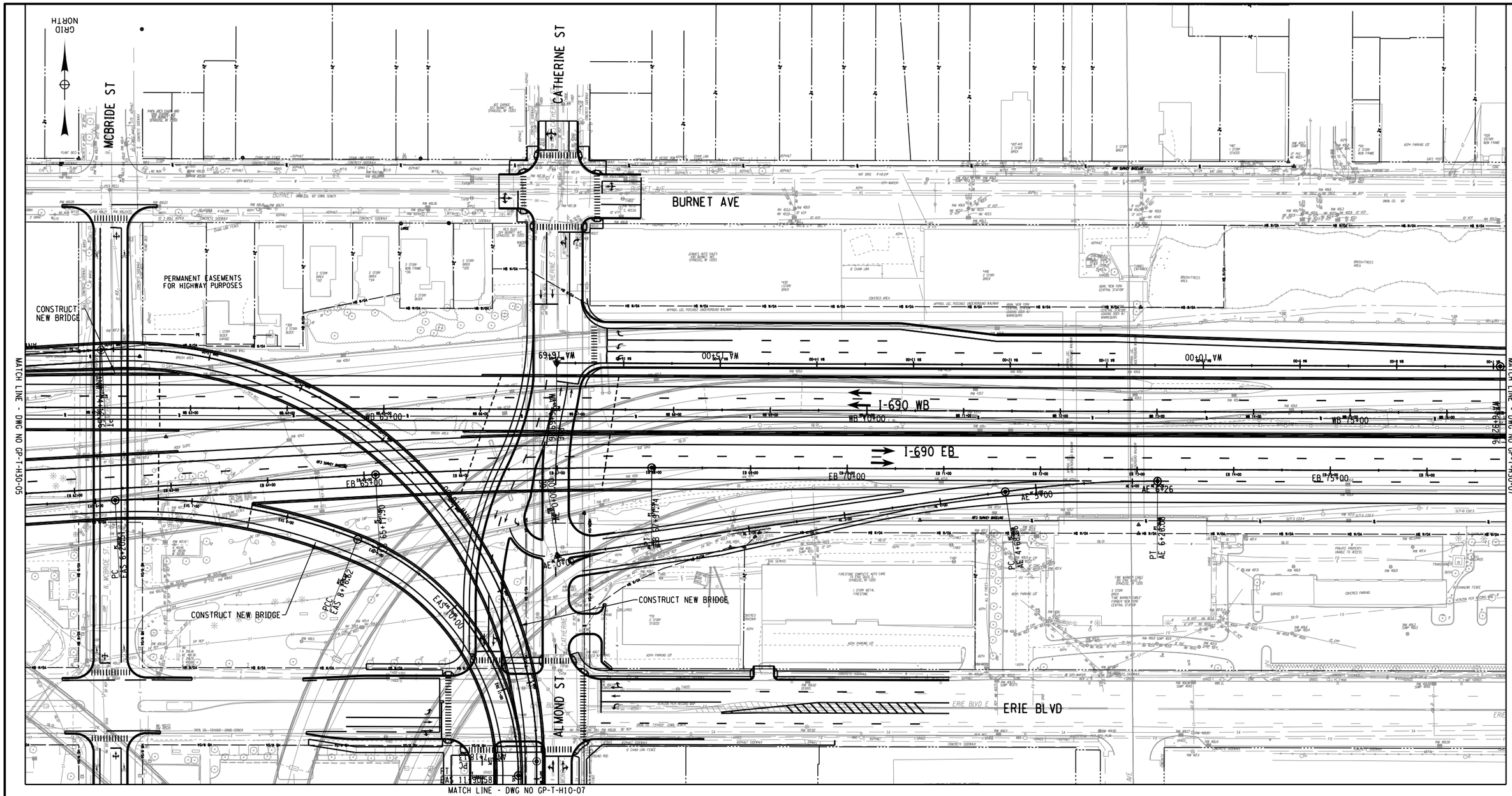
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

DESIGN SUPERVISOR JOB MANAGER DESIGN CHECK DRAFTING PROJECT MANAGER **H. UNGAR**

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PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
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JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DON$SPEC\0123456789012345678901234567890123456789012345
DATE/TIME = DON$SYSTIME\0123456
USER = DON$USERNAME



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

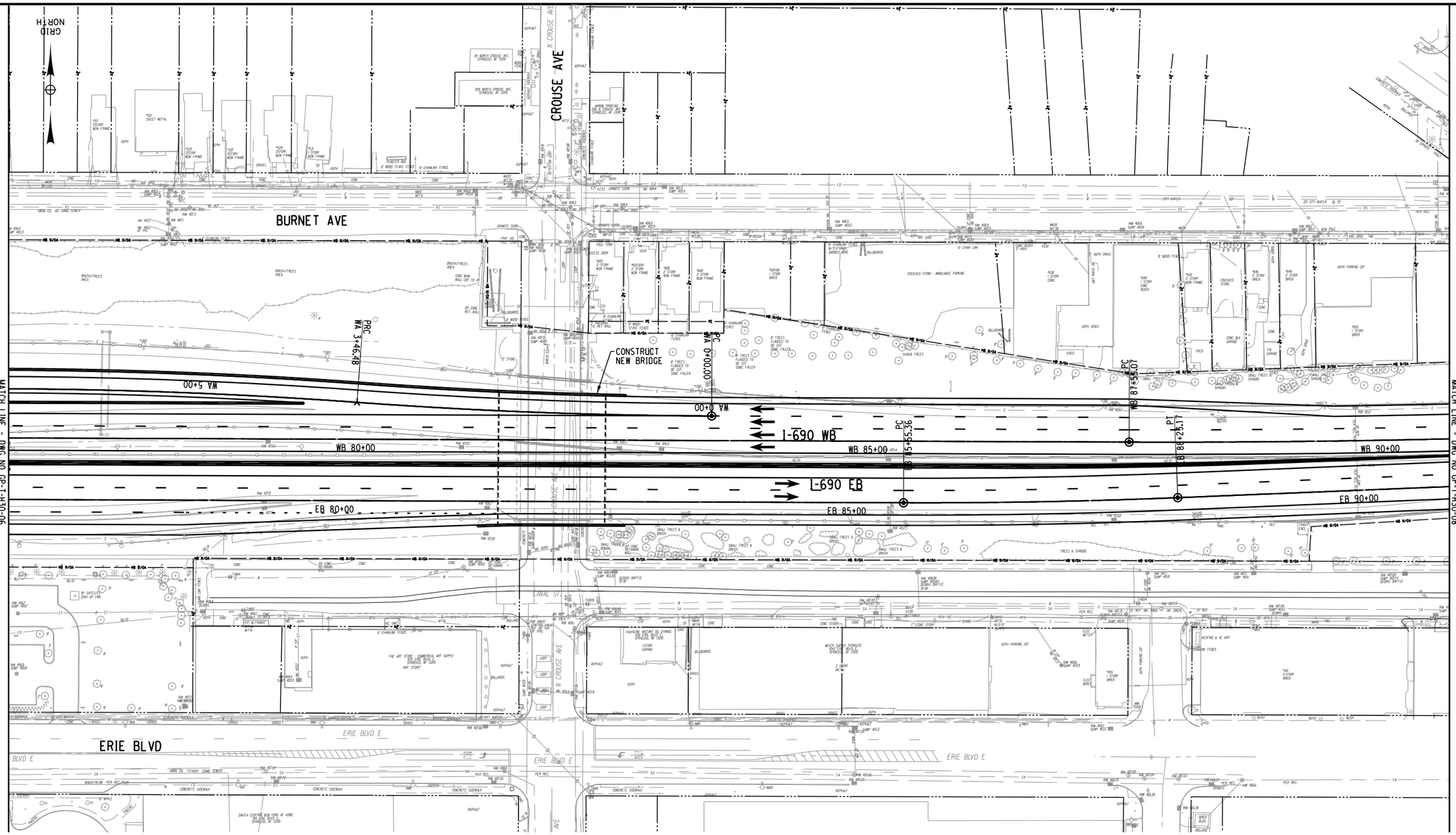
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SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. GP-T-H30-07
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR

CHECK

DRAFTING

CHECK

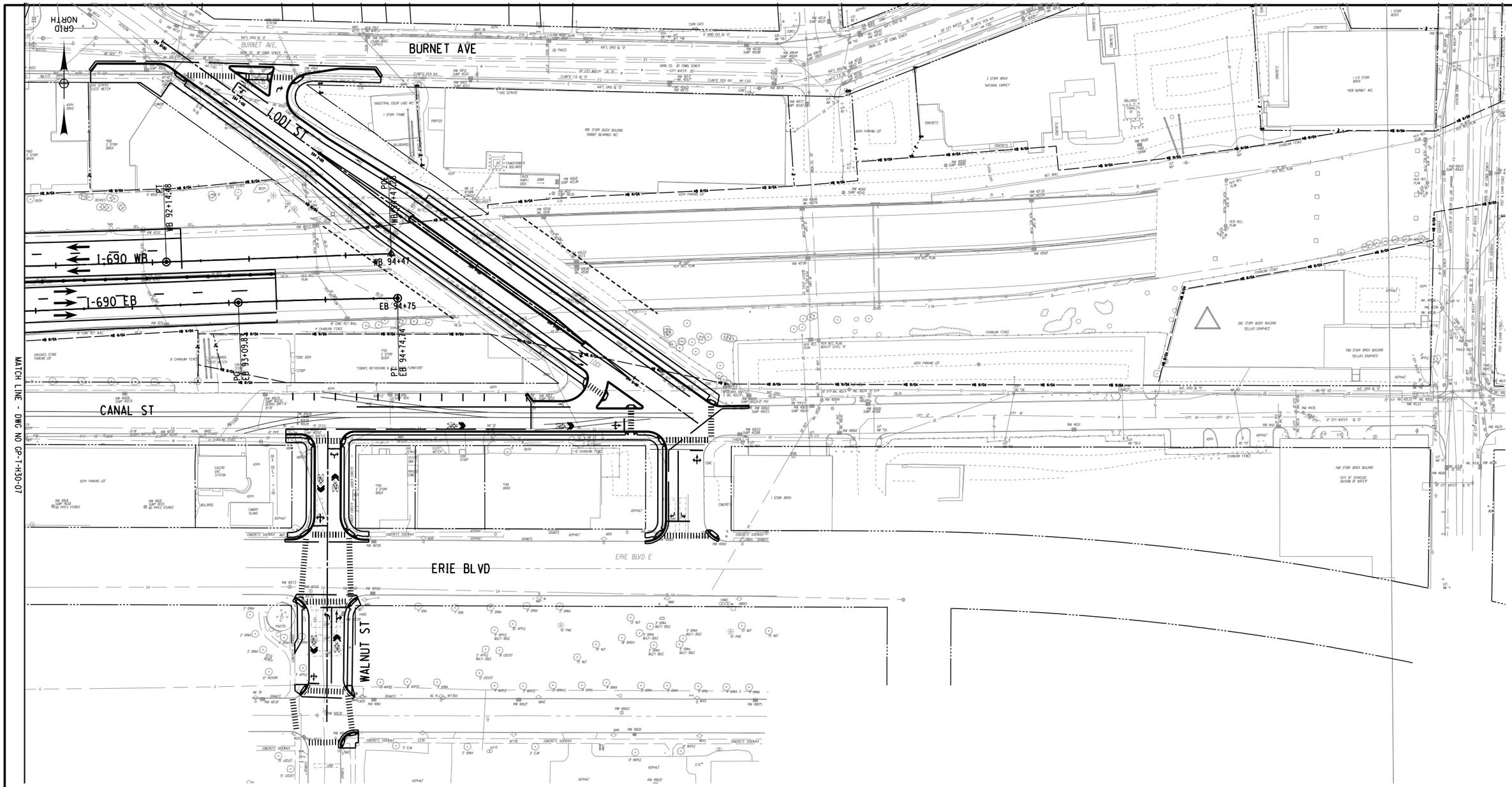
DESIGN

JOB MANAGER

DESIGN SUPERVISOR

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USER = DGN$USERNAME

MATCH LINE - DWG NO GP-I-H30-07



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

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SCALE IN FEET

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL PLAN
I-690
ORANGE TUNNEL CONCEPT

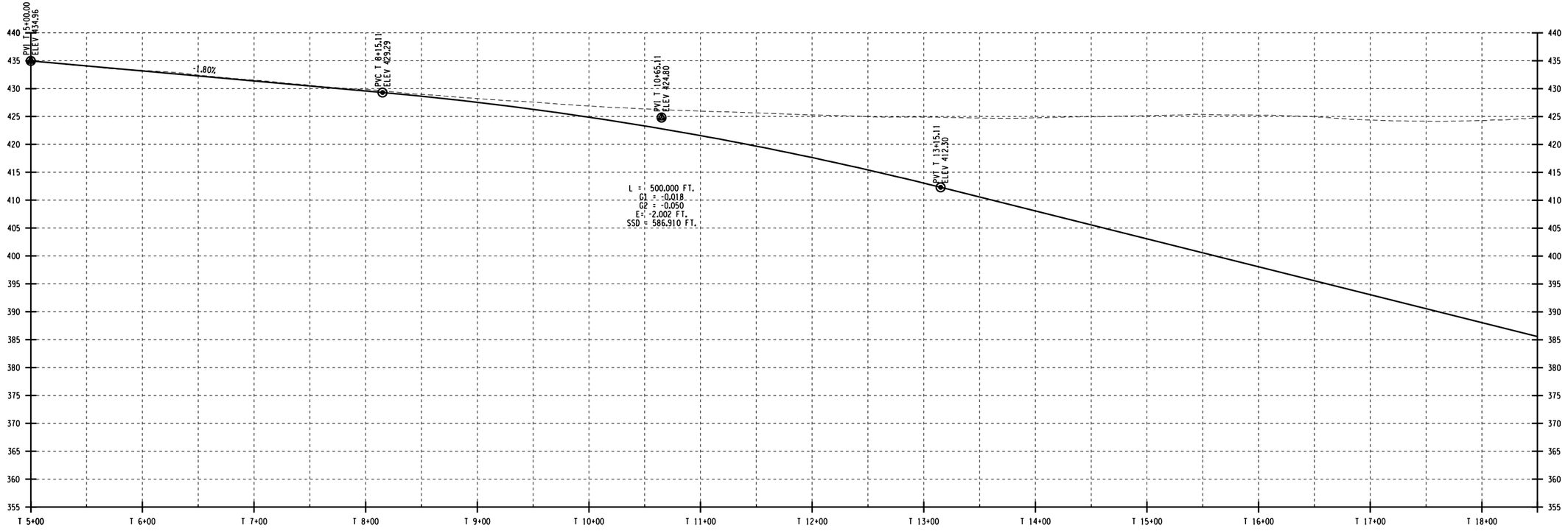
CONTRACT NUMBER

DRAWING NO. GP-T-H30-08

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 TUNNEL PROFILE

PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT COUNTY: ONONDAGA COUNTY, NY REGION: 3	PIN **3501.60**	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED PROFILE BUSINESS LOOP 81 ORANGE TUNNEL CONCEPT	CONTRACT NUMBER DRAWING NO. PR-T-H10-01 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 TUNNEL PROFILE

PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT COUNTY: ONONDAGA COUNTY, NY REGION: 3	PIN **3501.60**	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED PROFILE BUSINESS LOOP 81 ORANGE TUNNEL CONCEPT	CONTRACT NUMBER DRAWING NO. PR-T-H10-02 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**

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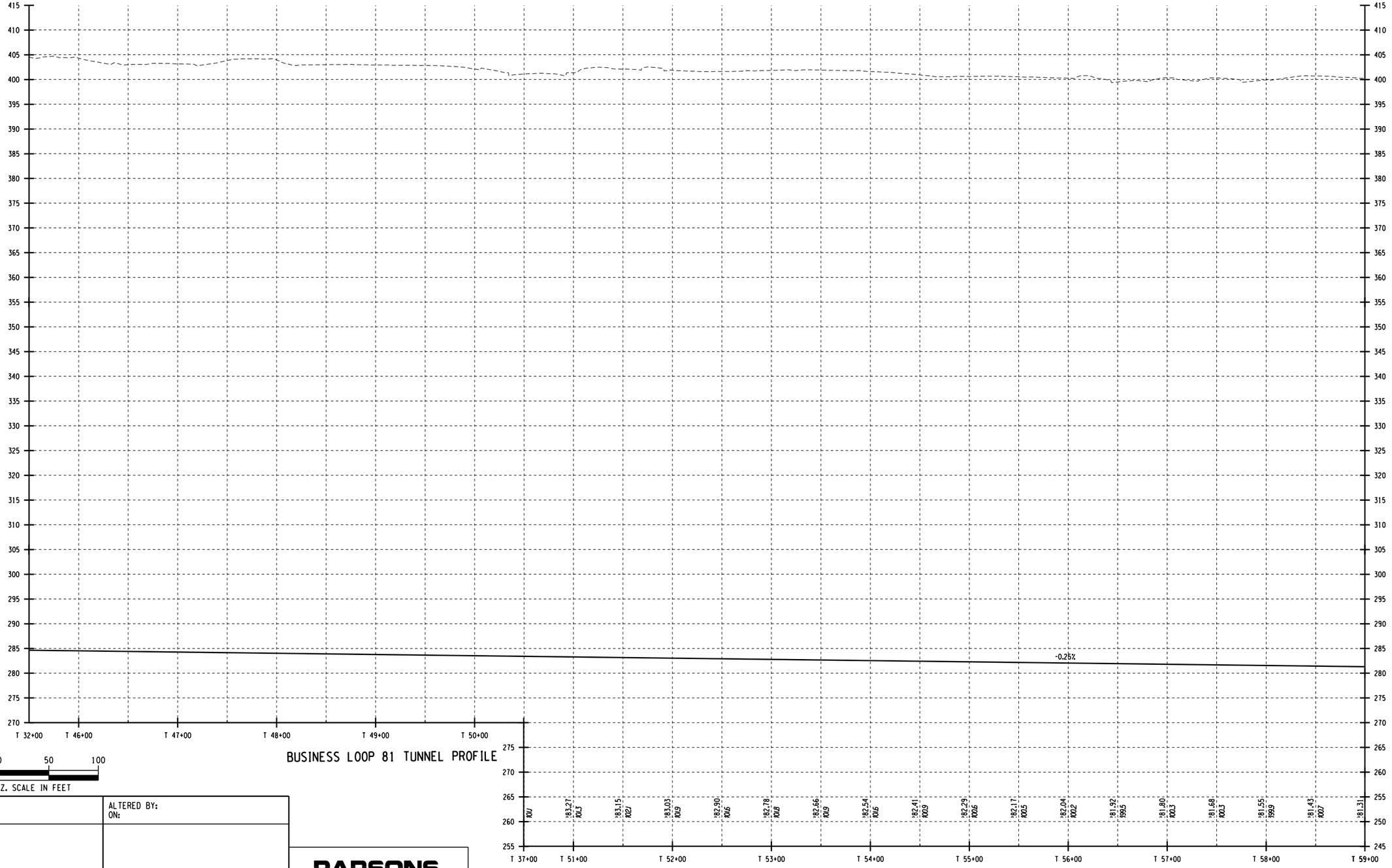
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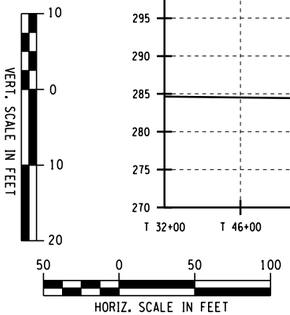
DESIGN

JOB MANAGER

DESIGN SUPERVISOR



BUSINESS LOOP 81 TUNNEL PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. PR-T-H10-03

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

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DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

PROJECT MANAGER **H. UNGAR**

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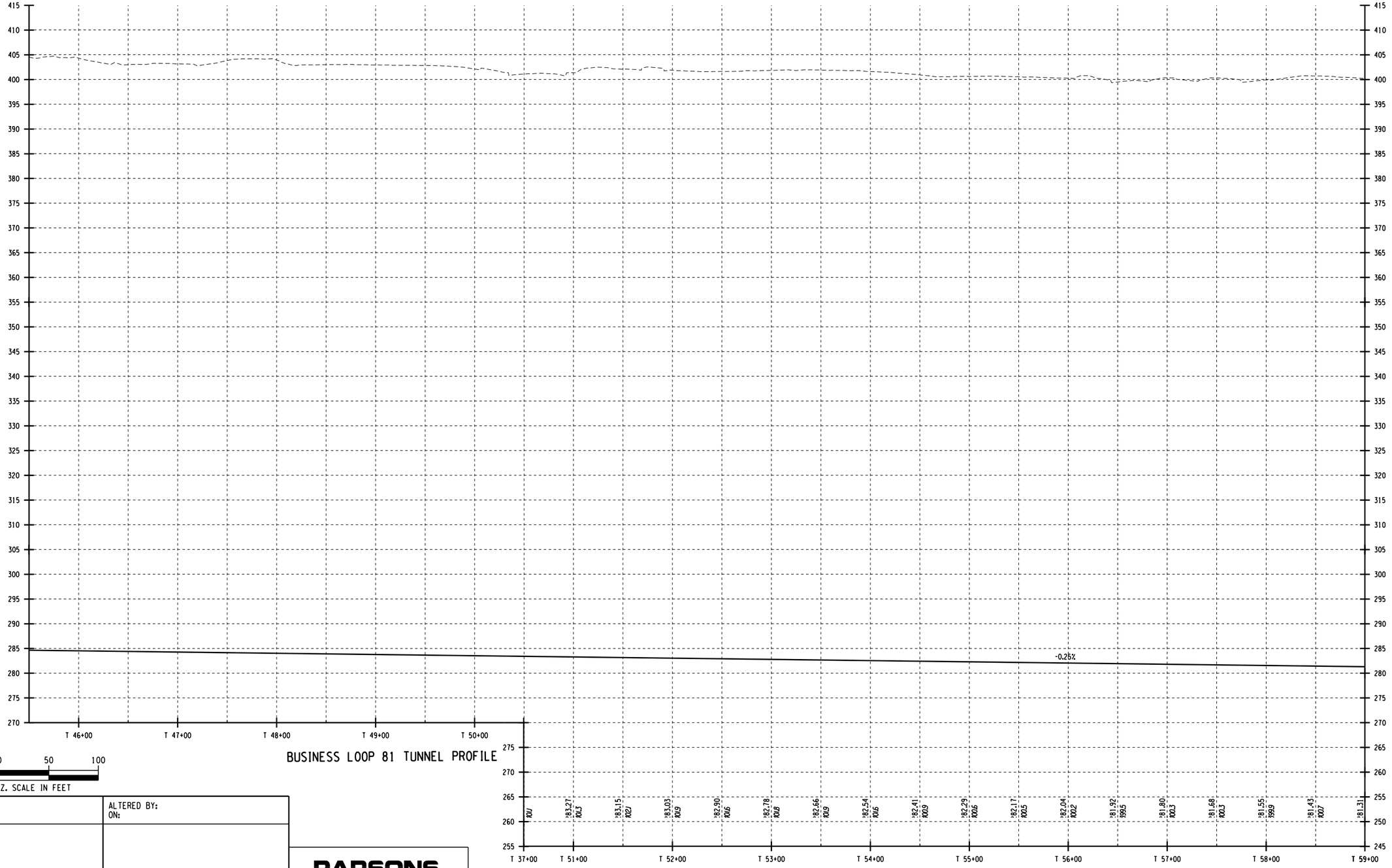
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DESIGN CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR



BUSINESS LOOP 81 TUNNEL PROFILE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

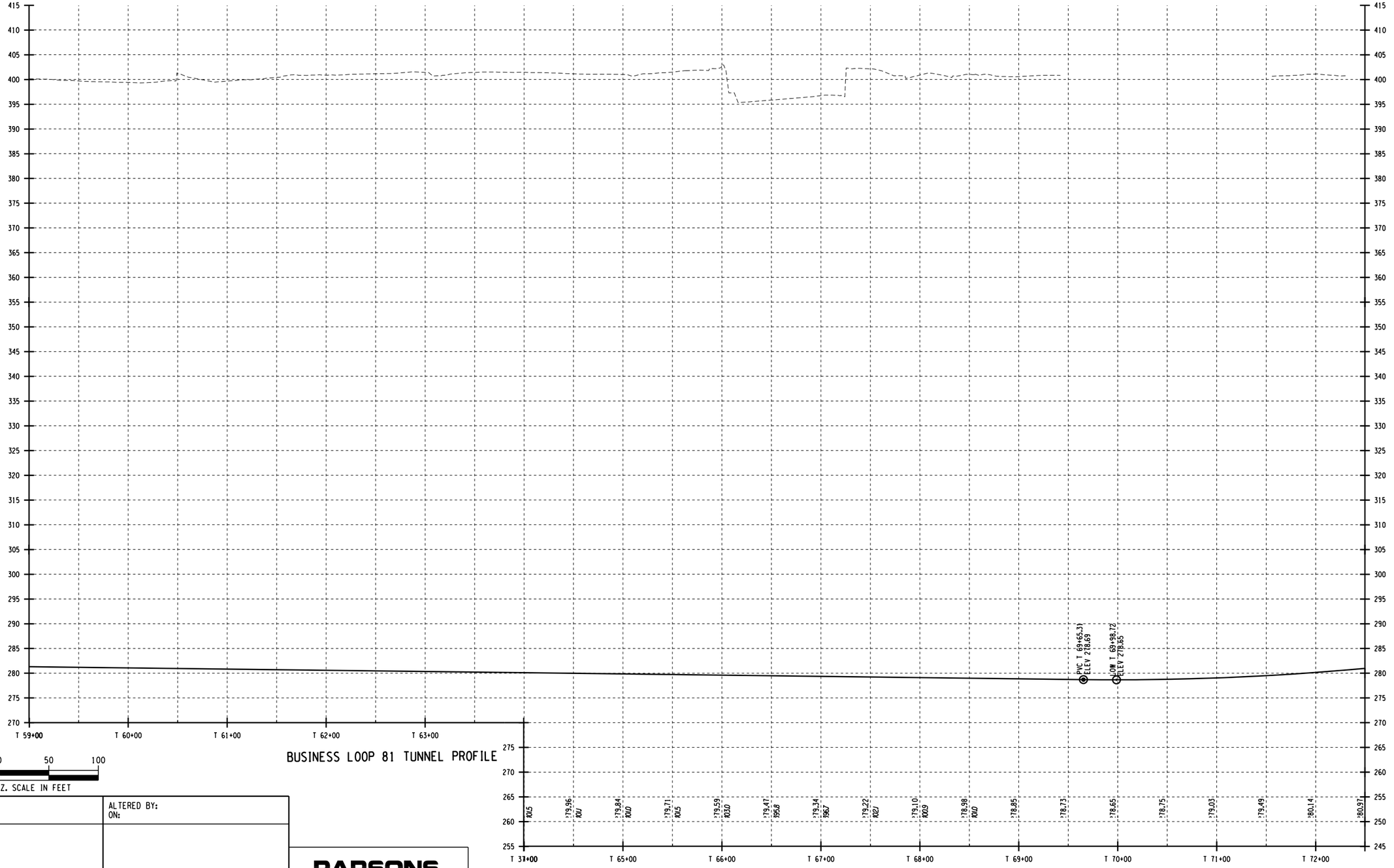
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SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

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BUSINESS LOOP 81 TUNNEL PROFILE

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50 0 50 100
HORIZ. SCALE IN FEET

PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

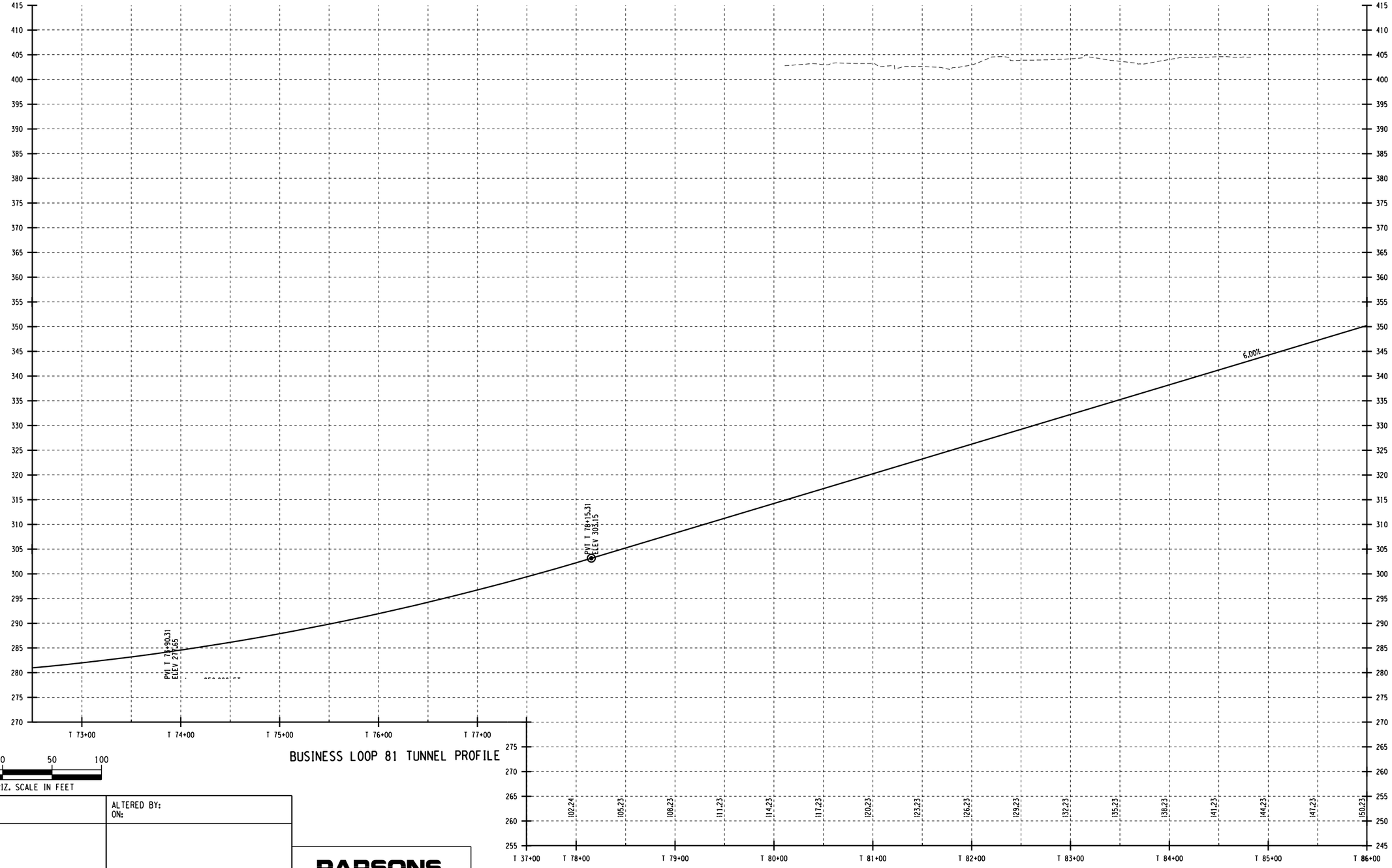
PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. PR-T-H10-05
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 TUNNEL PROFILE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

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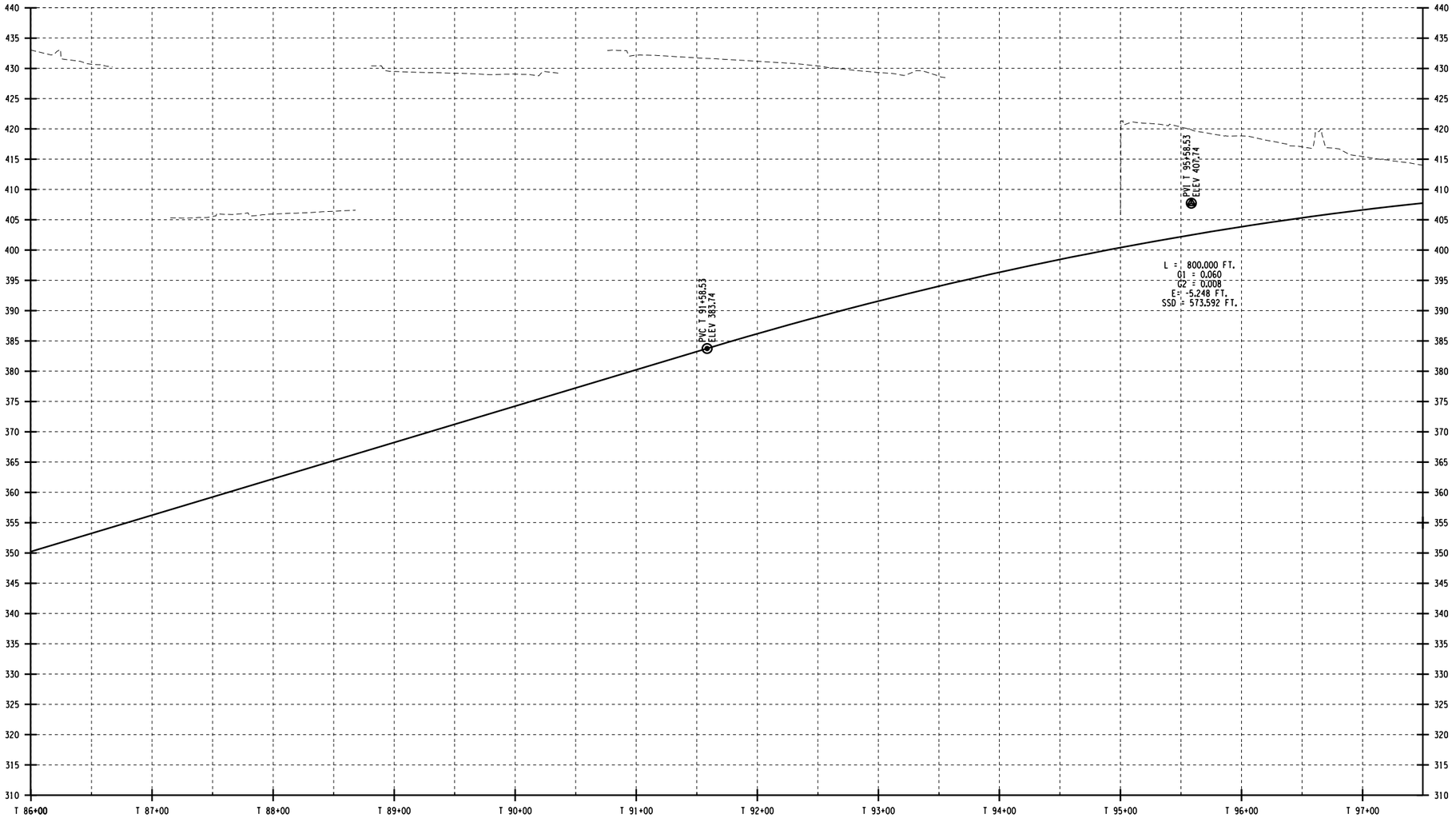
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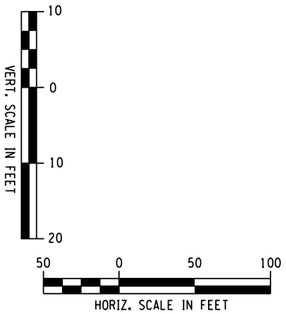
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 TUNNEL PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

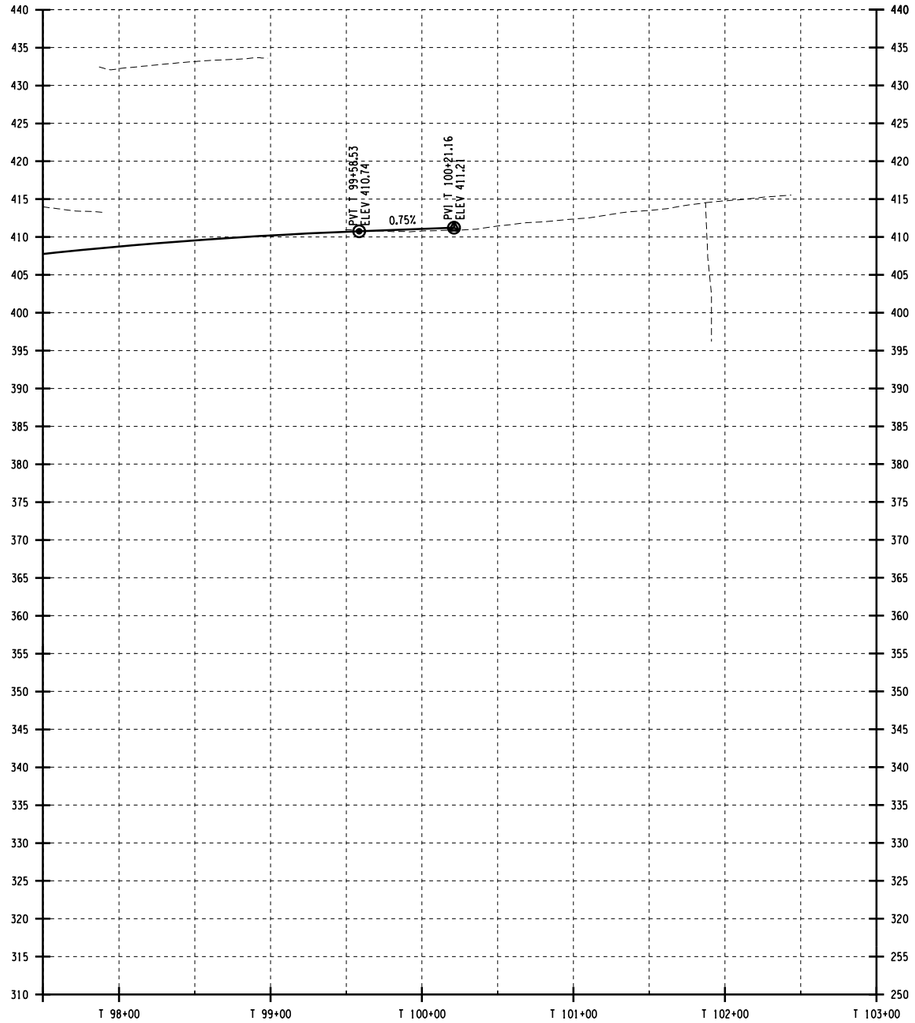
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

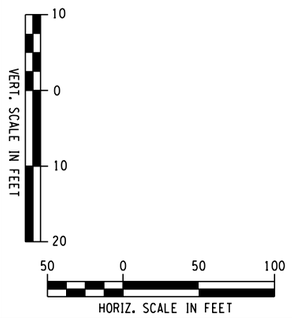
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME



BUSINESS LOOP 81 TUNNEL PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT COUNTY: ONONDAGA COUNTY, NY REGION: 3	PIN **3501.60**	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED PROFILE BUSINESS LOOP 81 ORANGE TUNNEL CONCEPT	CONTRACT NUMBER DRAWING NO. PR-T-H10-08 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**

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DRAFTING

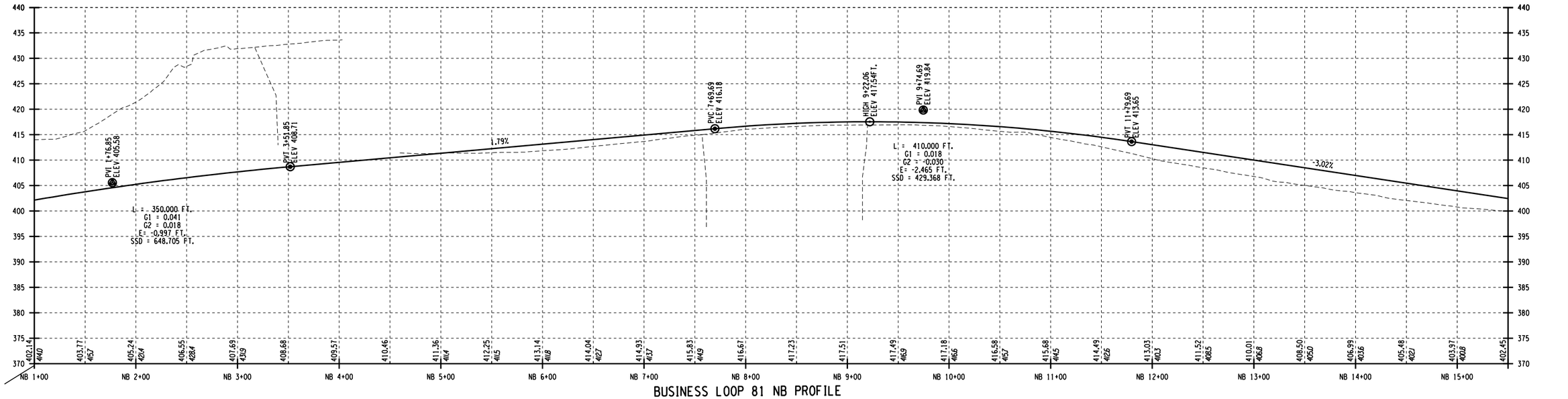
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DESIGN

JOB MANAGER

DESIGN SUPERVISOR

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BUSINESS LOOP 81 NB PROFILE

BUSINESS LOOP 81 NB PROFILE

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HORIZ. SCALE IN FEET: 50, 0, 50, 100

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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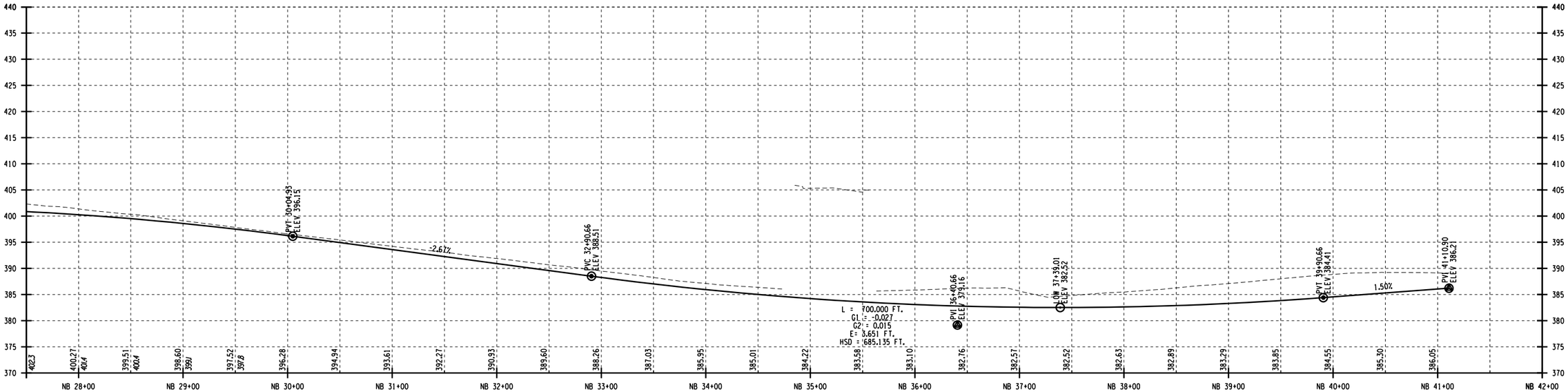
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
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JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 NB PROFILE

BUSINESS LOOP 81 NB PROFILE

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HORIZ. SCALE IN FEET
50
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50
100

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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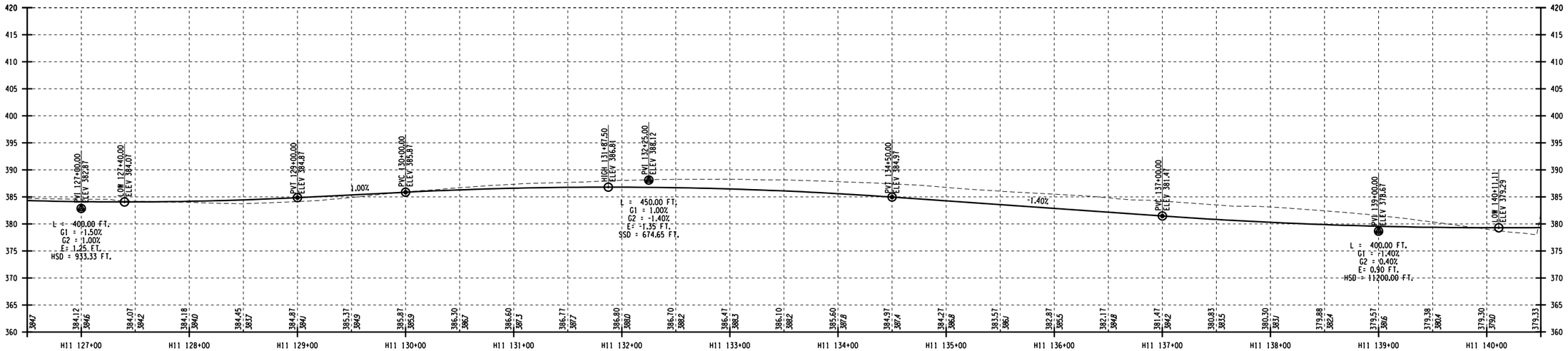
SHEET NO.

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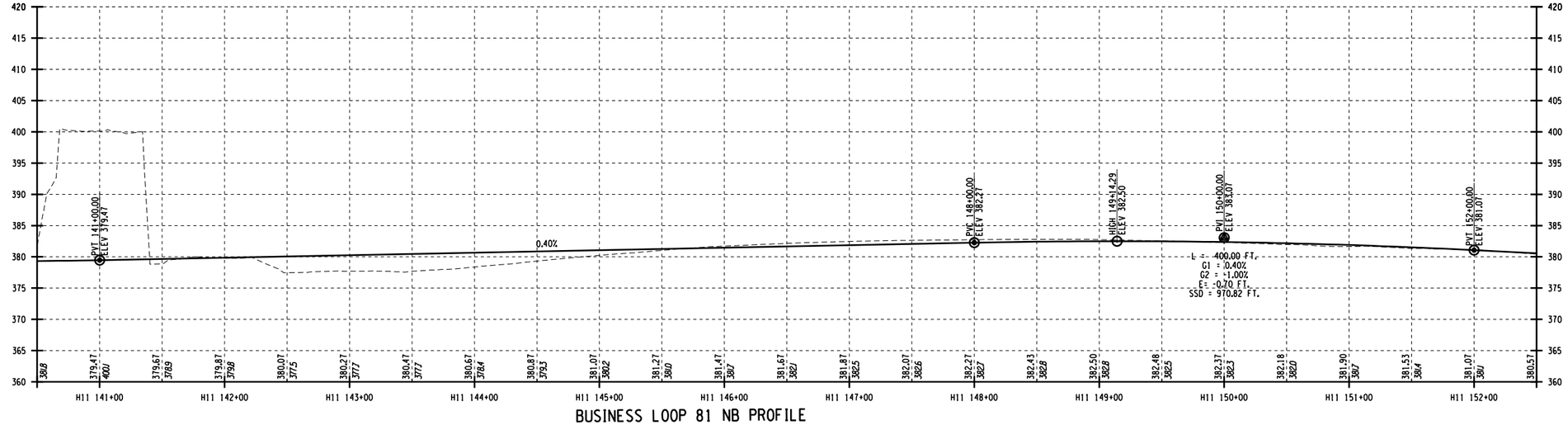
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
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DESIGN
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DESIGN SUPERVISOR

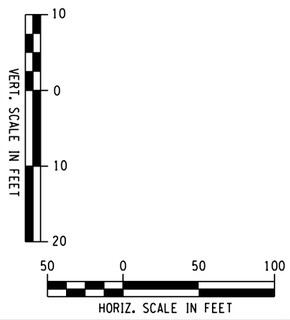
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BUSINESS LOOP 81 NB PROFILE



BUSINESS LOOP 81 NB PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

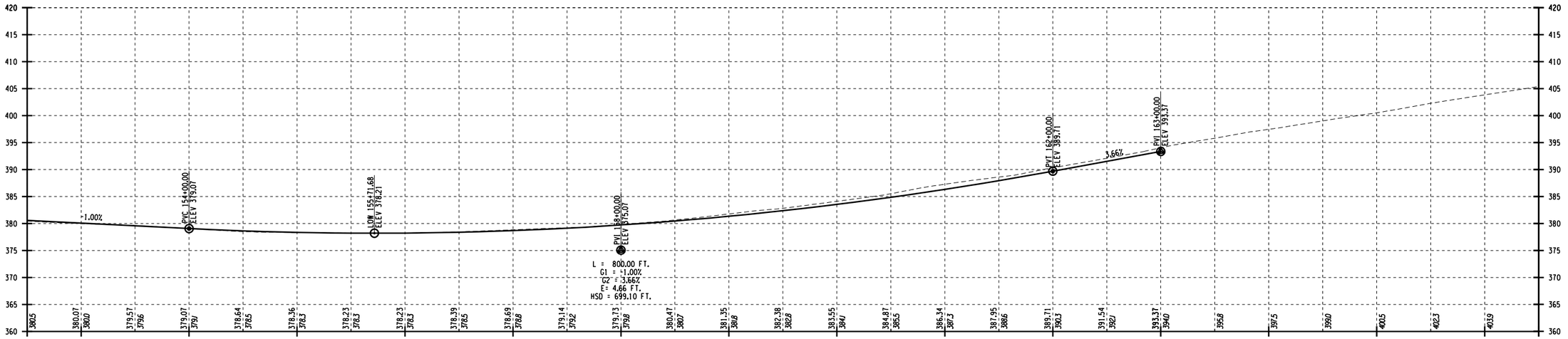
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	COUNTY: ONONDAGA COUNTY NY REGION: 3					SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

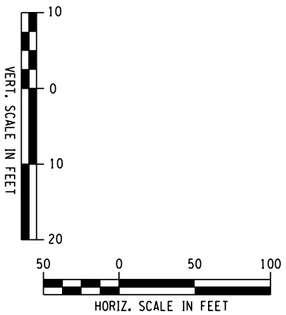
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DRAFTING
DESIGN
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JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 NB PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

DRAWING NO. PR-T-H10-12

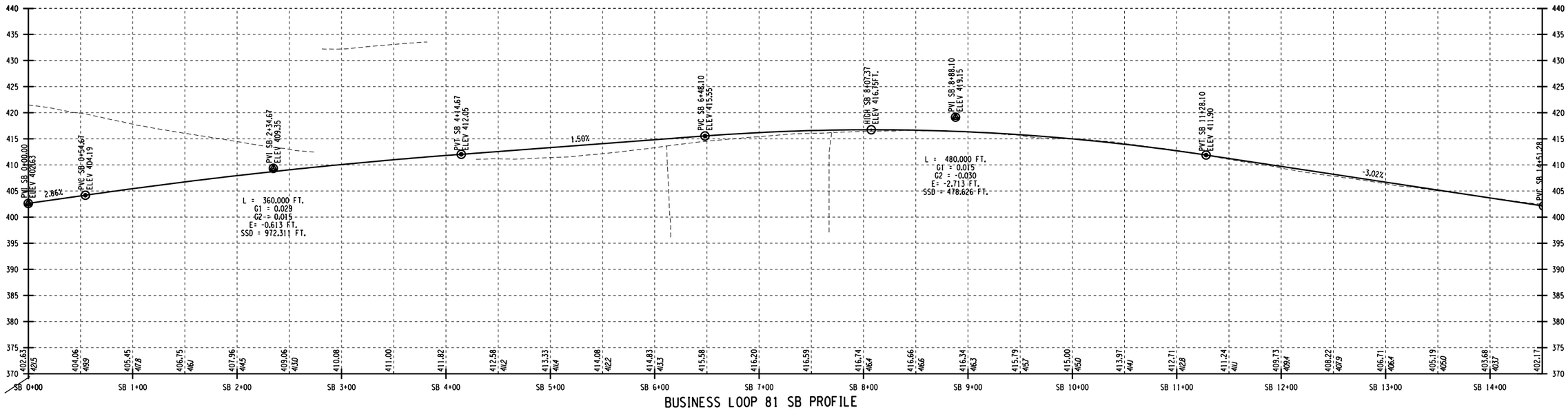
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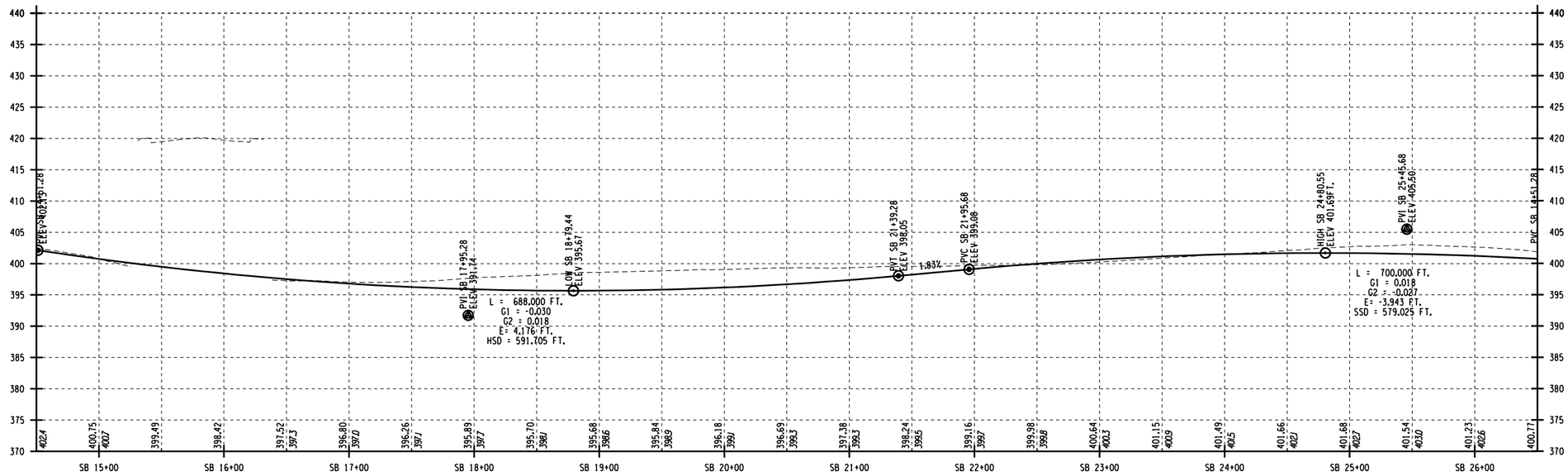
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

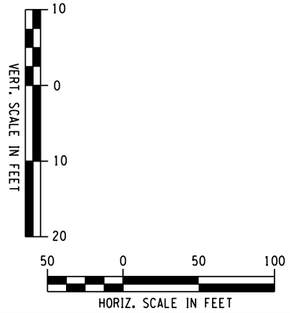
PROJECT MANAGER **H. UNGAR**
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DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 SB PROFILE





PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

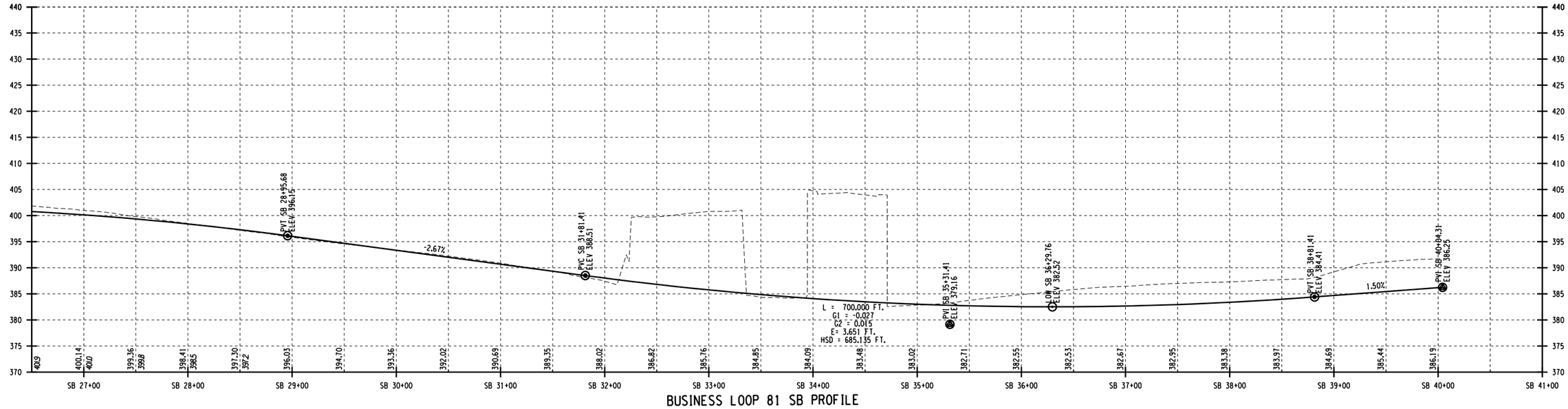
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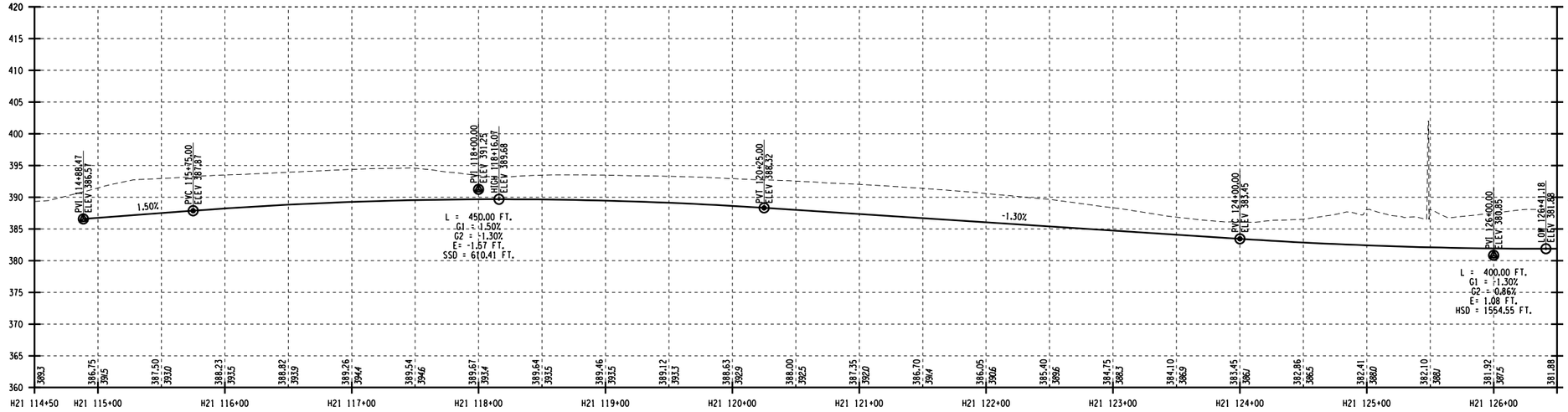
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

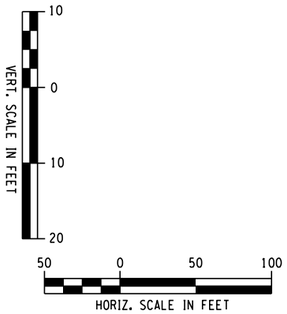
NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 SB PROFILE



BUSINESS LOOP 81 SB PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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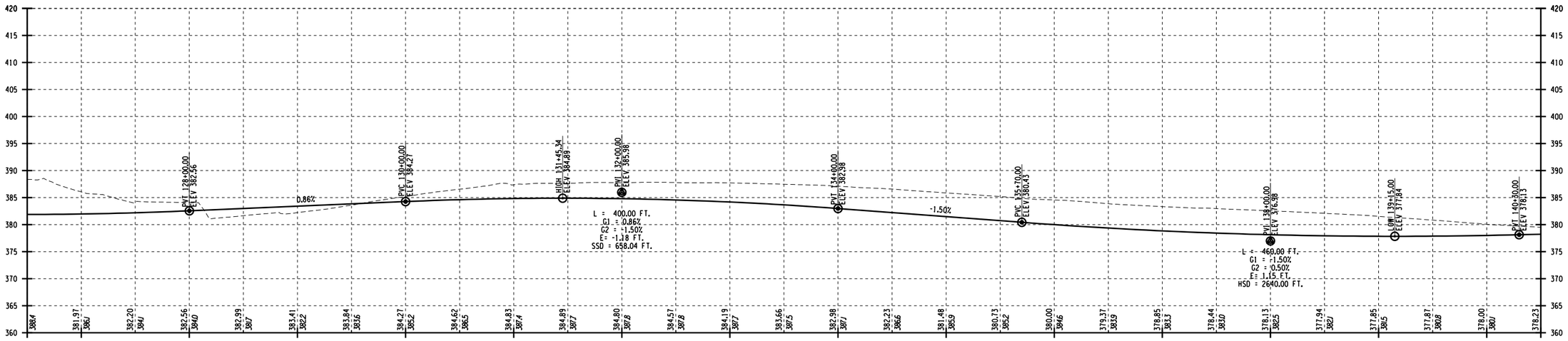
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

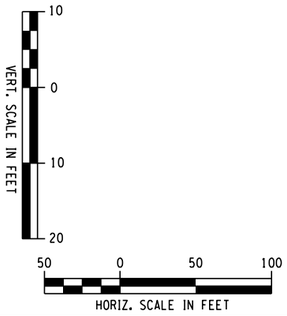
PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
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JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 SB PROFILE

BUSINESS LOOP 81 SB PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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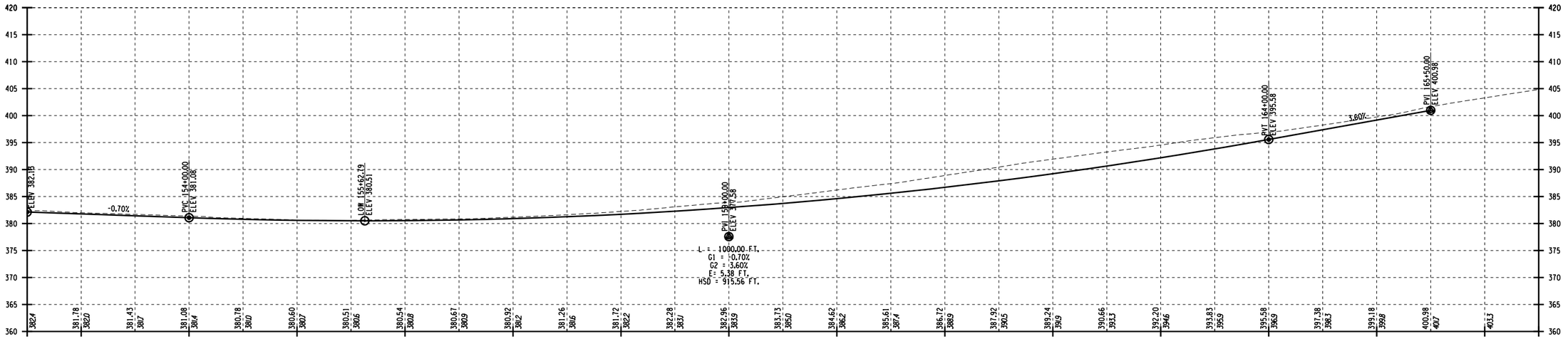
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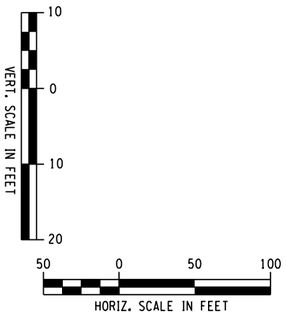
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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BUSINESS LOOP 81 SB PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

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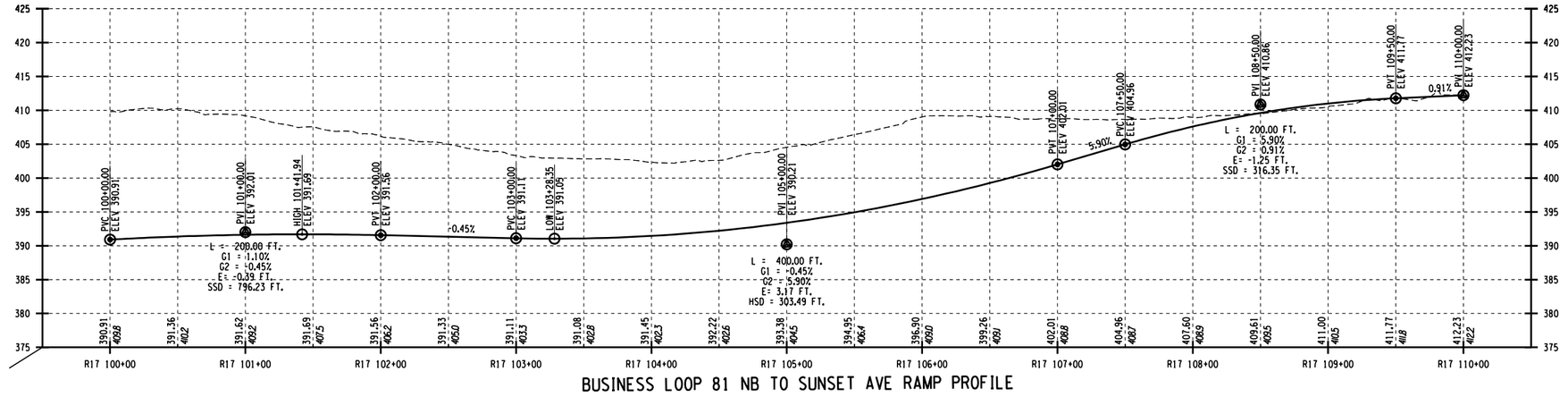
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

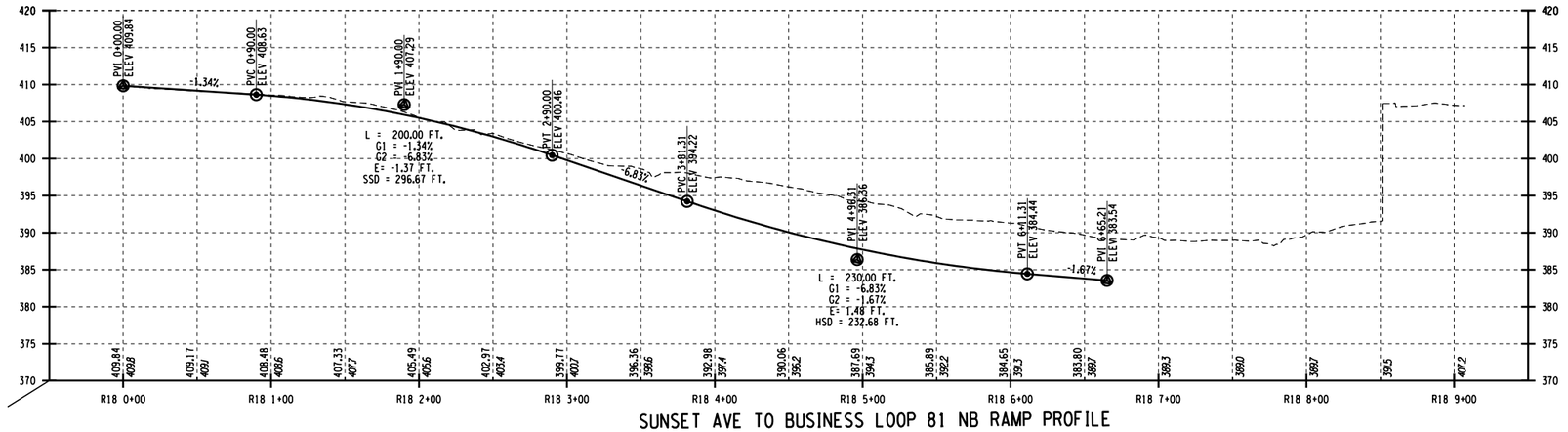
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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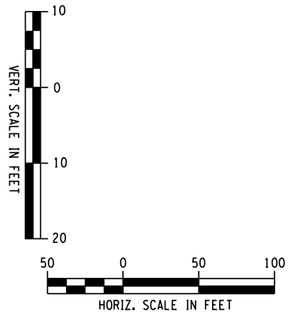
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BUSINESS LOOP 81 NB TO SUNSET AVE RAMP PROFILE



SUNSET AVE TO BUSINESS LOOP 81 NB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

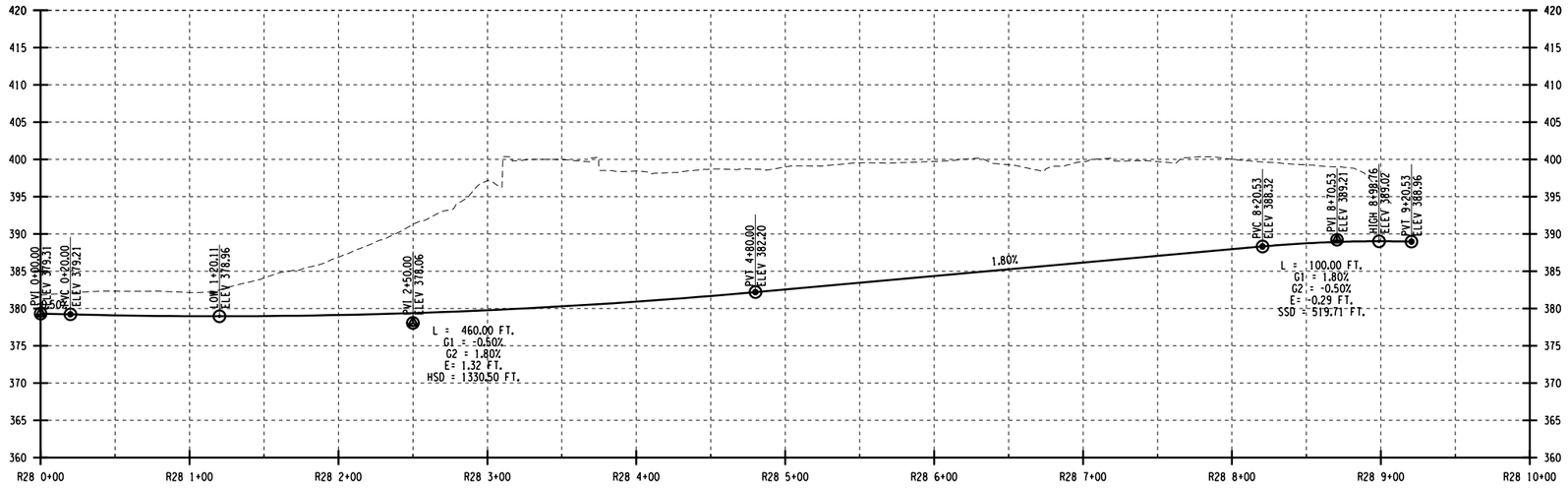
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3				PROFILE BUSINESS LOOP 81 ORANGE TUNNEL CONCEPT	DRAWING NO. PR-T-H10-17 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

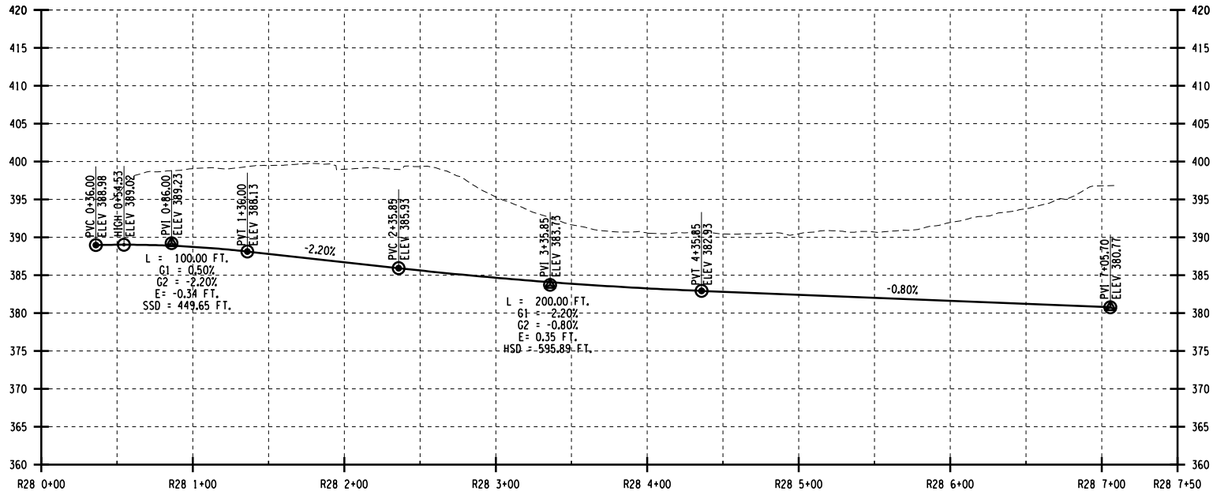
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
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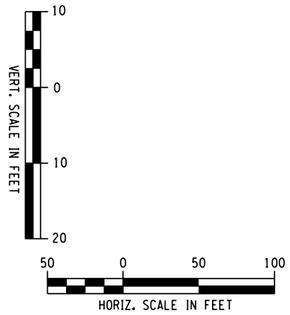
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BUSINESS LOOP 81 SB TO GENANT DR RAMP PROFILE



GENANT DR TO BUSINESS LOOP 81 SB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

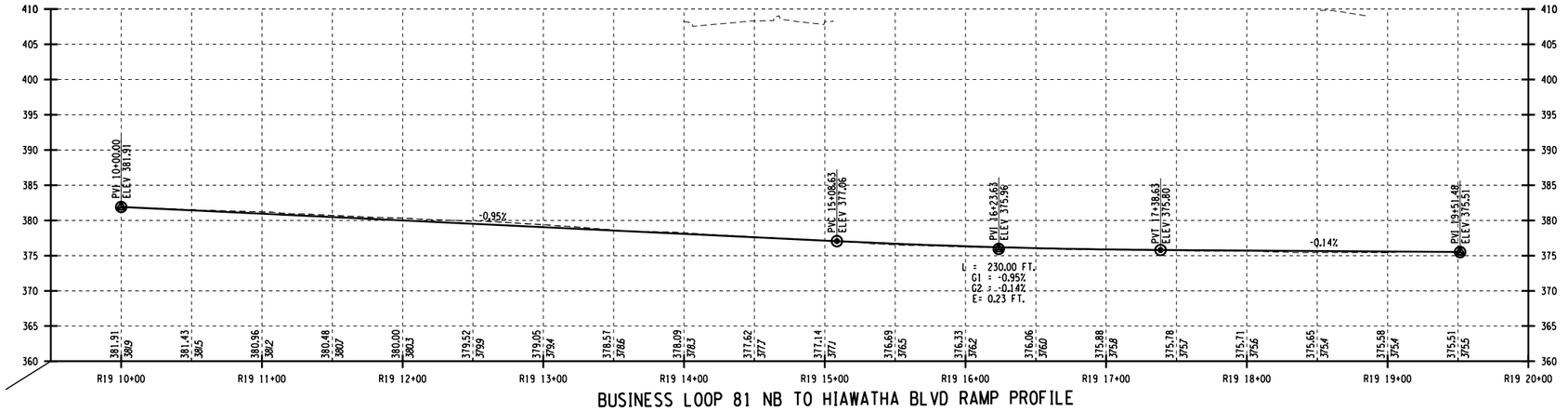
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

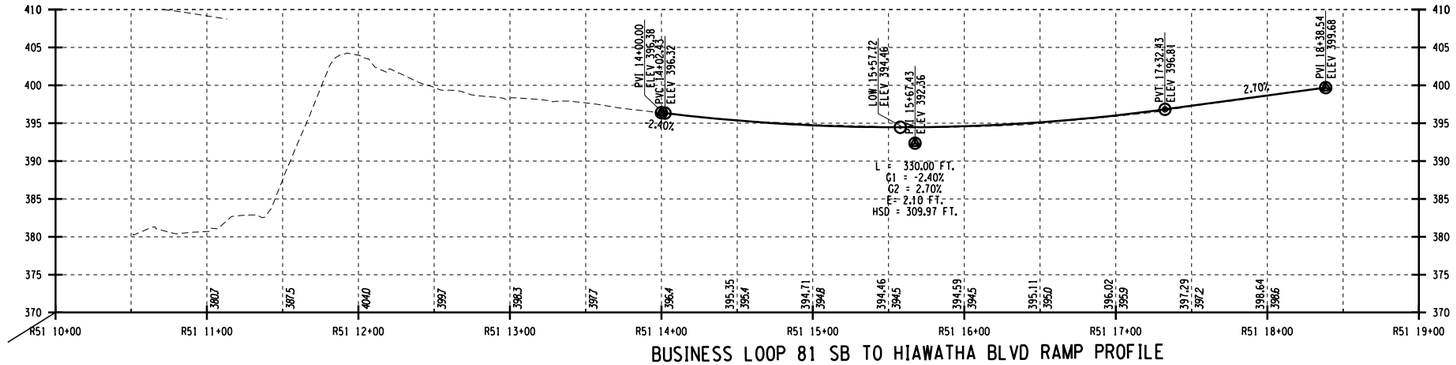
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR

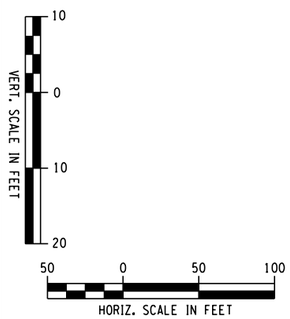
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BUSINESS LOOP 81 NB TO HIAWATHA BLVD RAMP PROFILE



BUSINESS LOOP 81 SB TO HIAWATHA BLVD RAMP PROFILE



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PARSONS

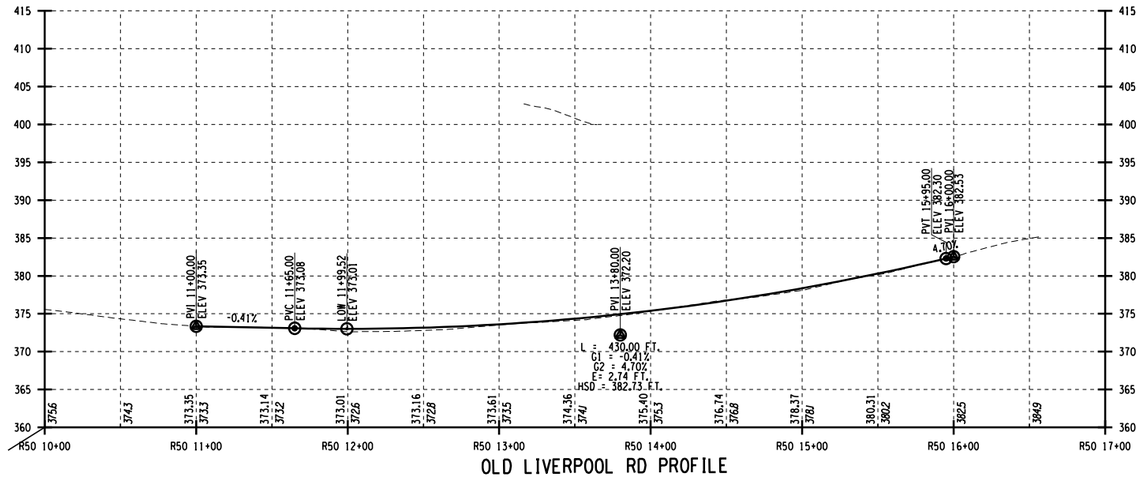
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

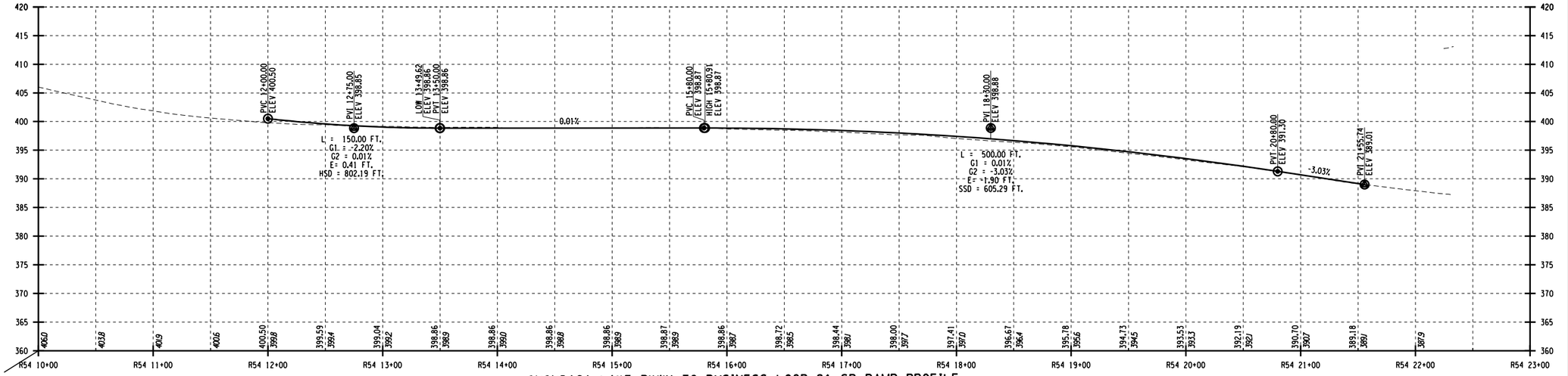
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DESIGN SUPERVISOR

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OLD LIVERPOOL RD PROFILE



ONONDAGA LAKE PKWY TO BUSINESS LOOP 81 SB RAMP PROFILE

VERT. SCALE IN FEET: 10, 0, 10, 20

HORIZ. SCALE IN FEET: 50, 0, 50, 100

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

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PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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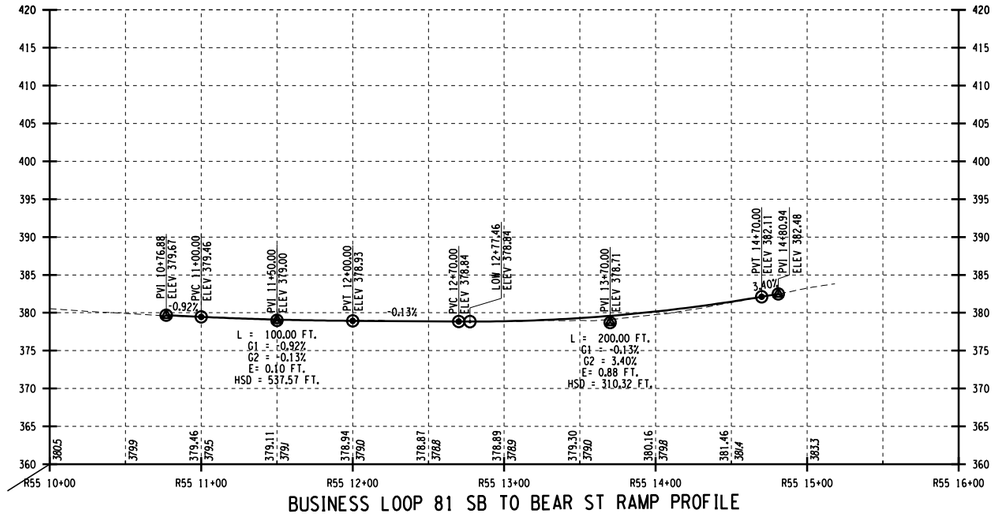
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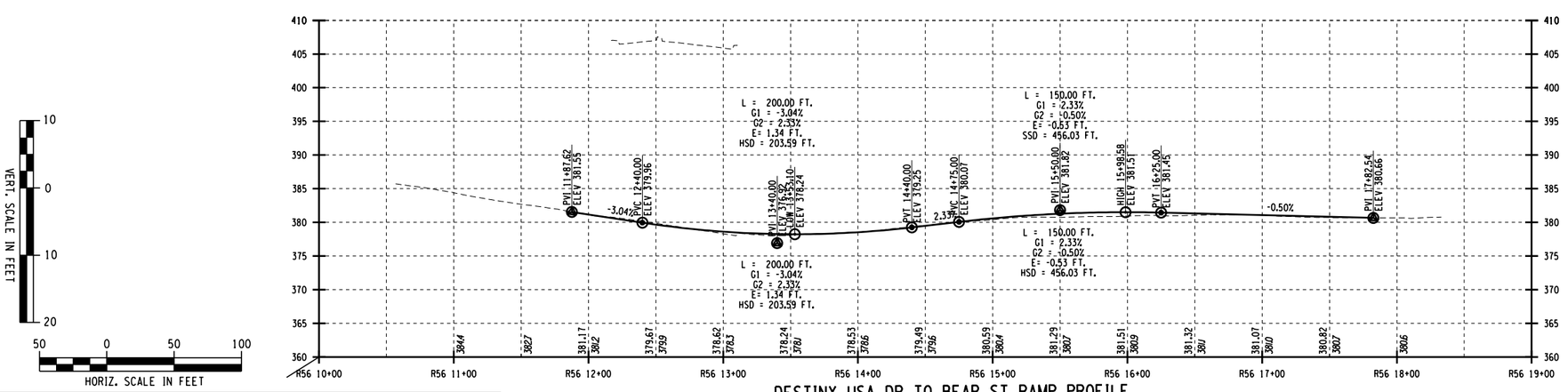
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

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BUSINESS LOOP 81 SB TO BEAR ST RAMP PROFILE



DESTINY USA DR TO BEAR ST RAMP PROFILE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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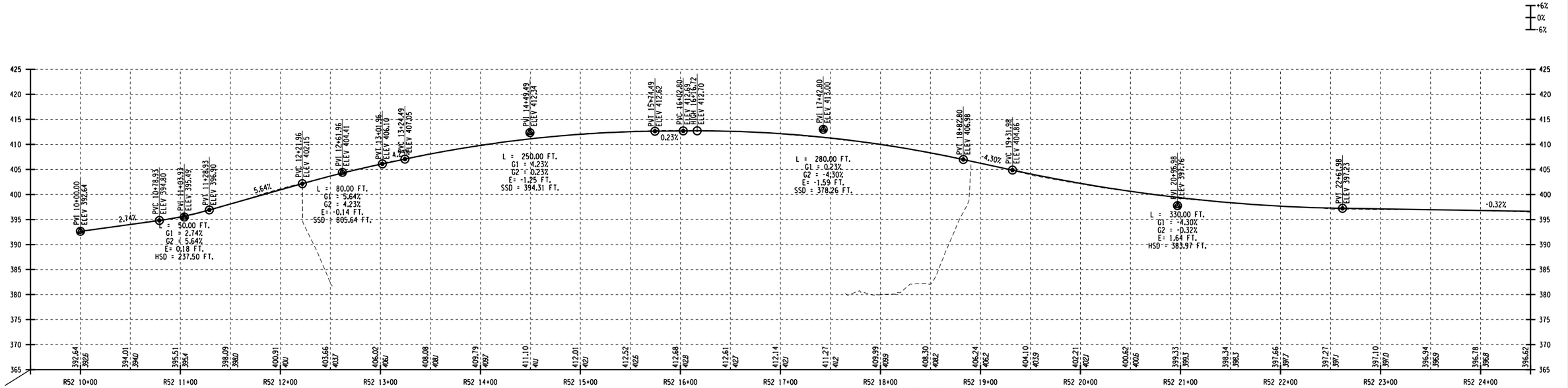
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

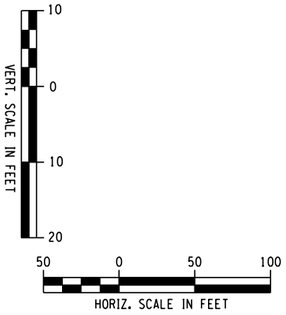
PROJECT MANAGER H. UNGAR
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BUSINESS LOOP 81 SB TO HIAWATHA BLVD/DESTINY USA DR/BEAR ST RAMP PROFILE

BUSINESS LOOP 81 SB TO HIAWATHA BLVD/DESTINY USA DR/BEAR ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

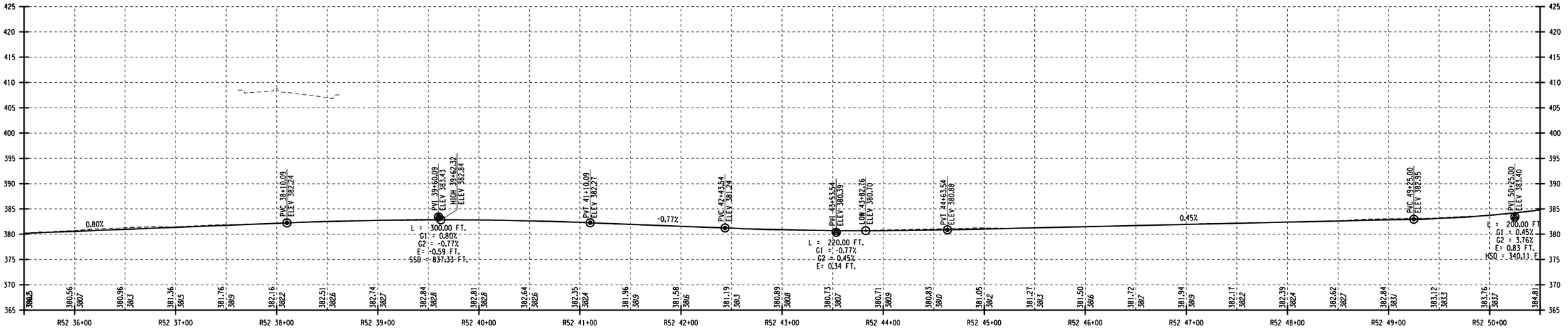
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

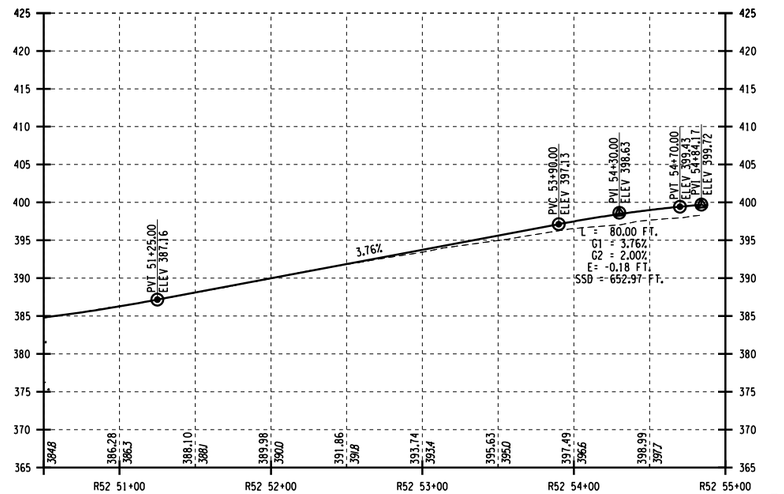
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
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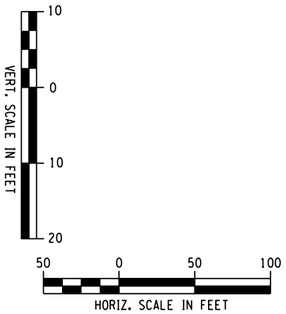
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BUSINESS LOOP 81 SB TO HIAWATHA BLVD/DESTINY USA DR/BEAR ST RAMP PROFILE



BUSINESS LOOP 81 SB TO HIAWATHA BLVD/DESTINY USA DR/BEAR ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

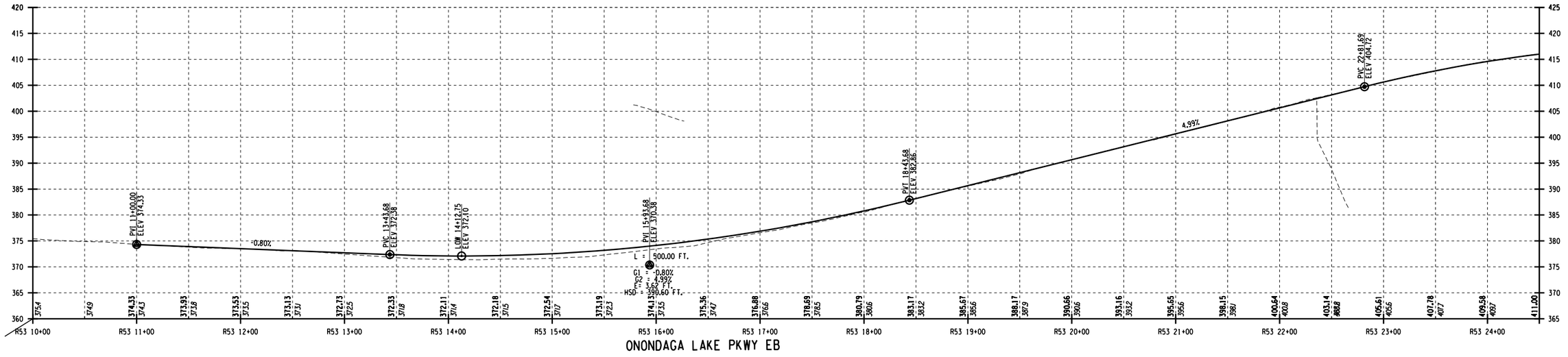
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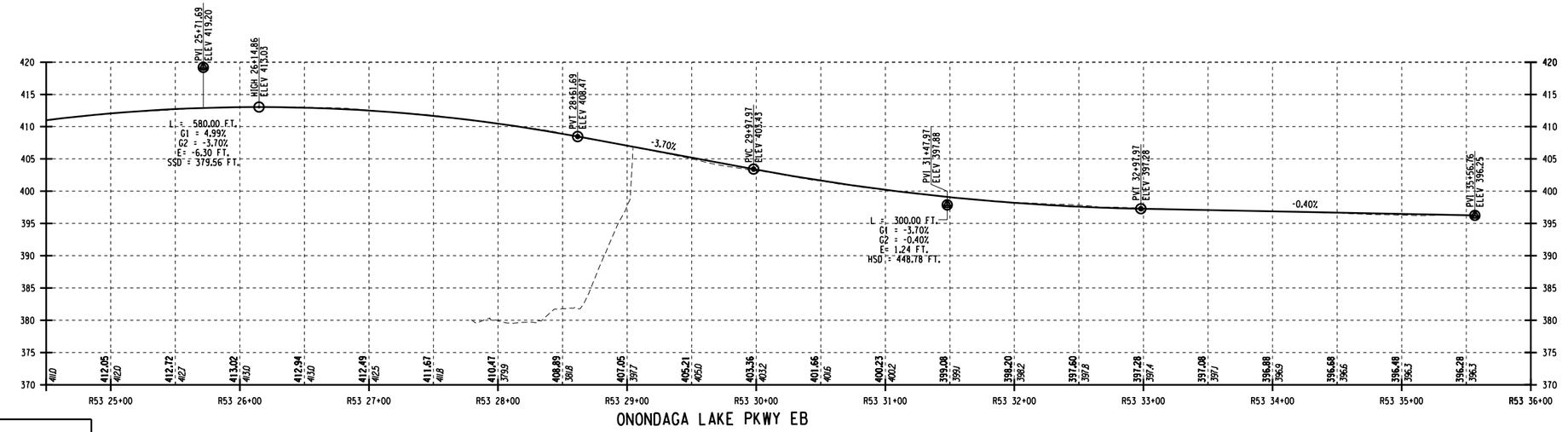
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

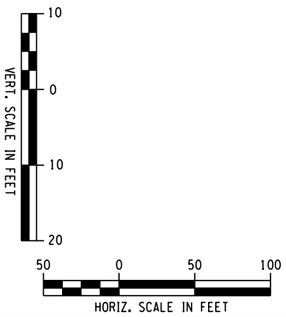
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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DATE/TIME = DGN$SYSTIME01234567890123456
USER = DGN$USERNAME







AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. PR-T-H10-24

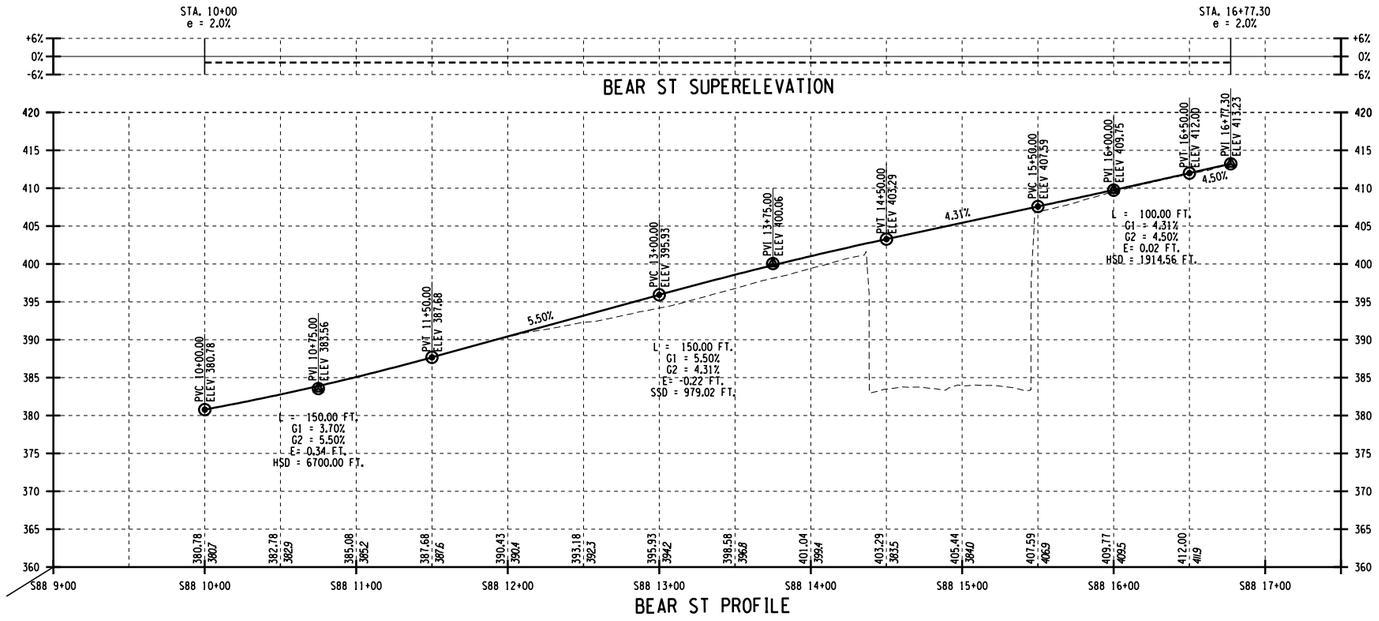
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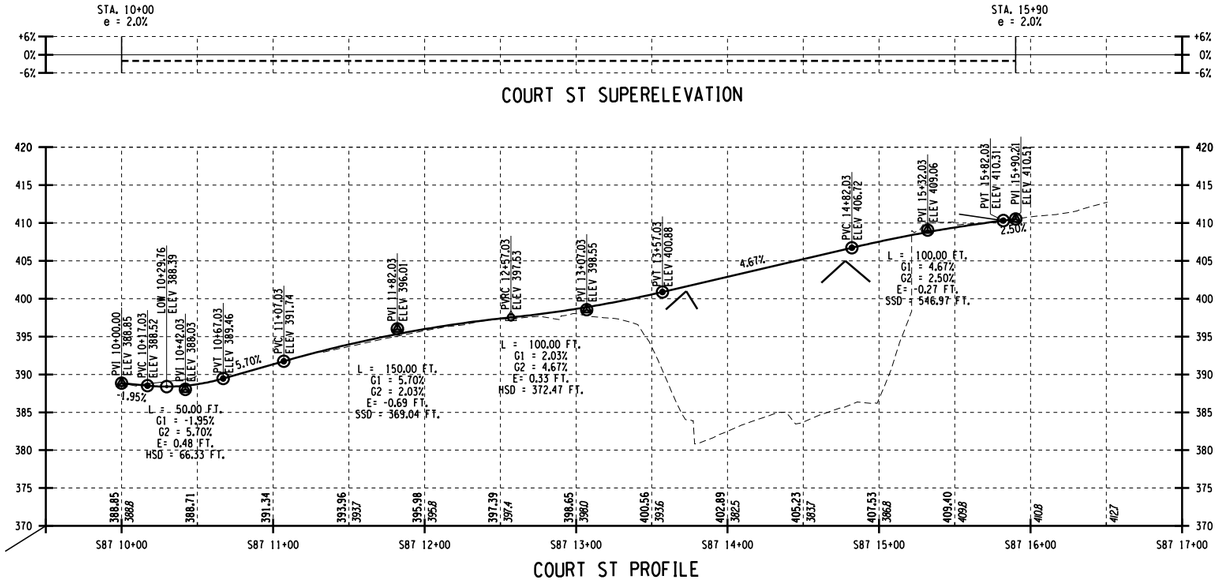
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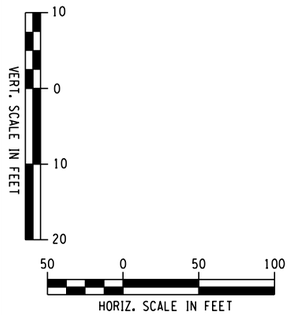
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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PROJECT MANAGER H. UNGAR
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DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

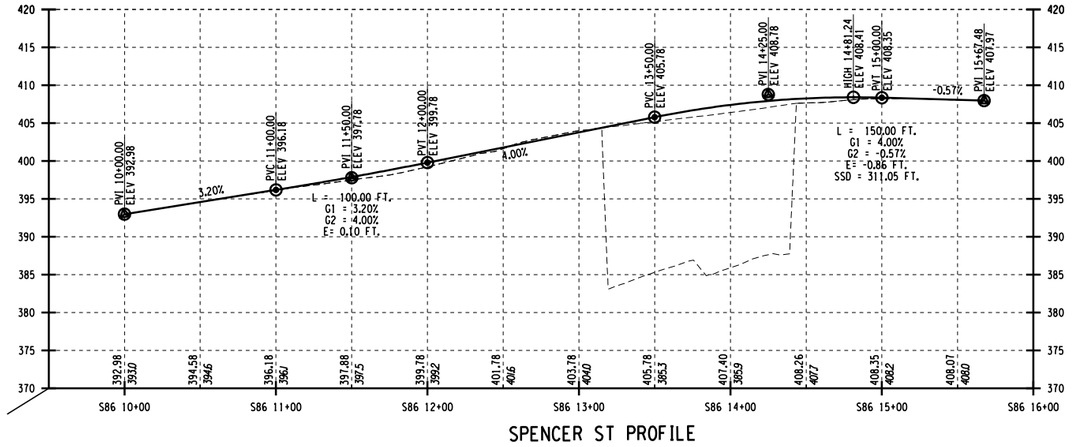
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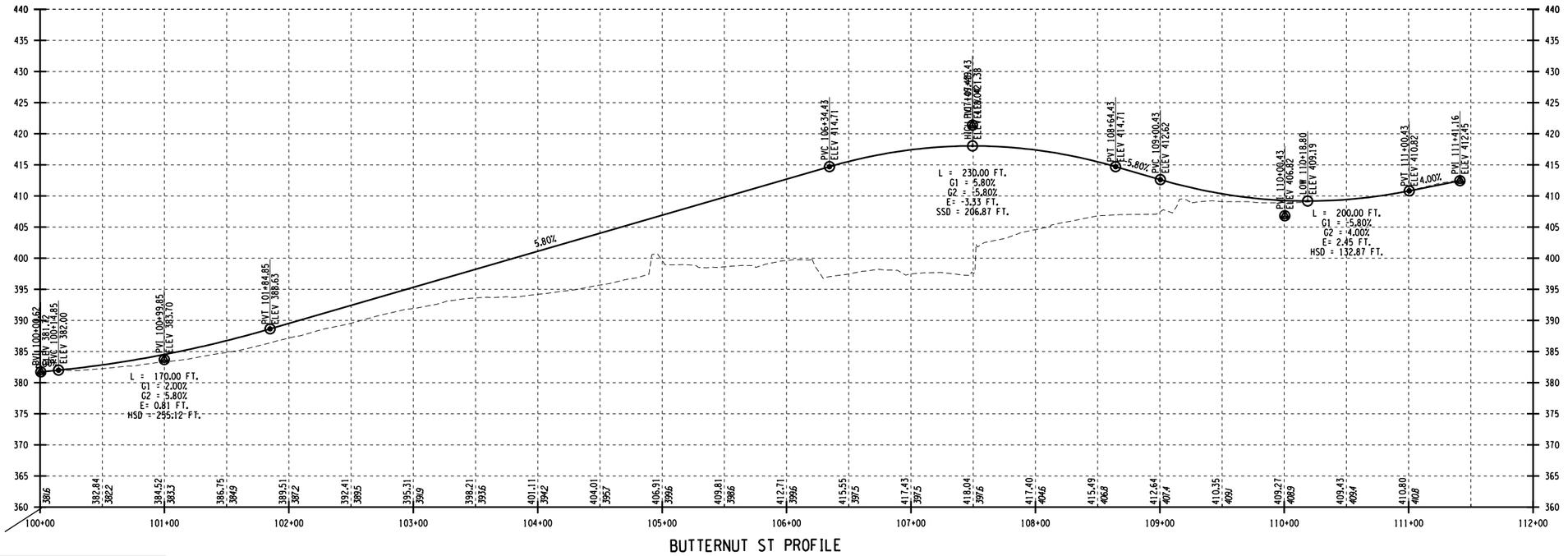
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

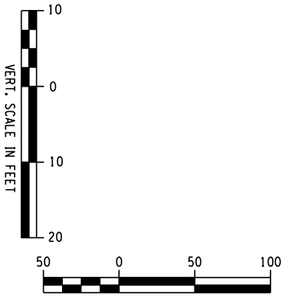
NEW YORK STATE OF OPPORTUNITY. Department of Transportation



SPENCER ST PROFILE



BUTTERNUT ST PROFILE



PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

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BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

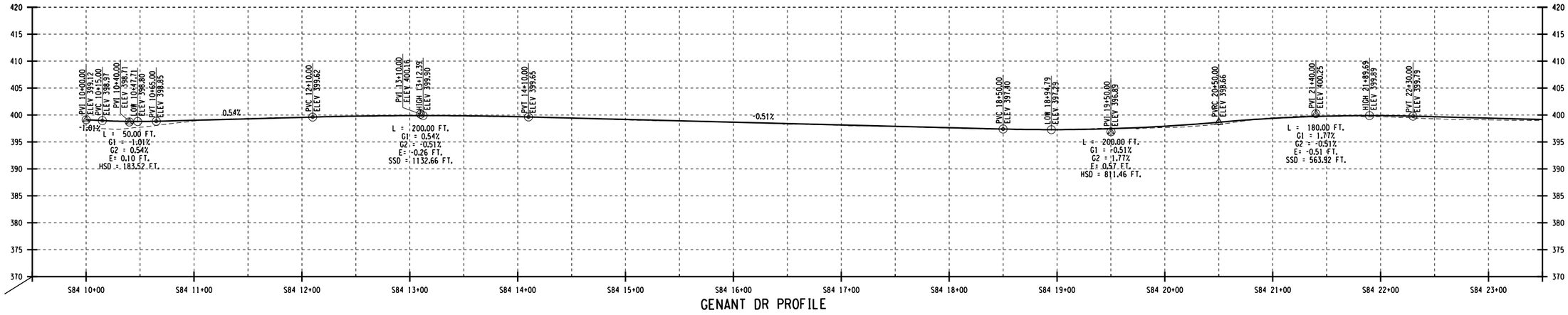
PROFILE
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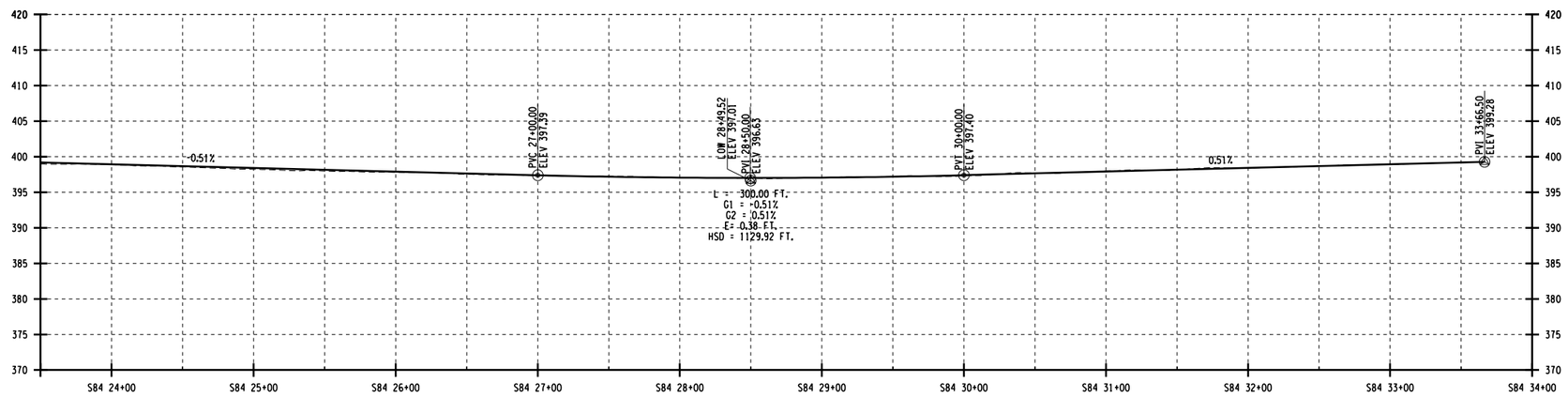
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

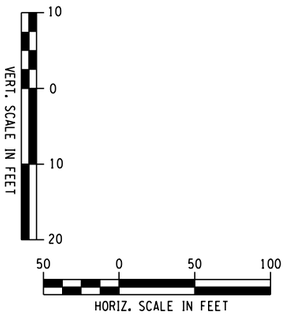
NEW YORK STATE OF OPPORTUNITY. Department of Transportation



GENANT DR PROFILE



GENANT DR PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

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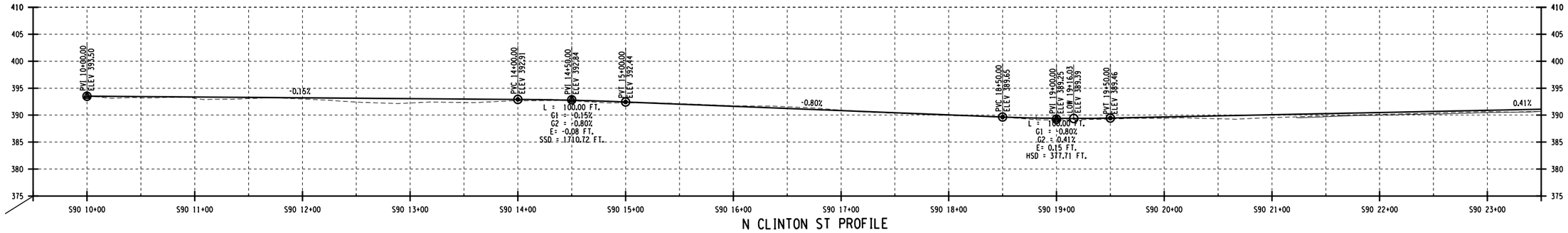
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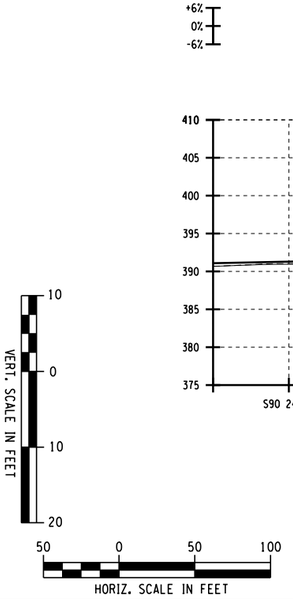
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

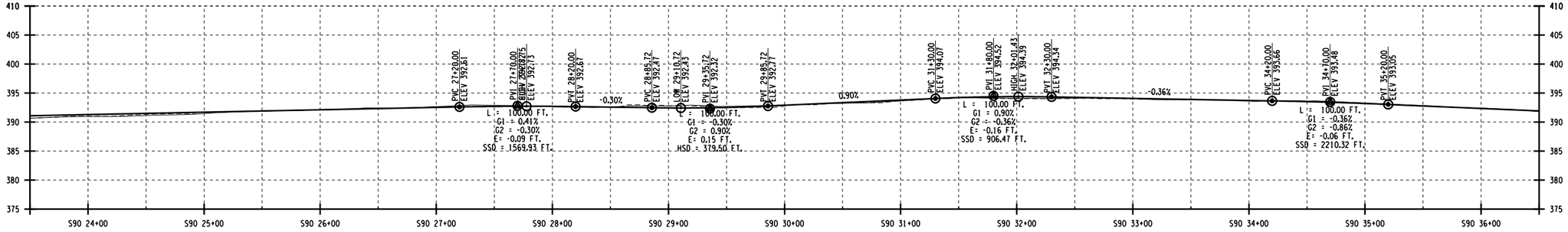
PROJECT MANAGER H. UNGAR
CHECK
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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N CLINTON ST PROFILE





N CLINTON ST PROFILE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

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ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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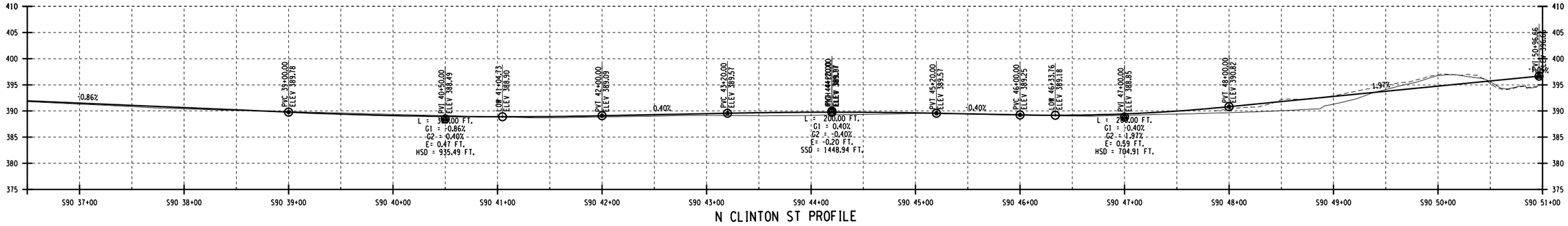
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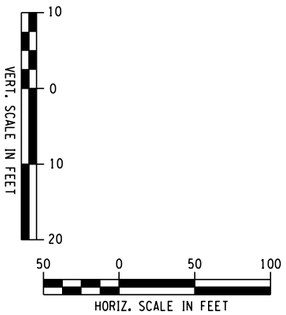
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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USER = DGN$USERNAME



N CLINTON ST PROFILE



PROJECT MANAGER **H. UNGAR**

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DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

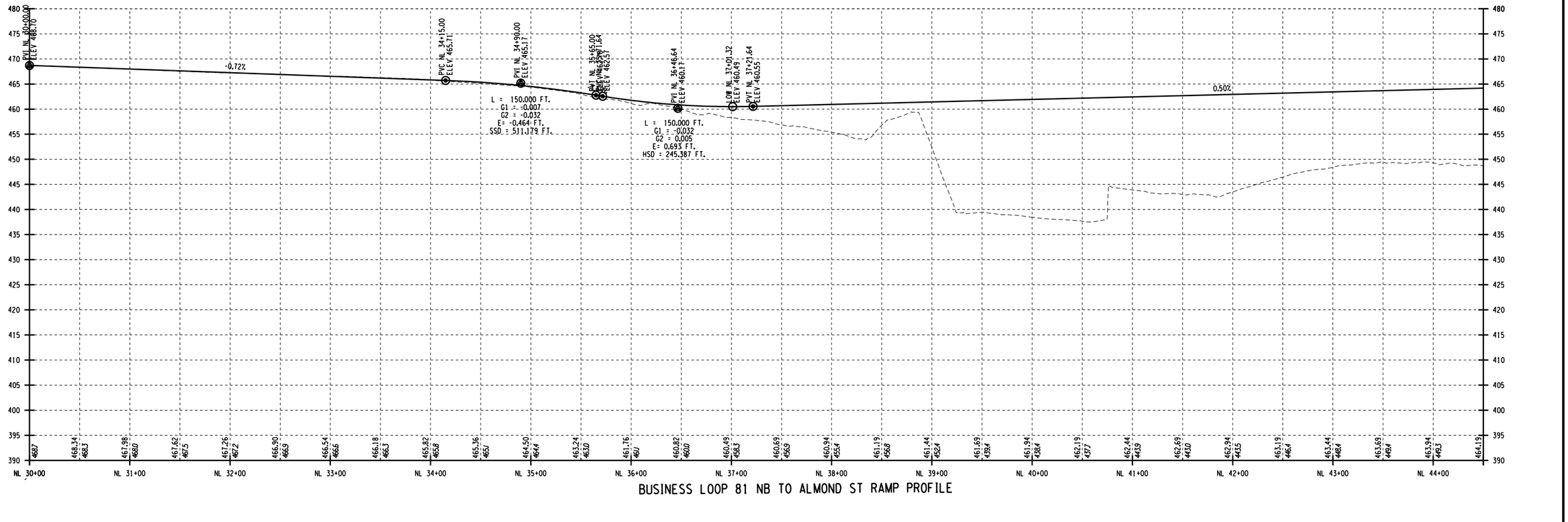
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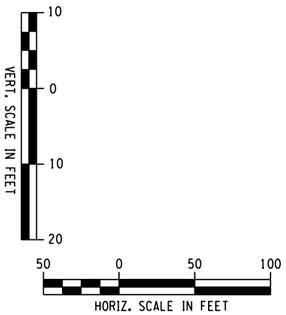
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation



BUSINESS LOOP 81 NB TO ALMOND ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

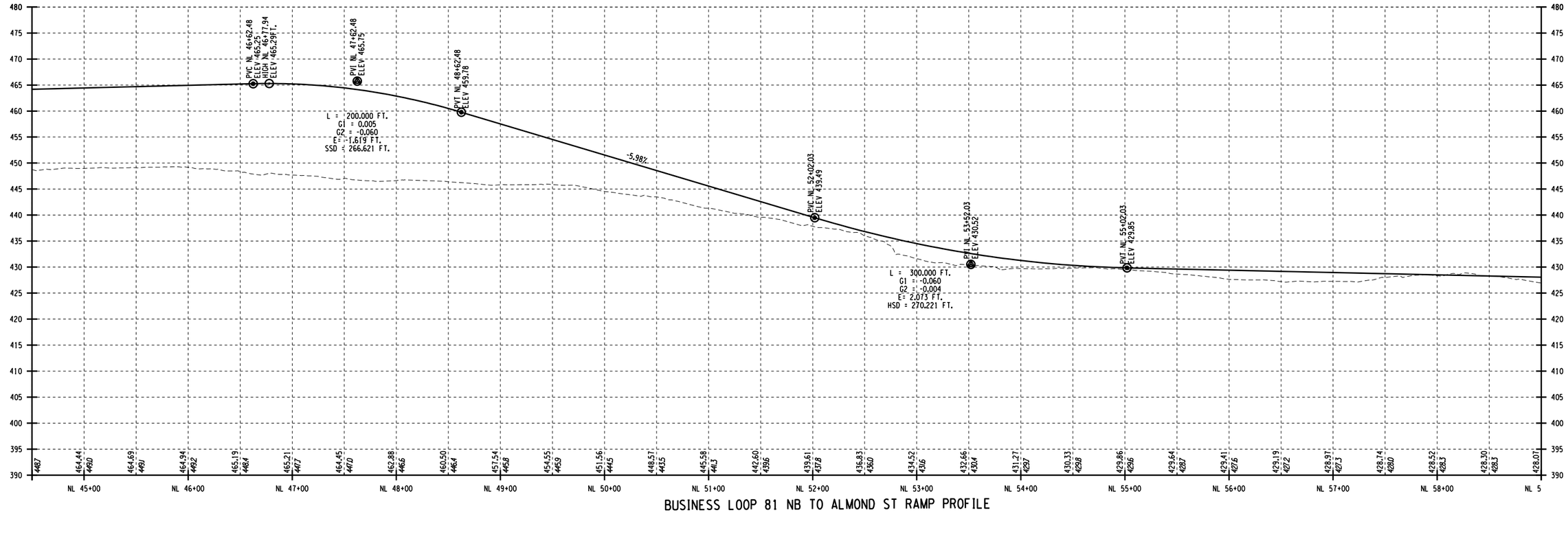
AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

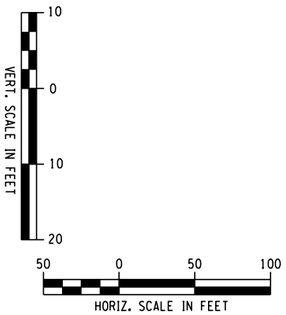
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 NB TO ALMOND ST RAMP PROFILE



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PARSONS

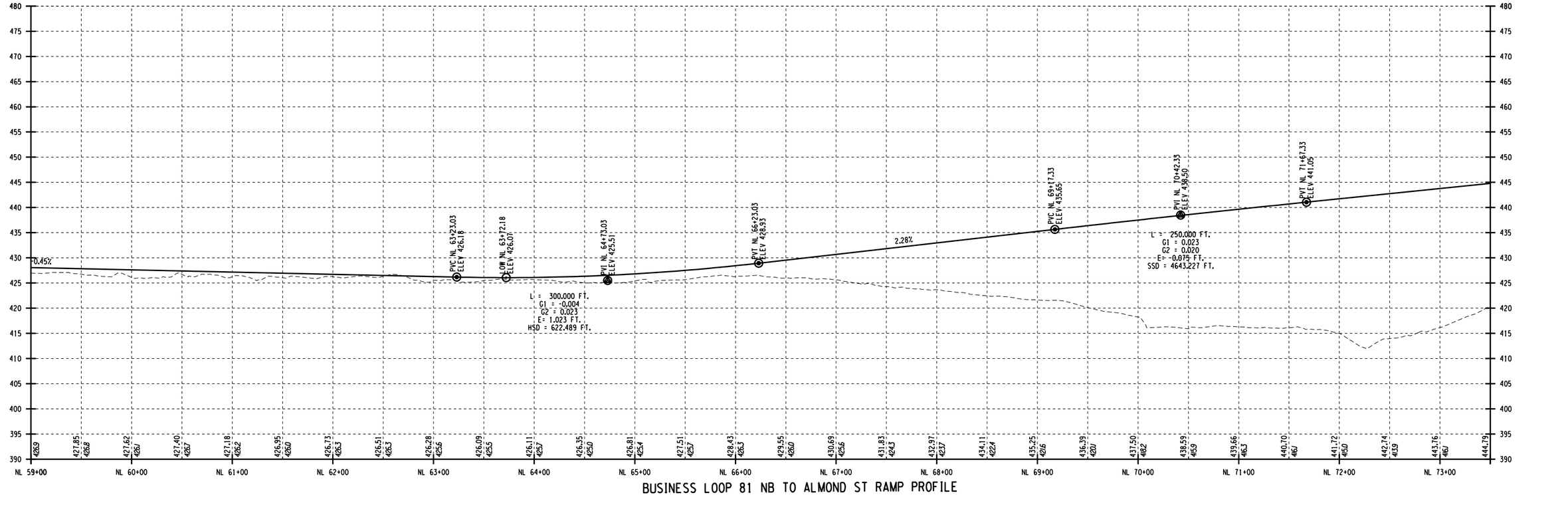
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

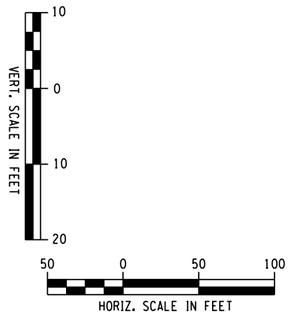
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
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DESIGN SUPERVISOR

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BUSINESS LOOP 81 NB TO ALMOND ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

PROFILE
BUSINESS LOOP 81
ORANGE TUNNEL CONCEPT

DRAWING NO. PR-T-H10-32

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
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JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
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PROJECT MANAGER **H. UNGAR**

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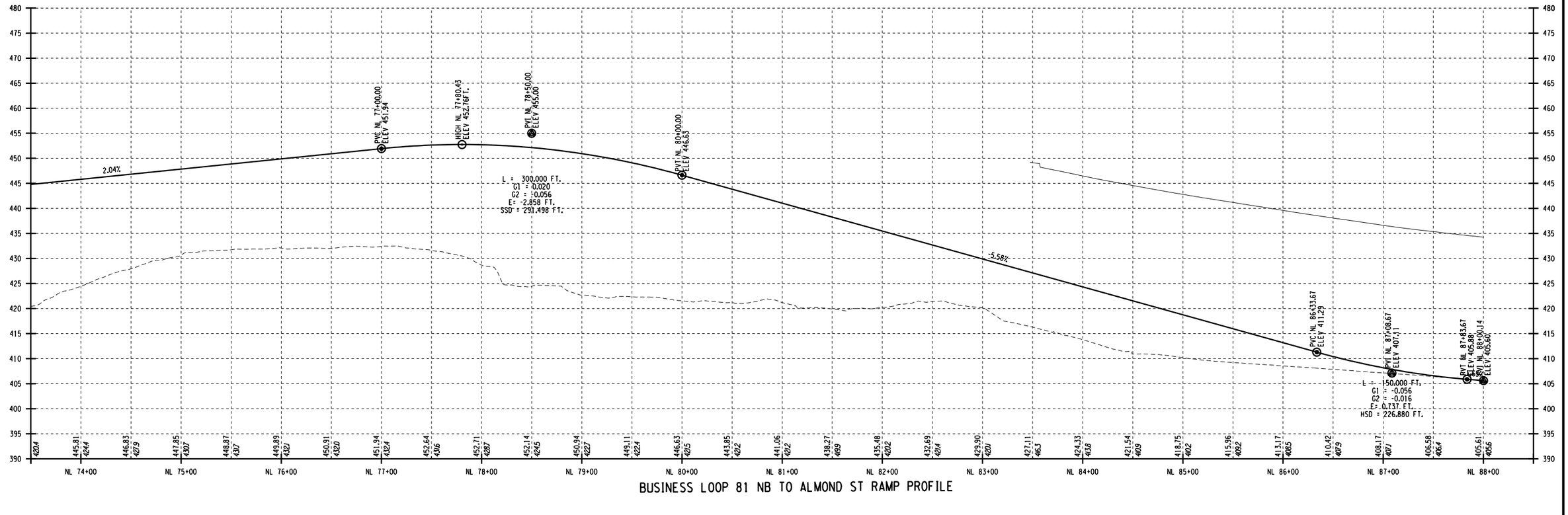
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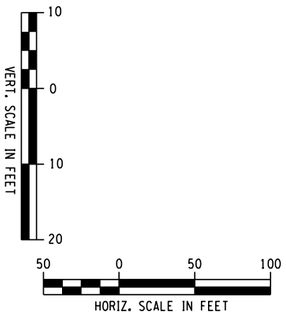
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JOB MANAGER

DESIGN SUPERVISOR



BUSINESS LOOP 81 NB TO ALMOND ST RAMP PROFILE



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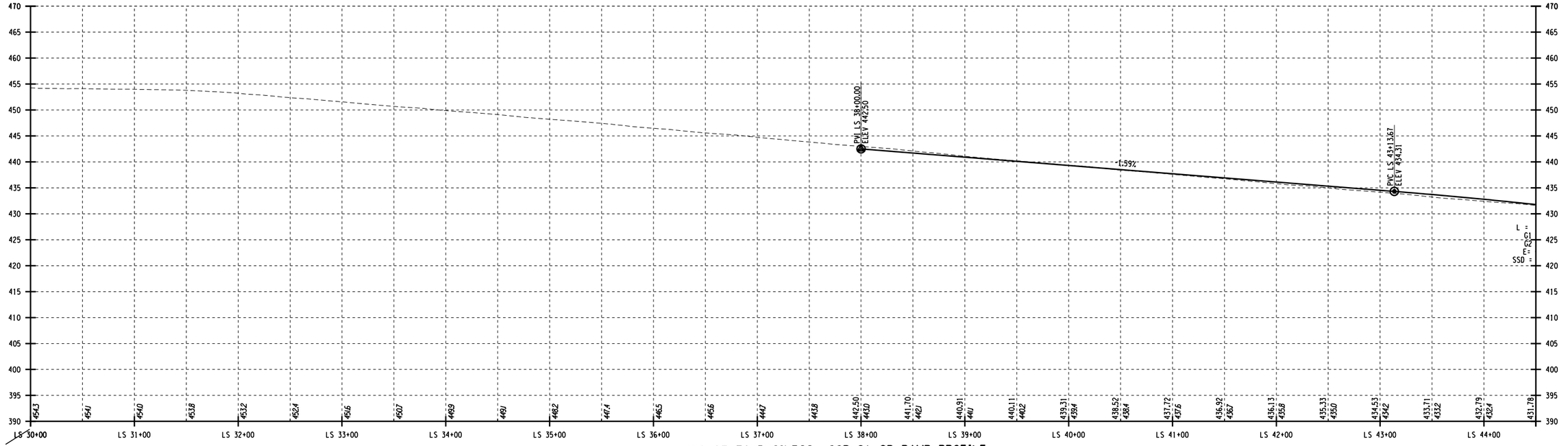
PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT	PIN **3501.60**	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

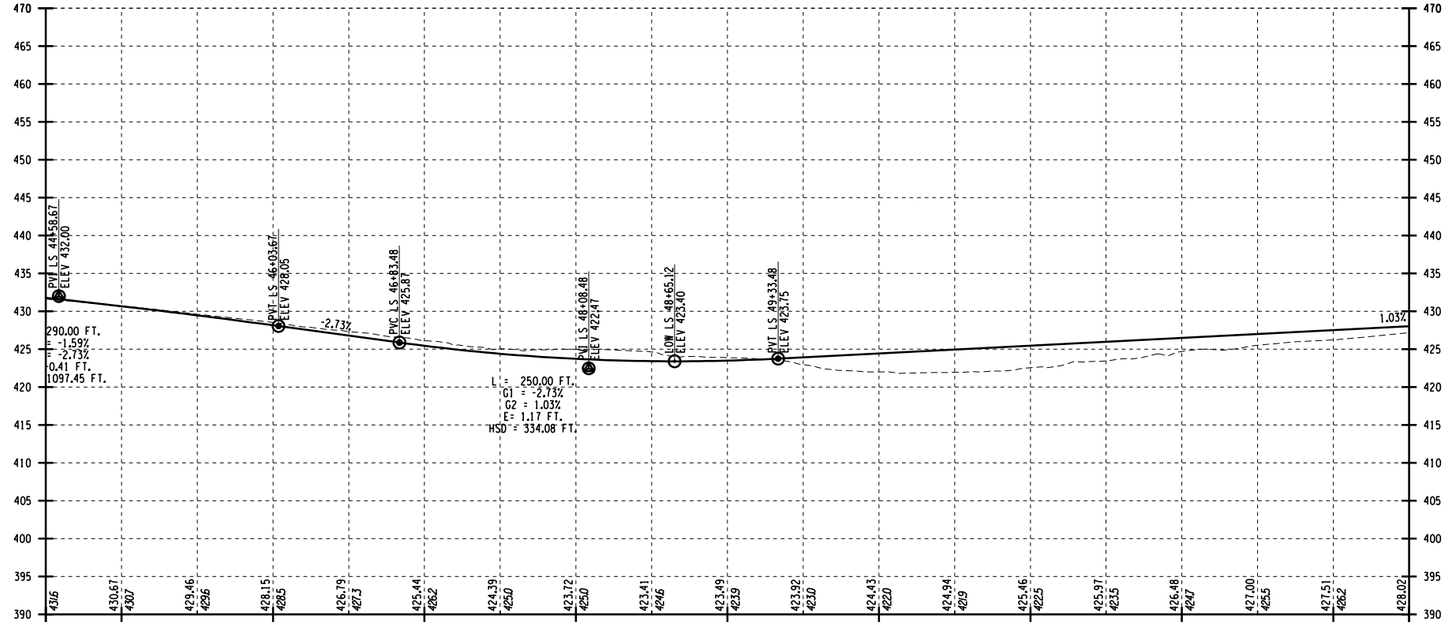
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

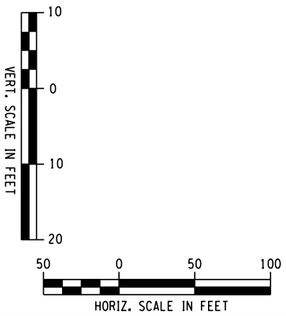
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ALMOND ST TO BUSINESS LOOP 81 SB RAMP PROFILE



ALMOND ST TO BUSINESS LOOP 81 SB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

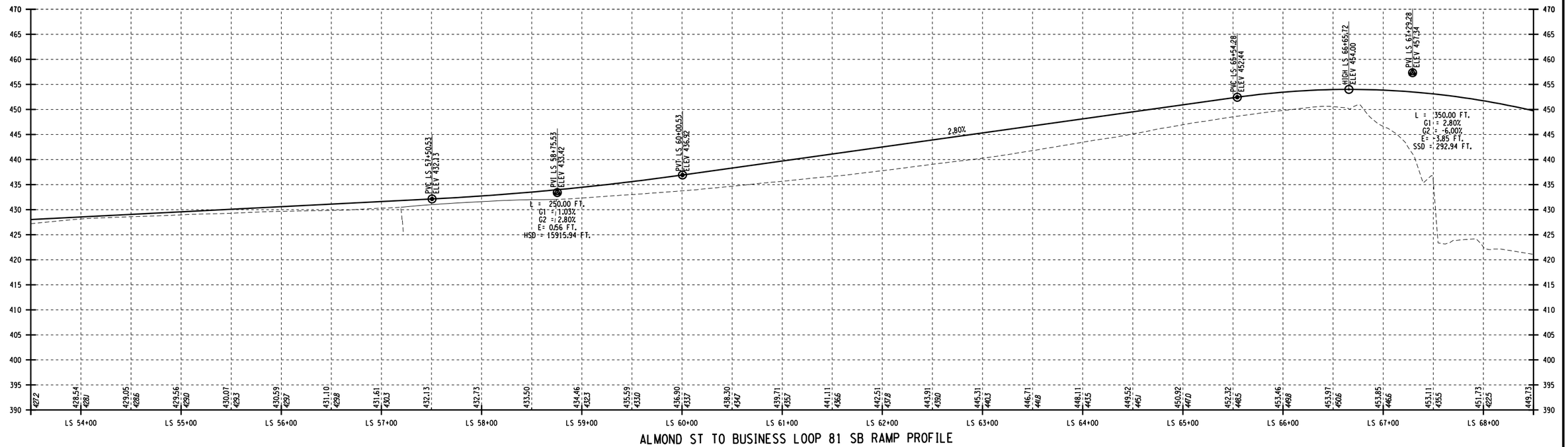
I-81 VIADUCT	PIN **3501.60**	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
COUNTY: ONONDAGA COUNTY, NY REGION: 3				PROFILE BUSINESS LOOP 81 TUNNEL ALTERNATIVE	DRAWING NO. PR-T-H10-34 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

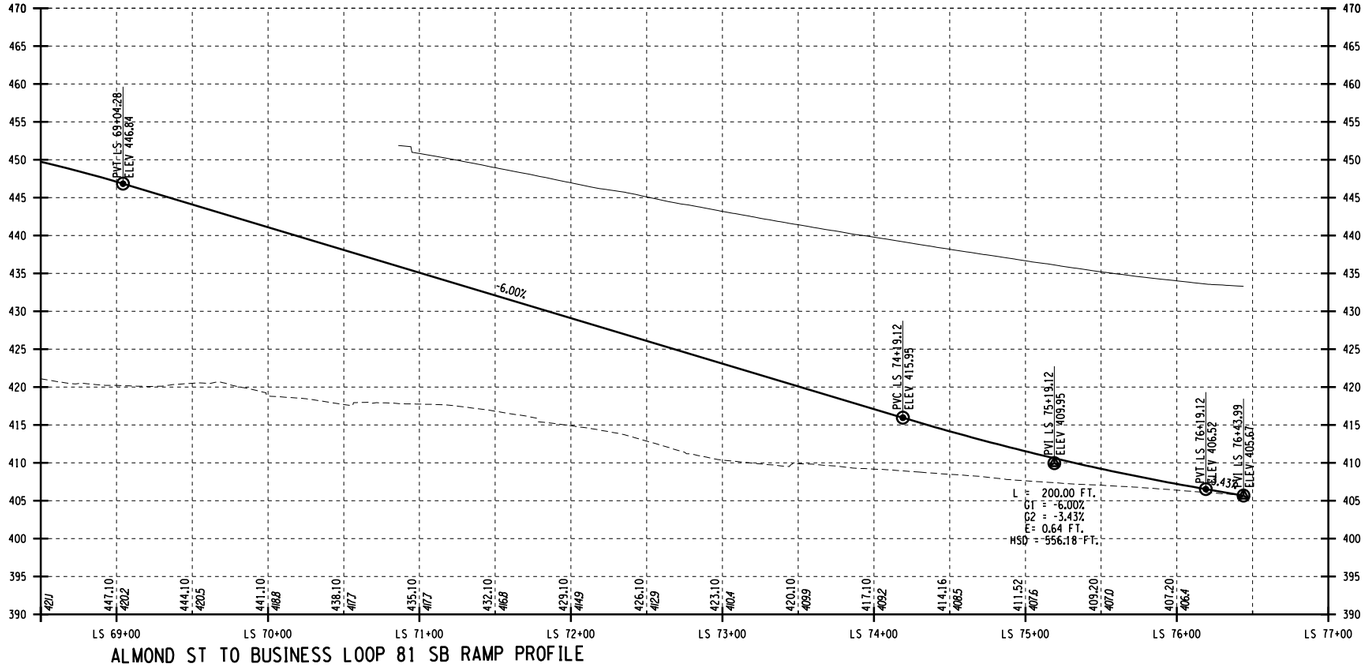
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

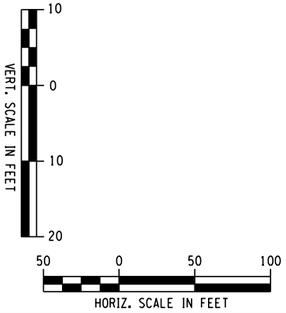
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ALMOND ST TO BUSINESS LOOP 81 SB RAMP PROFILE



ALMOND ST TO BUSINESS LOOP 81 SB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
TUNNEL ALTERNATIVE

CONTRACT NUMBER

DRAWING NO. PR-T-H10-35

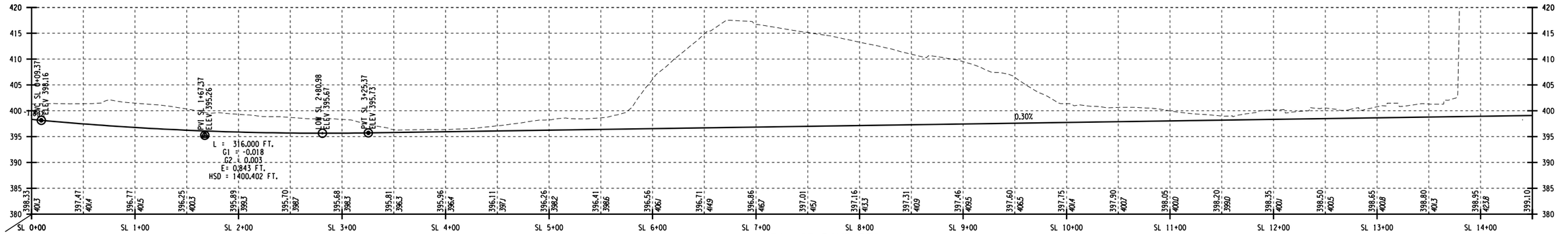
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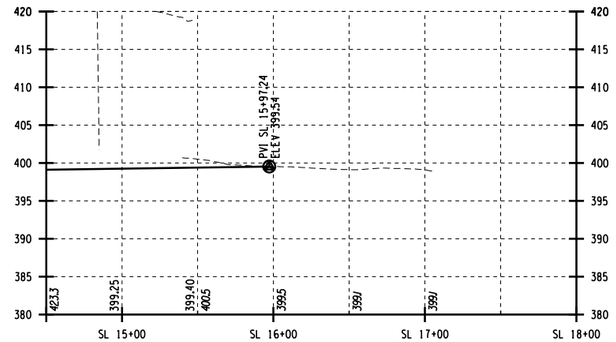
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
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JOB MANAGER
DESIGN SUPERVISOR

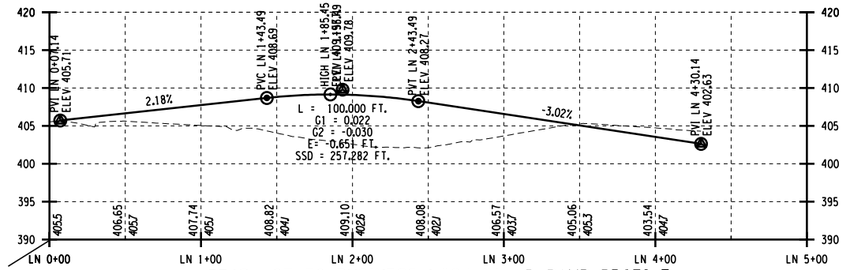
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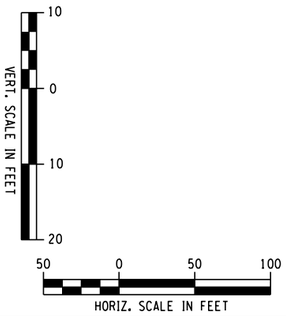
BUSINESS LOOP 81 SB TO CLINTON ST RAMP PROFILE



BUSINESS LOOP 81 SB TO CLINTON ST RAMP PROFILE



PEARL ST TO BUSINESS LOOP 81 NB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

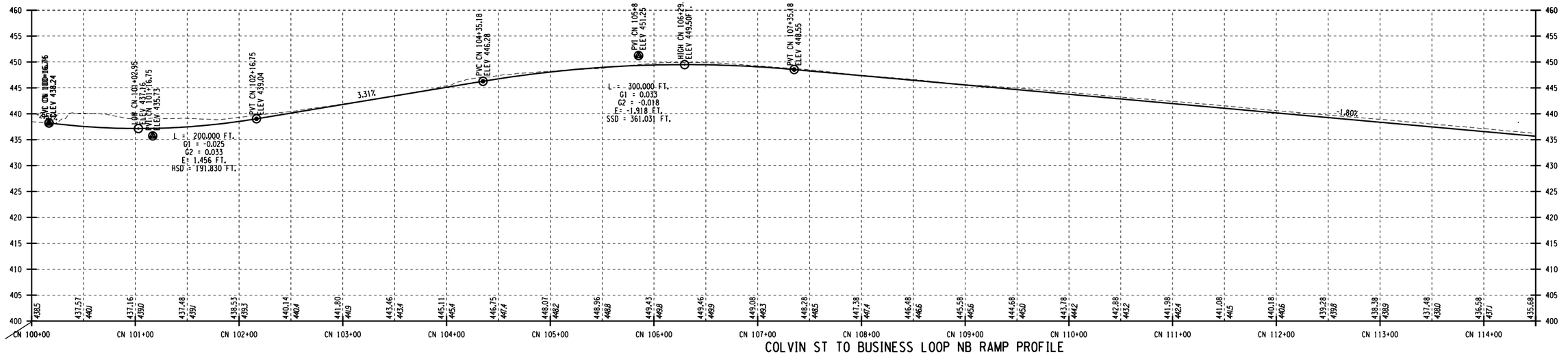
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					PROFILE BUSINESS LOOP 81 TUNNEL ALTERNATIVE	DRAWING NO. PR-T-H10-36 SHEET NO.
	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

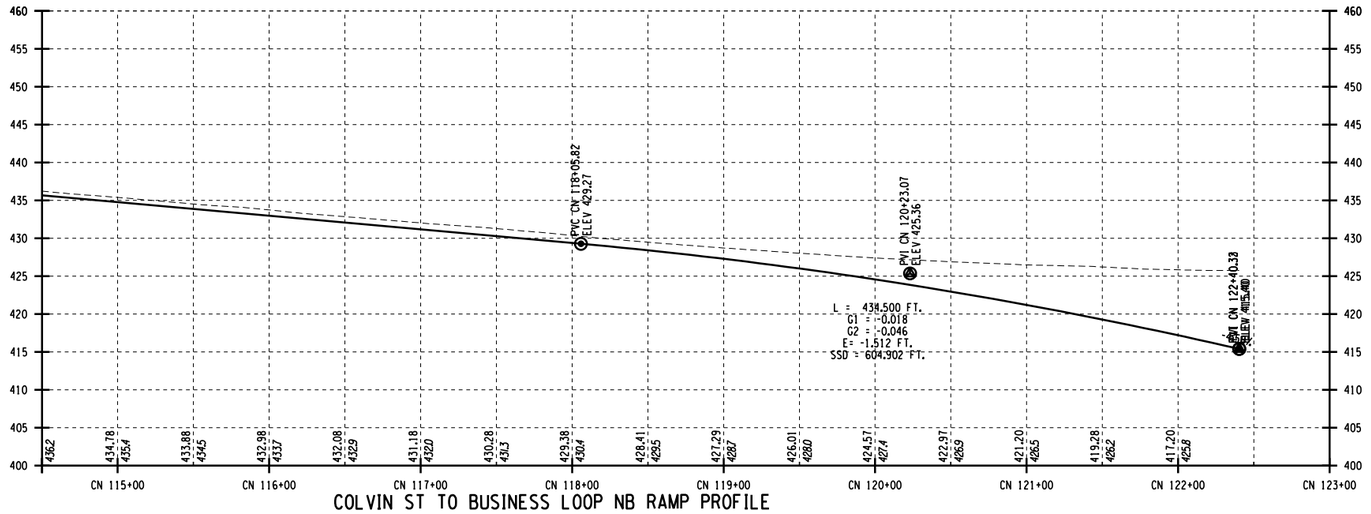
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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COLVIN ST TO BUSINESS LOOP NB RAMP PROFILE



COLVIN ST TO BUSINESS LOOP NB RAMP PROFILE

VERT. SCALE IN FEET: 10, 0, 10, 20

HORIZ. SCALE IN FEET: 50, 0, 50, 100

PROJECT MANAGER H. UNGAR

CHECK

DRAFTING

DESIGN

CHECK

JOB MANAGER

DESIGN SUPERVISOR

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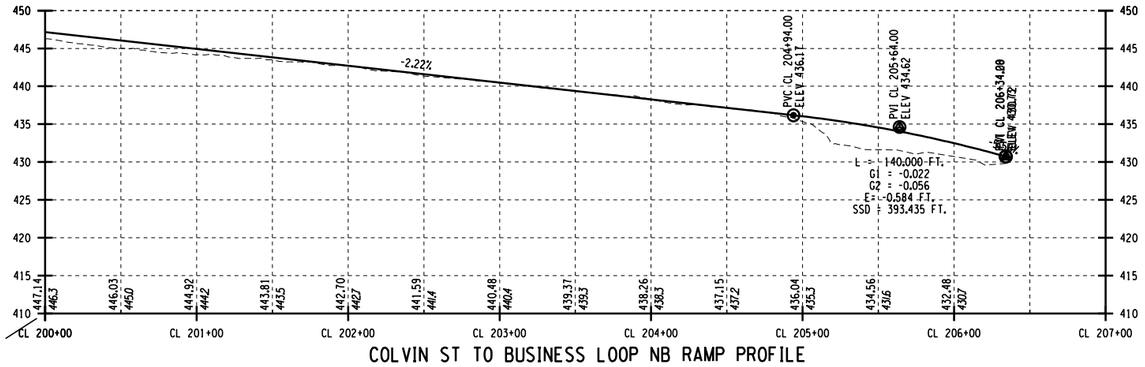
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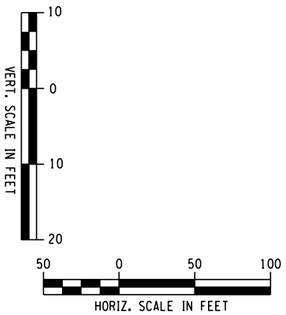
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3				PROFILE BUSINESS LOOP 81 TUNNEL ALTERNATIVE	DRAWING NO. PR-T-H10-37 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



COLVIN ST TO BUSINESS LOOP NB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
BUSINESS LOOP 81
TUNNEL ALTERNATIVE

CONTRACT NUMBER

DRAWING NO. PR-T-H10-38

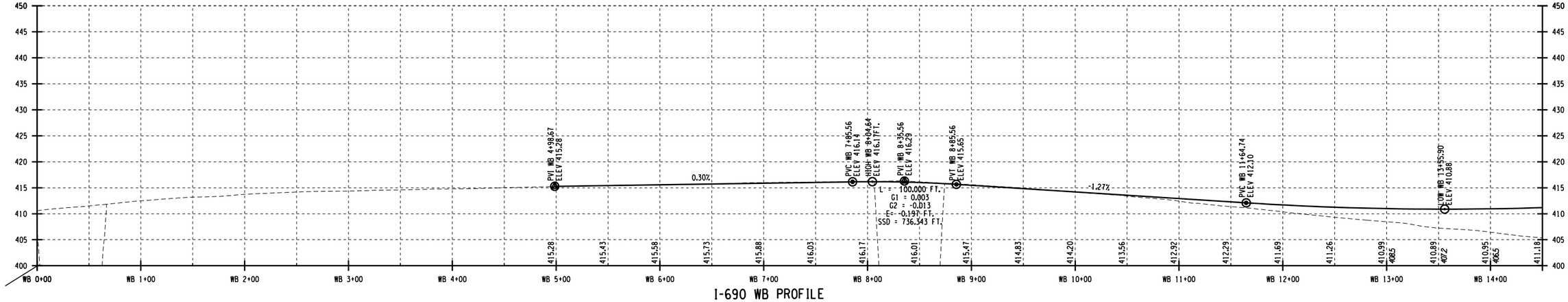
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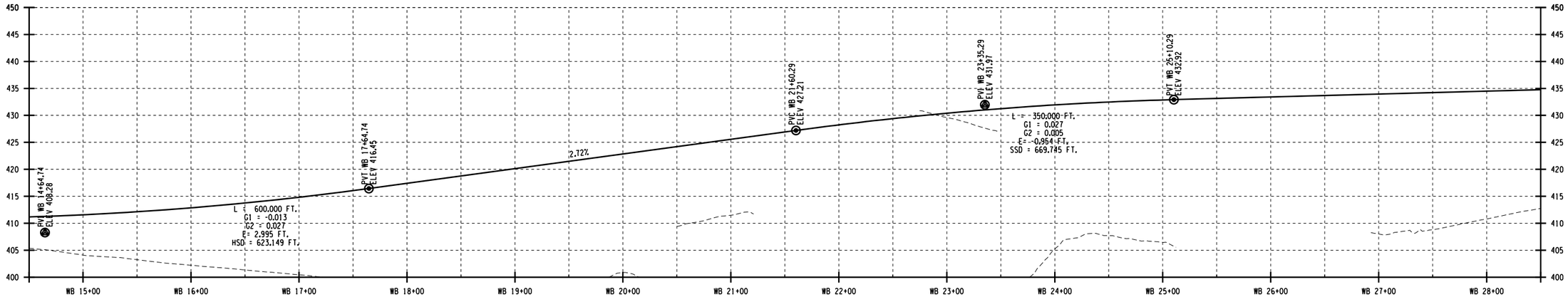
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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I-690 WB PROFILE



I-690 WB PROFILE

VERT. SCALE IN FEET
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0
10
20

HORIZ. SCALE IN FEET
50 0 50 100

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690 WB
TUNNEL ALTERNATIVE

CONTRACT NUMBER

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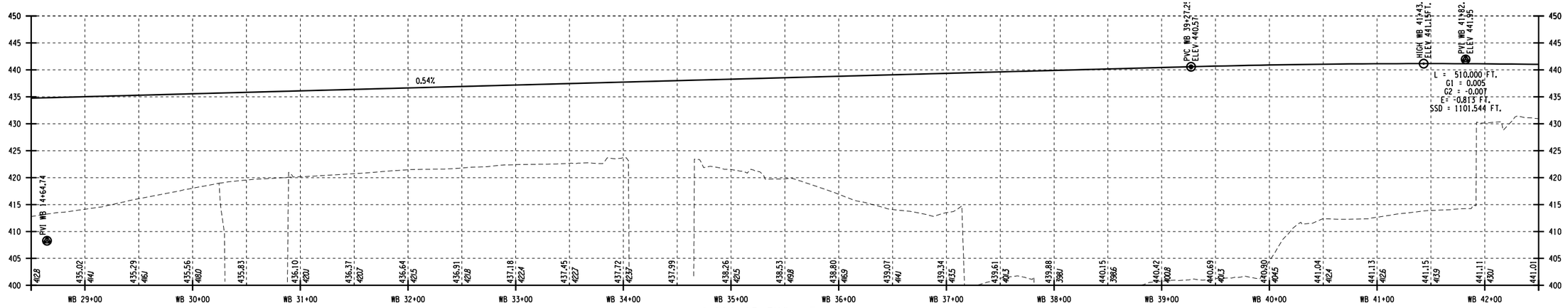
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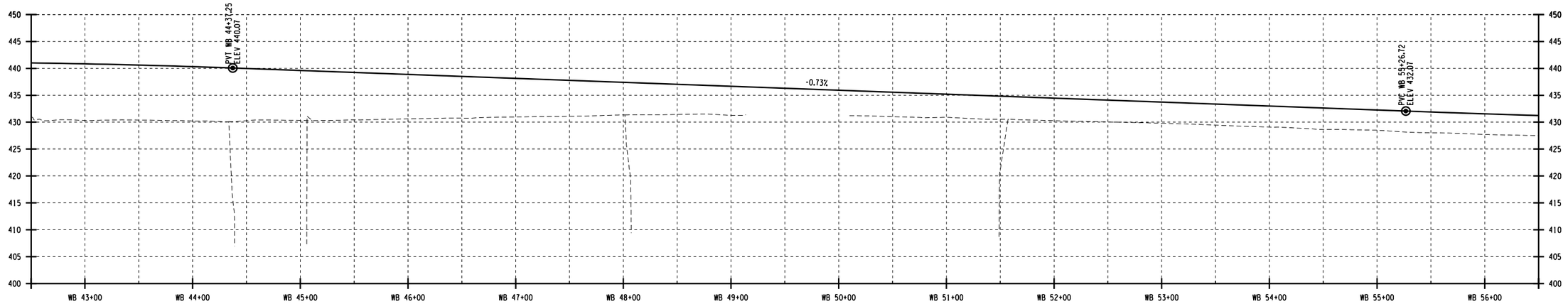
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

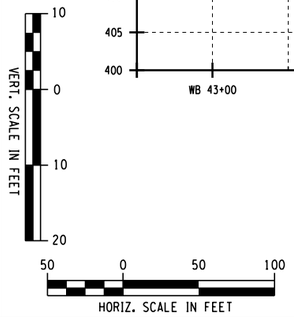
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I-690 WB PROFILE



I-690 WB PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690 WB
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. PR-T-H30-02

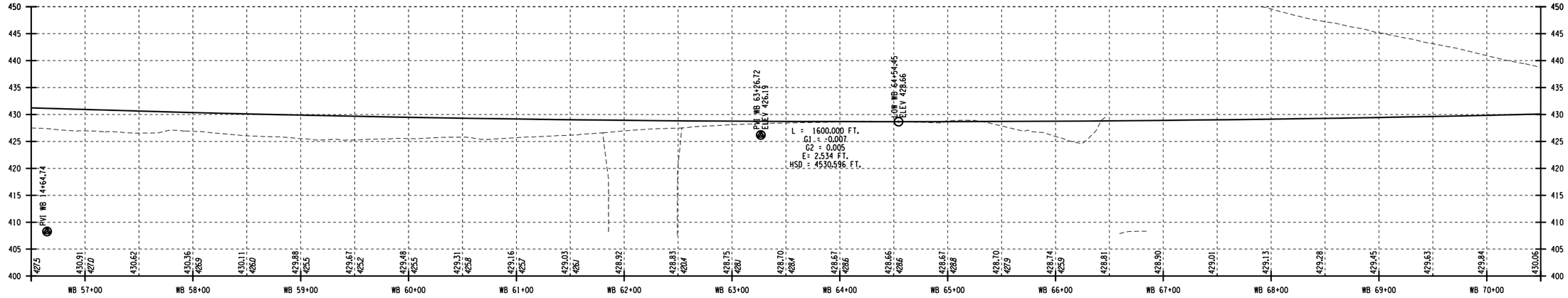
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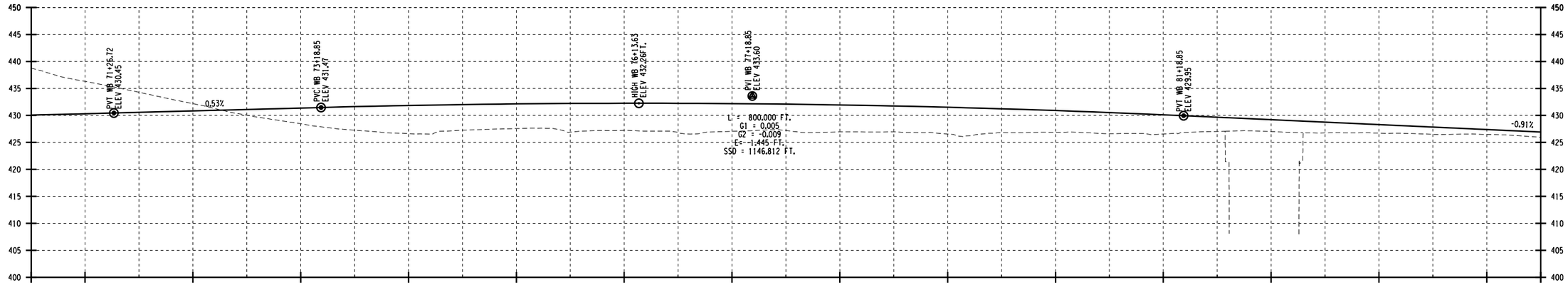
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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USER = DGN$USERNAME



I-690 WB PROFILE



I-690 WB PROFILE

VERT. SCALE IN FEET: 10, 0, 10, 20

HORIZ. SCALE IN FEET: 50, 0, 50, 100

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690 WB
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. PR-T-H30-03

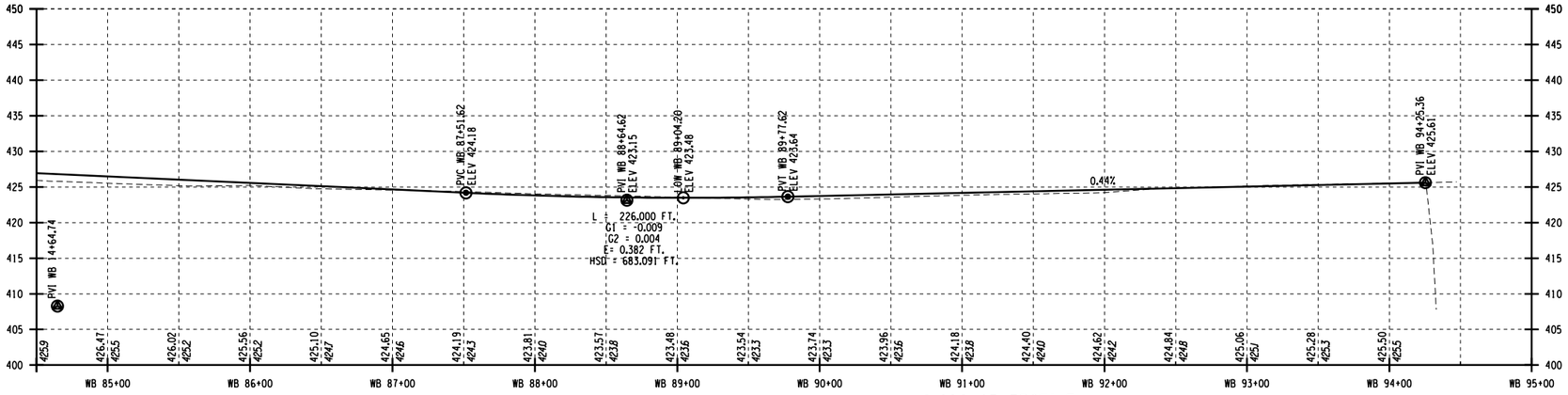
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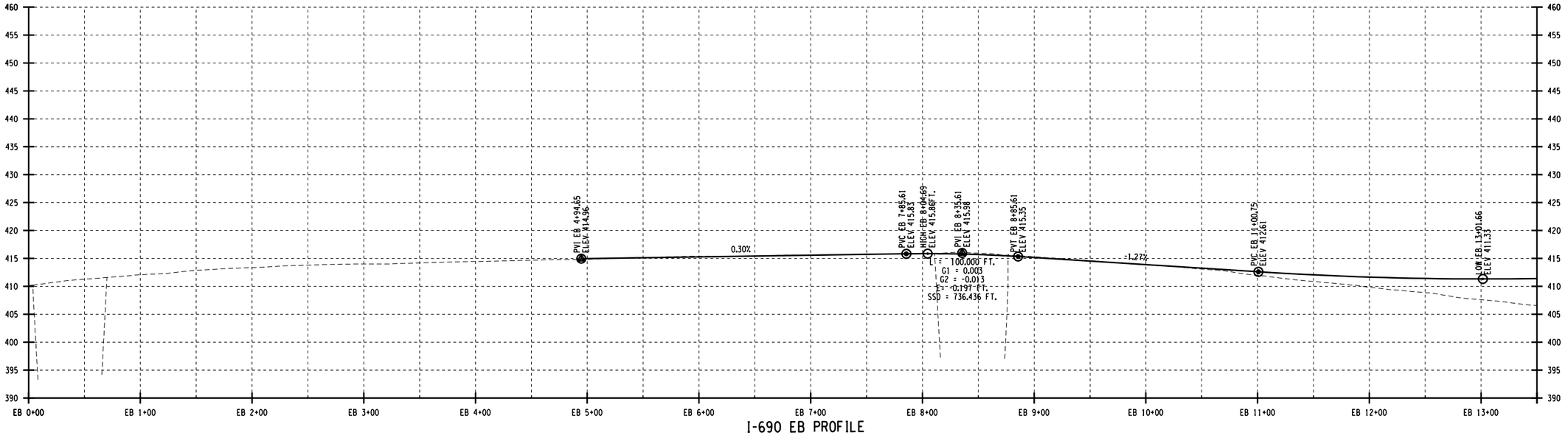
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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I-690 WB PROFILE



I-690 EB PROFILE

VERT. SCALE IN FEET: 10, 0, 10, 20

HORIZ. SCALE IN FEET: 50, 0, 50, 100

PROJECT MANAGER H. UNGAR

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

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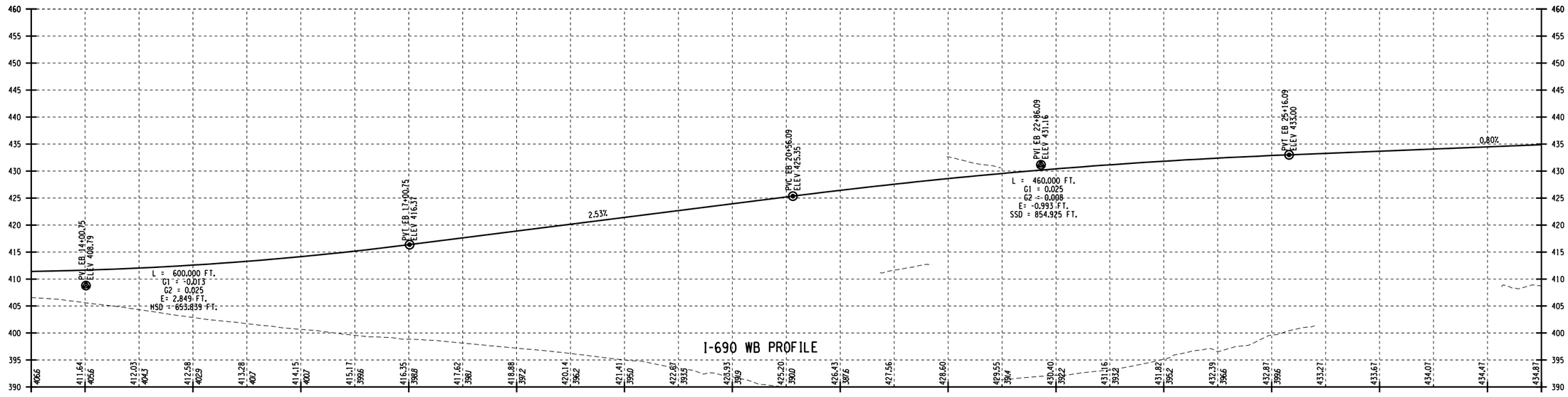
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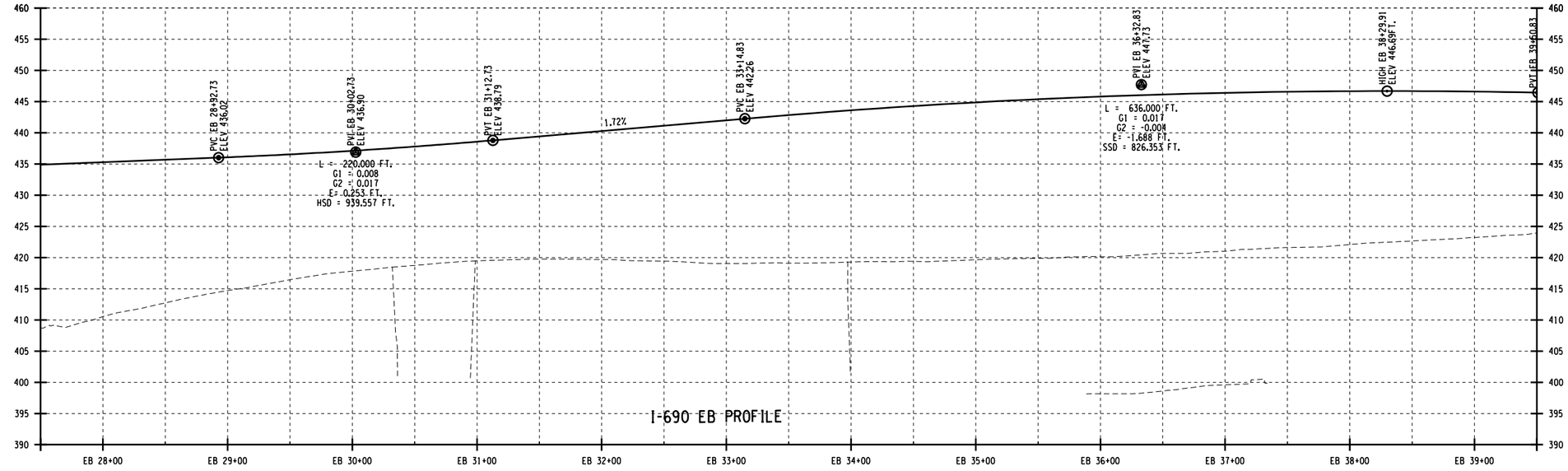
PARSONS

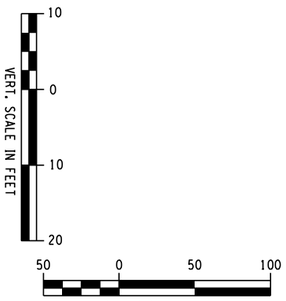
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation







PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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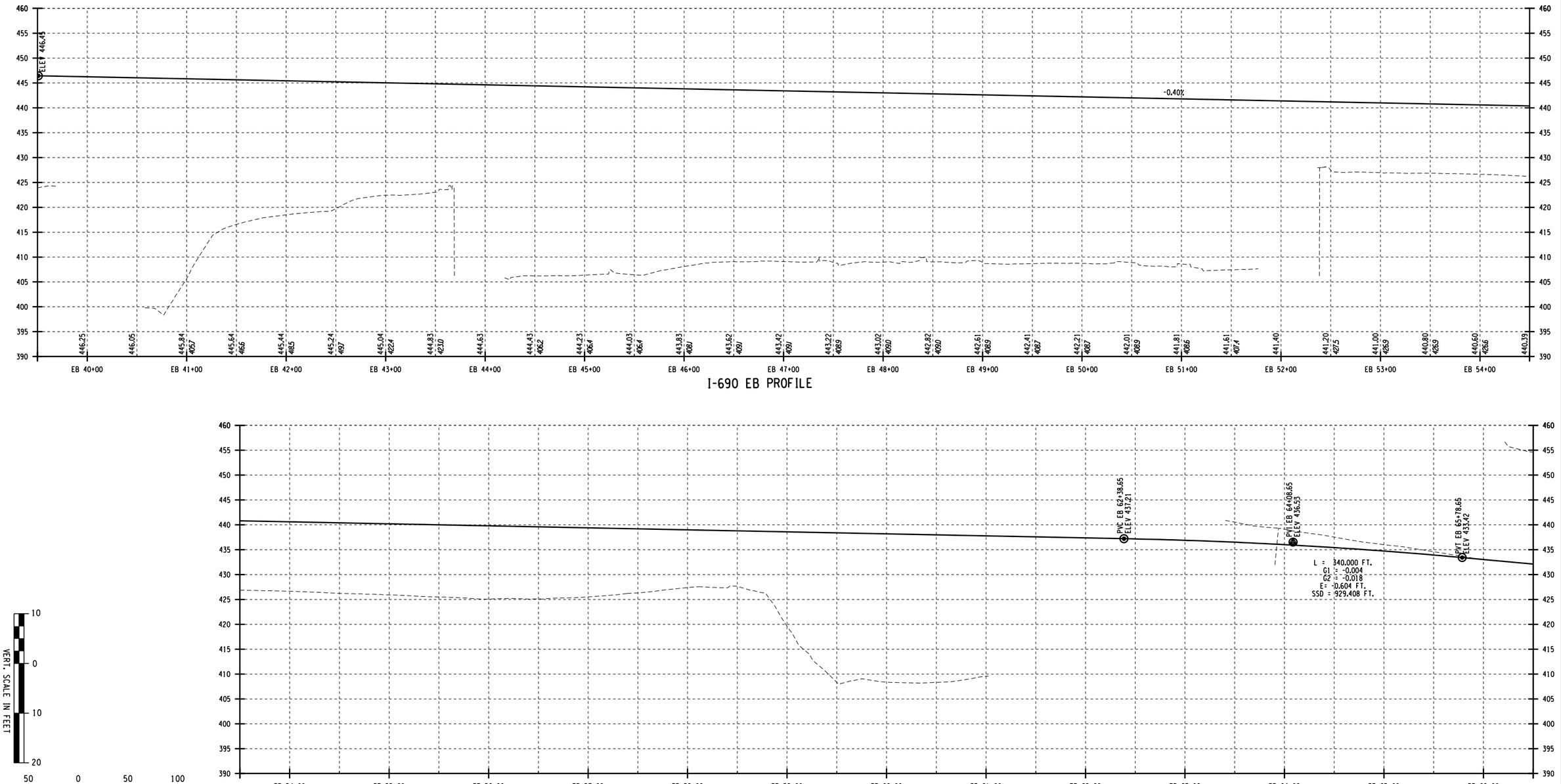
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PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
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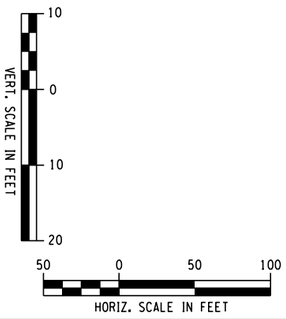
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



I-690 EB PROFILE

I-690 EB PROFILE



PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

DESIGN

CHECK

JOB MANAGER

DESIGN SUPERVISOR

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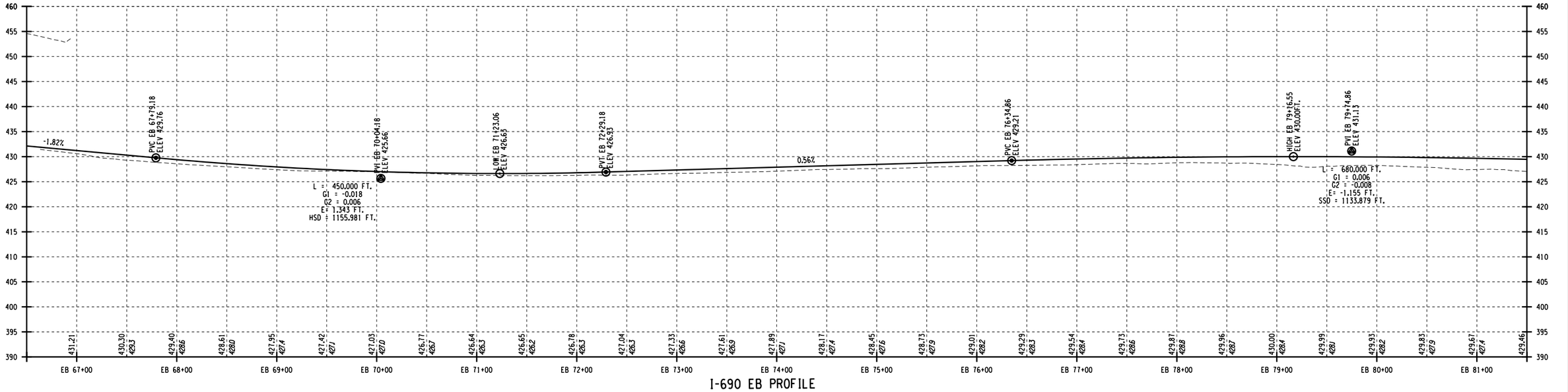
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PARSONS

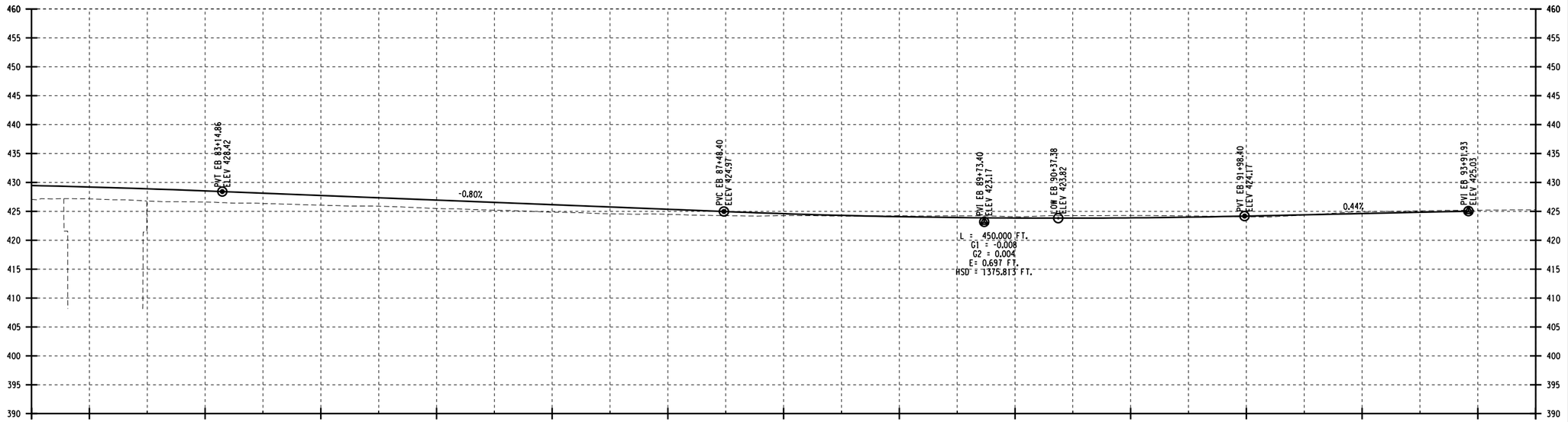
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



I-690 EB PROFILE



I-690 EB PROFILE

VERT. SCALE IN FEET: 10, 0, 10, 20

HORIZ. SCALE IN FEET: 50, 0, 50, 100

PROJECT MANAGER **H. UNGAR**

CHECK

DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690 WB & EB
ORANGE TUNNEL CONCEPT

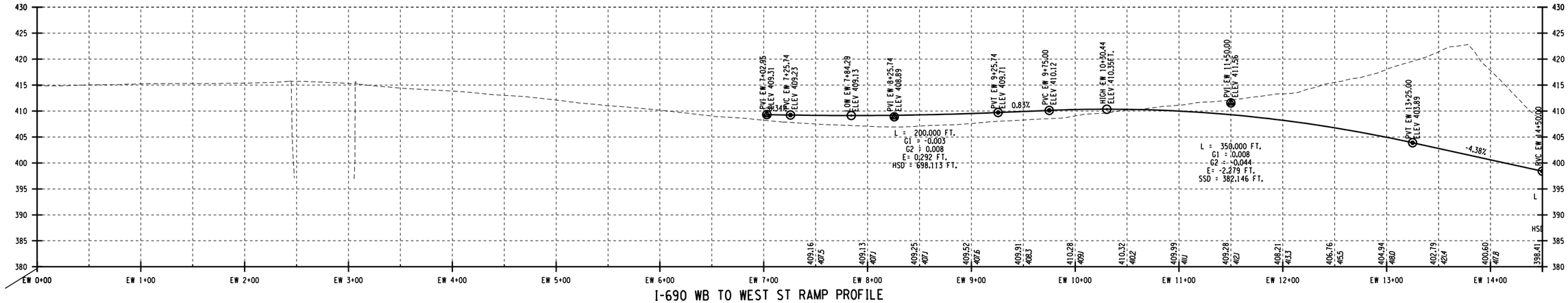
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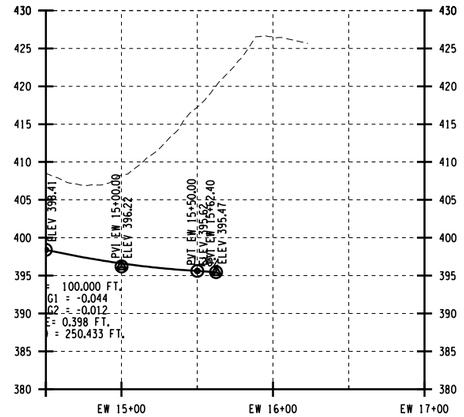
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

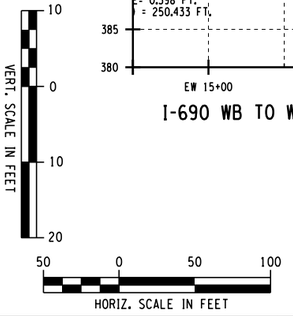
NEW YORK STATE OF OPPORTUNITY. Department of Transportation



I-690 WB TO WEST ST RAMP PROFILE



I-690 WB TO WEST ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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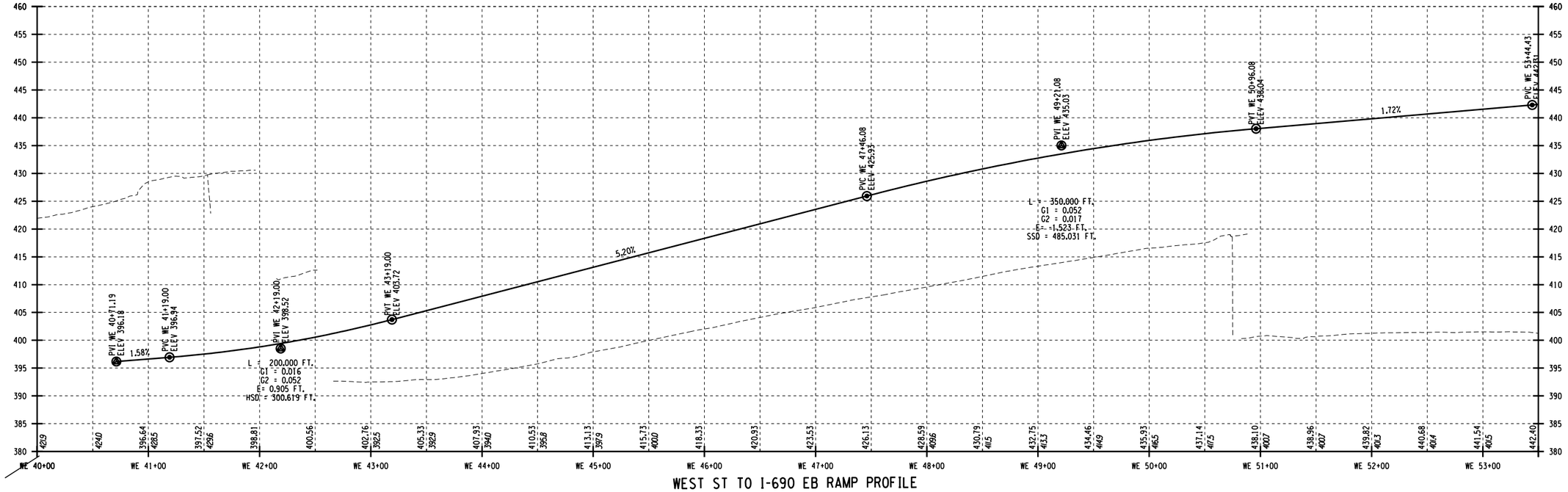
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

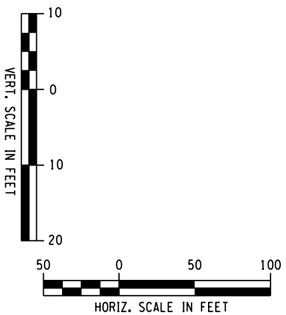
PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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WEST ST TO I-690 EB RAMP PROFILE

WEST ST TO I-690 EB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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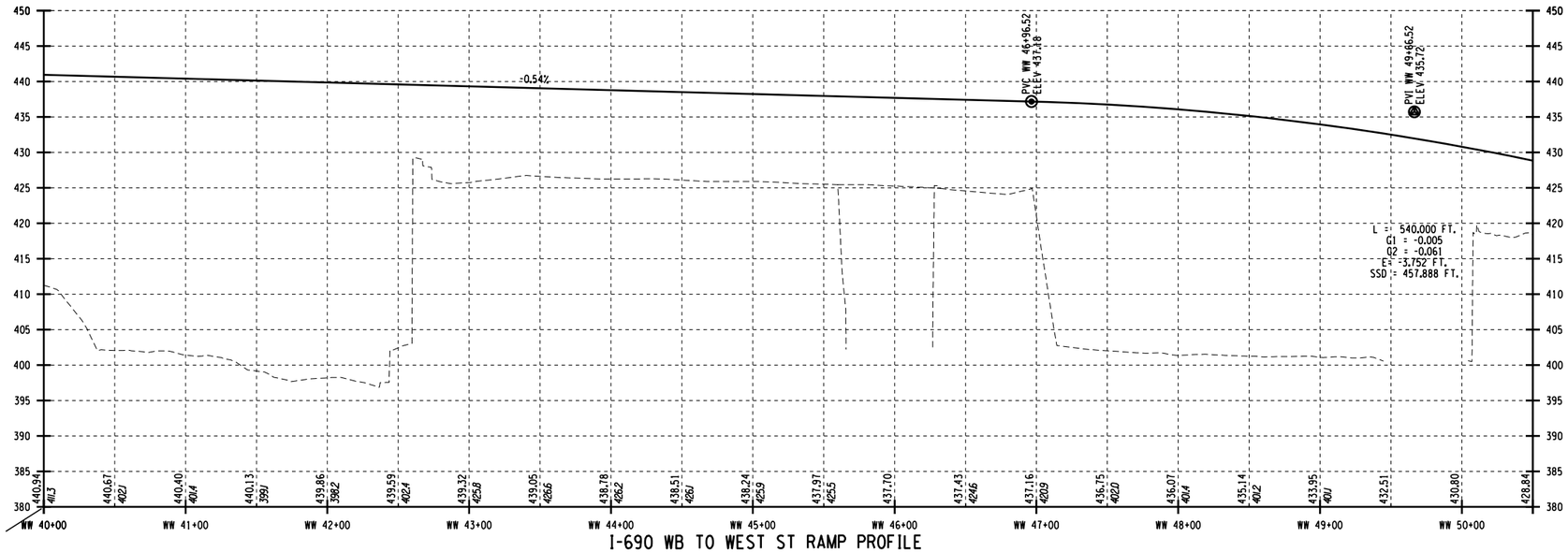
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

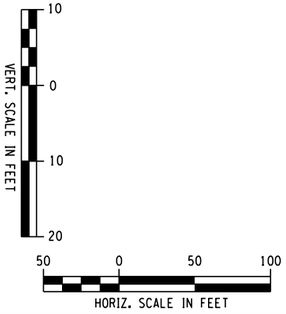
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I-690 WB TO WEST ST RAMP PROFILE

I-690 WB TO WEST ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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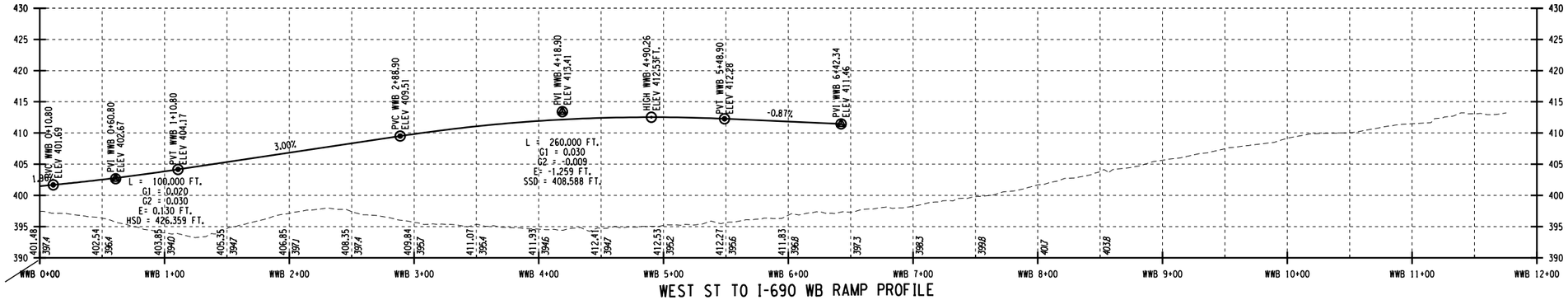
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

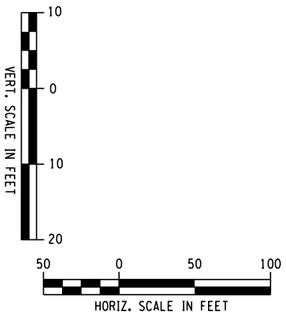
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
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DESIGN SUPERVISOR

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WEST ST TO I-690 WB RAMP PROFILE



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PARSONS

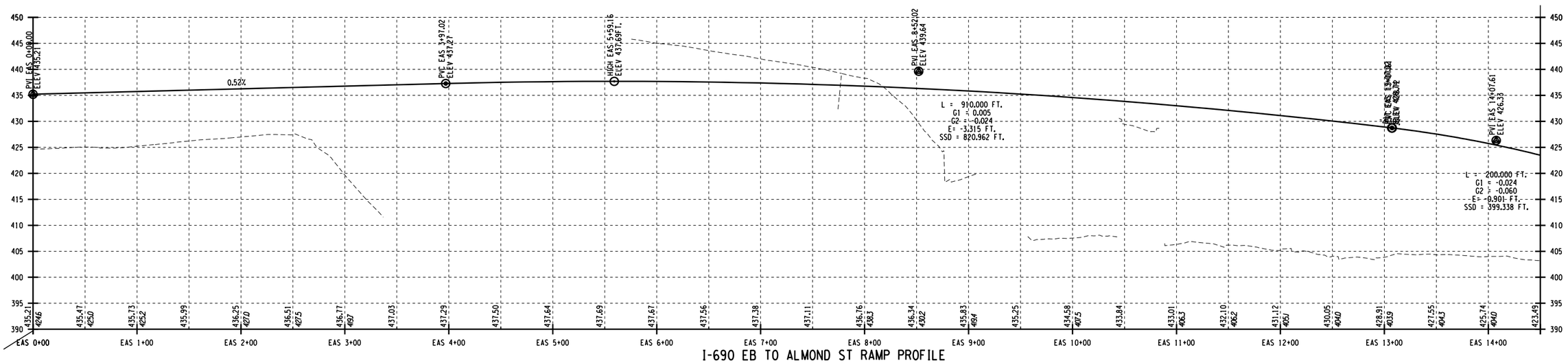
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

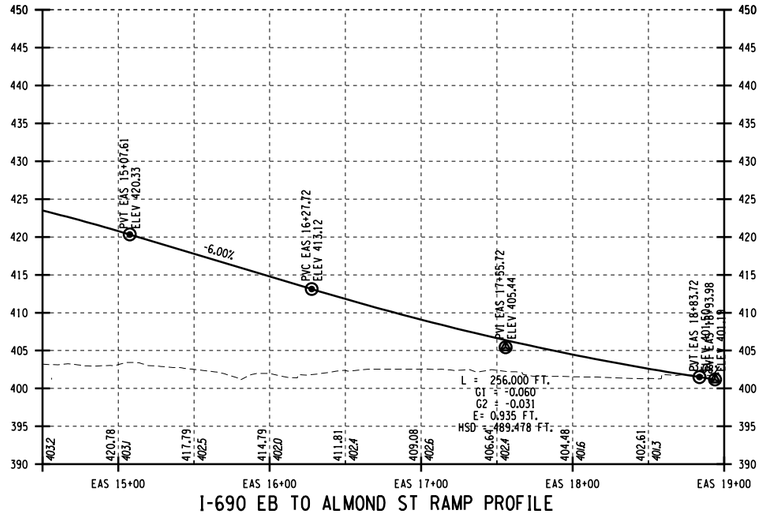
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER **H. UNGAR**
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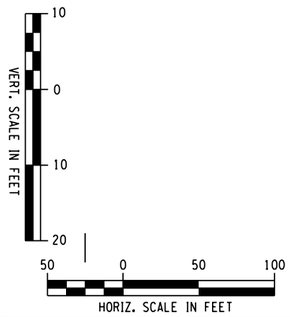
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I-690 EB TO ALMOND ST RAMP PROFILE



I-690 EB TO ALMOND ST RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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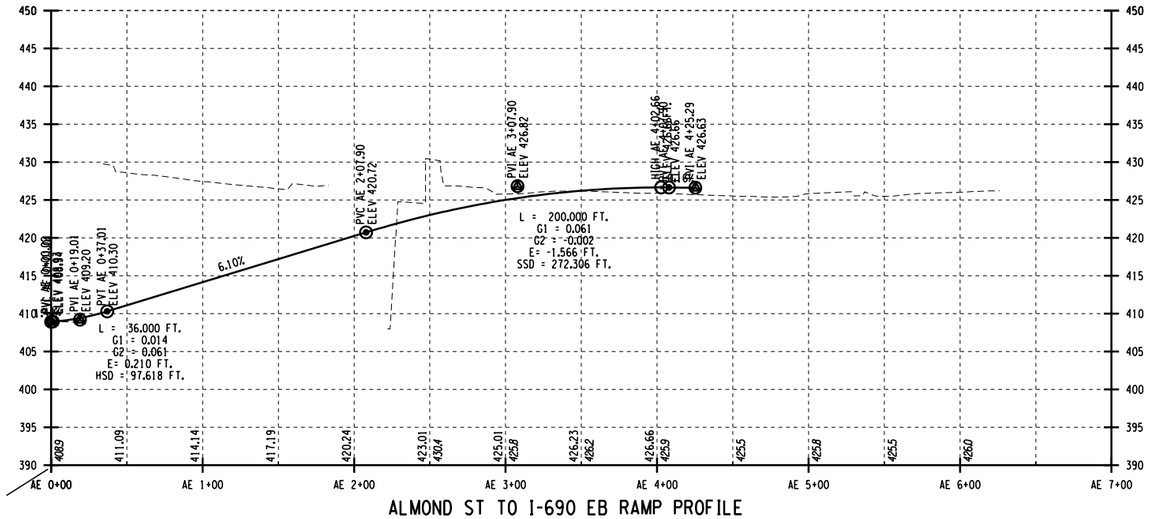
SHEET NO.

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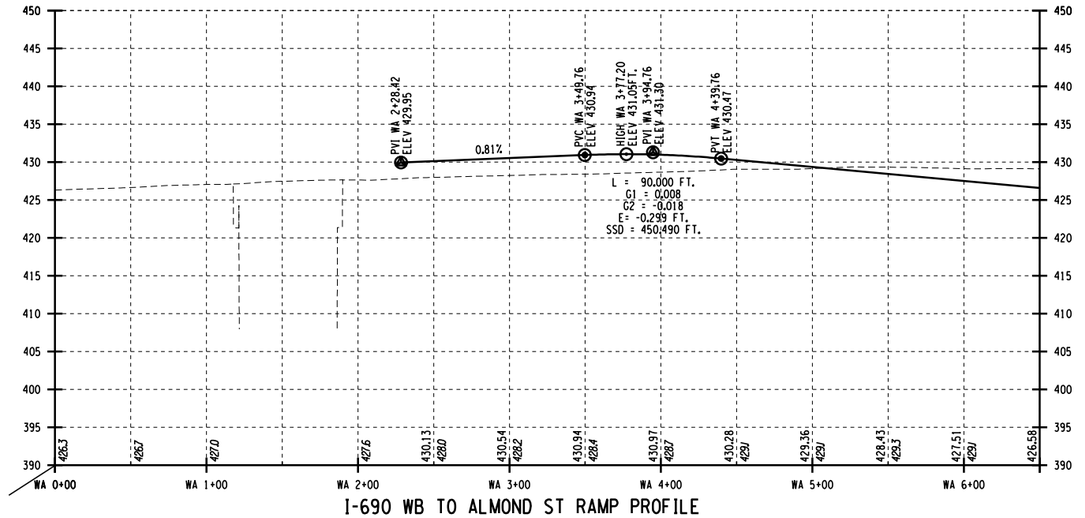
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

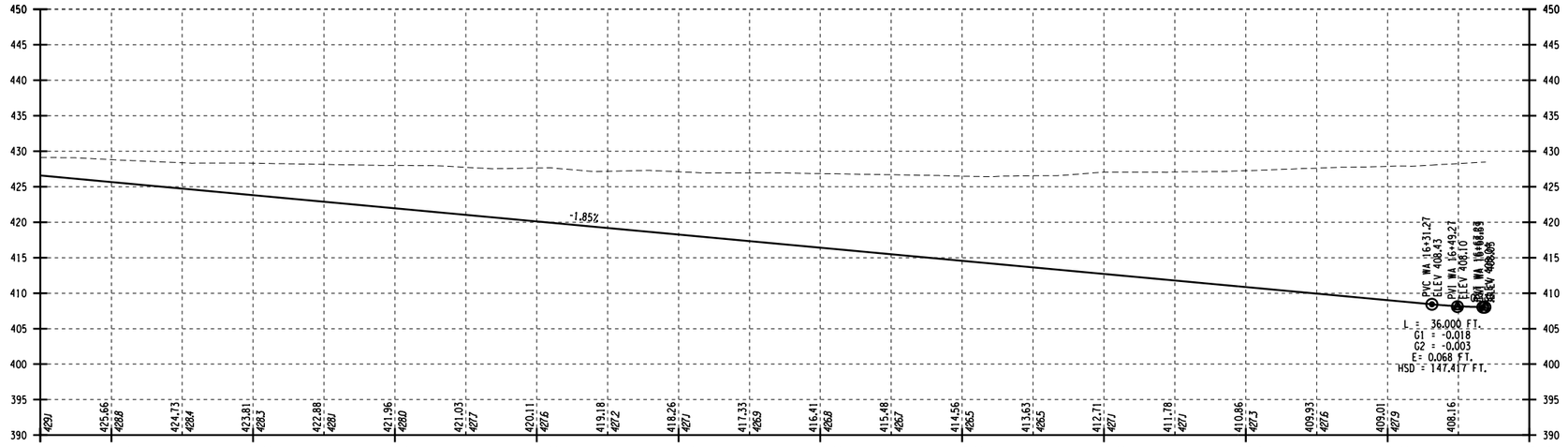
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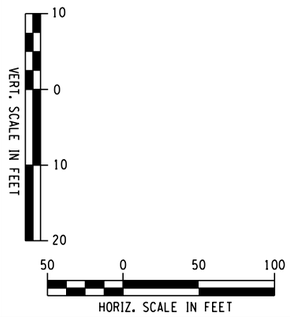
ALMOND ST TO I-690 EB RAMP PROFILE



I-690 WB TO ALMOND ST RAMP PROFILE



I-690 WB TO ALMOND ST RAMP PROFILE



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PARSONS

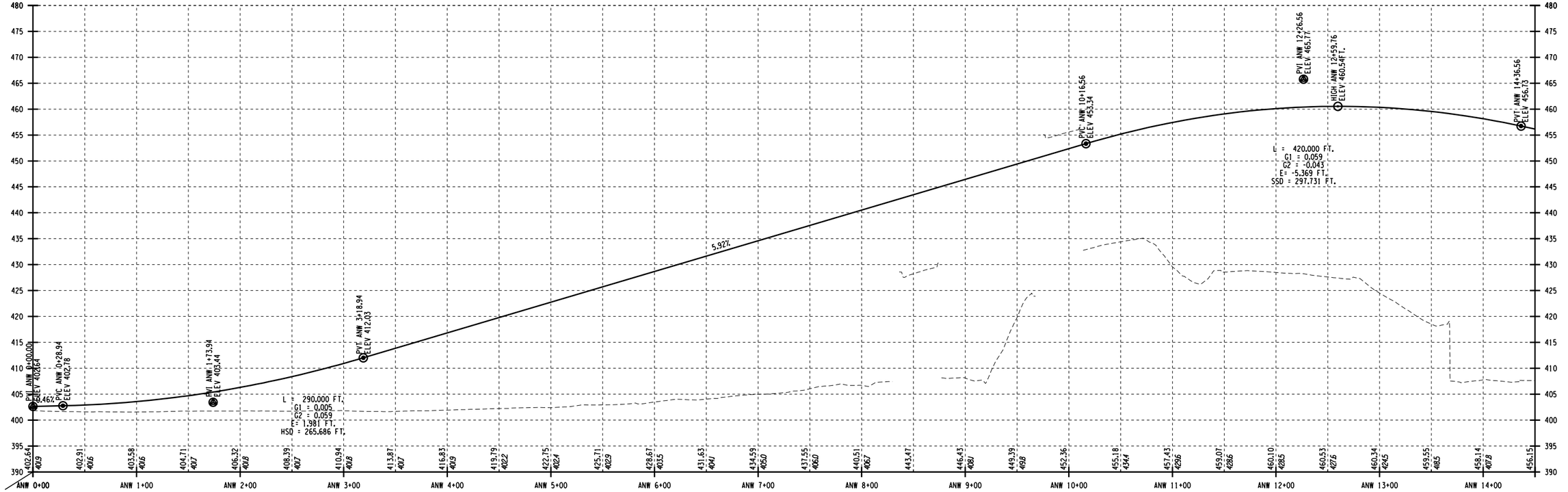
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3				PROFILE I-690 ORANGE TUNNEL CONCEPT	DRAWING NO. PR-T-H30-13 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

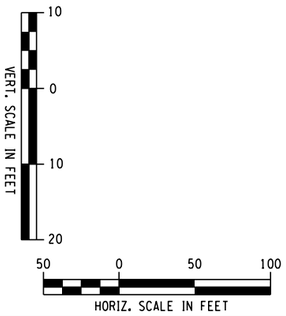
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

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ALMOND ST TO I-690 WB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

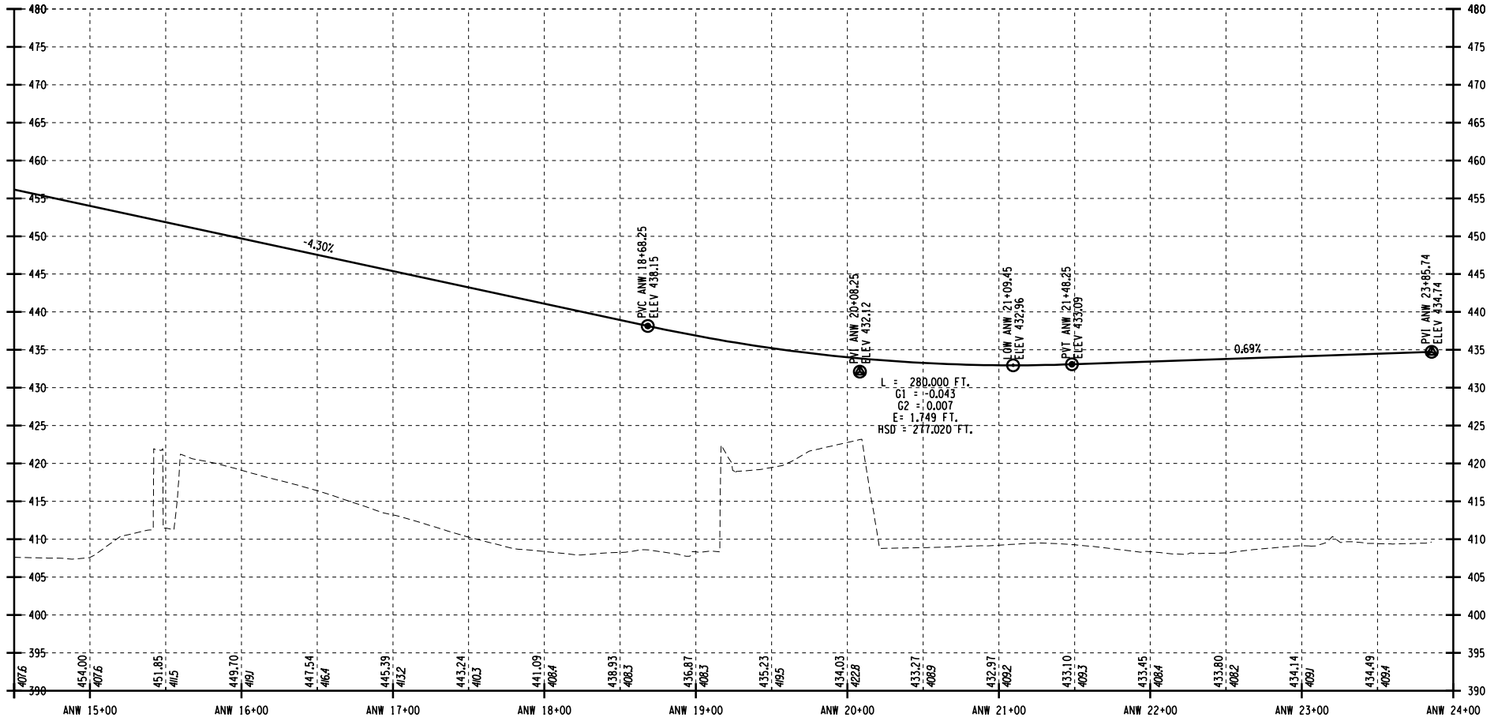
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3					SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

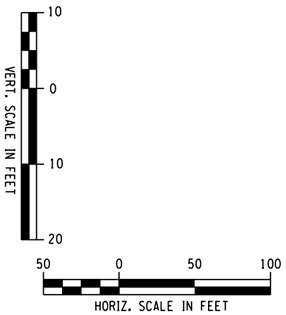
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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ALMOND ST TO I-690 WB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

DRAWING NO. PR-T-H30-15

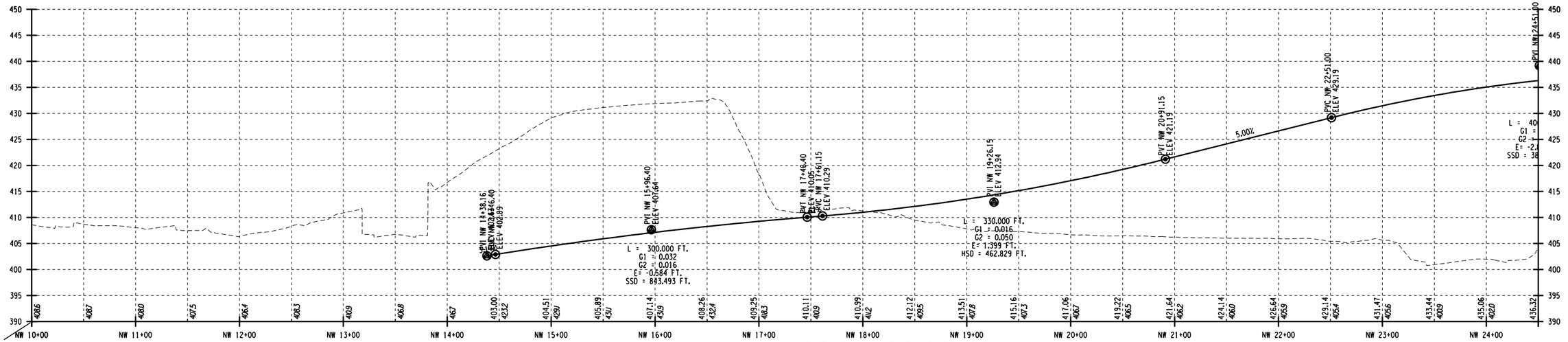
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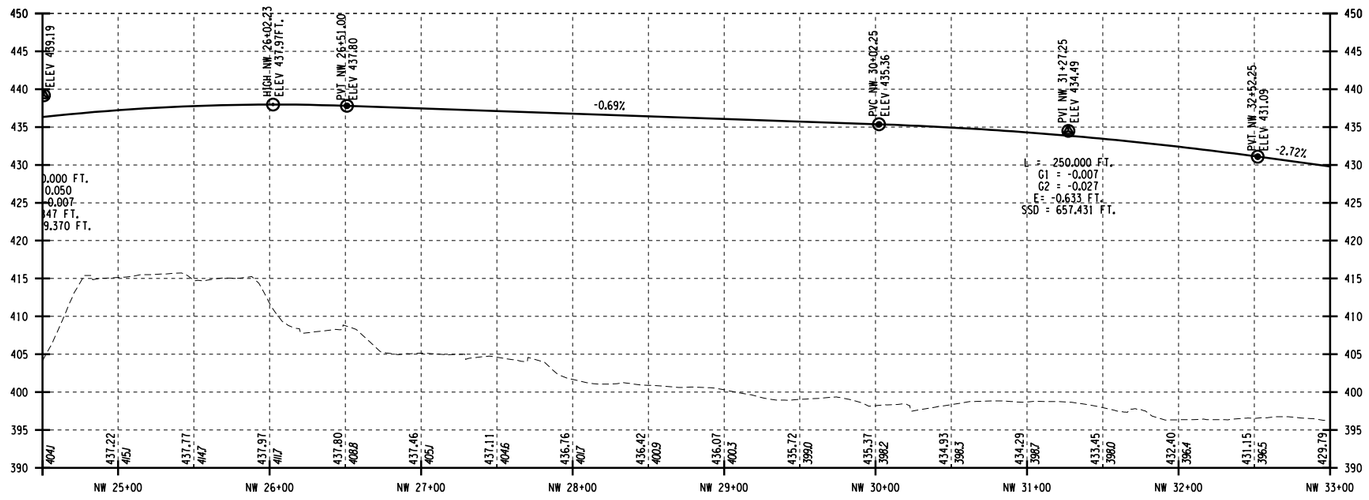
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR

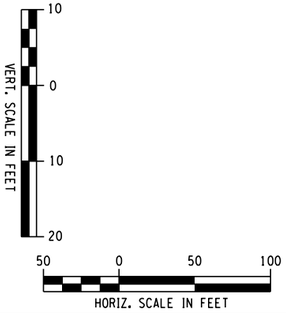
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BUSINESS LOOP 81 NB TO I-690 WB RAMP PROFILE



BUSINESS LOOP 81 NB TO I-690 WB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

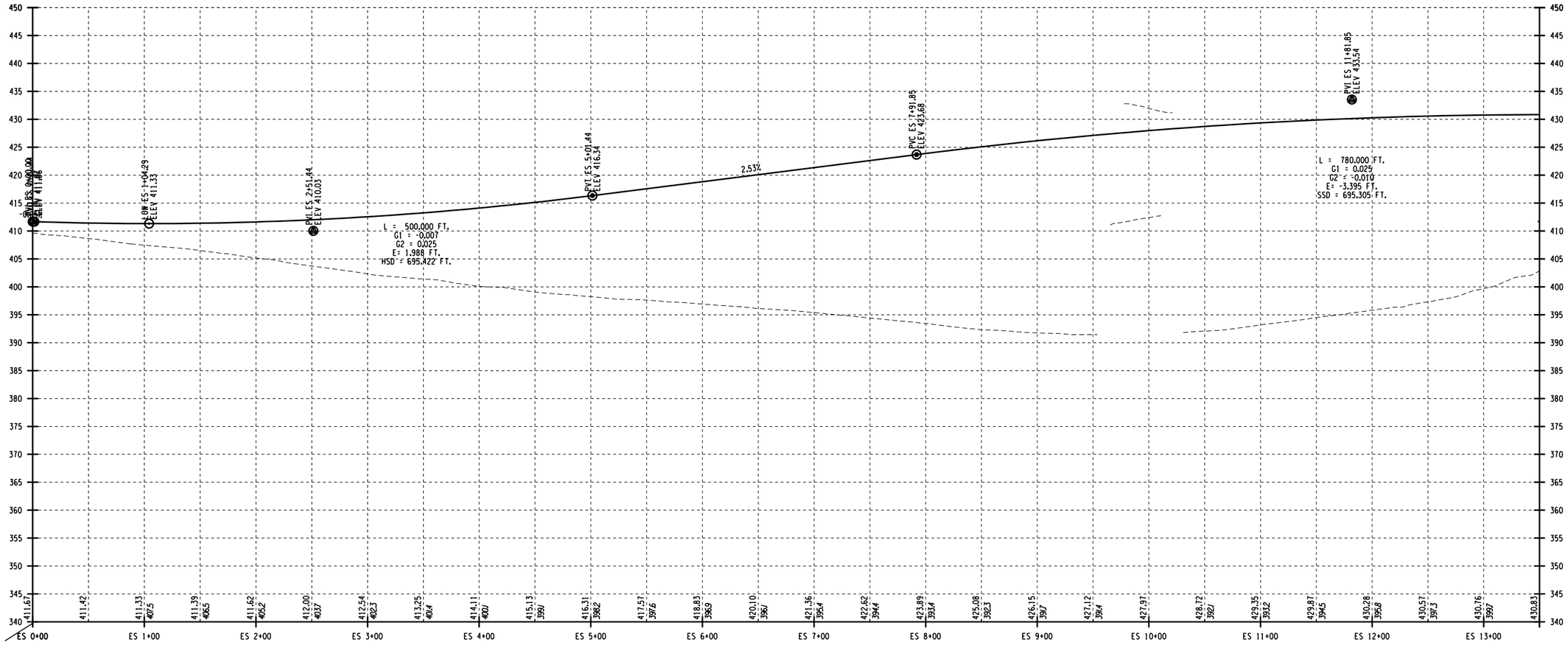
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3				PROFILE I-690 ORANGE TUNNEL CONCEPT	DRAWING NO. PR-T-H30-16 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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I-690 EB TO BUSINESS LOOP 81 SB RAMP PROFILE

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20

HORIZ. SCALE IN FEET
50
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PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

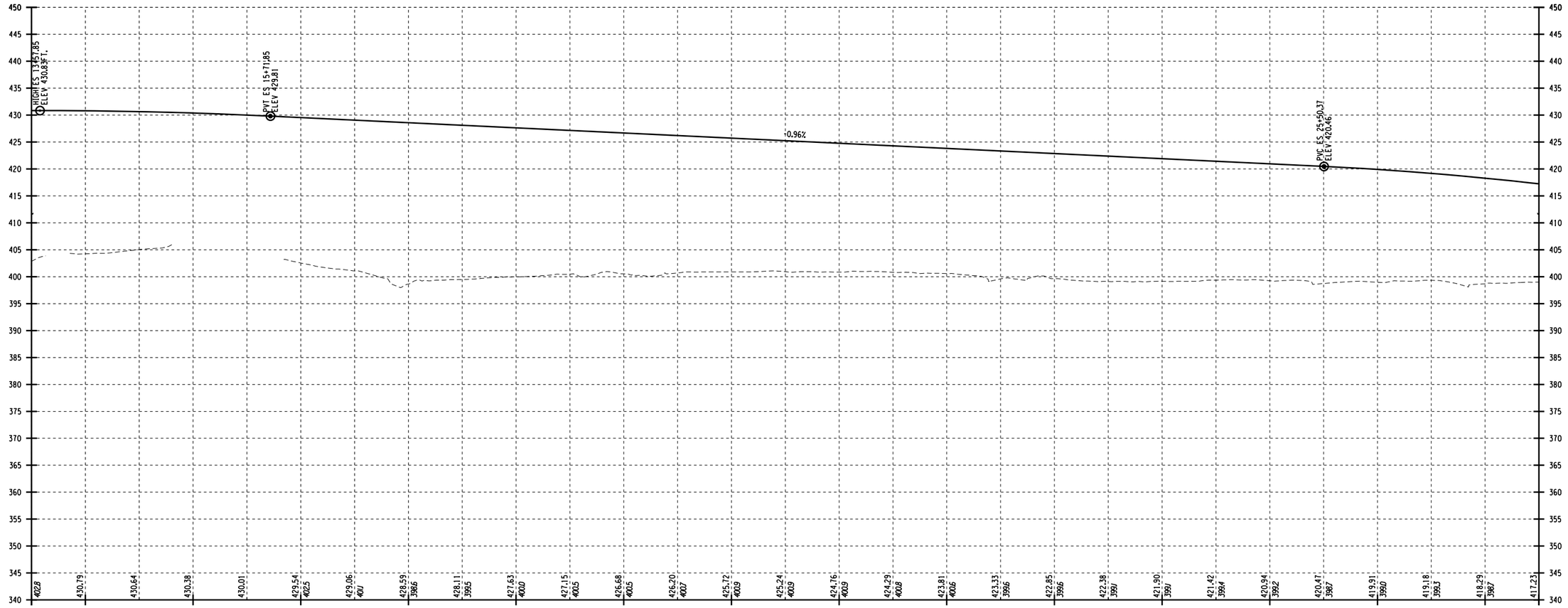
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SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. **Department of Transportation**

I-690 EB TO TUNNEL SB RES?



I-690 EB TO BUSINESS LOOP 81 SB RAMP PROFILE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

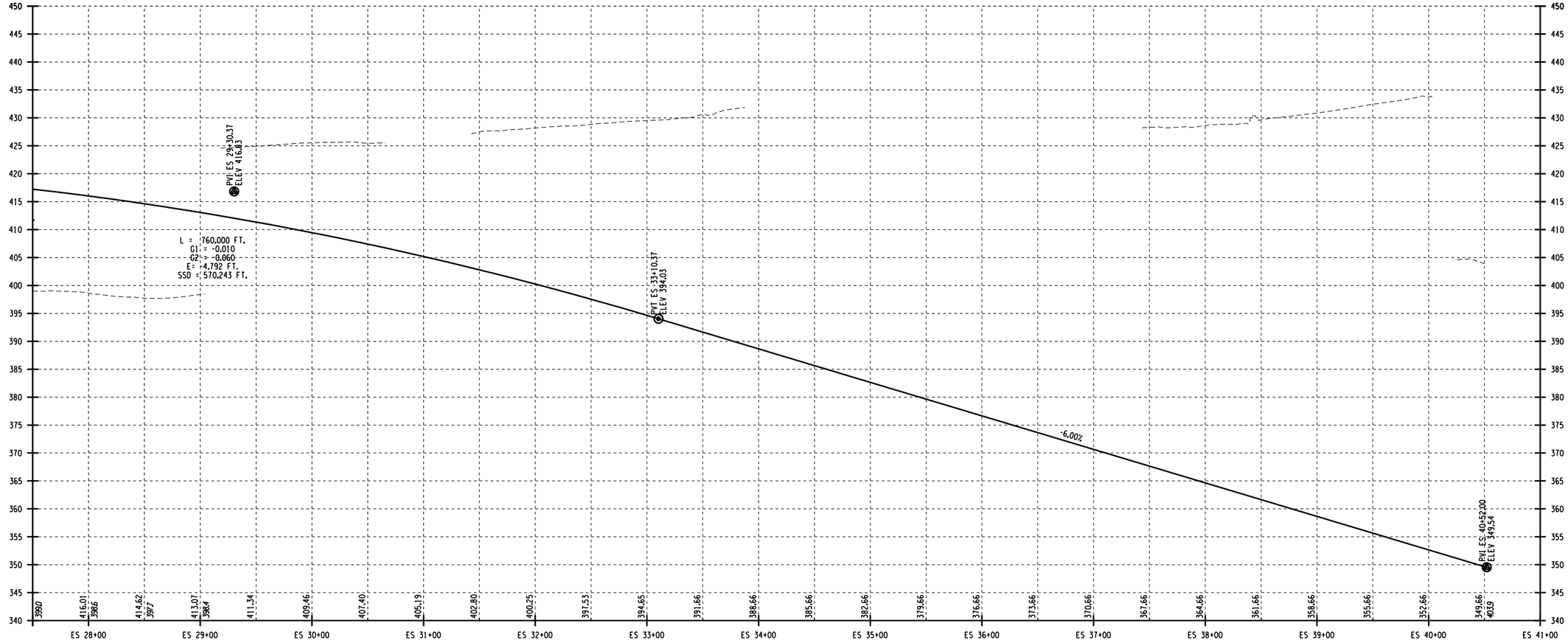
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3				PROFILE I-690 ORANGE TUNNEL CONCEPT	DRAWING NO. PR-T-H30-18 SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

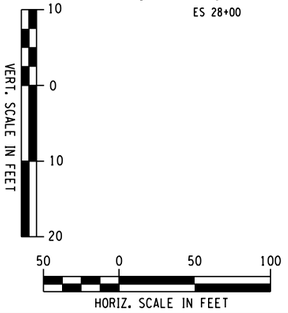
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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I-690 EB TO BUSINESS LOOP 81 SB RAMP PROFILE



PROJECT MANAGER **H. UNGAR**
CHECK
DRAFTING
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JOB MANAGER
DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

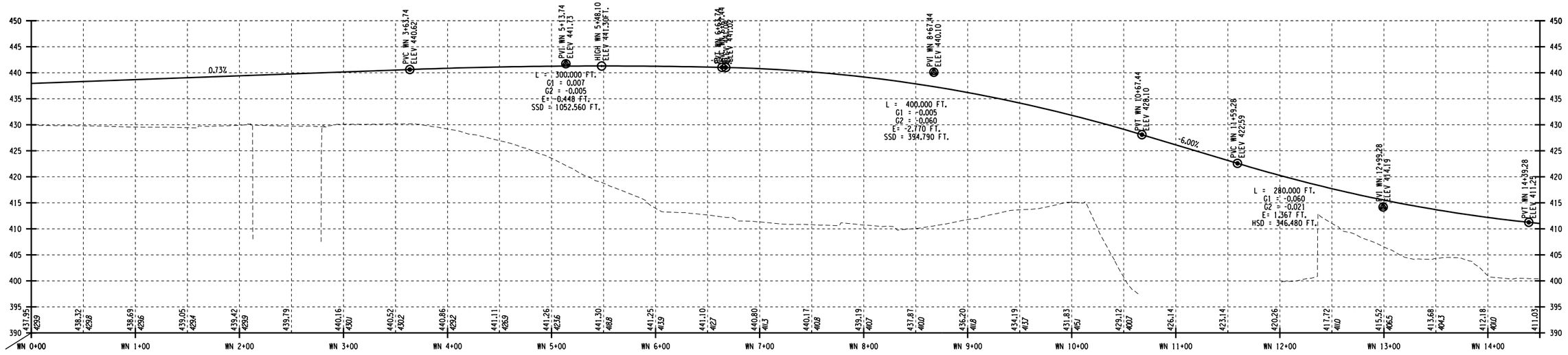
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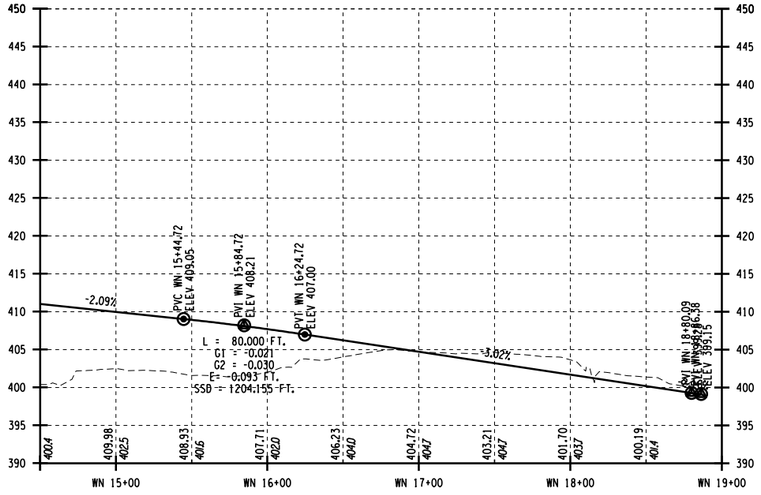
SHEET NO.

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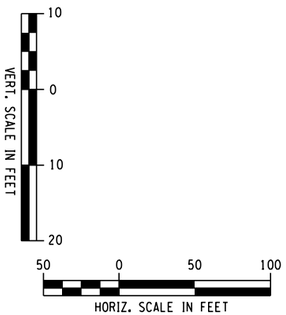
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I-690 WB TO BUSINESS LOOP 81 NB RAMP PROFILE



I-690 WB TO BUSINESS LOOP 81 NB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

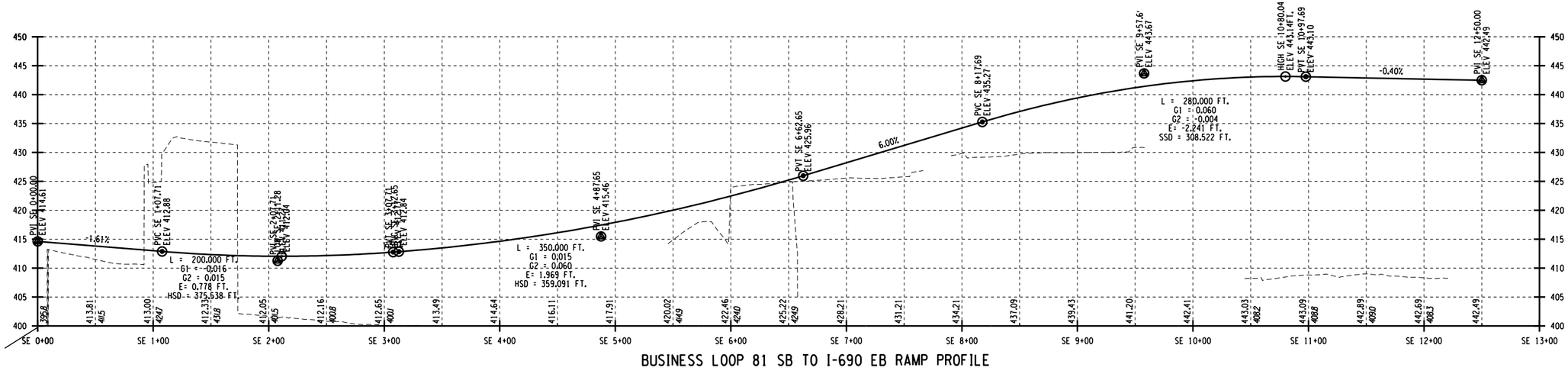
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

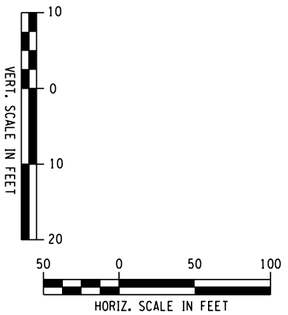
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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BUSINESS LOOP 81 SB TO I-690 EB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

CONTRACT NUMBER

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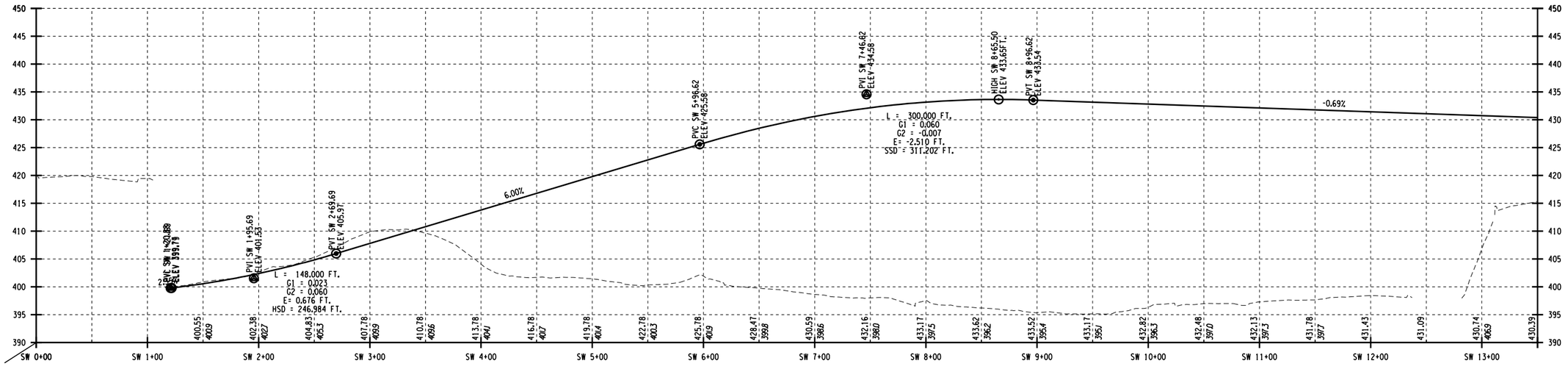
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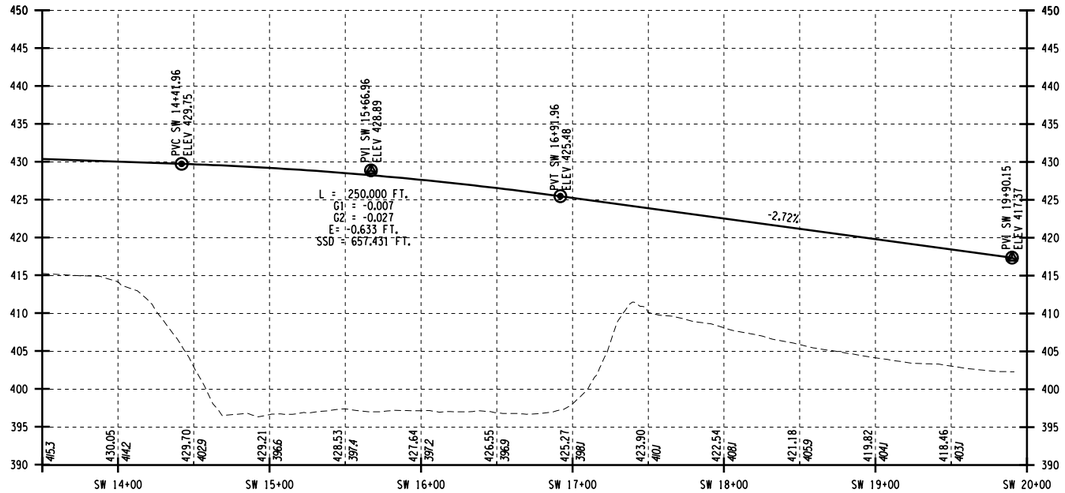
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DESIGN SUPERVISOR

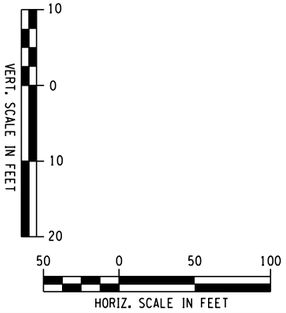
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BUSINESS LOOP 81 SB TO I-690 WB RAMP PROFILE



BUSINESS LOOP 81 SB TO I-690 WB RAMP PROFILE



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

PROFILE
I-690
ORANGE TUNNEL CONCEPT

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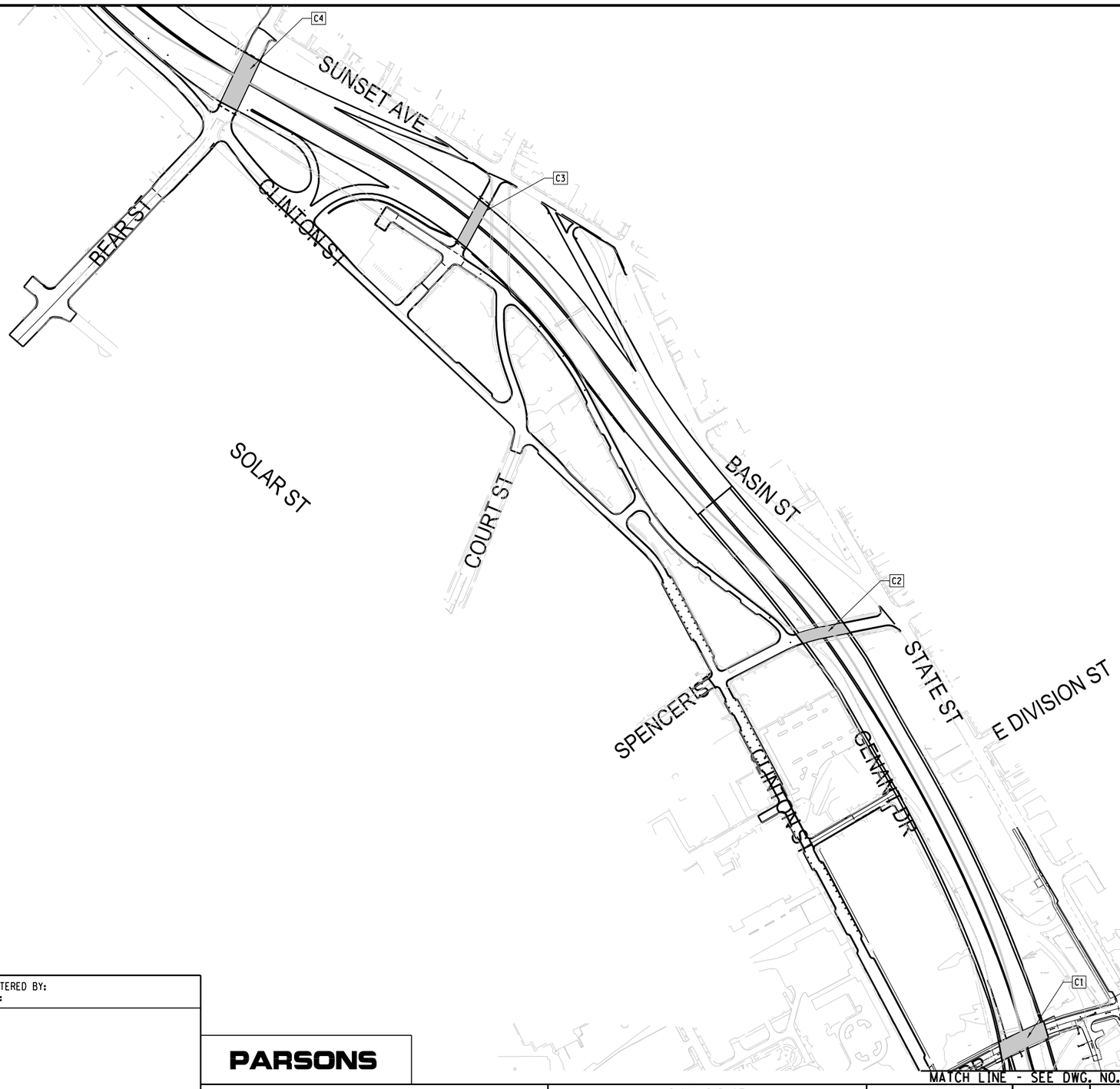
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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13.3: Conceptual Bridge Location Plans



NO.	BRIDGE NO.	LOCATION
1	A	I-690 EB OVER CLINTON ST TO STATE ST
2	B	I-690 WB OVER CLINTON ST TO STATE ST
3	H	I-690 WB OVER CLINTON ST RAMP
4	K	I-690 EB TO I-81 SB RAMP OVER CLINTON ST TO SALINA ST
5	I	TUNNEL I-81 NB TO I-690 WB RAMP
6	F	I-81 SB TO I-690 WB RAMP
7	E	I-81 SB TO I-690 EB RAMP
8	C	I-690 WB TO I-81 NB RAMP
9	D	JAMES STREET OVER I-81 NB & SB
10	J	I-81 NB&SB OVER SALINA ST
11	L	I-81 TO I-690 WB RAMP
12	M	ALMOND ST TO I-81 SB RAMP OVER CUT & COVER TUNNEL CONSTRUCTION
13	C1	BUTTERNUT STREET OVER I-81
14	C2	SPENCER ST OVER FORMER I-81
15	C3	COURT ST OVER FORMER I-81
16	C4	BEAR ST OVER FORMER I-81
17	I690WB-0	I-690WB OVER CROUSE AVENUE
18	I690EB-5	I-690EB OVER CROUSE AVENUE
19	I690WB-1	I-690WB OVER CATHERINE ST
20	I690EB-4	I-690EB OVER CATHERINE ST
21	I690WB-2	I-690WB OVER TOWNSEND ST TO MCBRIDE ST
22	I690EB-3	I-690EB OVER TOWNSEND ST TO MCBRIDE ST
23	I690WB-6	I-690WB OVER LODI ST
24	I690EB-6	I-690EB OVER LODI ST
25	I690EB-R7	I-690EB TO ALMOND ST RAMP
26	I690WB-R7	ALMOND NB TO I-690WB RAMP
27	SC-1	BRIGHTON AVENUE OVER NEW I-81
28	S2	I-81 NB OVER CONNECTOR RAMP
29	S5	I-81 SB OVER CONNECTOR RAMP
30	S1	I-81 NB OVER E. SENECA TURNPIKE
31	S6	I-81 SB OVER E. SENECA TURNPIKE
32	S7	NEW ROAD OVER I-81 (FORMER)
33	I690WB-5	I-690 WB OVER WEST ST
34	I690EB-1	I-690 EB OVER WEST ST
35	1690WB-7	I-690WB OVER LEAVENWORTH ST
36	I690EB-0	I-690EB OVER LEAVENWORTH ST
37	P1	EVANS ST OVER ONONDAGA CREEK
38	I690WB-R5	I-690 WB RAMP OVER ONONDAGA CREEK
39	I690WB-5A	I-690 WB OVER ONONDAGA CREEK
40	I690EB-1A	I-690 EB OVER ONONDAGA CREEK
41	I690EB-R3	I-690EB RAMP OVER ONONDAGA CREEK
42	I690EB-R4	I-690EB TO I81SB TUNNEL RAMP OVER ONONDAGA CREEK
43	I690WB-R4	I-690 WB RAMP OVER FRANKLIN ST
44	I690WB-4	I-690 WB OVER FRANKLIN ST
45	I690EB-2	I-690 EB OVER FRANKLIN ST
46	I690EB-R3A	I-690EB RAMP OVER FRANKLIN ST
47	I690EB-R4A	I-690EB TO I-81SB TUNNEL RAMP OVER FRANKLIN ST
48	I81 NB&SB-1	I-81 NB &SB OVER E COLVIN ST
49	RR-1	RAILROAD OVER E COLVIN ST
50	I81 NB-R13	I-81 NB TO ALMOND ST RAMP OVER E COLVIN ST
51	I81 NB-R12	I-81 NB TO ALMOND ST RAMP OVER MLK EAST
52	I81 NB-R11	I-81 NB TO ALMOND ST RAMP OVER RR,
53	I81 SB-R12	ALMOND ST TO I-81 SB RAMP OVER MLK EAST
54	I81 SB-R11	ALMOND ST TO I-81 SB RAMP OVER RR,
55	N1	I-81 SB OVER I-81 NB
56	N2	I-81 SB OVER I-481 WB
57	N4	I-81 SB OVER THOMPSON RD
58	N5-I81NB	I-81 NB OVER FEMA FLOODPLAIN
59	N5-I81SB	I-81 SB OVER FEMA FLOODPLAIN
60	NC-1	SOUTH BAY RD OVER I-81

PROJECT MANAGER H. UNGAR
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JOB MANAGER
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PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT
Orange Tunnel Concept

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

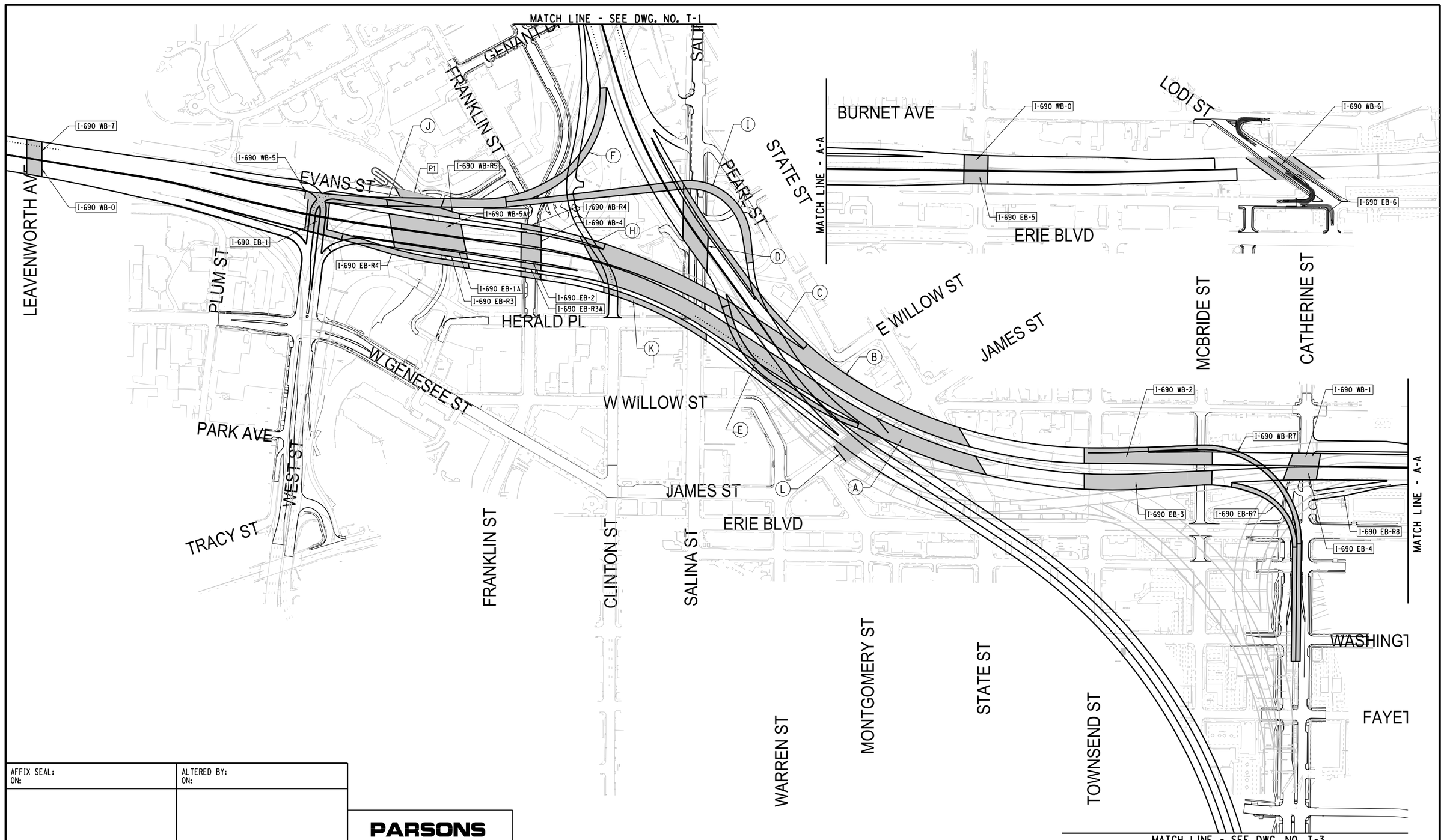
CONTRACT NUMBER

LOCATION PLAN OF BRIDGES
(1 OF 4)

DRAWING NO. T-1001
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation



PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT
Orange Tunnel Concept

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

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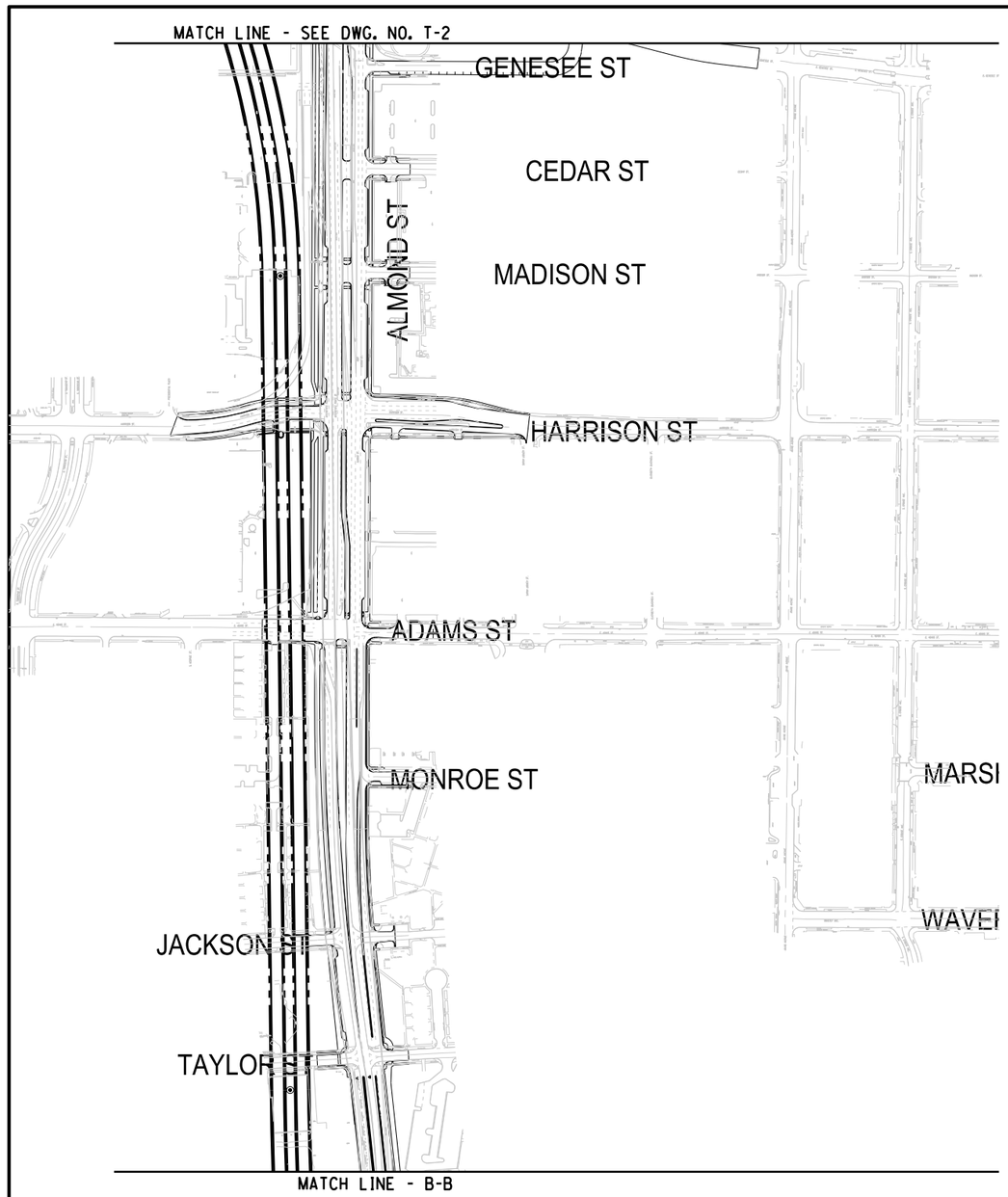
LOCATION PLAN OF BRIDGES
(2 OF 4)

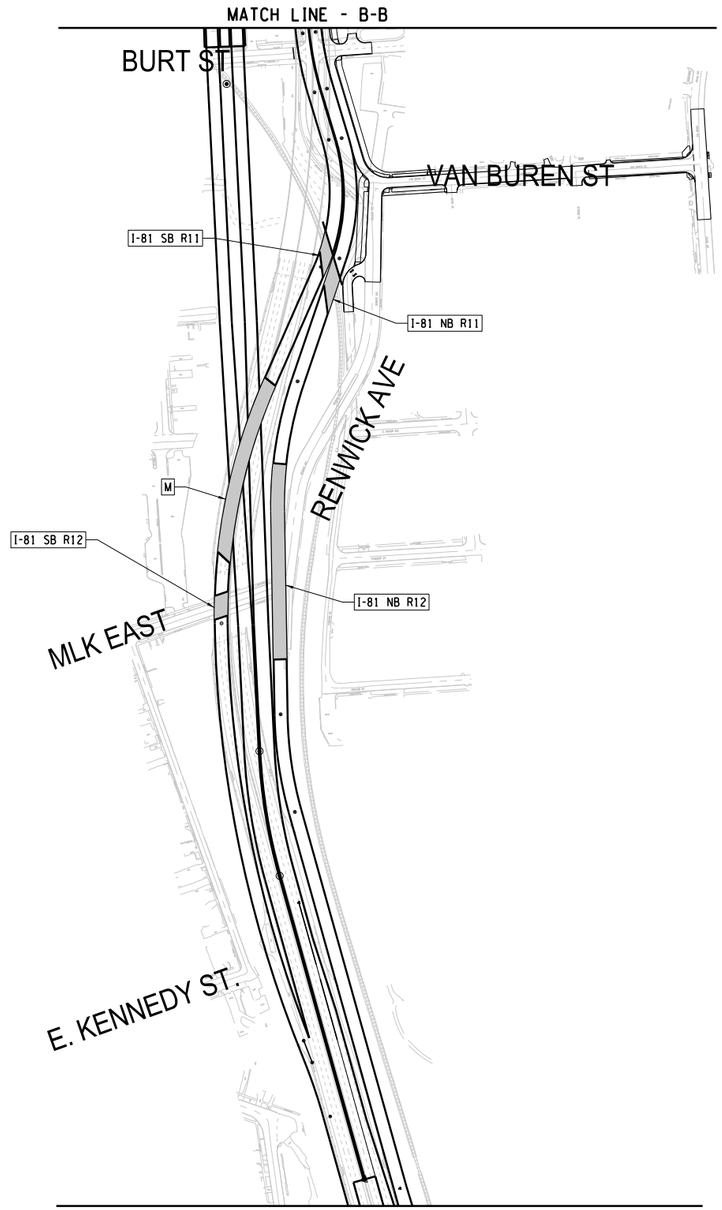
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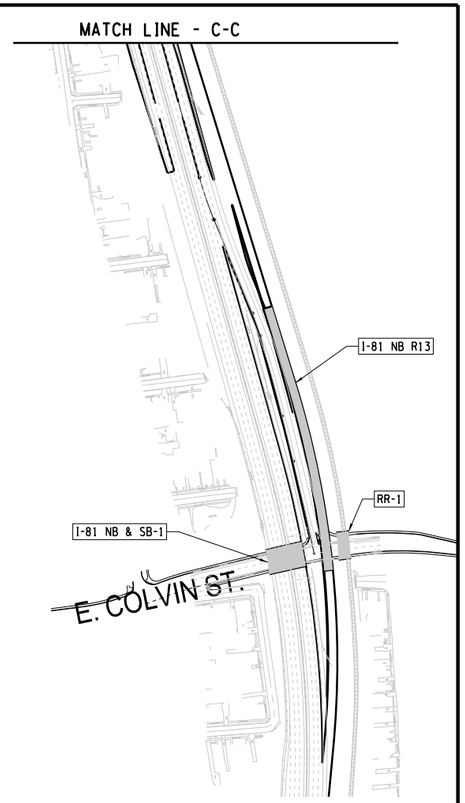
DRAWING NO. T-1002
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation







PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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DATE/TIME = 8/2/2018
USER = p0030432

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT
Orange Tunnel Concept

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

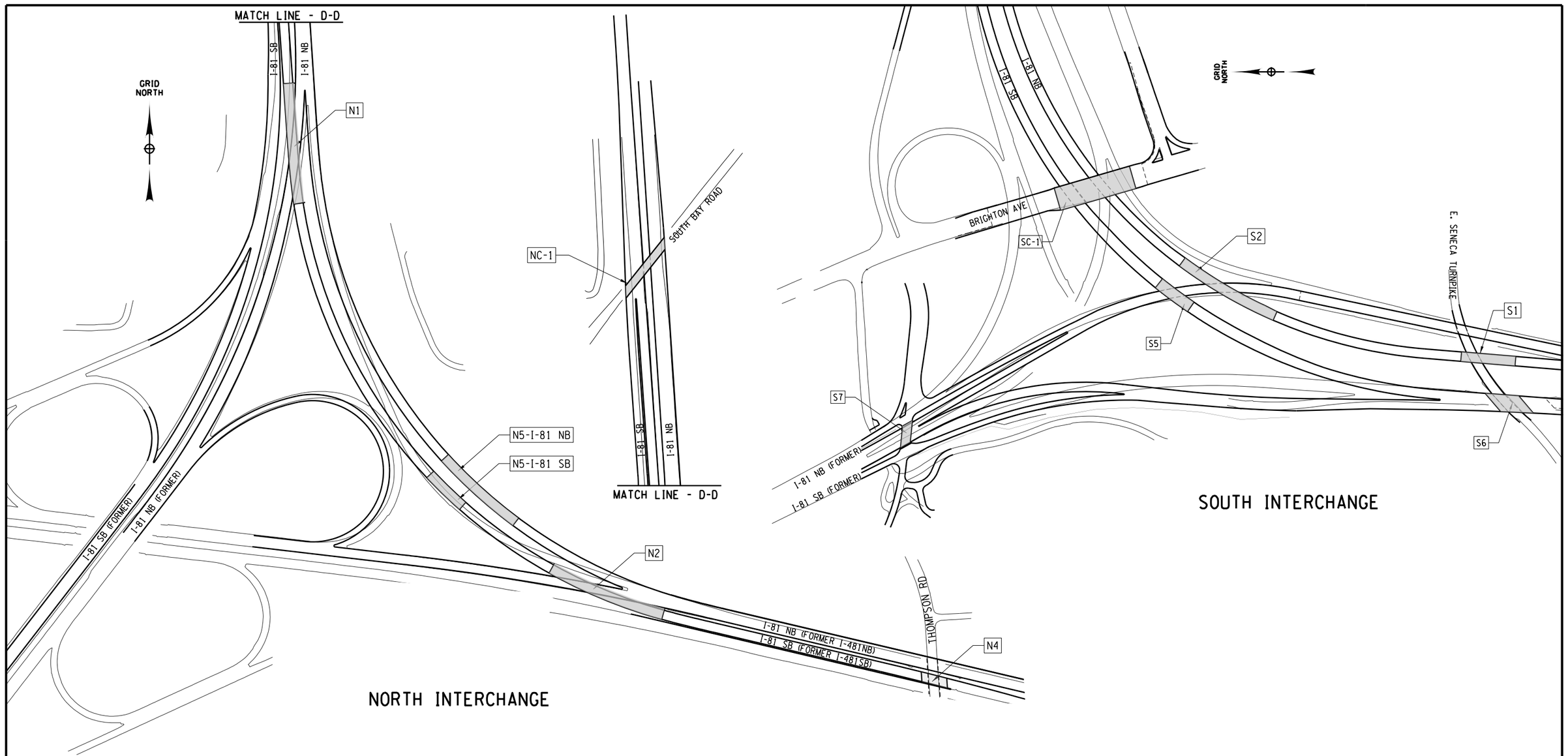
LOCATION PLAN OF BRIDGES
(3 OF 4)

CONTRACT NUMBER

DRAWING NO. T-1003
SHEET NO.

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DATE/TIME = 8/1/2018
USER = p0030432

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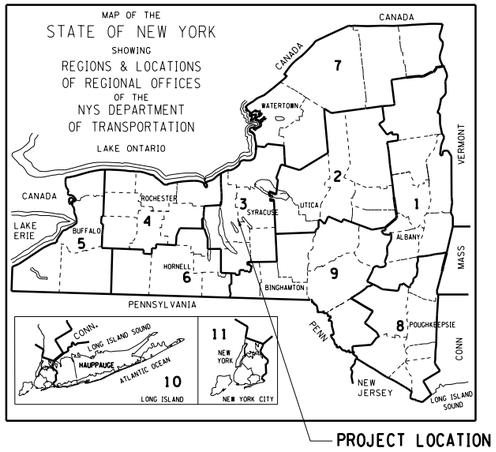
PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 VIADUCT Orange Tunnel Concept COUNTY: ONONDAGA COUNTY, NY REGION: 3	PIN	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED LOCATION PLAN OF BRIDGES (4 OF 4)	CONTRACT NUMBER D031085 DRAWING NO. T-1004 SHEET NO.

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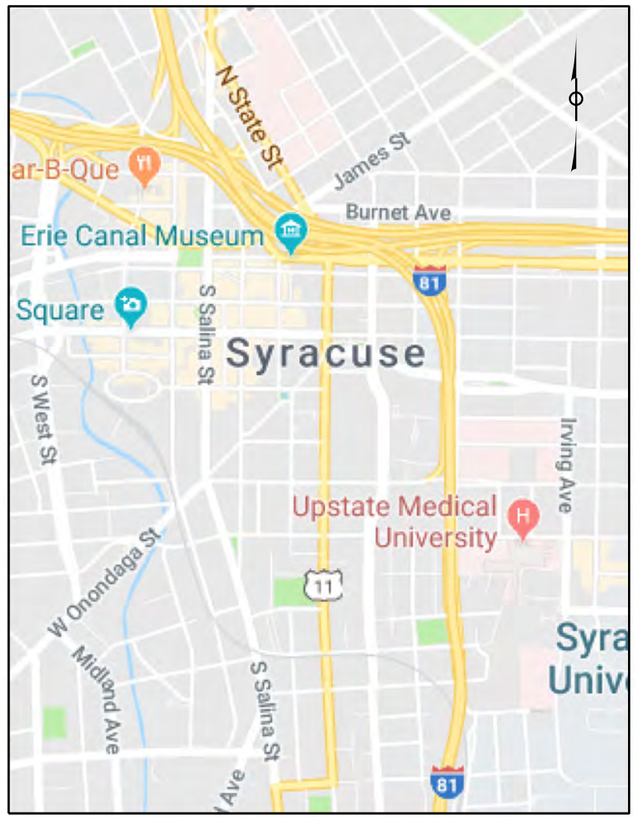
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

13.4: Conceptual Tunnel Plans, Profiles and Sections



STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

I-81 VIADUCT REPLACEMENT
TUNNEL PRELIMINARY DESIGN
ORANGE TUNNEL CONCEPT
CITY OF SYRACUSE



LOCATION MAP
SCALE: N.T.S.

DRAWING NO. TS-0000
SHEET NO. 1 OF 30

PROJECT MANAGER H. UNGAR
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PROJECT MANAGER H. UNGAR
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INDEX OF DRAWINGS

SHEET NO.	DESCRIPTION	DRAWING NUMBER
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2	INDEX SHEET	TS-0001
3	GENERAL NOTES	TS-0002
4	BORING PLAN & GEOTECHNICAL PROFILE STA 5+00 TO STA 28+50	TS-1001
5	BORING PLAN & GEOTECHNICAL PROFILE STA 28+50 TO STA 52+50	TS-1002
6	BORING PLAN & GEOTECHNICAL PROFILE STA 52+50 TO STA 76+50	TS-1003
7	BORING PLAN & GEOTECHNICAL PROFILE STA 76+50 TO STA 100+00	TS-1004
8	SUPPORT OF EXCAVATION PLAN & PROFILE DEPRESSED ROADWAY STA 8+00 TO STA 17+00	TS-1010
9	SUPPORT OF EXCAVATION PLAN & PROFILE CUT & COVER STA 17+00 TO STA 28+00	TS-1011
10	SUPPORT OF EXCAVATION PLAN & PROFILE CUT & COVER STA 82+50 TO STA 90+00	TS-1012
11	SUPPORT OF EXCAVATION PLAN & PROFILE DEPRESSED ROADWAY STA 90+00 TO STA 100+00	TS-1013
12	SOUTH SIDE SOE DEPRESSED ROADWAY SECTION A-A STA 11+00 TO STA 15+00	TS-1101
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21	NORTH SIDE SOE DEPRESSED ROADWAY SECTION J-J STA 97+50 TO 98+00	TS-1110
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AFFIX SEAL:
ON: _____

ALTERED BY: _____
ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:
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I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

INDEX OF DRAWINGS

CONTRACT NUMBER

DRAWING NO. TS-0001
SHEET NO. 2 OF 30

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DESIGN SUPERVISOR

GENERAL NOTES:

1. ALL WORK SHALL BE ACCORDING TO LOCAL LAWS AND REGULATIONS AND IN COMPLIANCE WITH APPLICABLE SAFETY REGULATIONS.
2. CONTRACTOR SHALL PERFORM ADDITIONAL SUBSURFACE EXPLORATIONS TO FURTHER EXPLORE THE GROUND CONDITION FOR THE PROPOSED CONSTRUCTION ON THESE DRAWINGS.
3. CONTRACTOR IS REQUIRED TO OBTAIN THE NECESSARY PERMITS FOR THE WORK SHOWN ON THESE DRAWINGS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR WATER CONTROL DURING TUNNELING AND EXCAVATION WORK.
5. A COMPREHENSIVE INSTRUMENTATION PROGRAM SHALL BE DEVELOPED AND IMPLEMENTED TO MONITOR THE GROUND AND THE NEARBY STRUCTURES.

NOTES:

A. CODES AND STANDARDS

1. NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT) STANDARD SPECIFICATIONS 2018.
2. GEOTECHNICAL ENGINEERING CIRCULAR NO. 4-GROUND ANCHORS AND ANCHORED SYSTEMS FHWA-IF-99-015.
3. POST TENSIONING INSTITUTE (PTI) RECOMMENDATIONS FOR PRESTRESSED ROCK AND SOIL ANCHORS, 3RD EDITION.
4. ACI 318-14 BUILDING CODE.
5. ACI 350-06 (CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES)
6. ACI 350.5-12 (SPECIFICATIONS FOR ENVIRONMENTAL CONCRETE STRUCTURES)
7. AASHTO LFRD (BRIDGE DESIGN SPECIFICATION)

B. MATERIALS

1. CONCRETE, f'c, THE MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS:
   - SOLDIER PILE TREMIE CONCRETE (SPTC) WALL TREMIE CONCRETE: NYSDOT CLASS G CONCRETE, COMPRESSIVE STRENGTH f'c = 4000 PSI.
   - CUT AND COVER TUNNEL SLABS AND WALLS: NYSDOT CLASS HP, f'c = 5000 PSI.
   - BORED TUNNEL SEGMENTAL LINING: NYSDOT CLASS HP, f'c = 8000 PSI.
   - SHOTCRETE FACING FOR ROCK BOLT WALL: NYSDOT CLASS G, f'c = 4000 PSI.
   - PORTLAND CEMENT GROUT FOR TIEBACK AND ROCKBOLTS: f'c = 4000 PSI.
2. REINFORCING STEEL:

   ASTM A615 GRADE 60.
3. STRUCTURAL STEEL:

   SOLDIER PILES FOR SOLDIER PILE LAGGING (SPL) WALLS, SPTC WALLS, WALERS FOR TIEBACK: ASTM A572, GRADE 50.

   ANGLES, WEDGE PLATES, AND BEARING PLATES: ASTM A572, GRADE 50.
4. TIEBACK ANCHORS:

   GRADE 270, LOW-RELAXATION STRANDS ASTM A416, WITH PTI AND FHWA CLASS II CORROSION PROTECTION.

C. SPL WALL INSTALLATION

1. SOLIDER PILE LAGGING WALL SHALL BE CONSTRUCTED ON BOTH SIDES OF I-81 ALIGNMENT BETWEEN THE STATION LIMITS SHOWN ON THE PRELIMINARY DESIGN DRAWINGS. IDENTIFY ANY UTILITIES PRESENT ALONG OR CROSSING THE ALIGNMENT OF THE SPL WALL. REROUTE ANY UTILITIES CROSSING OR ALONG THE ALIGNMENT OF THE WALL.
2. SOLIDER PILES WILL BE INSTALLED IN PREDRILLED HOLES TO THE WALL BOTTOM ELEVATIONS AND AT SPACING SHOWN ON SUPPORT OF EXCAVATION (SOE) PLAN AND PROFILE DRAWINGS. THE PREDRILLED HOLES SHALL BE CONCRETED TO PROPOSED EXCAVATION DEPTH I.E. ELEVATION AT BOTTOM OF ROADWAY.
3. TAKE ALL NECESSARY MEASURES TO ENSURE THAT THE SIDEWALLS OF PREDRILLED HOLES DO NOT COLLAPSE DURING DRILLING.
4. SOLDIER PILES SHALL BE HELD IN POSITION USING A TEMPLATE UNTIL PILE ALIGNMENT, ELEVATION, AND VERTICALITY WILL NOT CHANGE DUE TO DISTURBANCES FROM OTHER CONSTRUCTION ACTIVITIES AND UNDER ITS OWN WEIGHT.
5. COMMENCE EXCAVATION BETWEEN THE SPL WALLS WHILE INSTALLING WOOD LAGGING ELEMENTS TO THE BOTTOM OF EXCAVATION OR FIRST TIEBACK ELEVATION (WHICHEVER IS HIGHER). UPON INSTALLING ANY REQUIRED TIEBACKS, PROCEED WITH EXCAVATION TO THE NEXT TIEBACK LEVEL. THE EXCAVATION DEPTH AT ANY TIME SHOULD NOT EXTEND MORE THAN 2 FEET BELOW A TIEBACK PRIOR TO ITS INSTALLATION.

D. SPTC WALL INSTALLATION

1. THE SPTC WALLS SHALL BE CONSTRUCTED ON BOTH SIDES OF I-81 ALIGNMENT BETWEEN THE STATION LIMITS SHOWN ON THE PRELIMINARY DESIGN DRAWINGS. GUIDEWALLS SHALL BE CONSTRUCTION AT AN ELEVATION THAT WILL ALLOW MAINTAINING THE SLURRY WALL AS SHOWN IN PRELIMINARY DRAWINGS. IDENTIFY ANY UTILITIES PRESENT ALONG OR CROSSING THE ALIGNMENT OF THE SPL WALL. REROUTE ANY UTILITIES CROSSING OR ON THE ALIGNMENT OF THE WALL.
2. THE SPTC WALL SHALL BE CONSTRUCTED TO THE LINES, GRADES, AND CROSS SECTIONS INDICATED ON THE PRELIMINARY DESIGN DRAWINGS. EXCAVATE THE TRENCH IN PANELS TO THE DEPTHS INDICATED ON THE SOE PLAN AND PROFILE DRAWINGS.
3. TAKE ALL NECESSARY MEASURES SUCH AS USE OF A SLURRY TO PREVENT COLLAPSE OF THE EXCAVATED TRENCH PRIOR TO SOLDIER PILE AND CONCRETE PLACEMENT. IN THE EVENT COLLAPSE OCCURS, BACKFILL WITH LEAN CONCRETE AND RE-EXCAVATE AS ACCEPTED OR AS DIRECTED BY THE ENGINEER.
4. CHECK THE VERTICALITY OF THE PANEL DURING EXCAVATION AT A MINIMUM OF 20-FOOT INTERVALS AND MAKE MODIFICATIONS TO THE EXCAVATION PROCEDURES AS REQUIRED TO MAINTAIN VERTICALITY WITHIN THE SPECIFIED TOLERANCES.
5. SOLDIER PILES SHALL BE INSTALLED TO THE BOTTOM OF EACH COMPLETED PANEL AT THE LOCATIONS AND SPACINGS SHOWN ON THE DRAWINGS. SOLDIER PILES SHALL BE HELD IN POSITION USING A TEMPLATE UNTIL PILE ALIGNMENT, ELEVATION, AND VERTICALITY WILL NOT CHANGE DUE TO DISTURBANCES FROM OTHER CONSTRUCTION ACTIVITIES AND UNDER ITS OWN WEIGHT.
6. DO NOT EXCAVATE TWO ADJACENT PANELS AT THE SAME TIME. SEQUENCE THE WORK SO THAT AT LEAST ONE CONCRETE PANEL IS LEFT BETWEEN TWO OPEN PANELS. AT LEAST TWO PANELS OF UNEXCAVATED GROUND MUST REMAIN BETWEEN OPEN PANELS.
7. DO NOT EXCAVATE NEXT TO AN EXISTING PANEL UNTIL THE CONCRETE IN THE EXISTING PANEL HAS BEEN IN PLACE AT LEAST 72 HOURS AND HAS STRENGTH OF AT LEAST 1,800 PSI.
8. PROVIDE A 'WATERTIGHT' WALL SYSTEM. REPAIR OR OTHERWISE RENDER 'WATERTIGHT' ALL JOINTS BETWEEN PANELS AND OTHER PENETRATIONS OR POINTS OF LEAKAGE THROUGH THE WALL.
9. EXCAVATION BETWEEN THE SPTC WALLS SHALL NOT BEGIN UNTIL THE SPTC WALL HAS ATTAINED DESIGN STRENGTH AS SPECIFIED. COMMENCE EXCAVATION BETWEEN THE SPTC WALLS TO A DEPTH OF 2 FEET BELOW FIRST TIEBACK ELEVATION AND INSTALL THE FIRST LEVEL OF TIEBACK. REPEAT THE ALTERNATING STEPS OF EXCAVATION AND TIEBACK INSTALLATION UNTIL THE EXCAVATION REACHES TOP OF BEDROCK ELEVATION.
10. SPTC WALLS SHALL BE CONSTRUCTED WITH ABOUT 5' EMBEDMENT INTO ROCK. INSTALL ONE TIEBACK AT TOE OF THE EMBEDDED SPTC WALL.
11. EXCAVATION WITHIN THE BEDROCK FORMATION WILL BE SUPPORTED BY ROCK BOLTS WITH SHOTCRETE FACING INSTALLED ON 5 FEET VERTICAL BY 5 FEET HORIZONTAL GRID.

E. TIEBACK ANCHOR INSTALLATION

1. TIEBACK ANCHOR METHOD OF INSTALLATION SHALL BE SUBMITTED TO ENGINEER FOR REVIEW AND APPROVAL. GROUT PLACEMENT SHALL BE IN ACCORDANCE WITH NYSDOT SPECIFICATIONS.
2. HOLES FOR TIEBACK ANCHORS SHALL BE DRILLED AT THE LOCATIONS AND TO THE LENGTH, INCLINATION, AND DIAMETER SHOWN ON THE PRELIMINARY DRAWINGS.
3. ALL TIEBACK ANCHORS SHALL BE PTI AND FHWA CLASS II CORROSION PROTECTION ANCHORS.
4. DO NOT PROGRESS THE EXCAVATION AT THE WALL FACE LOWER THAN 2 FEET BELOW THE GROUTED TIEBACK ELEVATION UNTIL THE GROUTED TIEBACKS ARE INSTALLED AND TESTED.
5. THE ESTIMATED UNBONDED LENGTHS AND MINIMUM BOND LENGTHS ARE SHOWN IN THE SOE SECTIONS DRAWINGS.
6. THE RATE OF PLACEMENT OF THE TENDON STRANDS INTO THE HOLE SHALL BE CONTROLLED SUCH THAT THE SHEATHING, COATING, AND GROUT TUBES ARE NOT DAMAGED DURING INSTALLATION.
7. A POSITIVE DISPLACEMENT GROUT PUMP SHALL BE USED. THE PUMP SHALL BE EQUIPPED WITH A PRESSURE GAUGE CAPABLE OF MEASURING PRESSURES OF AT LEAST 1 MPA OR TWICE THE ACTUAL GROUT PRESSURES TO MONITOR GROUT PRESSURES. THE GROUTING EQUIPMENT SHALL BE SIZED TO ENABLE THE GROUT TO BE PUMPED IN ONE CONTINUOUS OPERATION.
8. THE PRIMARY GROUT FOR THE ANCHOR HOLE SHALL STOP AT LEAST 12 INCHES BELOW THE BOTTOM OF TRUMPET TO PREVENT CONTACT BETWEEN THE TRUMPET AND THE GROUT. THE TRUMPET SHALL EITHER HAVE A TEMPORARY SEAL BETWEEN THE TRUMPET AND THE UNBONDED LENGTH CORROSION PROTECTION OR SHALL FIT TIGHTLY OVER THE UNBONDED LENGTH CORROSION PROTECTION.
9. TIEBACK ANCHORS ARE TEMPORARY STRUCTURES AND SHALL NOT BE RELIED UPON TO PROVIDE STRENGTH AND STABILITY TO THE PERMANENT STRUCTURE.
10. POST-GROUTING MAY BE REQUIRED TO OBTAIN DESIGN CAPACITY OF TIEBACK ANCHORS. POST GROUTING PROCEDURE SHALL BE CONDUCTED THROUGH A SLEEVED GROUT PIPE IN ACCORDANCE WITH FHWA TYPE C OR D PROCEDURES SPECIFIED IN TABLE 2-1 FHWA-SA-97-070
11. DO NOT PROGRESS A NEW HOLE PRESSURE-GROUT OR POST-GROUT WITHIN A RADIUS OF 5 FEET OF A TIEBACK ANCHOR UNTIL THE GROUT FOR THAT ANCHOR HAS SET FOR 24 HOURS
12. A MINIMUM OF TWO PERFORMANCE TESTS (WITH CREEP TESTS) SHALL BE PERFORMED ON SACRIFICIAL TIEBACK ANCHORS TO AT LEAST 133% DESIGN LOAD (DL) PRIOR TO INSTALLATION OF PRODUCTION TIEBACK ANCHORS ON SOUTH AND NORTH SOE WALLS (TWO ON EACH SIDE).
13. ALL TIEBACK ANCHORS NOT PERFORMANCE OR CREEP TESTED SHALL BE PROOF TESTED IN ACCORDANCE WITH THE FHWA-IF-99-015.

F. TUNNEL

1. THE TUNNEL STRUCTURAL DRAWINGS ARE PRODUCED FOR ESTIMATING PURPOSES ONLY.
2. DEPRESSED ROADWAY AND CUT AND COVER TUNNEL:
   a. ONCE EXCAVATION IS STABILIZED AND DEWATERED, A 6 INCHES MUD MAT SHALL BE INSTALLED BEFORE POURING THE INVERT SLAB.
   b. COLD JOINTS ARE NOT PERMITTED IN INVERT SLAB.
   c. WATER STOPS SHALL BE USED AT ALL CONSTRUCTION JOINTS IN CONTACT WITH GROUNDWATER.
   d. WATER PROOFING IS INSTALLED ON THE INTERIOR FACE OF THE SUPPORT OF EXCAVATION WALLS BEFORE CASTING THE FINAL STRUCTURES.
   e. REINFORCEMENT RATE IS AS SHOWN IN TABLE ON THIS SHEET, MINIMUM CONCRETE COVER IS 4 INCHES.
3. BORED TUNNEL
   a. FINAL DESIGN SHALL BE COORDINATED WITH CONTRACTOR AND TUNNEL BORING MACHINE DESIGNER.
   b. TUNNEL LINER IS MADE OF STEEL FIBER REINFORCED CONCRETE (SFRC) WITH A DOSAGE OF 60 LB/CY.
   c. POLYPROPYLENE FIBERS SHALL BE ADDED FOR FIRE RESISTANCE AT FIBER DOSAGE OF 3.4 LB/CY.
   d. TOTAL 48 SPEAR BOLTS REQUIRED PER RING.
   e. TOTAL 28 SHEAR BICONES ALONG THE CIRCUMFERENTIAL JOINT ARE REQUIRED PER RING.
   f. TOTAL 20 ALIGNMENT RODS ALONG THE RADIAL JOINTS ARE REQUIRED PER RING.
   g. TOTAL 10 GROUT SOCKETS REQUIRED PER RING, EACH SOCKET TO BE PROVIDED WITH PLASTIC NON-RETURN VALVE AND CAP WITH HYDROPHILIC GASKET.
   i. A SINGLE EPDM GASKET SHALL BE PROVIDED AROUND THE ENTIRE PERIMETER OF EVERY SEGMENT.
   k. EPDM GASKET SHALL BE CS024C BY TRELLEBORG OR EQUIVALENT.
   l. HYDROPHILIC STRIP SHALL BE PROVIDED AROUND THE ENTIRE PERIMETER OF EVERY SEGMENT.
4. CROSS PASSAGES
   a. CROSS PASSAGE CONSTRUCTION WILL COMMENCE ONCE BOTH TUNNELS ARE BORED.
   b. ROBUST BRACING MUST BE INSTALLED WITHIN BORED TUNNEL PRIOR TO CUTTING AND REMOVING SEGMENTS IN PREPARATION FOR CROSS PASSAGE EXCAVATION.
   c. FINAL LINER WILL BE REINFORCED AT 340 LB/CY.

G. VERTICAL DATUM

1. ELEVATIONS ARE BASED ON NAVD88.

RECOMMENDED REINFORCEMENT RATE FOR CUT AND COVER TUNNEL

STATION RANGE		REINFORCEMENT VOLUMETRIC WEIGHT (LB/YD^3)			
		ROOF	EXTERIOR WALL	INTERIOR WALL	INVERT SLAB
STA 17+00	STA 21+50	100	85	50	100
STA 21+50	STA 28+00	220	210	50	230
STA 82+50	STA 87+50	575	455	50	410
STA 87+50	STA 90+00	320	235	50	345

RECOMMENDED REINFORCEMENT RATE FOR DEPRESSED ROADWAY

STATION RANGE		REINFORCEMENT VOLUMETRIC WEIGHT (LB/YD^3)	
		EXTERIOR WALL	INVERT SLAB
STA 11+00	STA 15+00	200	120
STA 15+00	STA 17+00	170	150
STA 90+00	STA 93+00	170	35
STA 93+00	STA 98+00	80	85

AFFIX SEAL: ON: _____	ALTERED BY: _____ ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

GENERAL NOTES

CONTRACT NUMBER

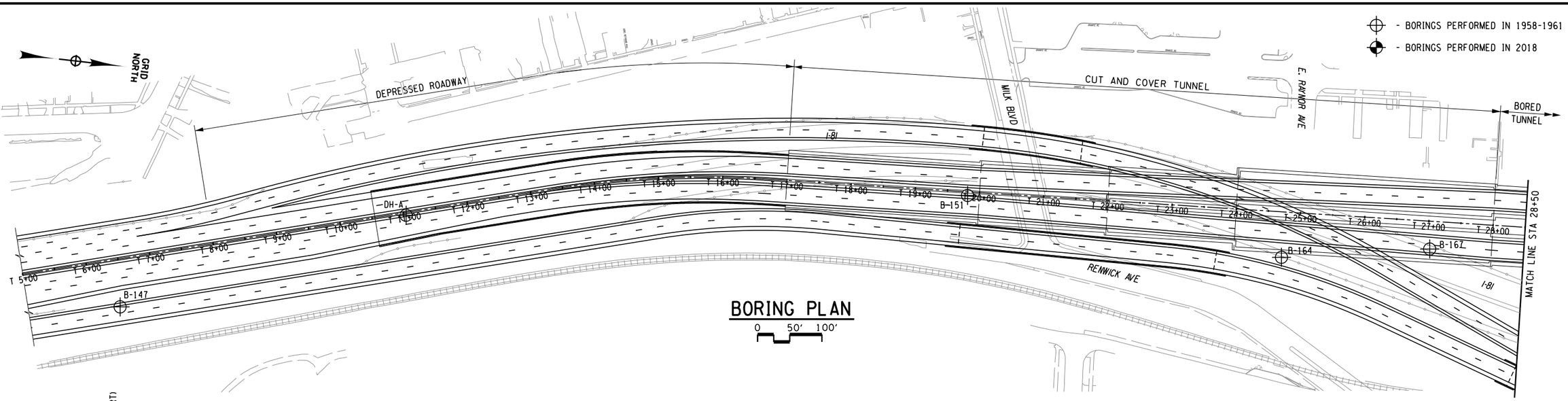
DRAWING NO. TS-0002
SHEET NO. 3 OF 30

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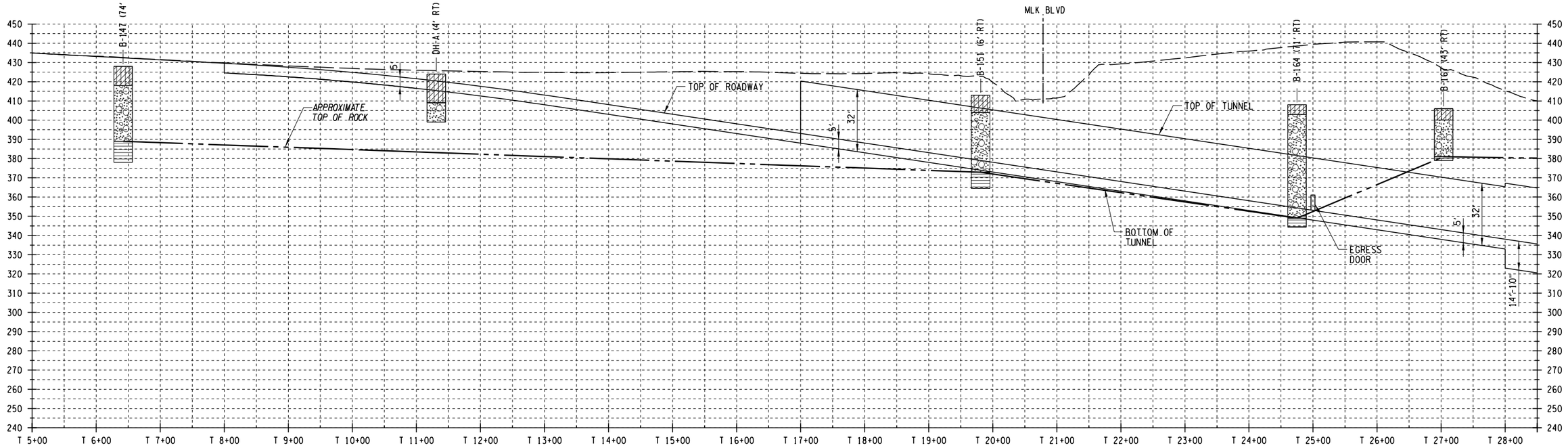
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PROJECT MANAGER H. UNGAR
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CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR



BORING PLAN

0 50' 100'



GEOTECHNICAL PROFILE

0 50' 100' HORIZ. 0 20' 40' VERTICAL

* BORING OFFSET IS WITH RESPECT TO TUNNEL ALIGNMENT

LEGEND:
- FILL
- SOFT SILT/CLAY
- SAND/SILT/GRAVEL
- WEATHERED ROCK
- ROCK

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

BORING PLAN AND GEOTECHNICAL PROFILE STA 5+00 TO STA 28+50

DRAWING NO. TS-1001

SHEET NO. 4 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:\pw_working\newyork\p00300910\dms43574\TS-1001 BORING PLAN & GEOTECHNICAL PROFILE STA 5+00 to STA 28+50.dgn

PROJECT MANAGER H. UNGAR

CHECK

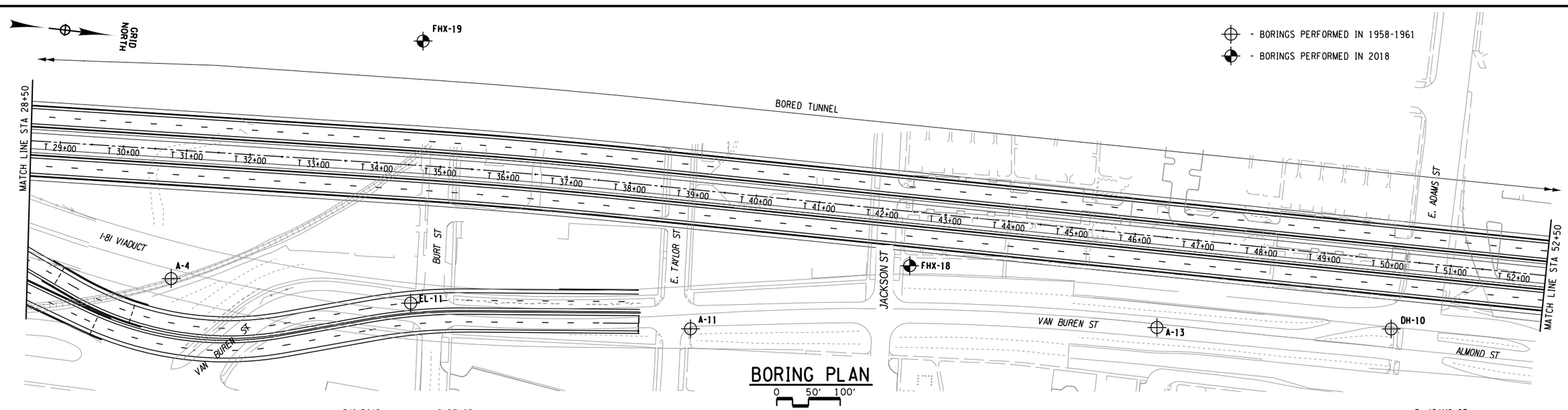
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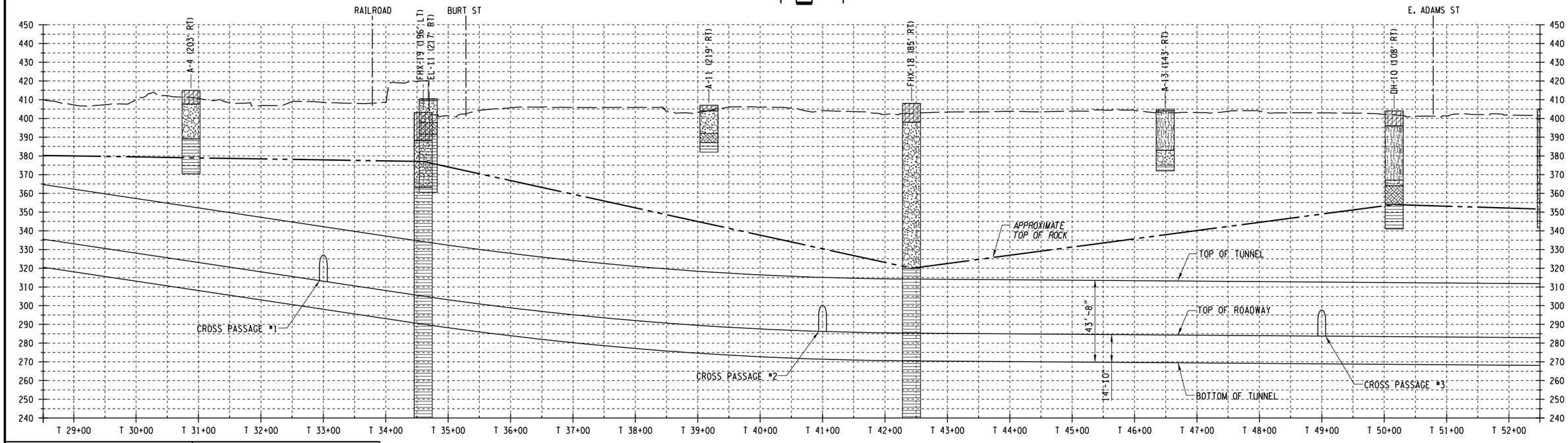
JOB MANAGER

DRAFTING

CHECK

DESIGN SUPERVISOR





AFFIX SEAL:
ON: _____

ALTERED BY: _____
ON: _____

GEOTECHNICAL PROFILE

0 50' 100' HORIZ. 0 20' 40' VERTICAL

✱ BORING OFFSET IS WITH RESPECT TO TUNNEL ALIGNMENT

LEGEND:
- FILL
- SOFT SILT/CLAY
- SAND/SILT/GRAVEL
- WEATHERED ROCK
- ROCK

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

BORING PLAN AND GEOLOGICAL PROFILE STA 28+50 TO STA 52+50

CONTRACT NUMBER

DRAWING NO. TS-1002

SHEET NO. 5 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910dms43574øTS-1002 BORING PLAN & GEOTECHNICAL PROFILE_STA 28+50 to STA 52+50.dgn

PROJECT MANAGER H. UNGAR

CHECK

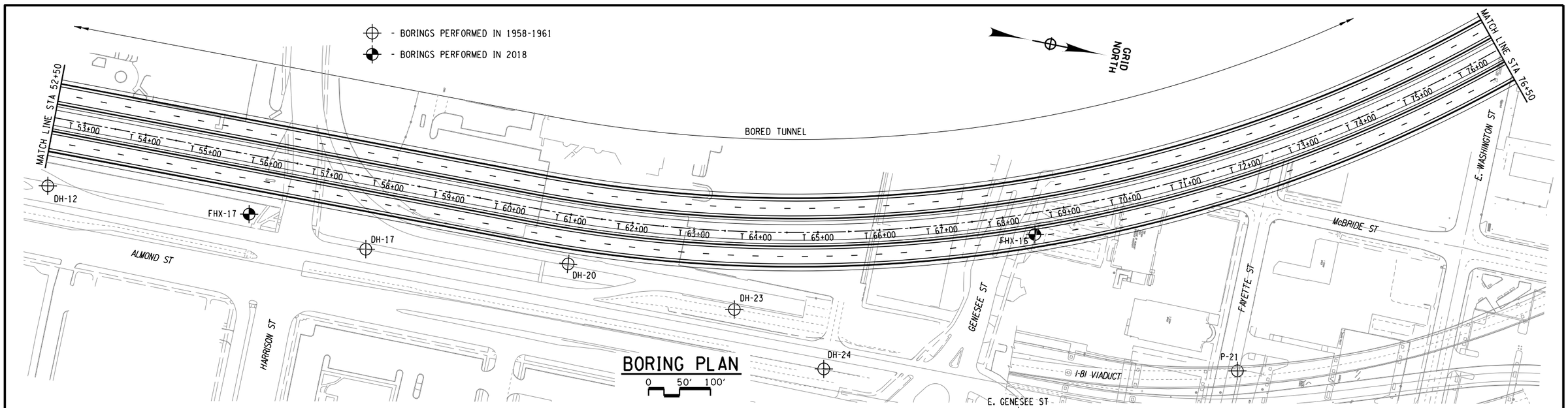
DRAFTING

CHECK

DESIGN

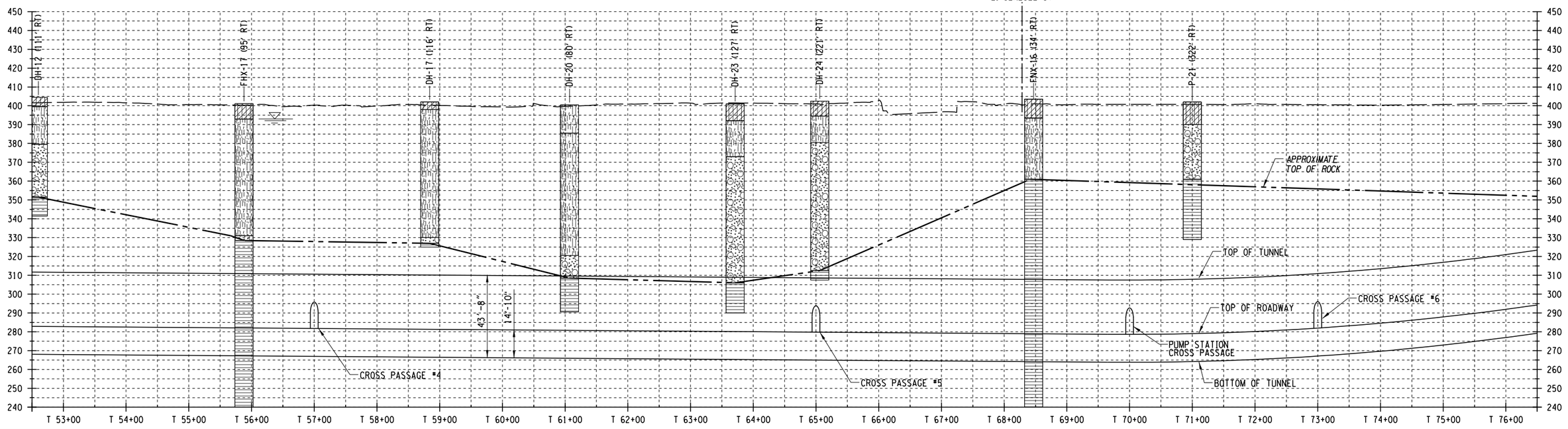
JOB MANAGER

DESIGN SUPERVISOR



BORING PLAN

0 50′ 100′



GEOLOGICAL PROFILE

0 50′ 100′ HORIZ. 0 20′ 40′ VERTICAL

✱ BORING OFFSET IS WITH RESPECT TO TUNNEL ALIGNMENT

LEGEND:

- FILL
- SOFT SILT/CLAY
- SAND/SILT/GRAVEL
- WEATHERED ROCK
- ROCK

AFFIX SEAL:
ON: _____

ALTERED BY: _____
ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

BORING PLAN AND GEOLOGICAL PROFILE STA 52+50 TO STA 76+50

CONTRACT NUMBER

DRAWING NO. TS-1003

SHEET NO. 6 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910dms43574øTS-1003 BORING PLAN & GEOTECHNICAL PROFILE_STA 52+50 to STA 76+50.dgn

PROJECT MANAGER H. UNGAR

CHECK

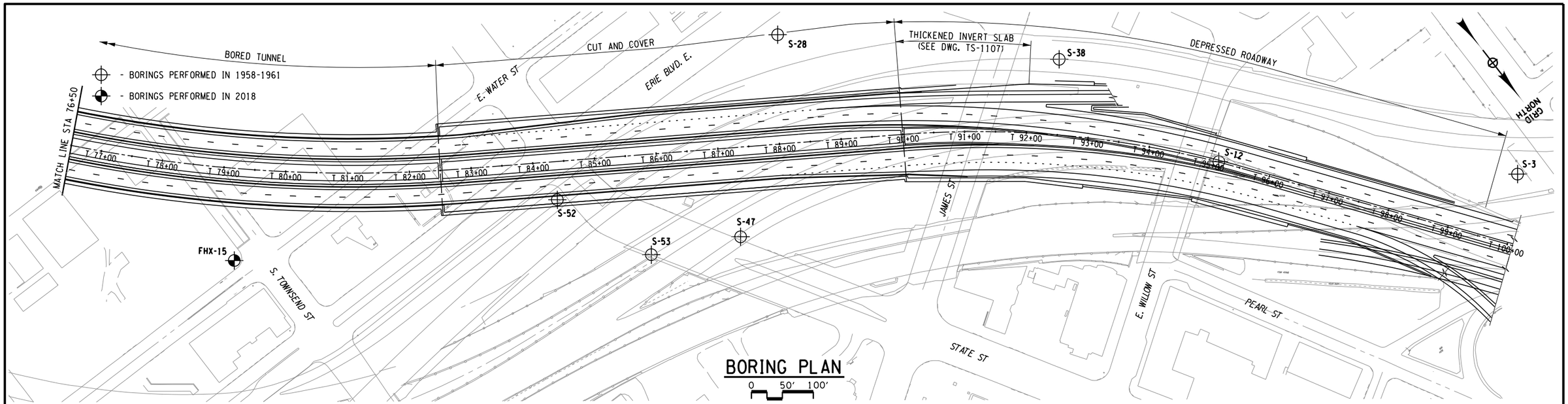
DRAFTING

DESIGN

CHECK

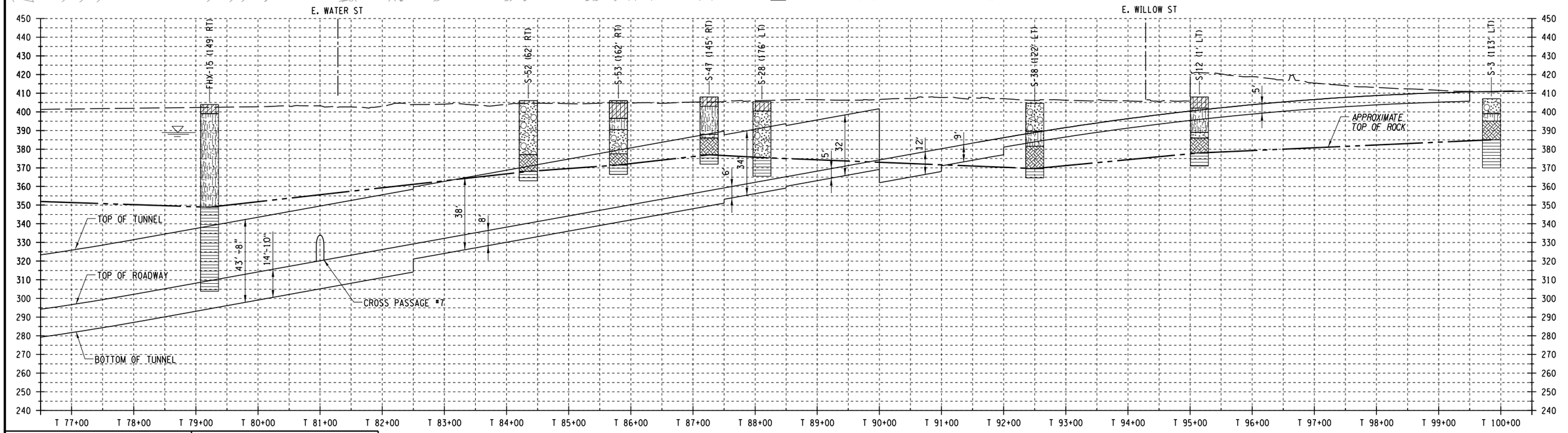
JOB MANAGER

DESIGN SUPERVISOR



BORING PLAN

0 50′ 100′



GEOLOGICAL PROFILE

0 50′ 100′ HORIZ. 0 20′ 40′ VERTICAL

✳ BORING OFFSET IS WITH RESPECT TO TUNNEL ALIGNMENT

LEGEND:
- FILL
- SOFT SILT/CLAY
- SAND/SILT/GRAVEL
- WEATHERED ROCK
- ROCK

AFFIX SEAL:
ON: _____

ALTERED BY: _____
ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

BORING PLAN AND GEOLOGICAL PROFILE STA 76+50 TO STA 100+00

CONTRACT NUMBER

DRAWING NO. TS-1004

SHEET NO. 7 OF 30

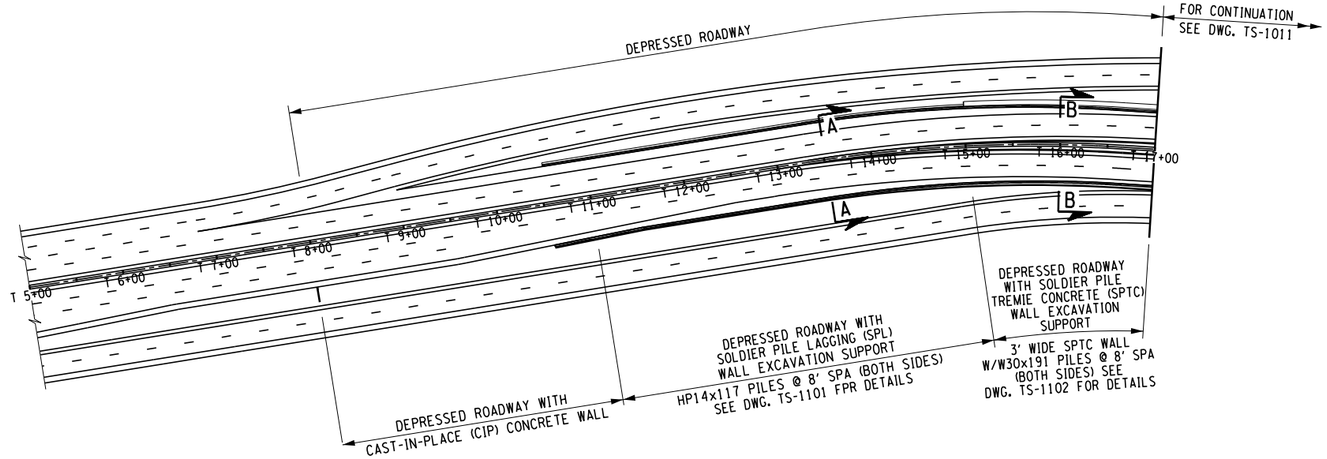
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910dms43574øTS-1004 BORING PLAN & GEOTECHNICAL PROFILE_STA 76+50 to STA 100+00.dgn

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

GRID NORTH

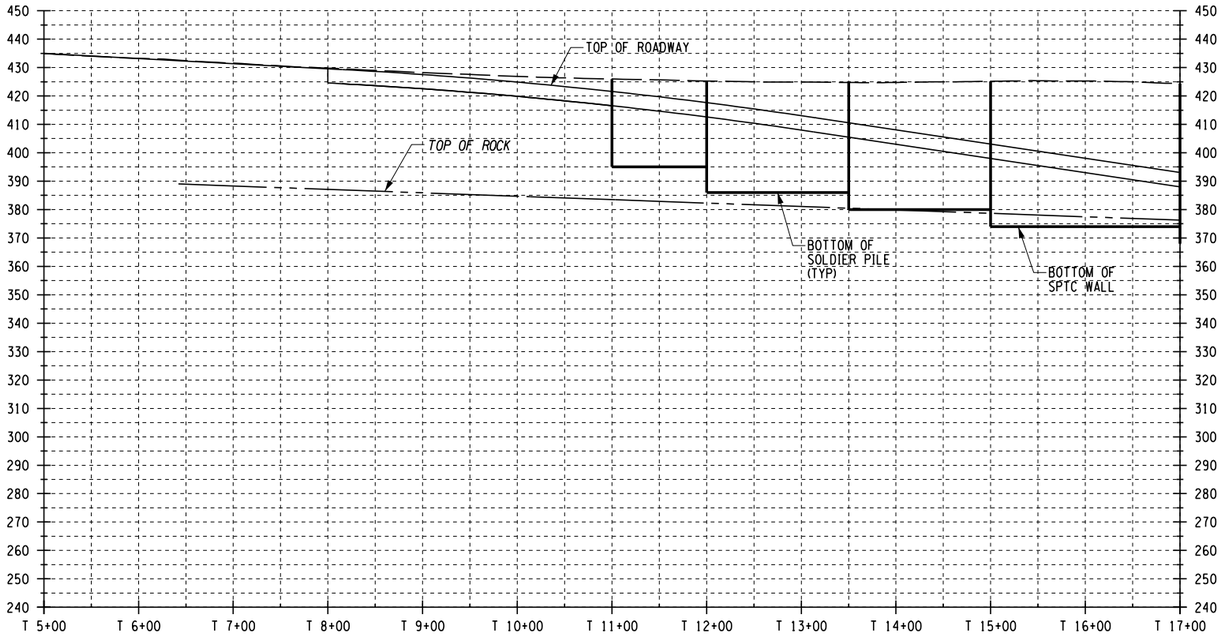


SOE PLAN

0 50' 100'

NOTES:

1. TIE-BACKS NOT SHOWN FOR CLARITY.
2. FOR SECTIONS, SEE DRAWINGS TS-1101 AND TS-1102.



PROFILE

0 50' 100' 0 20' 40'

HORIZ. VERTICAL

AFFIX SEAL: ON: _____	ALTERED BY: _____ ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SUPPORT OF EXCAVATION
PLAN AND PROFILE
SOUTH APPROACH DEPRESSED ROADWAY
STA 8+00 TO STA 15+00

CONTRACT NUMBER

DRAWING NO. TS-1010
SHEET NO. 8 OF 30

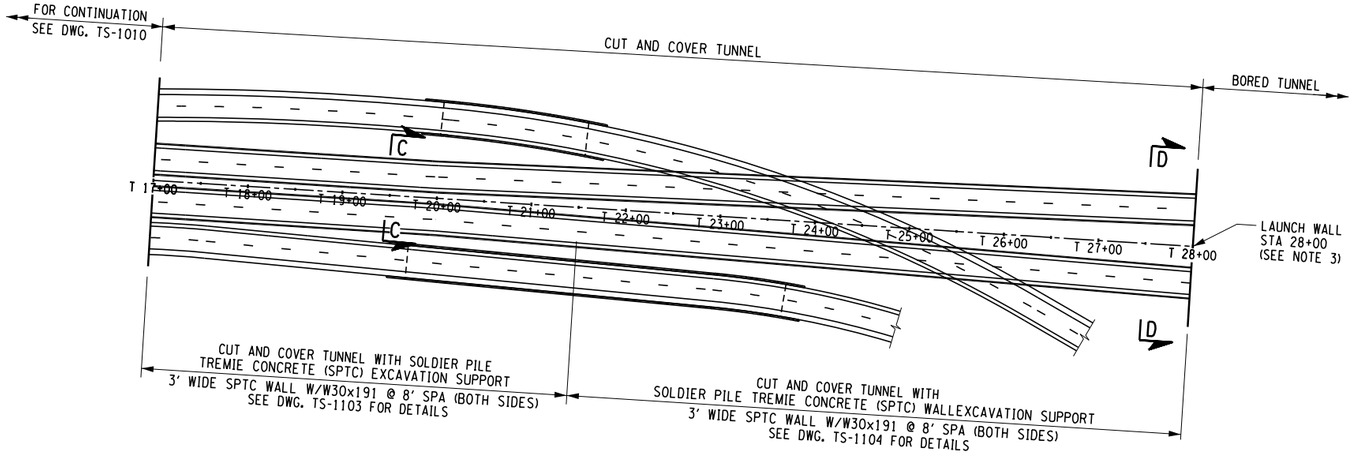
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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:\pw_working\newyork\p00300910\dms43574\TS-1010 SUPPORT OF EXCAVATION PLAN & PROFILE DEPRESSED ROADWAY STA 8+00 TO STA 15+00.dgn

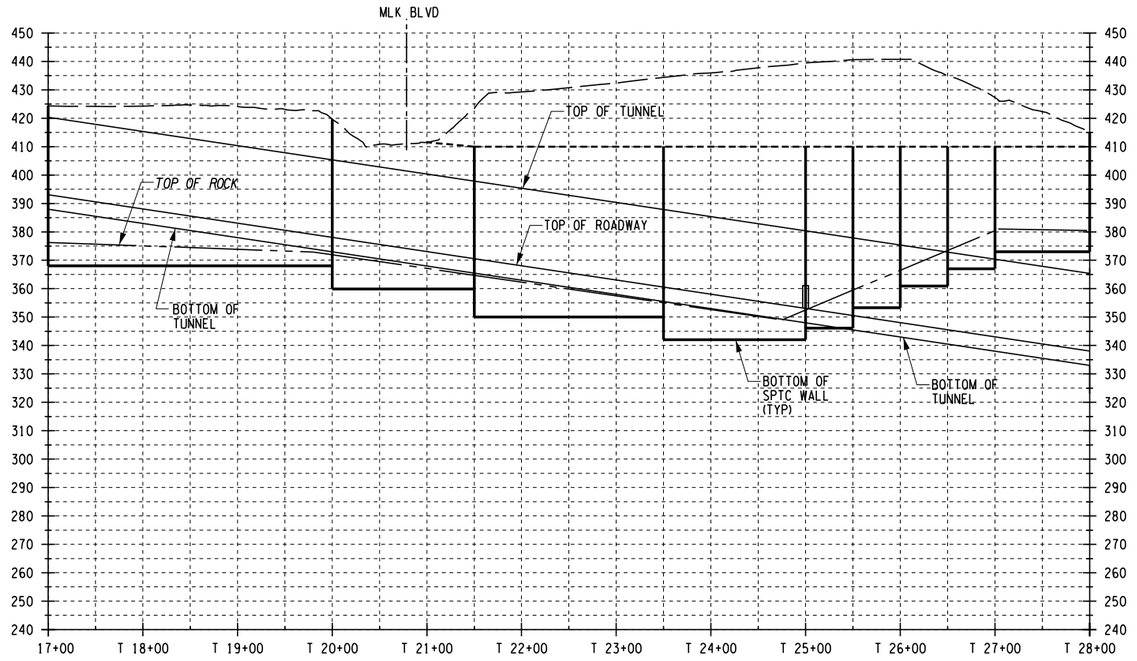
PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

GRID NORTH



SOE PLAN

0 50' 100'



PROFILE

0 50' 100' 0 20' 40'

HORIZ. VERTICAL

NOTES:

1. TIE-BACKS AND ROCK BOLTS ARE NOT SHOWN FOR CLARITY.
2. FOR SECTIONS, SEE DRAWINGS TS-1103 AND TS-1104.
3. SEE DWG. TS-1208 FOR LAUNCH WALL DETAILS.

NOTE:
BETWEEN STA 21+00 AND STA 28+00 THE EXISTING EMBANKMENT WILL BE LOWERED TO EL 410' PRIOR TO SOE INSTALLATION.

AFFIX SEAL: ON: _____	ALTERED BY: _____ ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SUPPORT OF EXCAVATION
PLAN AND PROFILE
SOUTH APPROACH DEPRESSED ROADWAY
STA 17+00 TO STA 28+00

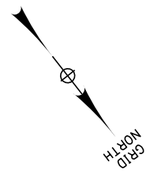
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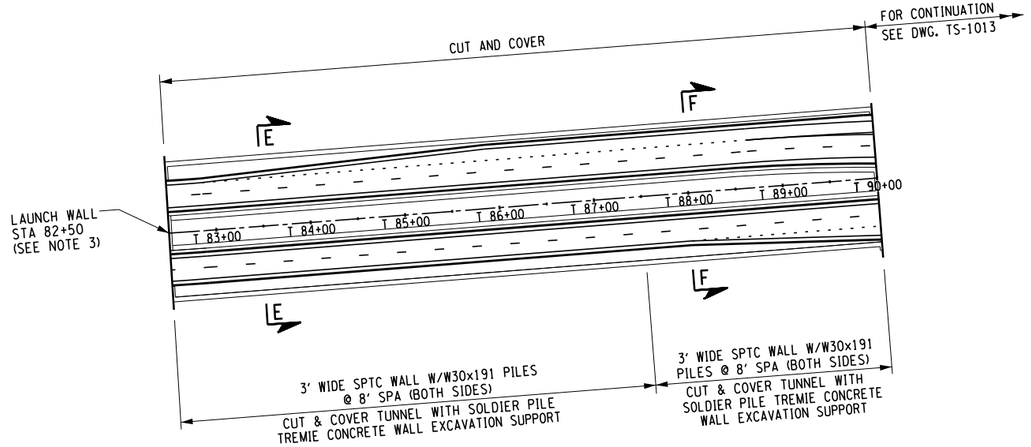
DRAWING NO. TS-1011
SHEET NO. 9 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

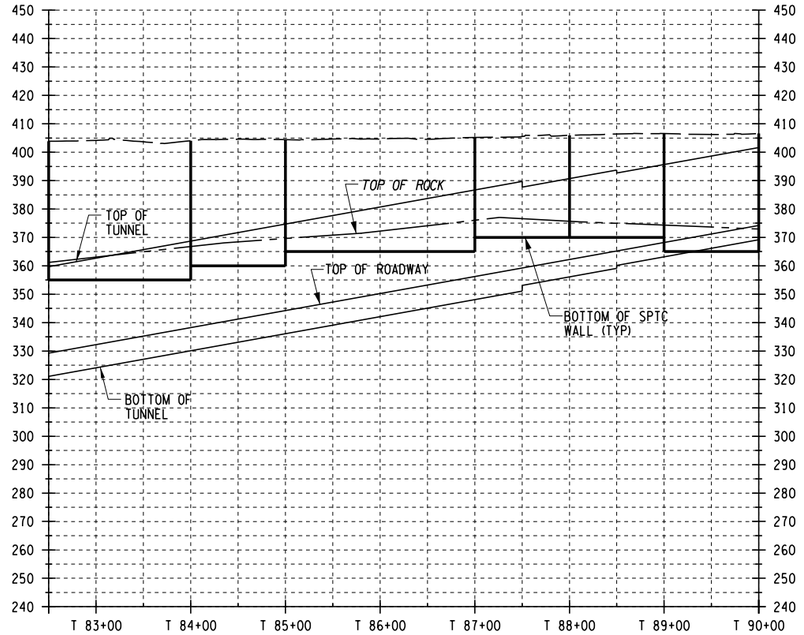
c:øpw_workingønewyorkøp00300910dms43574øTS-1011 SUPPORT OF EXCAVATION PLAN & PROFILE CUT & COVER STA 17+00 TO STA 28+00.dgn





SOE PLAN

0 50' 100'



PROFILE

0 50' 100' 0 20' 40'

HORIZ. VERTICAL

NOTES:

1. TIE-BACKS AND ROCK BOLTS ARE NOT SHOWN FOR CLARITY.
2. FOR SECTIONS, SEE DRAWINGS TS-1105 AND TS-1106.
3. SEE DWG. TS-1209 FOR LAUNCH WALL DETAILS.

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

AFFIX SEAL: ON: _____	ALTERED BY: _____ ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SUPPORT OF EXCAVATION
PLAN AND PROFILE
NORTH APPROACH - CUT AND COVER
STA 82+50 TO STA 90+00

CONTRACT NUMBER

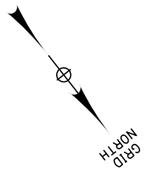
DRAWING NO. TS-1012
SHEET NO. 10 OF 30

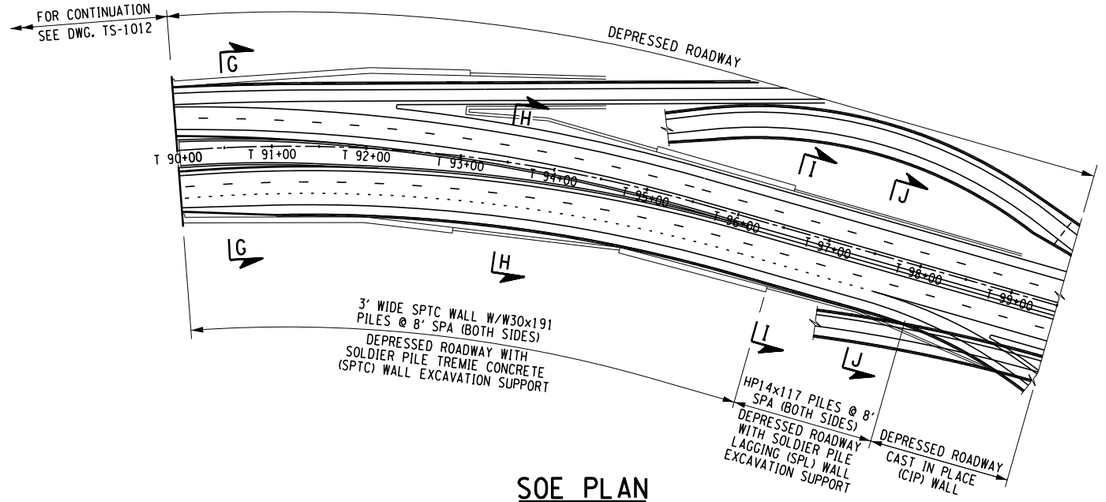
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910dms43574øTS-1012 SUPPORT OF EXCAVATION PLAN & PROFILE CUT & COVER STA 82+50 to STA 90+00.dgn

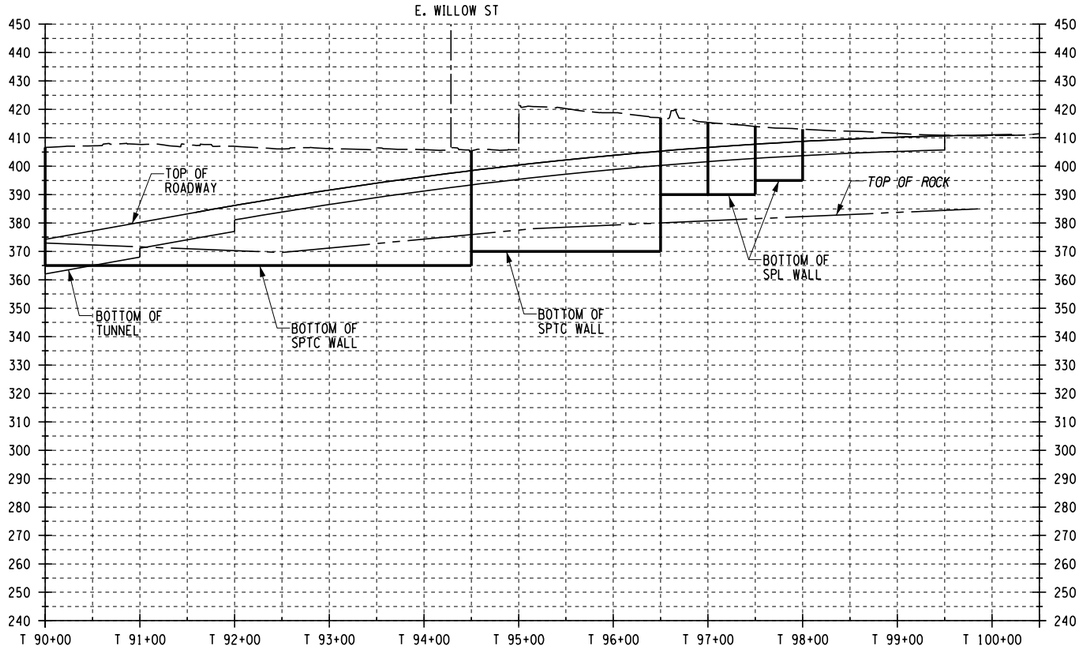
PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR





SOE PLAN

0 50' 100'



PROFILE

0 50' 100' 0 20' 40'

HORIZ. VERTICAL

NOTES:

1. TIE-BACKS AND ROCK BOLTS ARE NOT SHOWN FOR CLARITY.
2. FOR SECTIONS, SEE DRAWINGS TS-1107, TS-1108 AND TS-1109.

AFFIX SEAL: ON: _____	ALTERED BY: _____ ON: _____

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SUPPORT OF EXCAVATION
PLAN AND PROFILE
NORTH APPROACH- DEPRESSED ROADWAY
STA 90+00 TO STA 100+00

CONTRACT NUMBER

DRAWING NO. TS-1013
SHEET NO. 11 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

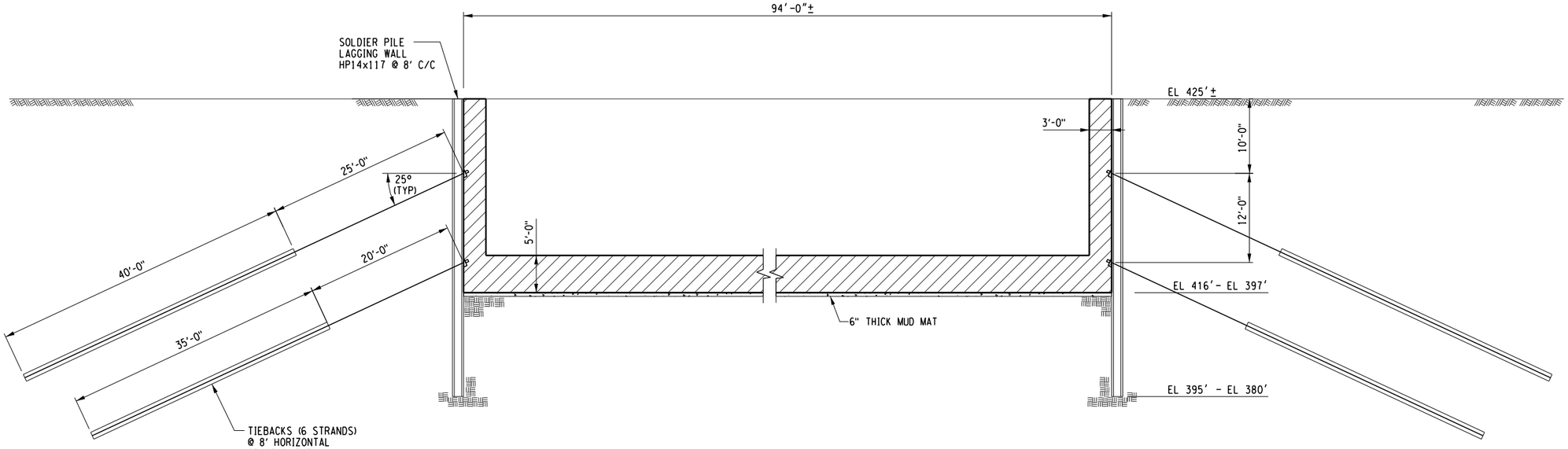
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

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PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NOTE:
ONLY 1 ROW OF TIEBACKS REQUIRED
FOR EXCAVATIONS UP TO 24'.

SOUTH SIDE SOE
DEPRESSED ROADWAY SECTION A-A
STA 11+00 - STA 15+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SOUTH SIDE SOE
DEPRESSED ROADWAY SECTION A-A
STA 11+00 TO STA 15+00

CONTRACT NUMBER

DRAWING NO. TS-1101
SHEET NO. 12 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

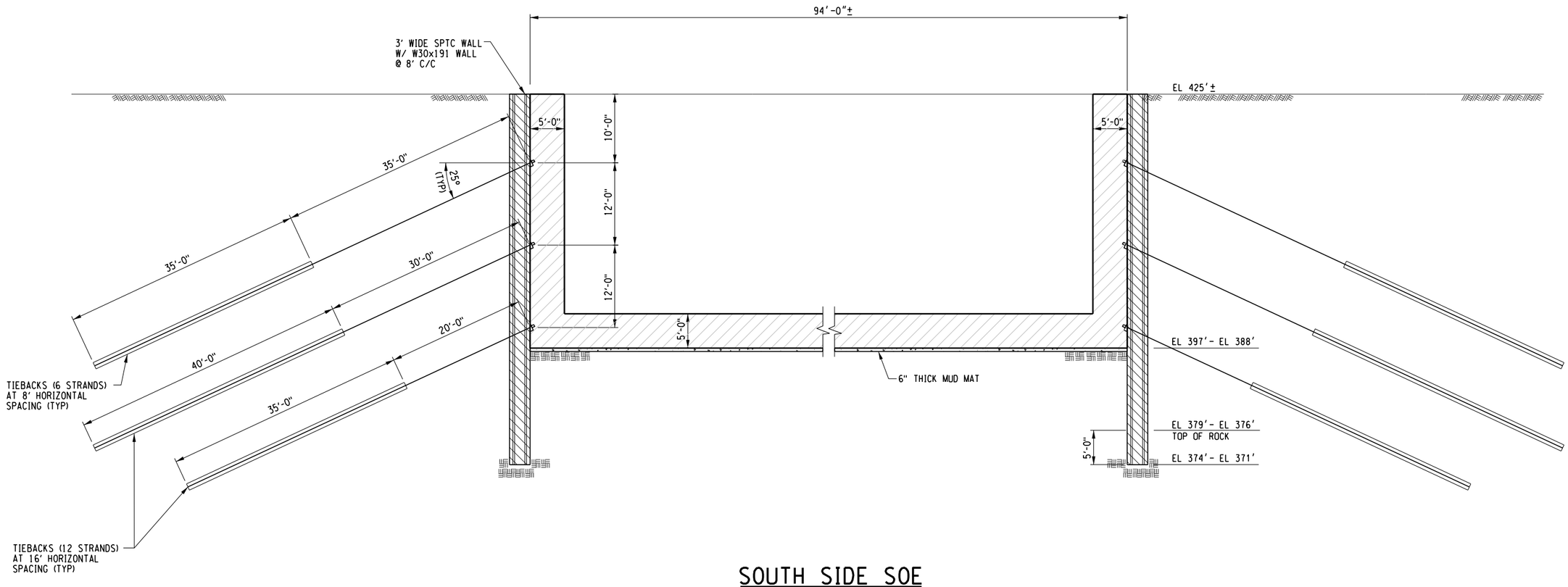
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:\pw_working\newyork\p001775b\dms435740\TS-1101 SOUTH SIDE SOE DEPRESSED ROADWAY SECTION A-A STA 11+00 TO STA 15+00.dgn

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



SOUTH SIDE SOE
DEPRESSED ROADWAY SECTION B-B
STA 15+00 - STA 17+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
					SOUTH SIDE SOE DEPRESSED ROADWAY SECTION B-B STA 15+00 TO STA 17+00	DRAWING NO. TS-1102
	COUNTY: ONONDAGA COUNTY, NY REGION: 3					SHEET NO. 13 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

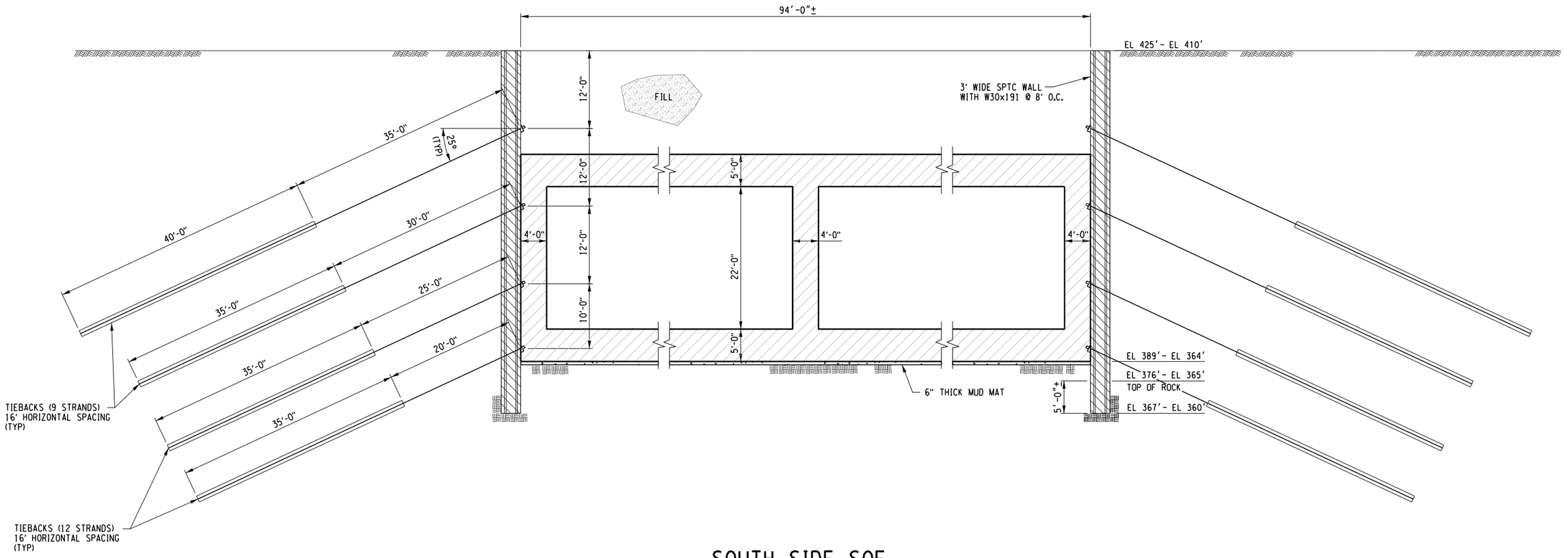
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

$FILE$

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



SOUTH SIDE SOE
CUT AND COVER TUNNEL SECTION C-C
STA 17+00 - STA 21+50

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SOUTH SIDE SOE
CUT AND COVER TUNNEL SECTION C-C
STA 17+00 TO STA 21+50

CONTRACT NUMBER

DRAWING NO. TS-1103
SHEET NO. 14 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

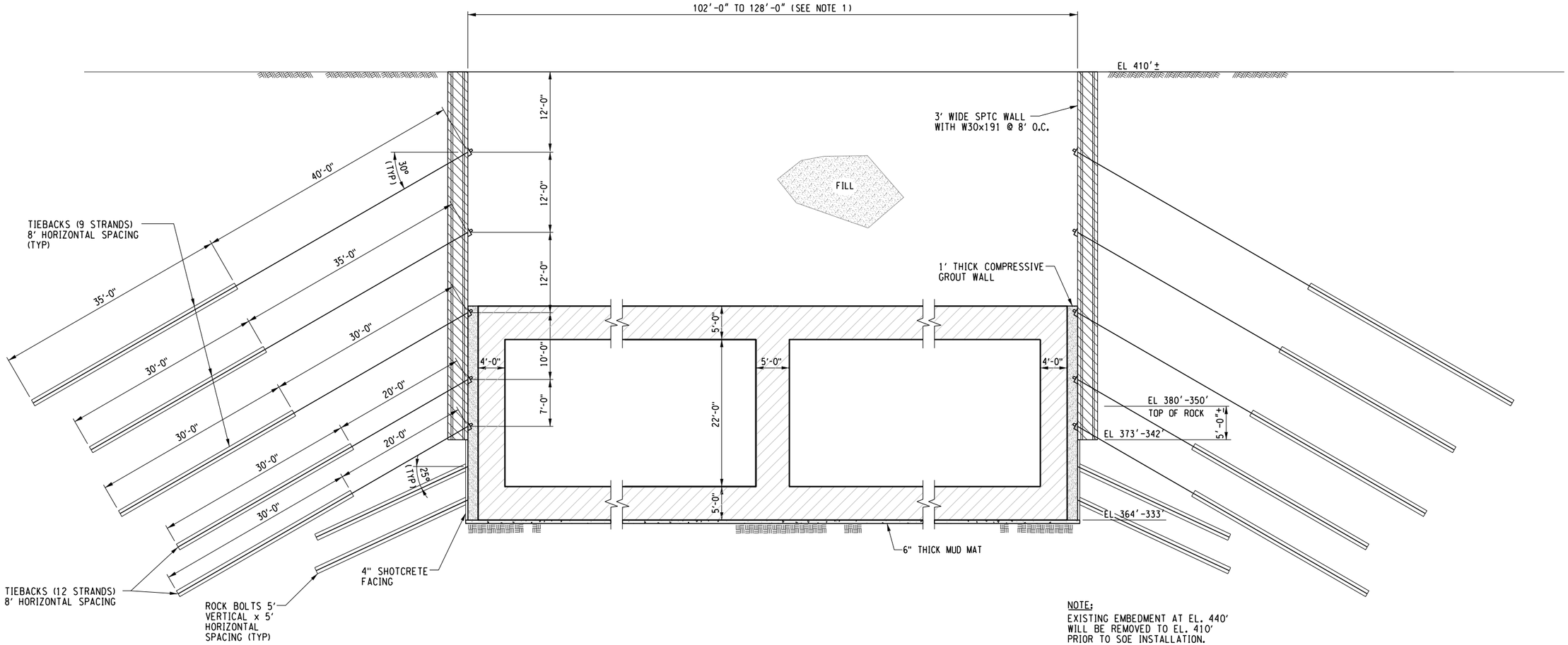
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910dms43574øTS-1103 SOUTH SIDE SOE CUT & COVER SECTION C-C STA 17+00 TO STA 21+50.dgn

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. SECTION WIDTH SHALL BE:
   - 102' AT STATIONS 21+50 TO 24+00.
   - 128' AT STATIONS 24+00 TO 28+00.
2. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NOTE:
EXISTING EMBEDMENT AT EL. 440'
WILL BE REMOVED TO EL. 410'
PRIOR TO SOE INSTALLATION.

SOUTH SIDE SOE
CUT AND COVER TUNNEL SECTION D-D
STA 21+50 - STA 28+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL COUNTY: ONONDAGA COUNTY, NY REGION: 3	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED SOUTH SIDE SOE CUT AND COVER TUNNEL SECTION D-D STA 21+50 TO STA 28+00	CONTRACT NUMBER DRAWING NO. TS-1104 SHEET NO. 15 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910øms43574øTS-1104 SOUTH SIDE SOE CUT & COVER SECTION D-D STA 21+50 TO STA 28+00.dgn

PROJECT MANAGER H. UNGAR

CHECK

DRAFTING

DESIGN

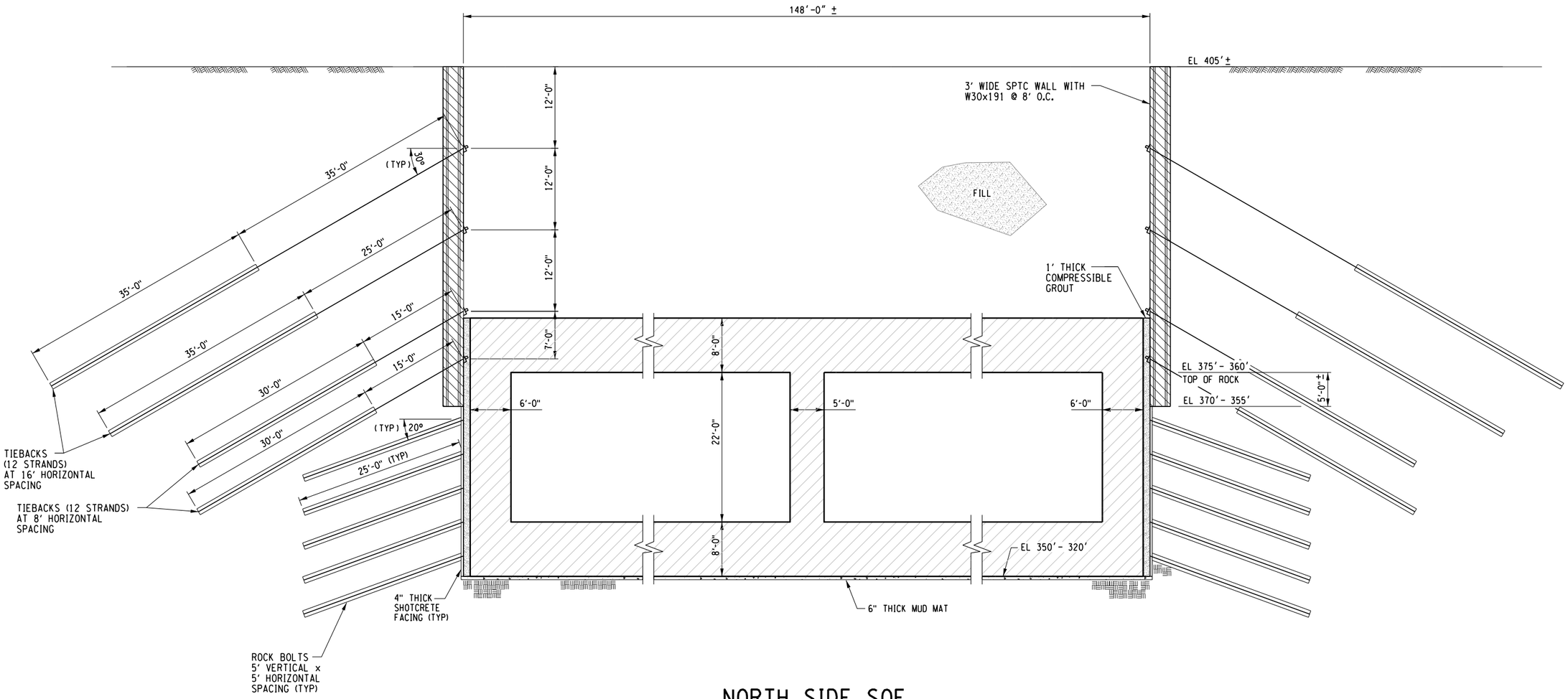
CHECK

JOB MANAGER

DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NORTH SIDE SOE
CUT AND COVER TUNNEL SECTION E-E
STA 82+50 - STA 87+50

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
	COUNTY: ONONDAGA COUNTY, NY REGION: 3				NORTH SIDE SOE CUT AND COVER TUNNEL SECTION E-E STA 82+50 TO STA 87+50	DRAWING NO. TS-1105 SHEET NO. 16 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR

CHECK

DRAFTING

CHECK

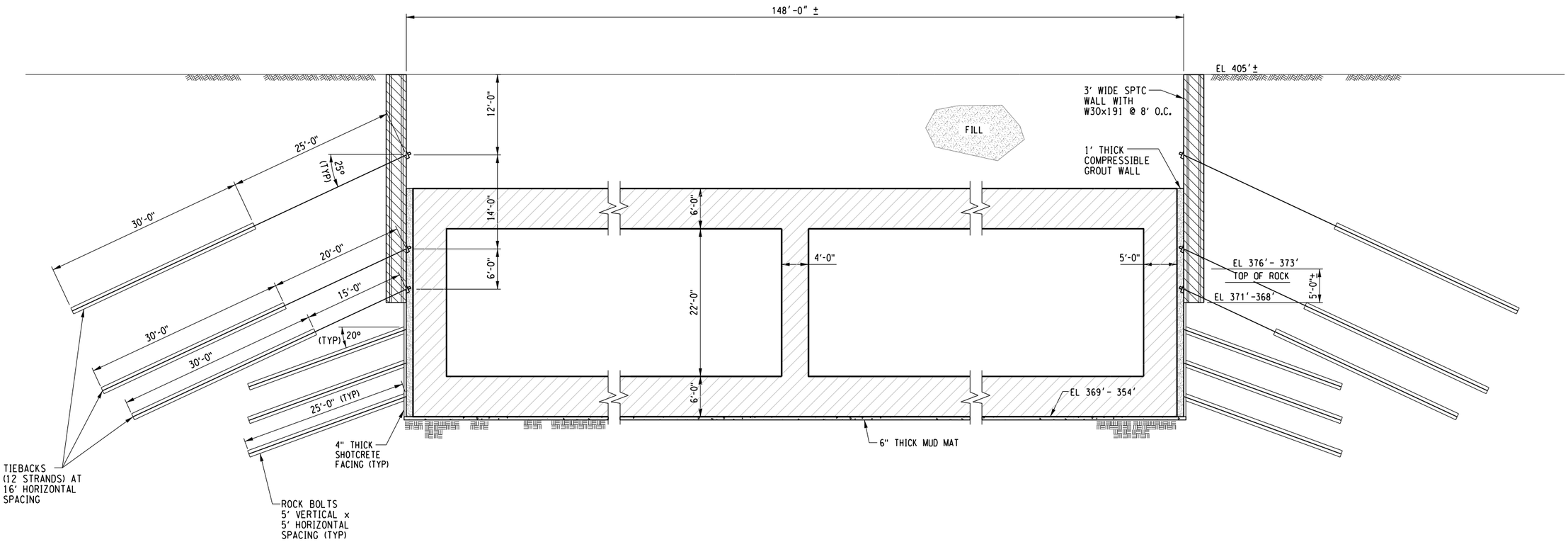
DESIGN

JOB MANAGER

DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NORTH SIDE SOE
CUT AND COVER TUNNEL SECTION F-F
STA 87+50 - STA 90+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

NORTH SIDE SOE
CUT AND COVER TUNNEL SECTION F-F
STA 87+50 TO STA 90+00

CONTRACT NUMBER

DRAWING NO. TS-1106

SHEET NO. 17 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:\pw_working\newyork\p00300910\dms43574\TS-1106 NORTH SIDE CUT & COVER TUNNEL SECTION F-F STA 87+50 TO STA 90+00.dgn

PROJECT MANAGER H. UNGAR

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DRAFTING

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DESIGN

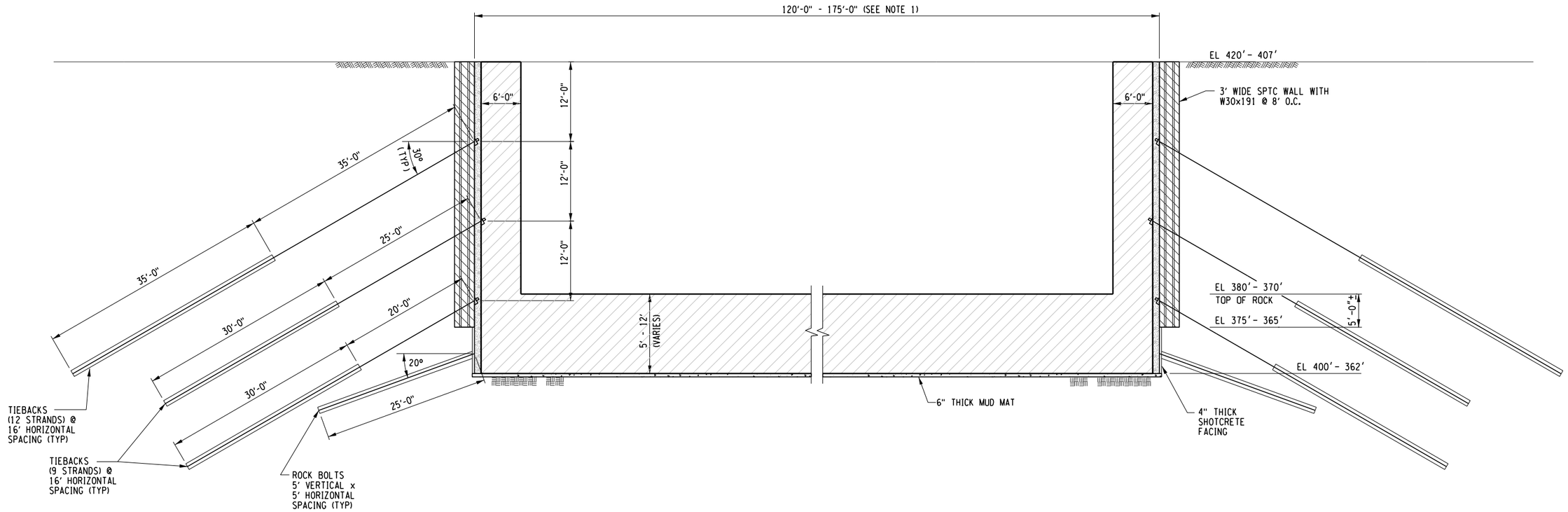
JOB MANAGER

DESIGN SUPERVISOR

NOTES:

1. SECTION WIDTH SHALL BE:
   - 150' TO 175' AT STATIONS 90+00 TO 93+00,
   - 120' AT STATIONS 95+00 TO 96+50.

2. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND WAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NORTH SIDE SOE
DEPRESSED ROADWAY SECTION G-G
STA 90+00 - STA 93+00, STA 95+00 - STA 96+50

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

NORTH SIDE SOE
DEPRESSED ROADWAY SECTION G-G
STA 90+00 TO STA 93+00,
STA 95+00 TO STA 96+50

CONTRACT NUMBER

DRAWING NO. TS-1107

SHEET NO. 18 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

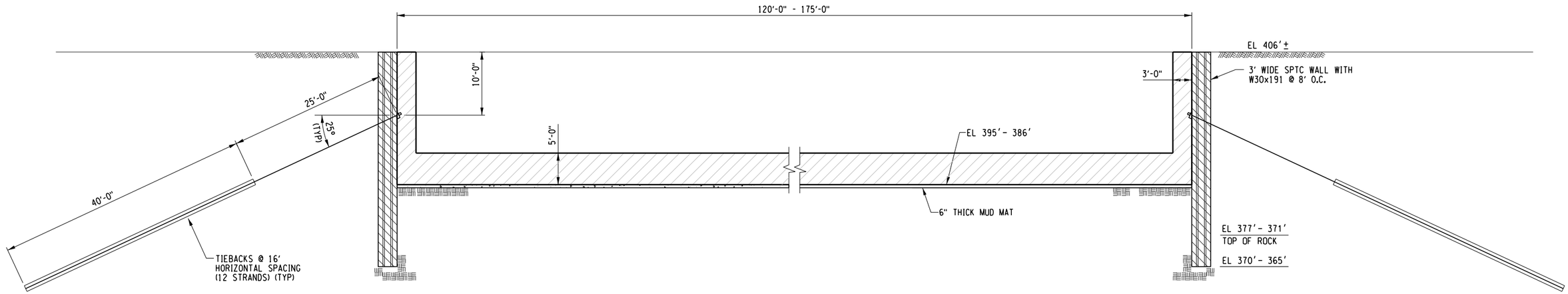
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910øms435740TS-1107 NORTH SIDE SOE DEPRESSED ROADWAY SECTION G-G STA 90+00 TO STA 93+00, STA 95+00 TO STA 96+50.dgn

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NORTH SIDE SOE
DEPRESSED ROADWAY SECTION H-H
STA 93+00 - STA 95+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

NORTH SIDE SOE
DEPRESSED ROADWAY SECTION H-H
STA 93+00 TO STA 95+00

CONTRACT NUMBER

DRAWING NO. TS-1108
SHEET NO. 19 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

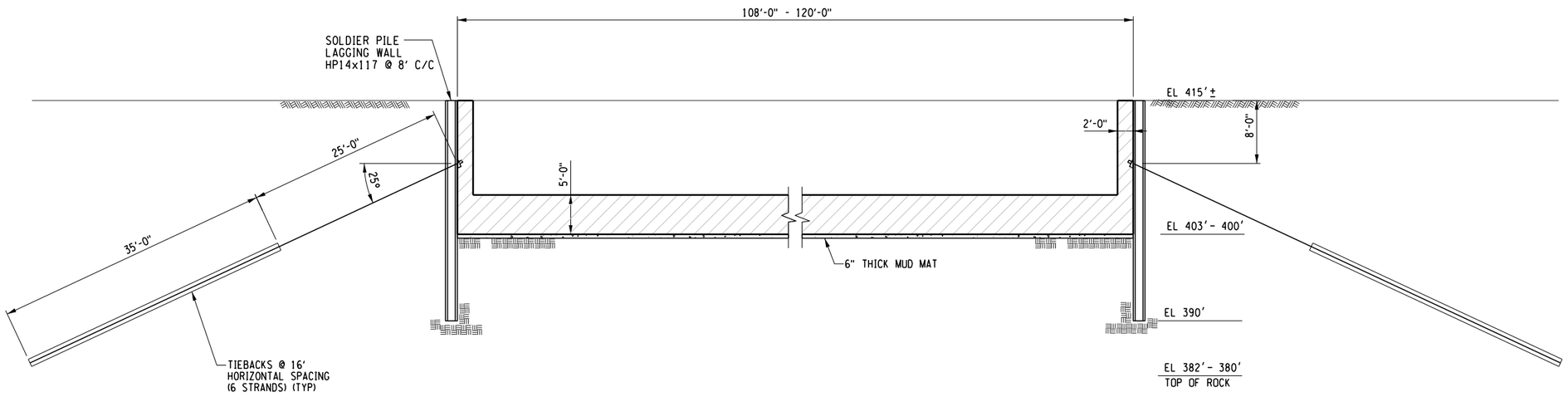
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910øms435740TS-1108 NORTH SIDE SOE DEPRESSED ROADWAY SECTION H-H STA 93+00 TO STA 95+00.dgn

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NORTH SIDE SOE
DEPRESSED ROADWAY SECTION I-I
STA 96+50 - STA 97+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
					NORTH SIDE SOE DEPRESSED ROADWAY SECTION I-I STA 96+50 TO STA 97+00	DRAWING NO. TS-1109
	COUNTY: ONONDAGA COUNTY, NY REGION: 3					SHEET NO. 20 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

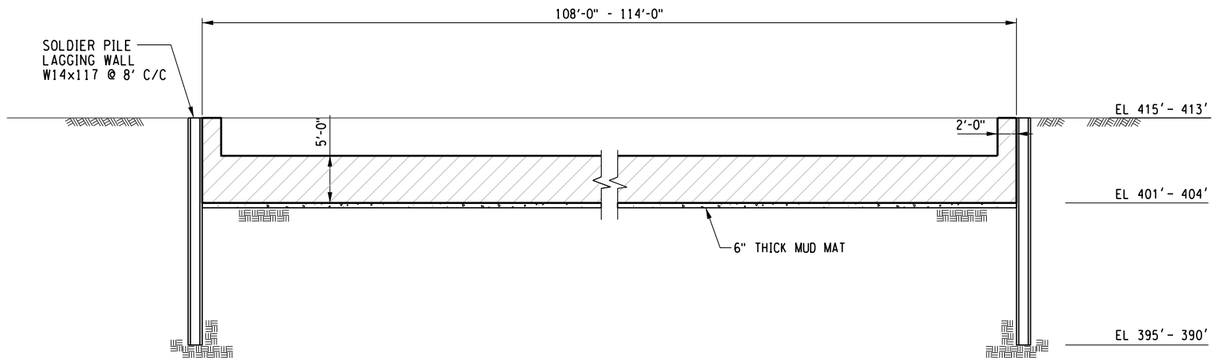
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910dms43574øTS-1109 NORTH SIDE SOE DEPRESSED ROADWAY SECTION I-I STA 96+50 TO STA 97+50.dgn

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

NOTES:

1. THE GROUND SURFACE BEYOND THE SUPPORT OF EXCAVATION WALLS ARE APPROXIMATE AND ILLUSTRATIVE ONLY AND MAY NOT REPRESENT THE GROUND SURFACE DURING CONSTRUCTION.



NORTH SIDE SOE
DEPRESSED ROADWAY SECTION J-J
STA 97+00 - STA 98+00

0 3 6 9 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

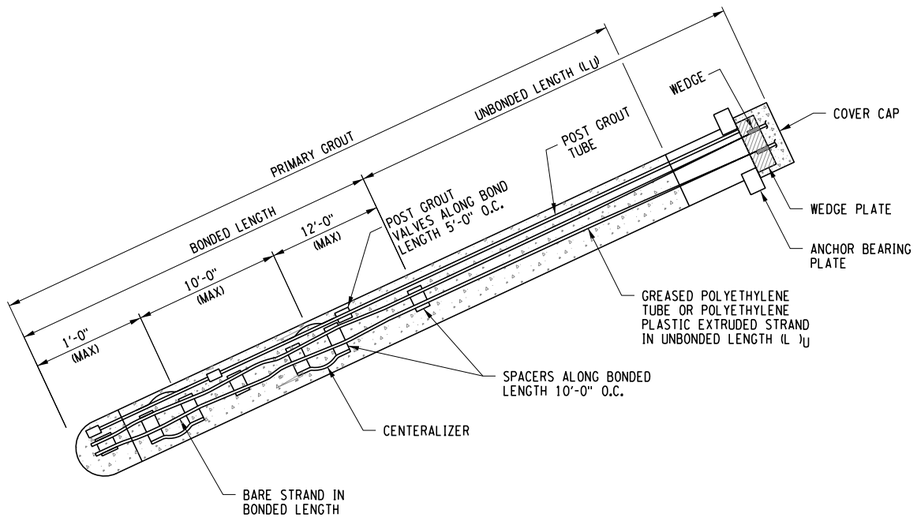
NORTH SIDE SOE
DEPRESSED ROADWAY SECTION J-J
STA 97+00 TO STA 98+00

CONTRACT NUMBER

DRAWING NO. TS-1110
SHEET NO. 21 OF 30

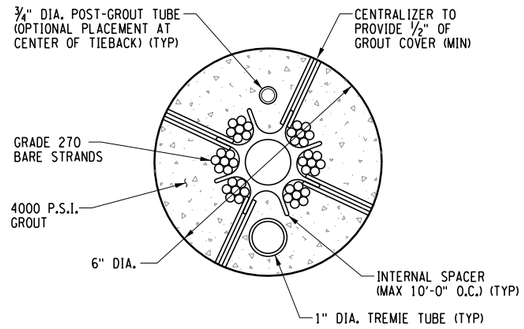
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation



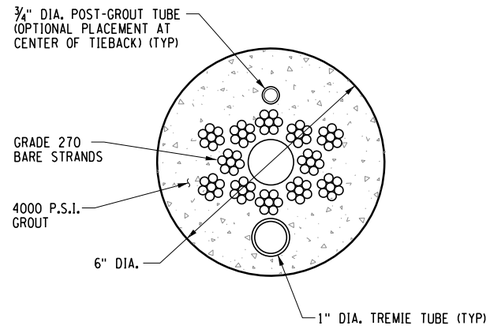
TYPICAL TIEBACK ANCHORAGE DETAIL

N.T.S.



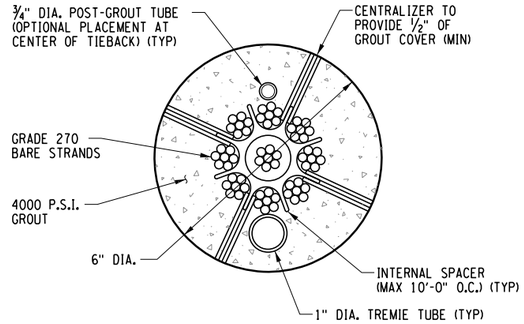
6 STRANDS SECTION

N.T.S.



12 STRANDS SECTION

N.T.S.



9 STRANDS SECTION

N.T.S.

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

AFFIX SEAL: ON:	ALTERED BY: ON:

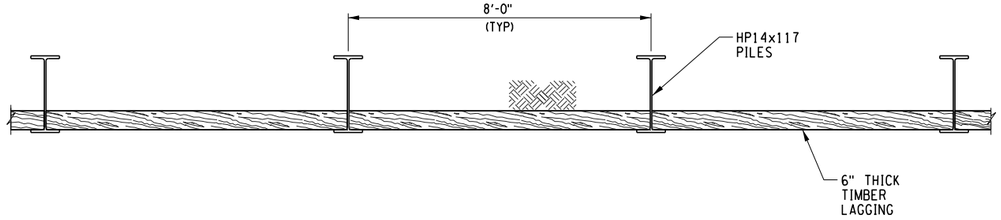
PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
	COUNTY: ONONDAGA COUNTY, NY REGION: 3				TIEBACK ANCHORAGE DETAILS AND SECTIONS	DRAWING NO. TS-1201 SHEET NO. 22 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

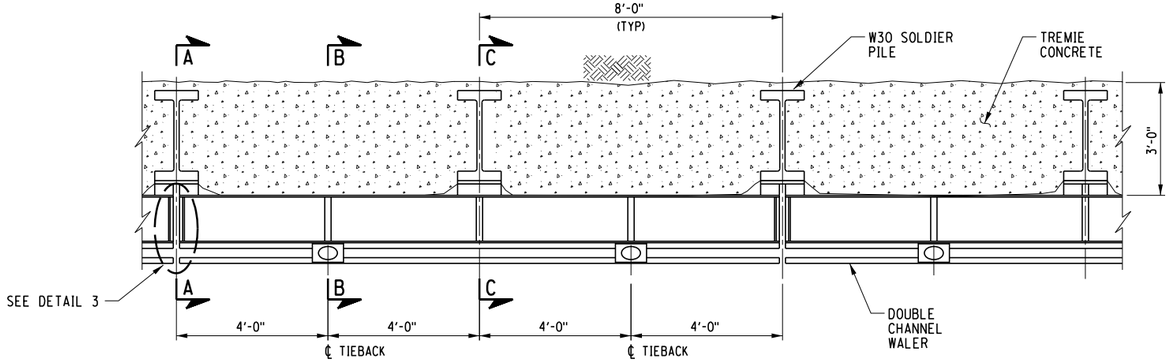
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:\pw_working\newyork\p00300911\dms43574\TS-1201 TIEBACK DETAILS & SECTIONS.dgn



TYPICAL PLAN VIEW FOR DEPRESSED ROADWAY WITH SPL WALL

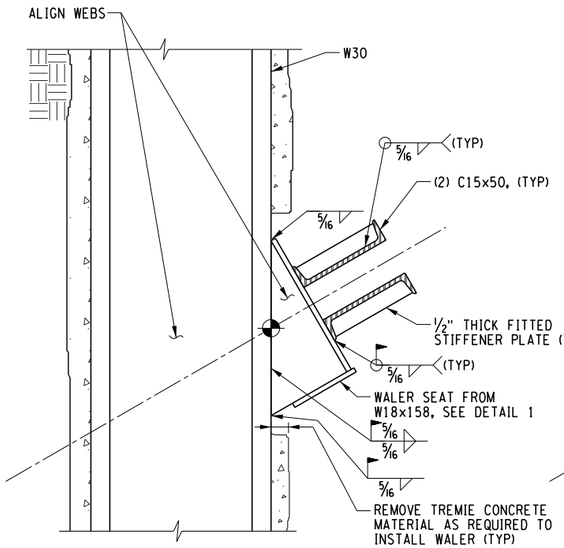
SCALE: ½"=1'-0"



TYPICAL PLAN VIEW FOR DEPRESSED ROADWAY AND CUT & COVER TUNNEL WITH SPTC WALL

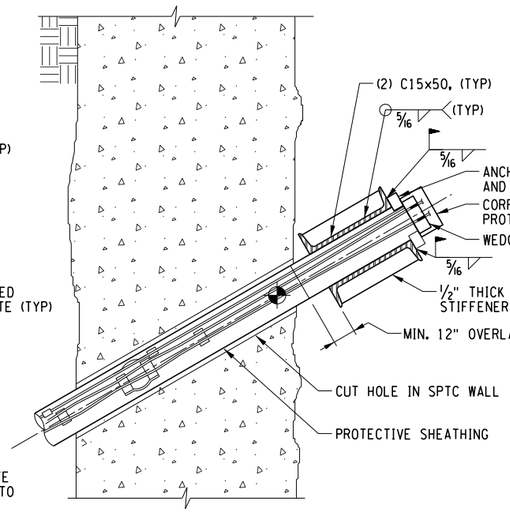
(ONLY EAST WALL SHOWN FOR CLARITY)

SCALE: ½"=1'-0"



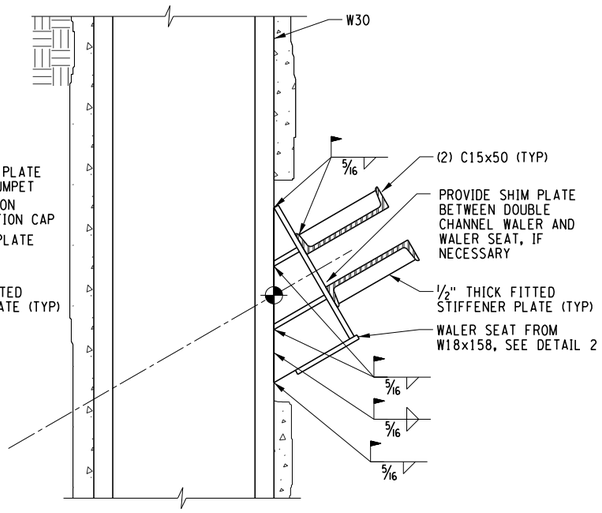
SECTION C (AT PILE)

SCALE: 1"=1'-0"



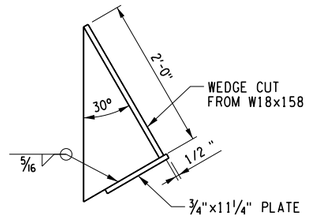
SECTION B (AT TIEBACK)

SCALE: 1"=1'-0"



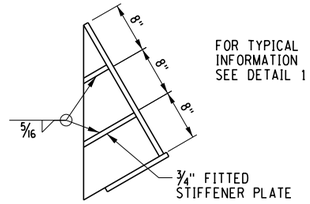
SECTION A (AT PILE)

SCALE: 1"=1'-0"



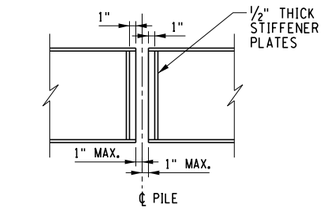
DETAIL 1 (WALER SEAT)

SCALE: 1"=1'-0"



DETAIL 2 (DOUBLE WALER SEAT)

SCALE: 1"=1'-0"



DETAIL 3 (WALER DETAIL)

SCALE: 1"=1'-0"

NOTE:

1. PROVIDE WELDED PLATES OR RECTANGULAR OR SQUARE HSS BETWEEN CHANNELS AS SPACERS, TWO MINIMUM PER WALER.

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

SUPPORT OF EXCAVATION
WALL SECTION AND DETAILS

DRAWING NO. TS-1202

SHEET NO. 23 of 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

c:\pw_working\newyork\p0030091\dms43574\TS-1202 SUPPORT OF EXCAVATION WALL SECTION & DETAILS.dgn

PROJECT MANAGER H. UNGAR

CHECK

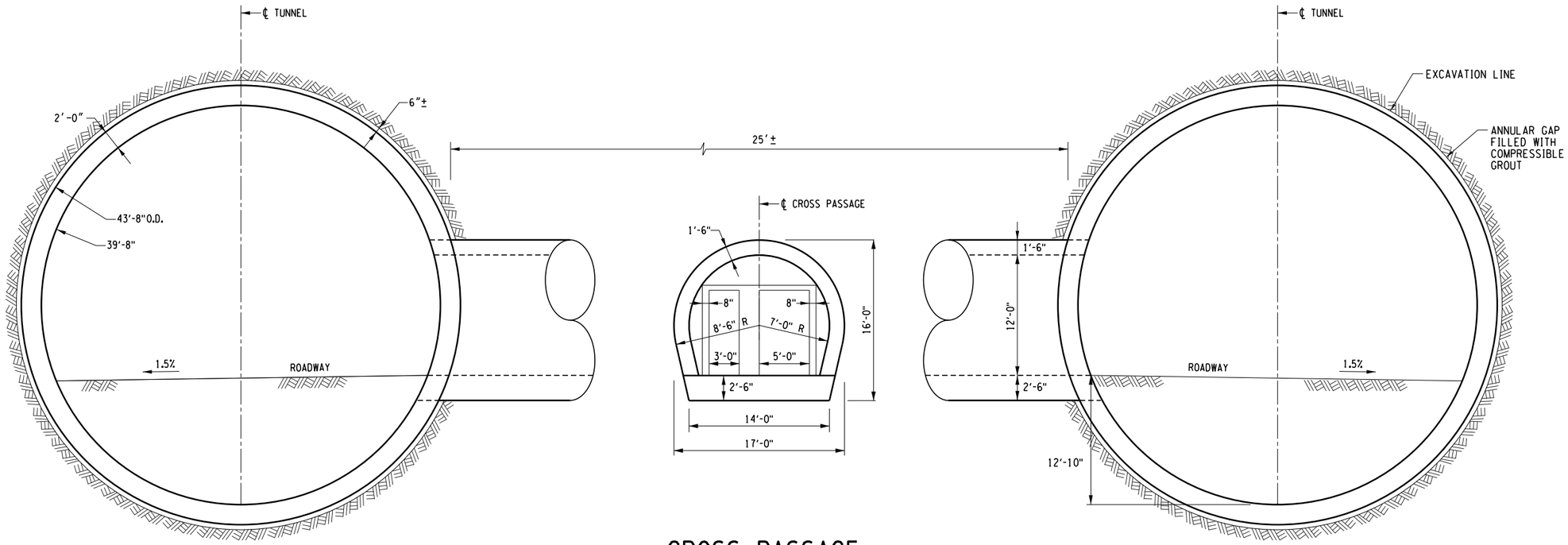
DRAFTING

CHECK

DESIGN

JOB MANAGER

DESIGN SUPERVISOR



SOUTHBOUND

CROSS PASSAGE

NORTHBOUND

TUNNEL AND CROSS PASSAGE SECTIONS

0 2 4 6 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TUNNEL & CROSS PASSAGE SECTIONS

CONTRACT NUMBER

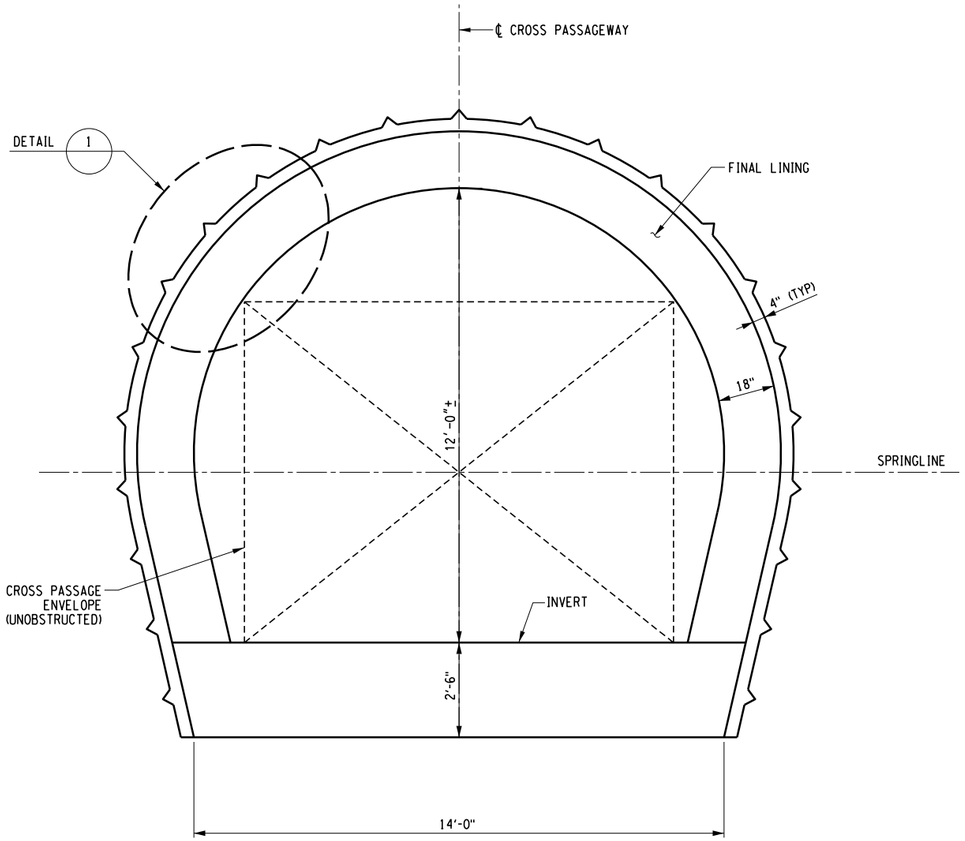
DRAWING NO. TS-1203

SHEET NO. 24 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

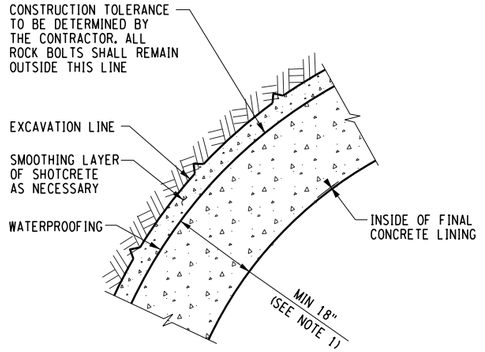
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp00300910ødms43574øTS-1203 TUNNEL & CROSS PASSAGE SECTIONS.dgn



CROSS PASSAGE FINAL LINING

0 1 2 FT



DETAIL 1

N.T.S.

NOTES:

1. THE MINIMUM REINFORCED CONCRETE THICKNESS IS 18 INCHES.
2. FINAL LINING WILL BE CONSTRUCTED USING CAST-IN-PLACE CONCRETE WITH 28-DAY COMPRESSIVE STRENGTH OF 5000 PSI AND WILL BE MINIMALLY REINFORCED BY 340 LB/CY OF REBAR.

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

AFFIX SEAL: ON:	ALTERED BY: ON:

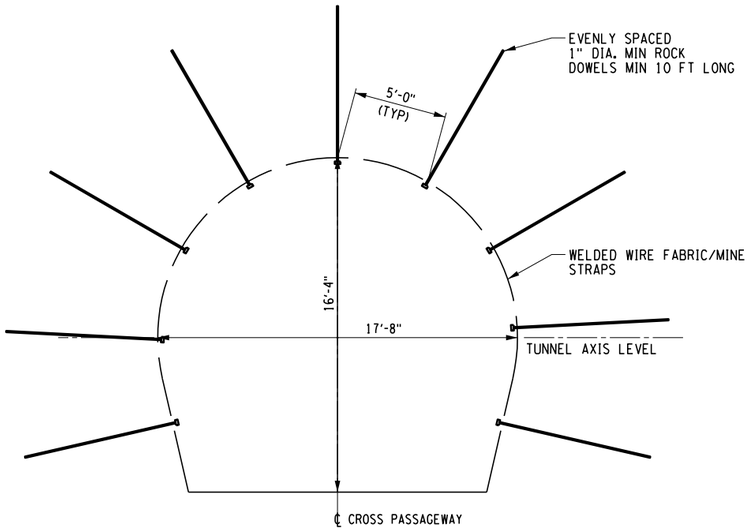
PARSONS

AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED	CONTRACT NUMBER
					CROSS PASSAGE FINAL LINING DETAILS	DRAWING NO. TS-1204
	COUNTY: ONONDAGA COUNTY, NY REGION: 3					SHEET NO. 25 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

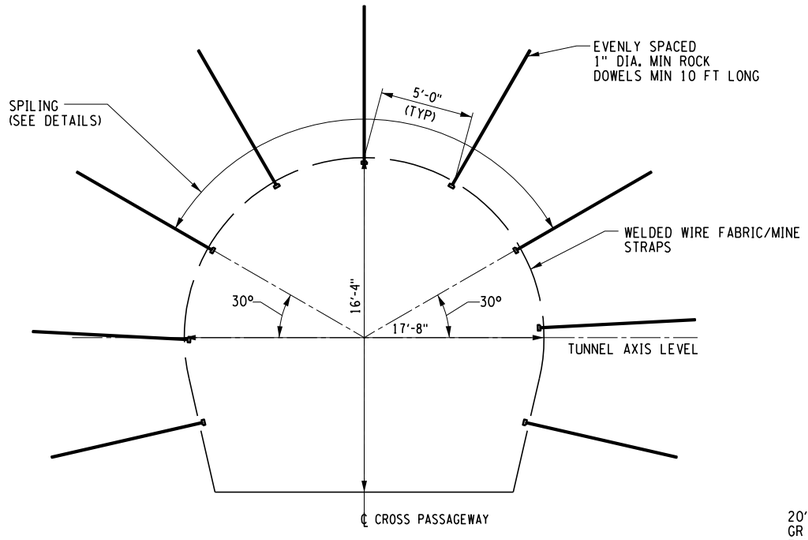
c:øpw_workingønewyorkøp00300910øms43574øTS-1204 CROSS PASSAGE FINAL LINING.dgn



TYPE 1 (41< RMR< 60) FAIR ROCK

5'x5' ROCK DOWELS PATTERN WITH MIN. 4" LAYER OF FIBER REINFORCED SHOTCRETE (CROWN & WALLS)

0 1 2 4 FT



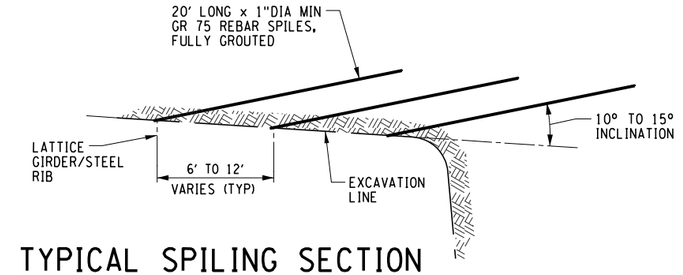
TYPE 2 (21< RMR< 40) POOR ROCK

5'x5' ROCK DOWELS PATTERN WITH MIN. 4" LAYER OF FIBER REINFORCED SHOTCRETE (CROWN & WALLS)

0 1 2 4 FT

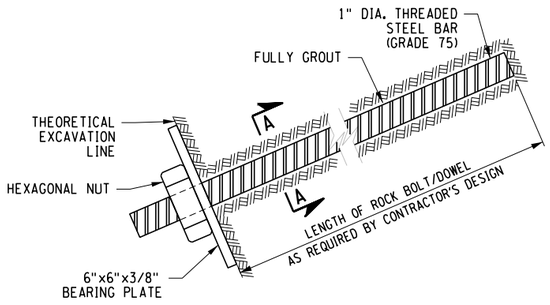
NOTES:

1. DETERMINATION OF THE TYPE OF SUPPORT WILL BE MADE BASED ON THE CONDITION OF ROCK ENCOUNTERED DURING EXCAVATION.
2. CONTRACTOR IS RESPONSIBLE FOR CONTROLLING GROUND WATER DURING EXCAVATION.
3. TOOLBOX ITEMS SHALL BE INSTALLED AS REQUIRED. TOOLBOX ITEMS MAY INCLUDE GROUTED ROCK. DOWELS, FRICTION DOWELS (I. E. SWELLEX BOLTS OR SPLIT SETS), GROUTED SPILES, STEEL SETS, LATTICE GIRDER, SHOTCRETE OR COMBINATION THERE OF.
6. MINIMUM f'c=4000 FOR FIBER REINFORCED SHOTCRETE.



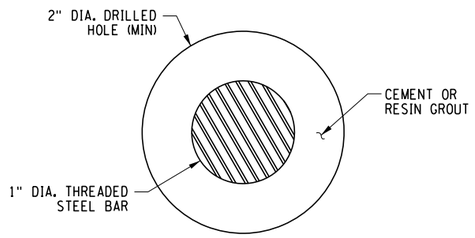
TYPICAL SPILING SECTION

N.T.S.



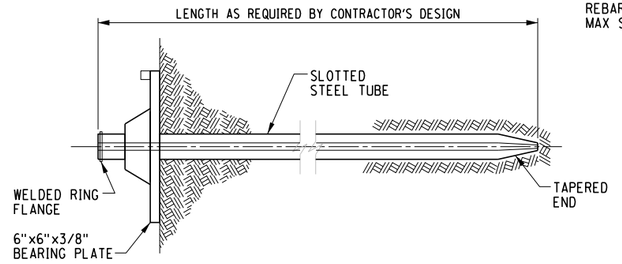
TYPICAL GROUTED ROCK DOWEL DETAILS

N.T.S.



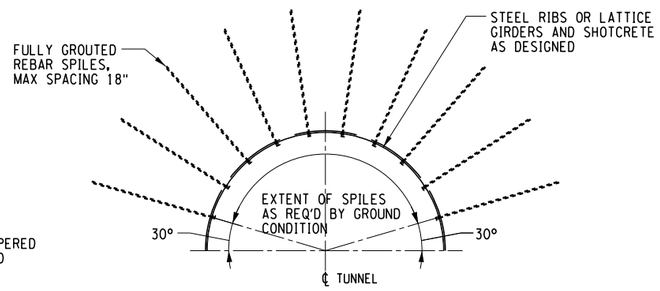
SECTION A

N.T.S.



SPLIT SET

N.T.S.



TYPICAL SPILING TRANSVERSE SECTION

N.T.S.

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

CROSS PASSAGE
INITIAL SUPPORT SECTIONS

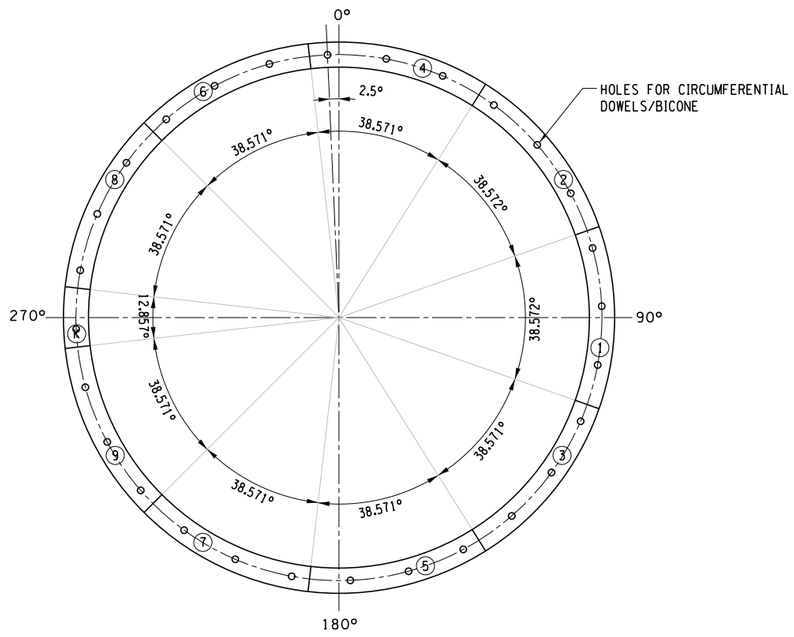
DRAWING NO. TS-1205
SHEET NO. 26 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

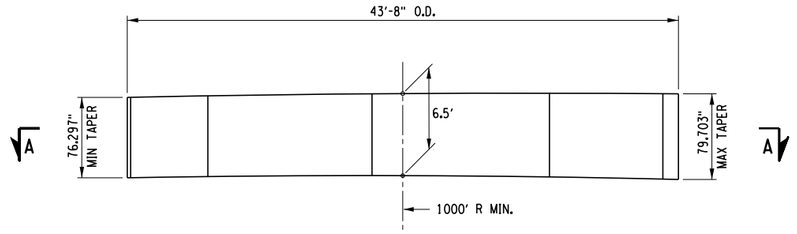
PROJECT MANAGER H. UNGAR
CHECK
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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SECTION A - RING GEOMETRY

N.T.S. (SEE NOTE 1)

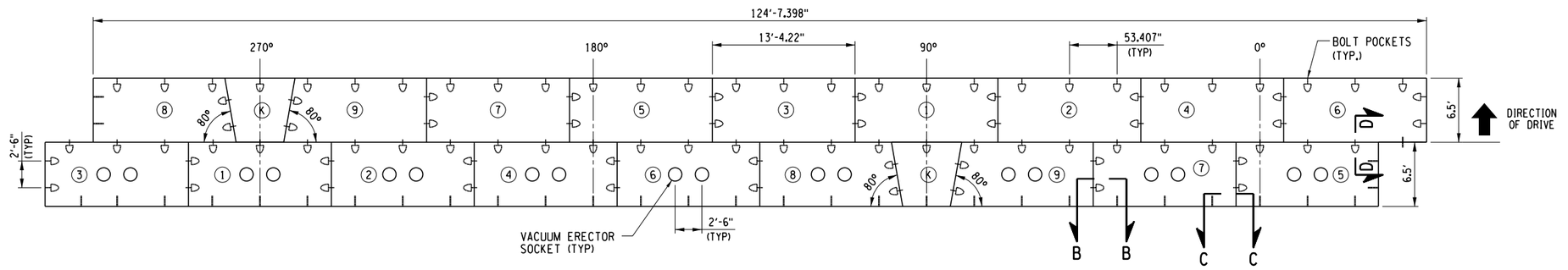


PLAN - RING GEOMETRY

N.T.S. (SEE NOTE 1)

NOTES:

1. DETAILS SHOWN ARE INDICATIVE ONLY.
2. LINER IS MADE OF STEEL FIBER REINFORCED CONCRETE (SFRC) WITH A FIBER DOSAGE OF 60 LB/CY.
3. POLYPROPYLENE FIBERS SHALL BE ADDED FOR FIRE RESISTANCE AT DOSAGE OF 3.4 LB/CY (2 KG/M^3).
4. EXTERIOR OF SEGMENT SHALL BE COATED WITH IMPERMEABLE SEALER.



GENERAL LAYOUT - INTERNAL FACE DEVELOPMENT

N.T.S. (SEE NOTE 1)

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SEGMENTAL LINER LAYOUT

CONTRACT NUMBER

DRAWING NO. TS-1206

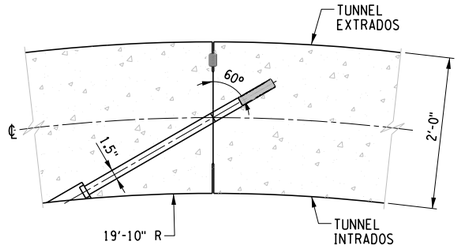
SHEET NO. 27 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

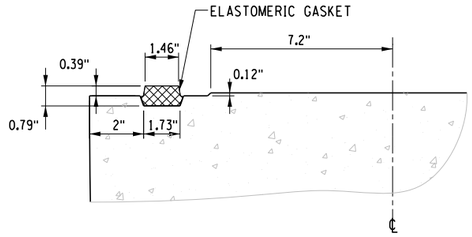
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR
CHECK

c:øpw_workingønewyorkøp00300910dms43574øTS-1206 SEGMENTAL LINER LAYOUT.dgn



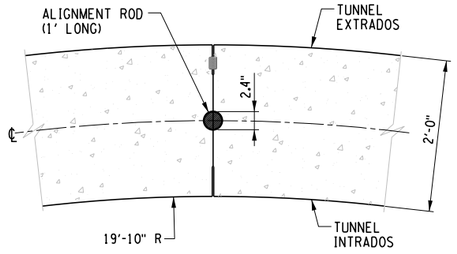
SECTION B
RADIAL JOIN DETAIL



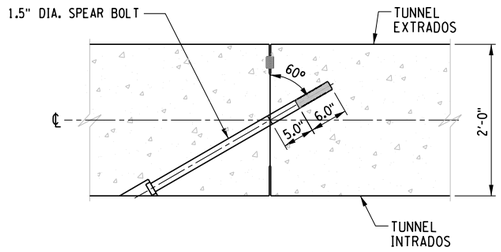
GASKET GROOVE DETAIL

NOTES:

1. DETAILS SHOWN ARE INDICATIVE ONLY.



SECTION C
RADIAL JOINT ALIGNMENT ROD



SECTION D
CIRCUMFERENTIAL JOINT DETAIL

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

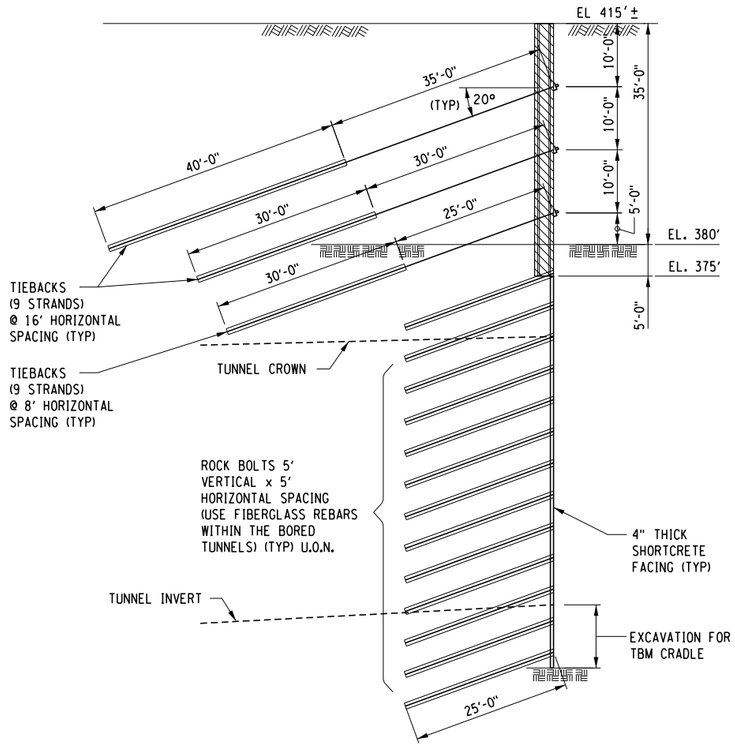
AS-BUILT REVISIONS DESCRIPTION OF ALTERATIONS:	I-81 TUNNEL COUNTY: ONONDAGA COUNTY, NY REGION: 3	PIN 3501.60	BRIDGES	CULVERTS	ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED SEGMENTAL LINER JOINT DETAILS	CONTRACT NUMBER DRAWING NO. TS-1207 SHEET NO. 28 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

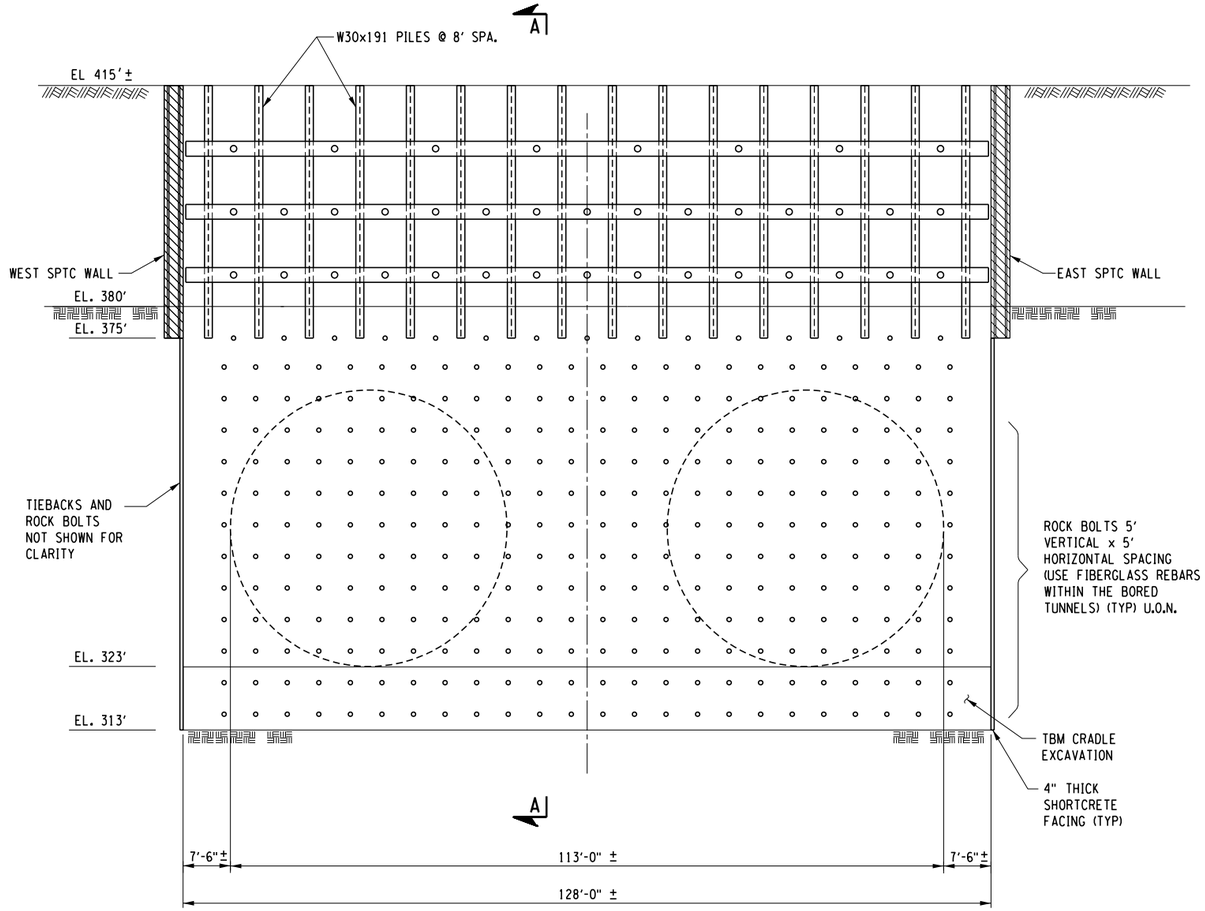
PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

c:øpw_workingønewyorkøp00300910ødms435740TS-1207 SEGMENTAL LINER JOINT DETAILS.dgn



SECTION A-A
STA. 28+00

0 3 6 9 12 FT



SOUTH SIDE LAUNCH WALL SOE ELEVATION
STA. 28+00

0 3 6 9 12 FT

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SOUTH LAUNCH WALL
SECTION AND DETAILS

CONTRACT NUMBER

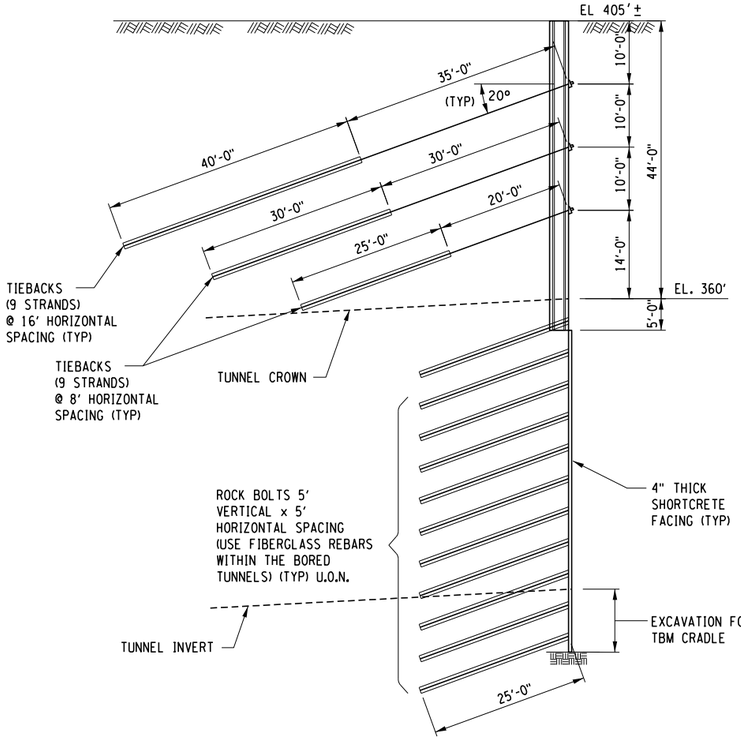
DRAWING NO. TS-1208

SHEET NO. 29 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

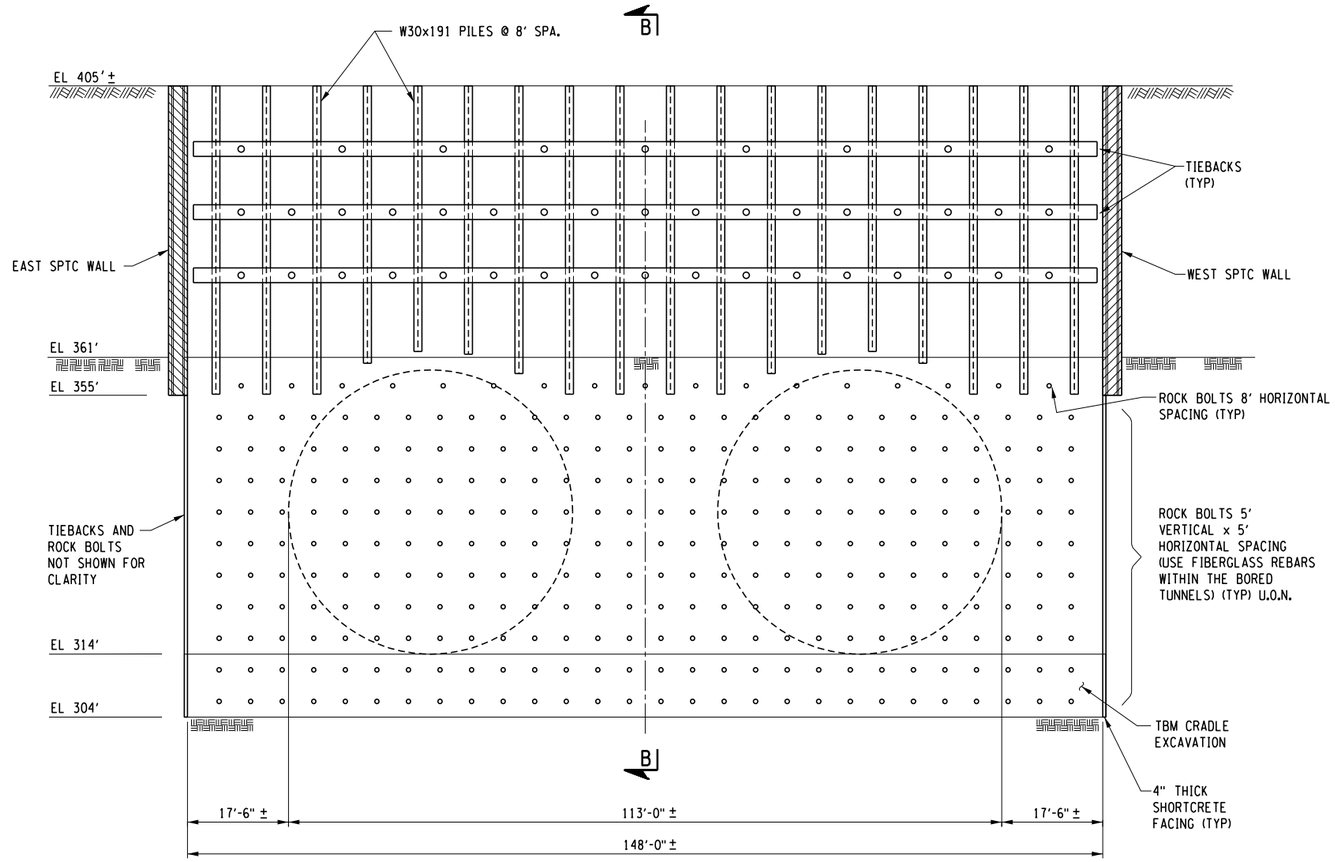
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

c:øpw_workingønewyorkøp001775bødms43574øTS-1208 SOUTH LAUNCH WALL SECTION & DETAILS.dgn



SECTION B-B
STA. 82+50

0 3 6 9 12 FT



NORTH SIDE LAUNCH WALL SOE ELEVATION
STA. 82+50

0 3 6 9 12 FT

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 TUNNEL

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

CONTRACT NUMBER

NORTH LAUNCH WALL
SECTION AND DETAILS

DRAWING NO. TS-1209

SHEET NO. 30 OF 30

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

c:\pw_working\newyork\p001775b\dms43574\TS-1209 NORTH LAUNCH WALL SECTION & DETAILS.dgn

13.5: Conceptual Tunnel Systems Plans, Sections and Elevations

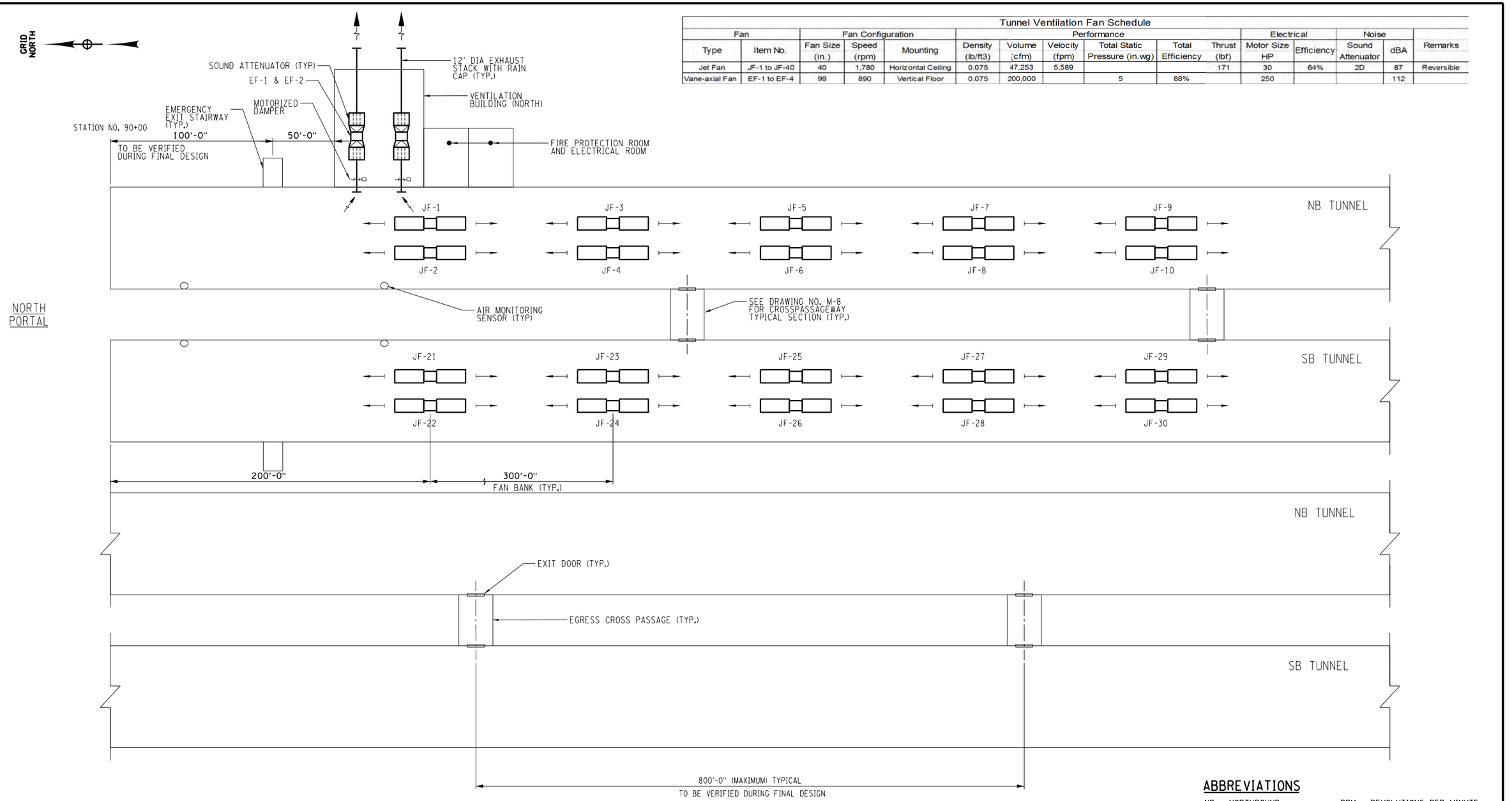
Tunnel Mechanical, Drainage & Ventilation Plans

Tunnel Electrical Plans

Tunnel Lighting Plans

Tunnel Ventilation Fan Schedule

Fan		Fan Configuration			Performance						Electrical		Noise		
Type	Item No.	Fan Size (in.)	Speed (rpm)	Mounting	Density (lb/ft3)	Volume (cfm)	Velocity (fpm)	Total Static Pressure (in.wg)	Total Efficiency	Thrust (lbf)	Motor Size HP	Efficiency	Sound Attenuator	dBA	Remarks
Jet Fan	JF-1 to JF-40	40	1,780	Horizontal Ceiling	0.075	47,253	5,589			171	30	64%	2D	87	Reversible
Vane-axial Fan	EF-1 to EF-4	99	890	Vertical Floor	0.075	200,000		5	88%		250			112	



ABBREVIATIONS

NB - NORTHBOUND
SB - SOUTHBOUND
TYP - TYPICAL
DIA - DIAMETER
In - INCHES
Lbs - POUNDS
Lbsf - POUNDS FORCE
Ft3 - CUBIC FOOT
In Wg - INCHES WATER GAUGE
RPM - REVOLUTIONS PER MINUTE
CFM - CUBIC FEET PER MINUTE
FPM - FEET PER MINUTE
DBA - DECIBELS SCALE

TUNNEL VENTILATION SYSTEM SCHEMATIC-1

NOT TO SCALE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TUNNEL VENTILATION SYSTEM SCHEMATIC-1

CONTRACT NUMBER

DRAWING NO. M-1

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

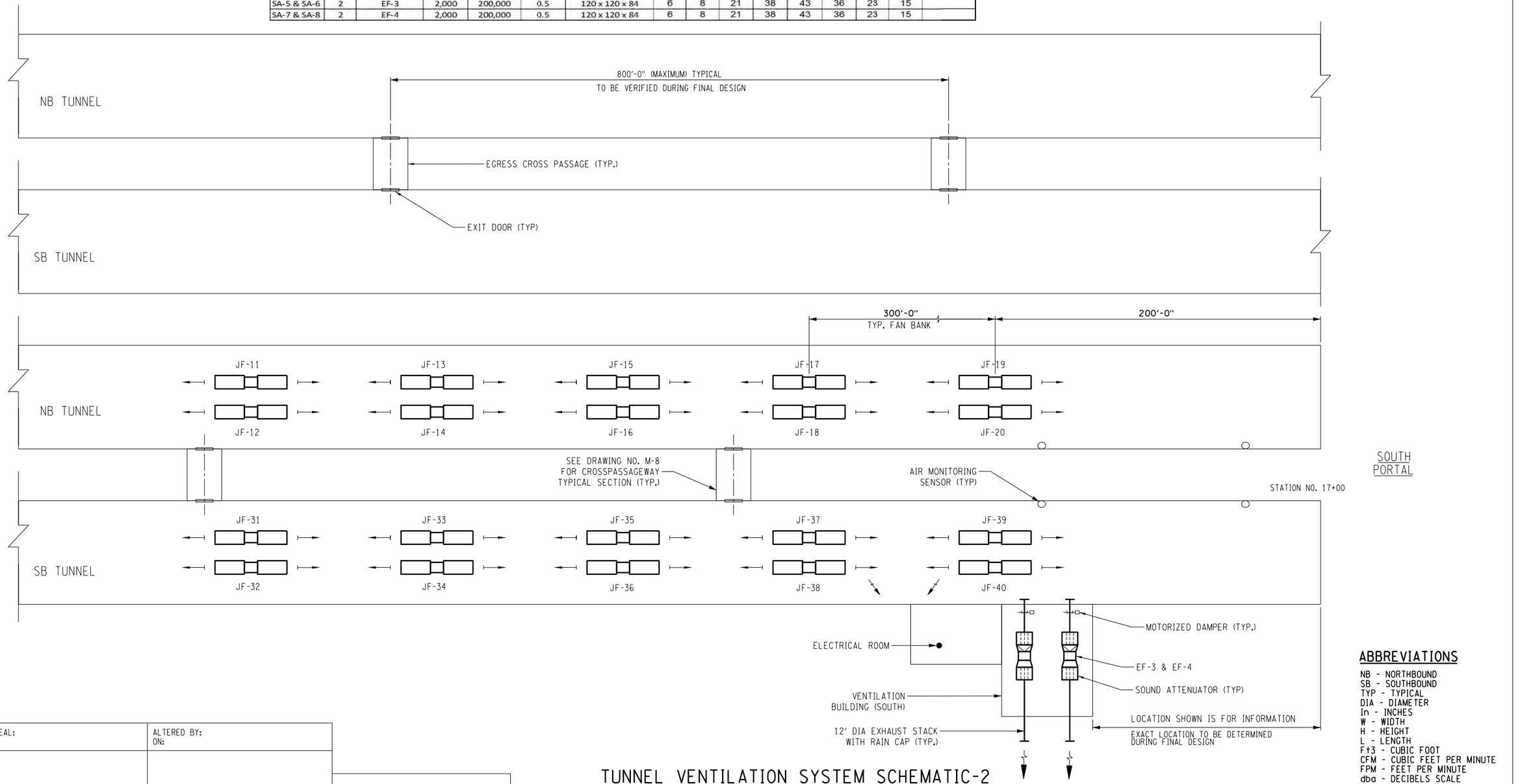
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYTIME01234567
USER = DGN$USERNAME

GRID NORTH

Sound Attenuator Schedule															
Item No.	QTY	Equipment Service	Max. Face Velocity (fpm)	Dynamic Insertion Loss in dB's (Octavc Band, HZ) Air Capacity (cfm)	Max PD (in)	Overall Dimension W x H x L (in)	63	125	250	500	1K	2K	4K	8K	Remarks
SA-1 & SA-2	2	EF-1	2,000	200,000	0.5	120 x 120 x 84	6	8	21	38	43	36	23	15	
SA-3 & SA-4	2	EF-2	2,000	200,000	0.5	120 x 120 x 84	6	8	21	38	43	36	23	15	
SA-5 & SA-6	2	EF-3	2,000	200,000	0.5	120 x 120 x 84	6	8	21	38	43	36	23	15	
SA-7 & SA-8	2	EF-4	2,000	200,000	0.5	120 x 120 x 84	6	8	21	38	43	36	23	15	



ABBREVIATIONS

NB - NORTHBOUND
SB - SOUTHBOUND
TYP - TYPICAL
DIA - DIAMETER
In - INCHES
W - WIDTH
H - HEIGHT
L - LENGTH
Ft3 - CUBIC FOOT
CFM - CUBIC FEET PER MINUTE
FPM - FEET PER MINUTE
dba - DECIBELS SCALE

TUNNEL VENTILATION SYSTEM SCHEMATIC-2

NOT TO SCALE

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = DGN$SPEC01234567890123456789012345678901234
DATE/TIME = DGN$SYSTIME01234567
USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TUNNEL VENTILATION SYSTEM SCHEMATIC-2

CONTRACT NUMBER

DRAWING NO. M-2

SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

GRID NORTH

82 FEET PER FIRE ZONE LENGTH, TOTAL 89 FIRE ZONES PER TUNNEL

NB TUNNEL — 89 FIRE ZONES

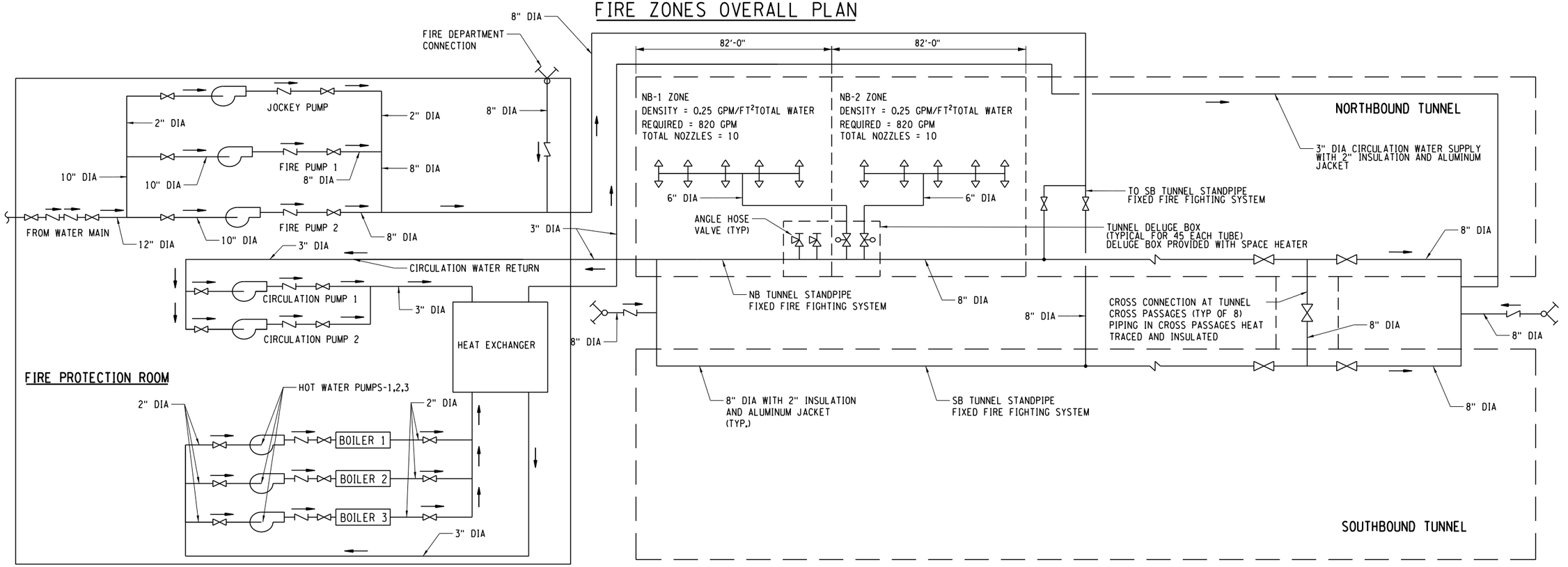
NORTH PORTAL

EGRESS CROSS PASSAGE (TYP.)

SB TUNNEL — 89 FIRE ZONES

SOUTH PORTAL

FIRE ZONES OVERALL PLAN



ABBREVIATIONS

NB - NORTHBOUND
SB - SOUTHBOUND
TYP - TYPICAL
DIA - DIAMETER
In - INCHES
FT2 - SQUARE FOOT
GPM - GALLONS PER MINUTER
QTY - QUANTITY
HP - HORSEPOWER
KW - KILOWATTS

TUNNEL FIRE SUPPRESSION SYSTEM SCHEMATIC

NOT TO SCALE

Tunnel Fire Suppression System Equipment Power Load

Equipment	Location	QTY	Power Load HP	Power Load KW	Remarks
Fire Pump	Fire Protection Room	2	500 / each		one-duty, one-standby
Jockey Pump	Fire Protection Room	1	5		
Circulation Pump	Fire Protection Room	2	7-1/2 / each		
Hot Water Pump	Fire Protection Room	3	1		two-duty, one-standby
Boiler	Fire Protection Room	3		175	two-duty, one-standby
HVAC	Fire Protection Room	1		150	

LEGEND

- SHUT-OFF VALVE
- DELUGE VALVE
- SPRAY NOZZLE
- CHECK VALVE
- FIRE DEPARTMENT CONNECTION
- FIRE HOSE VALVE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

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TUNNEL FIRE SUPPRESSION SYSTEM SCHEMATIC

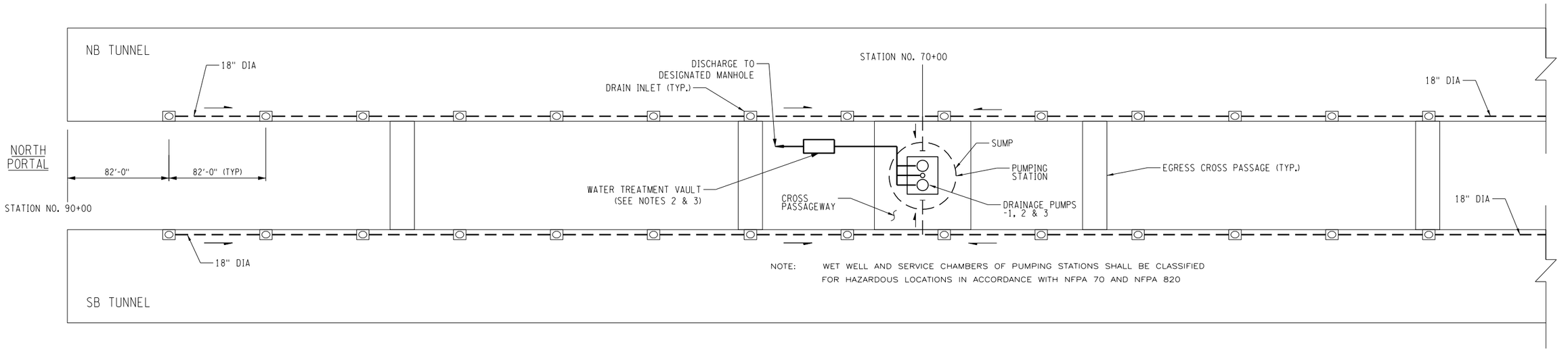
CONTRACT NUMBER

DRAWING NO. M-3
SHEET NO.

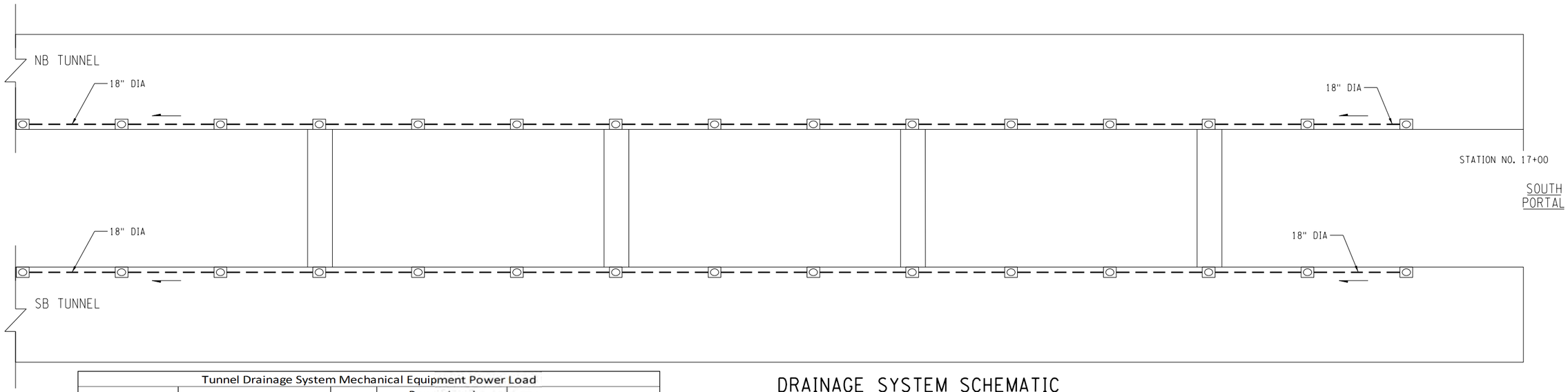
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

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NOTE: WET WELL AND SERVICE CHAMBERS OF PUMPING STATIONS SHALL BE CLASSIFIED FOR HAZARDOUS LOCATIONS IN ACCORDANCE WITH NFPA 70 AND NFPA 820



Tunnel Drainage System Mechanical Equipment Power Load					
Equipment	Location	QTY	Power Load		Remarks
			HP	KW	
Drainage Pump	Tunnel Pumping Station	1	5		
Drainage Pump	Tunnel Pumping Station	2	125 / each		one-duty, one-standby

DRAINAGE SYSTEM SCHEMATIC

NOT TO SCALE

ABBREVIATIONS

NB - NORTHBOUND
SB - SOUTHBOUND
TYP - TYPICAL
DIA - DIAMETER
HP - HORSEPOWER
KW - KILOWATTS
QTY - QUANTITY

NOTES:

1. WET WELL AND SERVICE CHAMBERS OF PUMPING STATIONS SHALL BE CLASSIFIED FOR HAZARDOUS LOCATIONS IN ACCORDANCE WITH NFPA 70 AND NFPA 820
2. PROVIDE SEPARATOR AND STORAGE TANK IN ACCORDANCE WITH LOCAL JURISDICTIONAL REQUIREMENTS
3. PROVIDE HYDROCARBON MONITORING SYSTEM

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

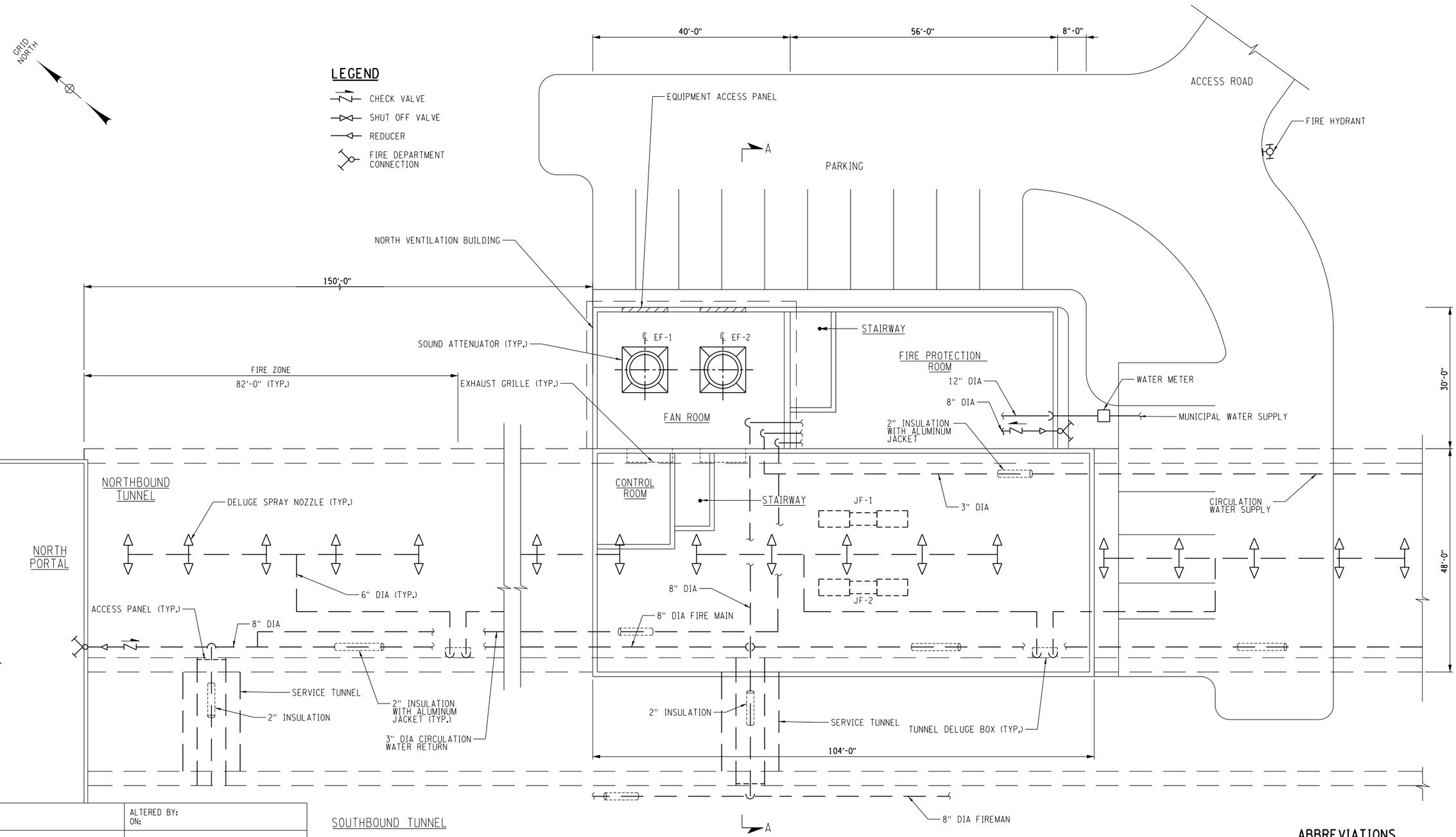
TUNNEL DRAINAGE SYSTEM SCHEMATIC

CONTRACT NUMBER

DRAWING NO. M-4
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation



PARTIAL PLAN

NOT TO SCALE

ABBREVIATIONS

TYP - TYPICAL
DIA - DIAMETER

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

NORTH VENTILATION BUILDING
PARTIAL PLAN-MECHANICAL

CONTRACT NUMBER

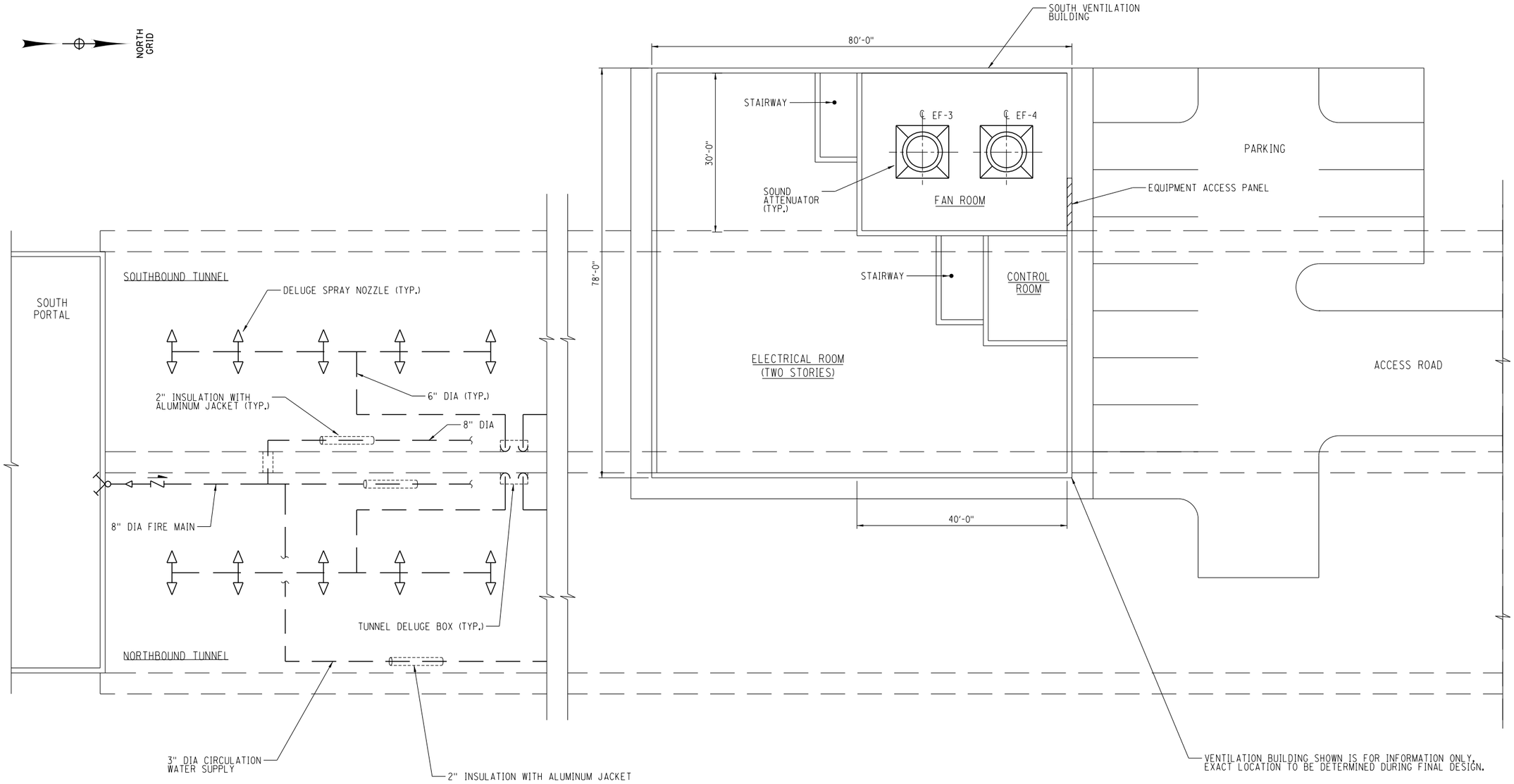
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SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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PARTIAL PLAN

NOT TO SCALE

LEGEND

- CHECK VALVE
- SHUT OFF VALVE
- REDUCER
- FIRE DEPARTMENT CONNECTION

ABBREVIATIONS

TYP - TYPICAL
DIA - DIAMETER

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

SOUTH VENTILATION BUILDING
PARTIAL PLAN-MECHANICAL

CONTRACT NUMBER

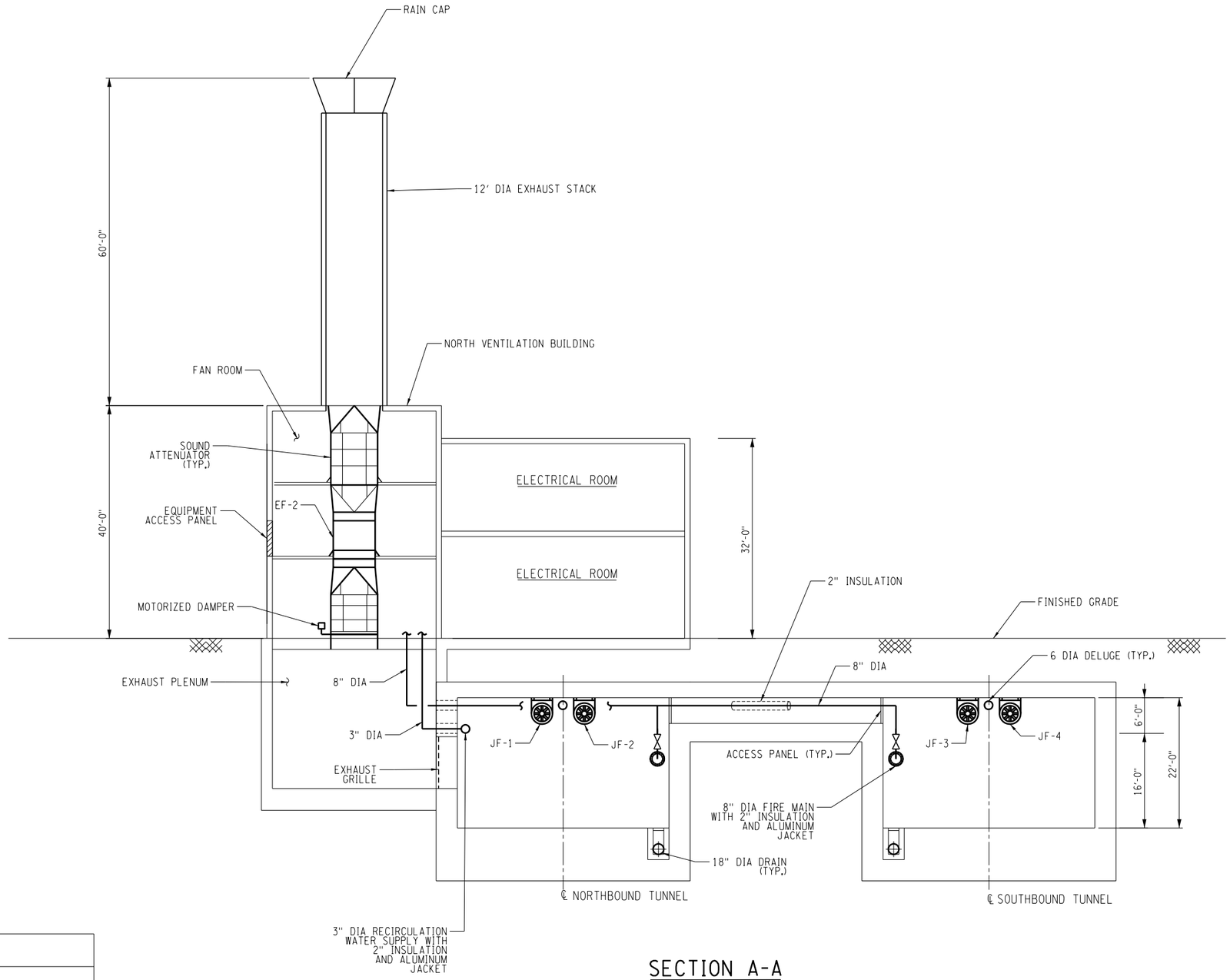
DRAWING NO. M-6
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DESIGN
JOB MANAGER
DESIGN SUPERVISOR

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DATE/TIME = DGN$SYTIME01234567
USER = DGN$USERNAME



SECTION A-A
NOT TO SCALE

ABBREVIATIONS

TYP - TYPICAL
DIA - DIAMETER

PROJECT MANAGER H. UNGAR
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DRAFTING
DESIGN
CHECK
JOB MANAGER
DESIGN SUPERVISOR

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USER = DGN$USERNAME

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

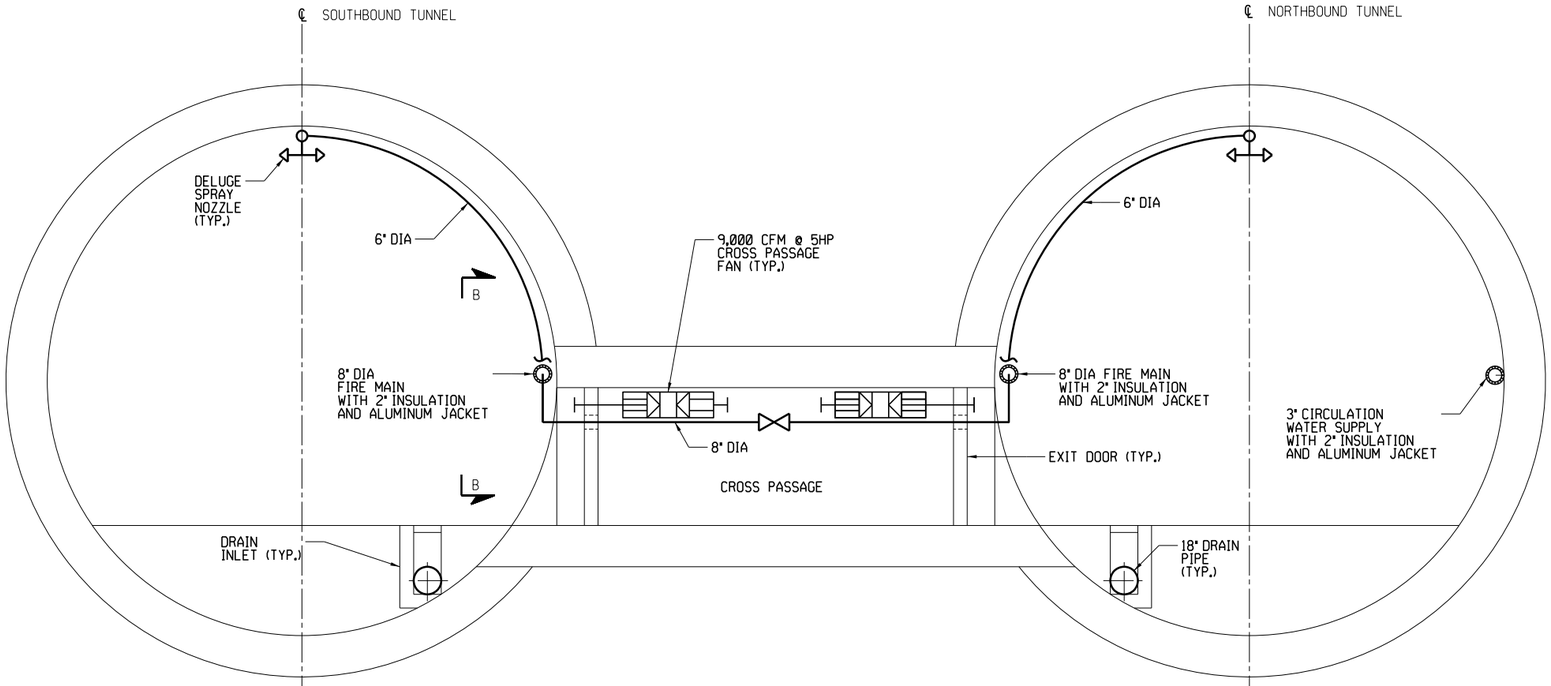
NORTH VENTILATION BUILDING
SECTION-MECHANICAL

CONTRACT NUMBER

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SHEET NO.

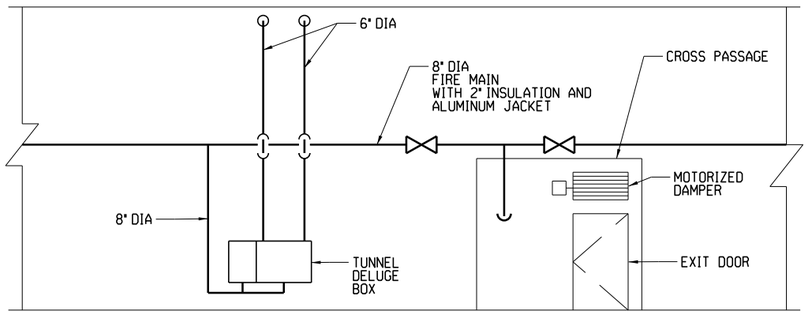
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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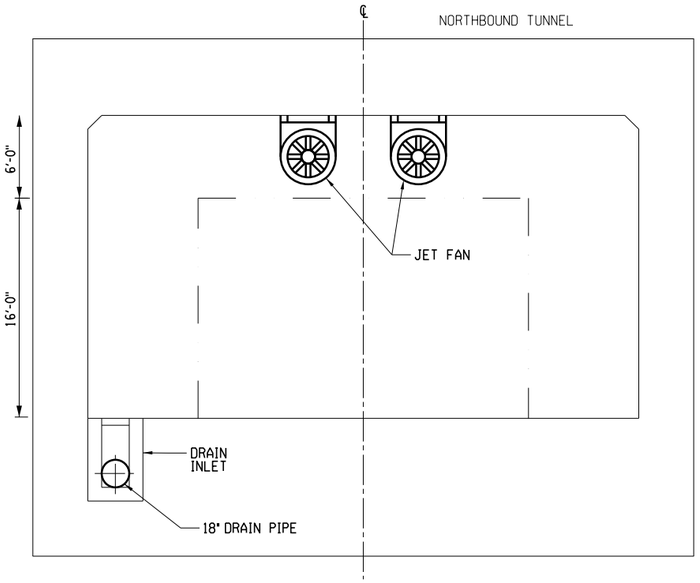
CROSS PASSAGE-TYPICAL SECTION

NOT TO SCALE



SECTION B-B

NOT TO SCALE



TYPICAL CUT AND COVER TUNNEL SECTION

NOT TO SCALE

ABBREVIATIONS

TYP - TYPICAL
DIA - DIAMETER
CFM - CUBIC FEET PER MINUTE
HP - HORSEPOWER

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TYPICAL TUNNEL SECTIONS-1

CONTRACT NUMBER

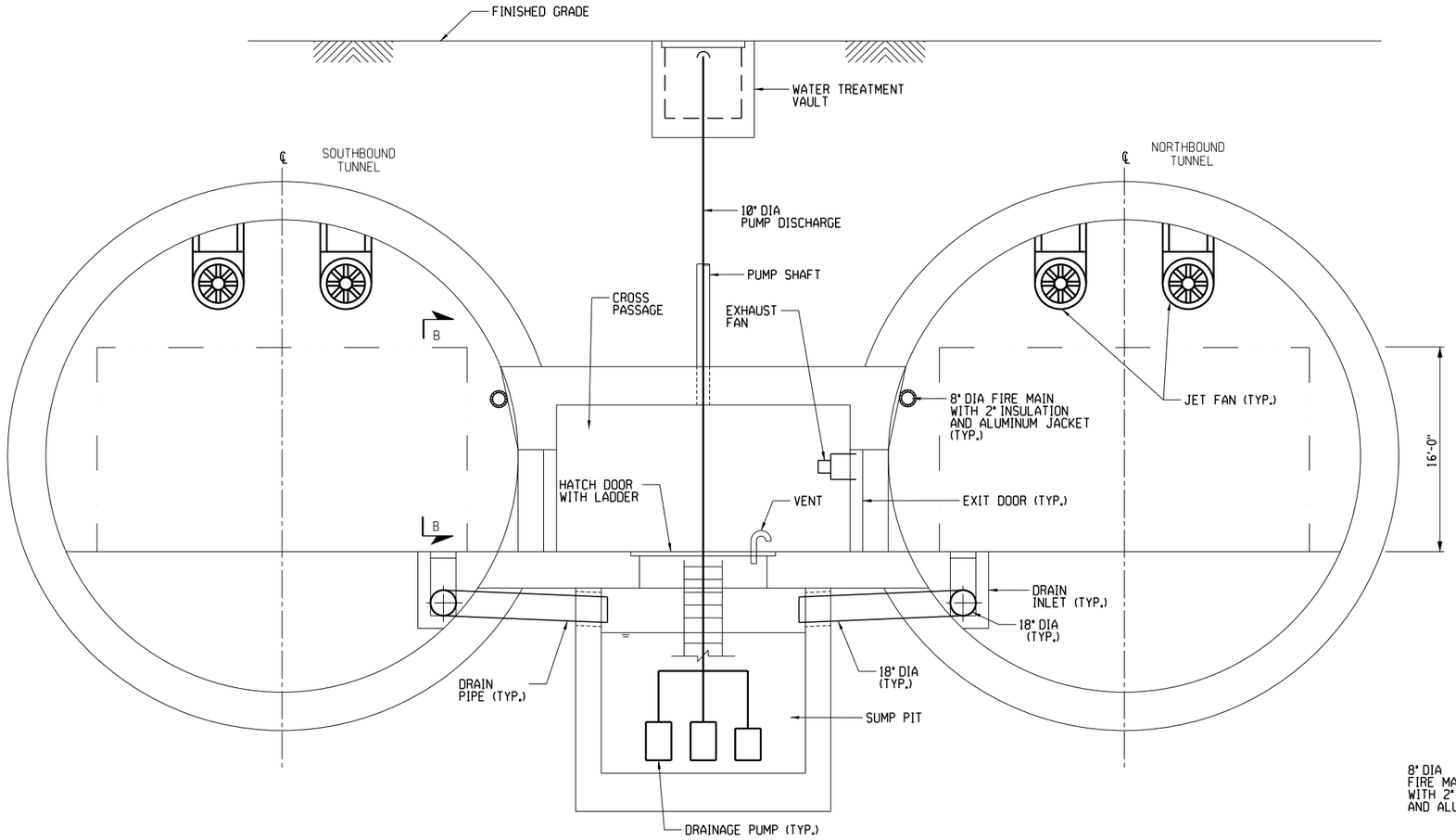
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SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

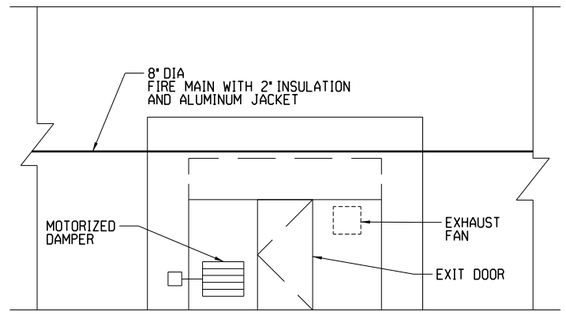
PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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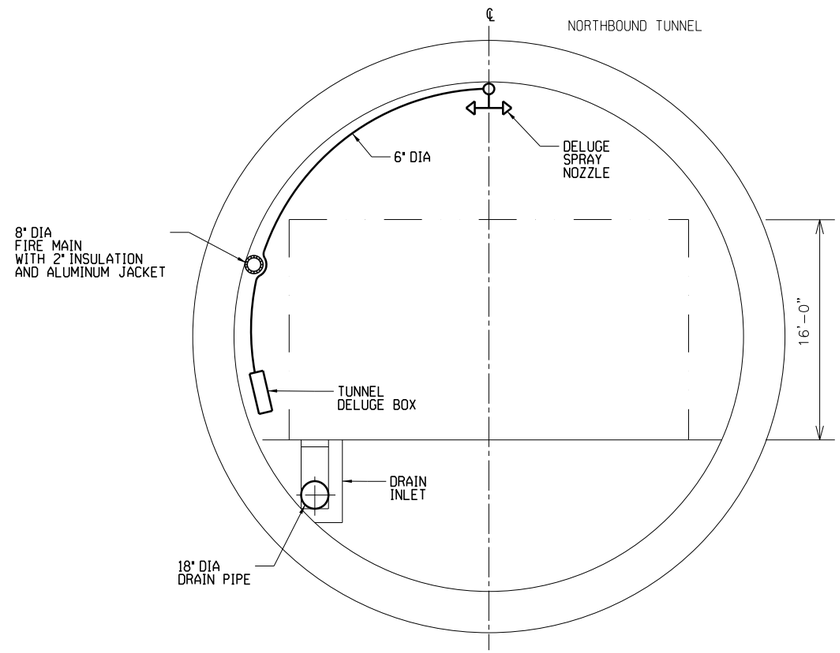
CROSSPASSAGE/SUMP SECTION

NOT TO SCALE



SECTION B-B

NOT TO SCALE



BORED TUNNEL SECTION

NOT TO SCALE

ABBREVIATIONS

TYP - TYPICAL
DIA - DIAMETER

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN **3501.60**

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TYPICAL TUNNEL SECTIONS-2

CONTRACT NUMBER

DRAWING NO. M-9

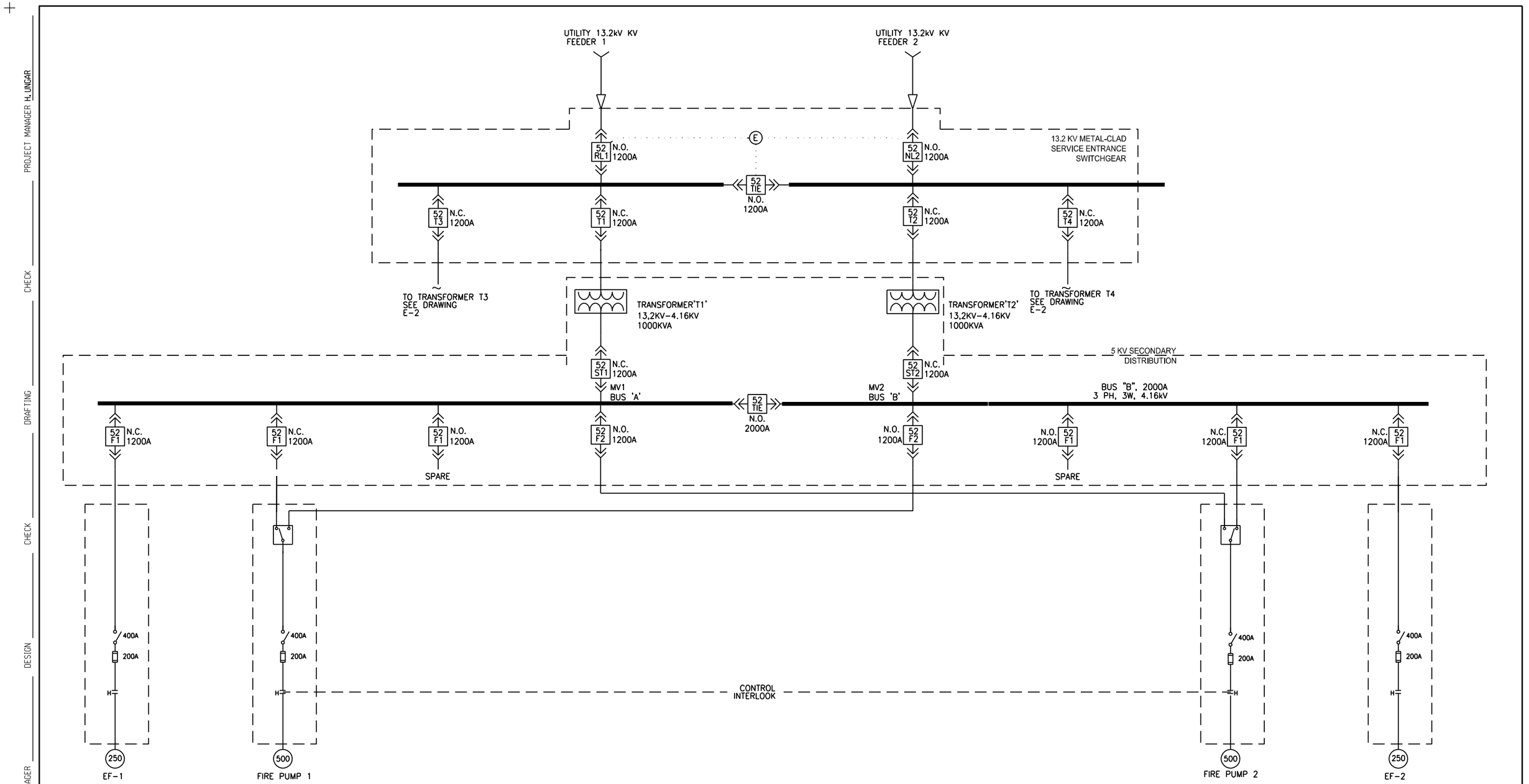
SHEET NO.

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NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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JOB MANAGER
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PROJECT MANAGER H. UNGAR
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JOB MANAGER
DESIGN SUPERVISOR

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DATE/TIME = 8/31/2018
USER = p0009882

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

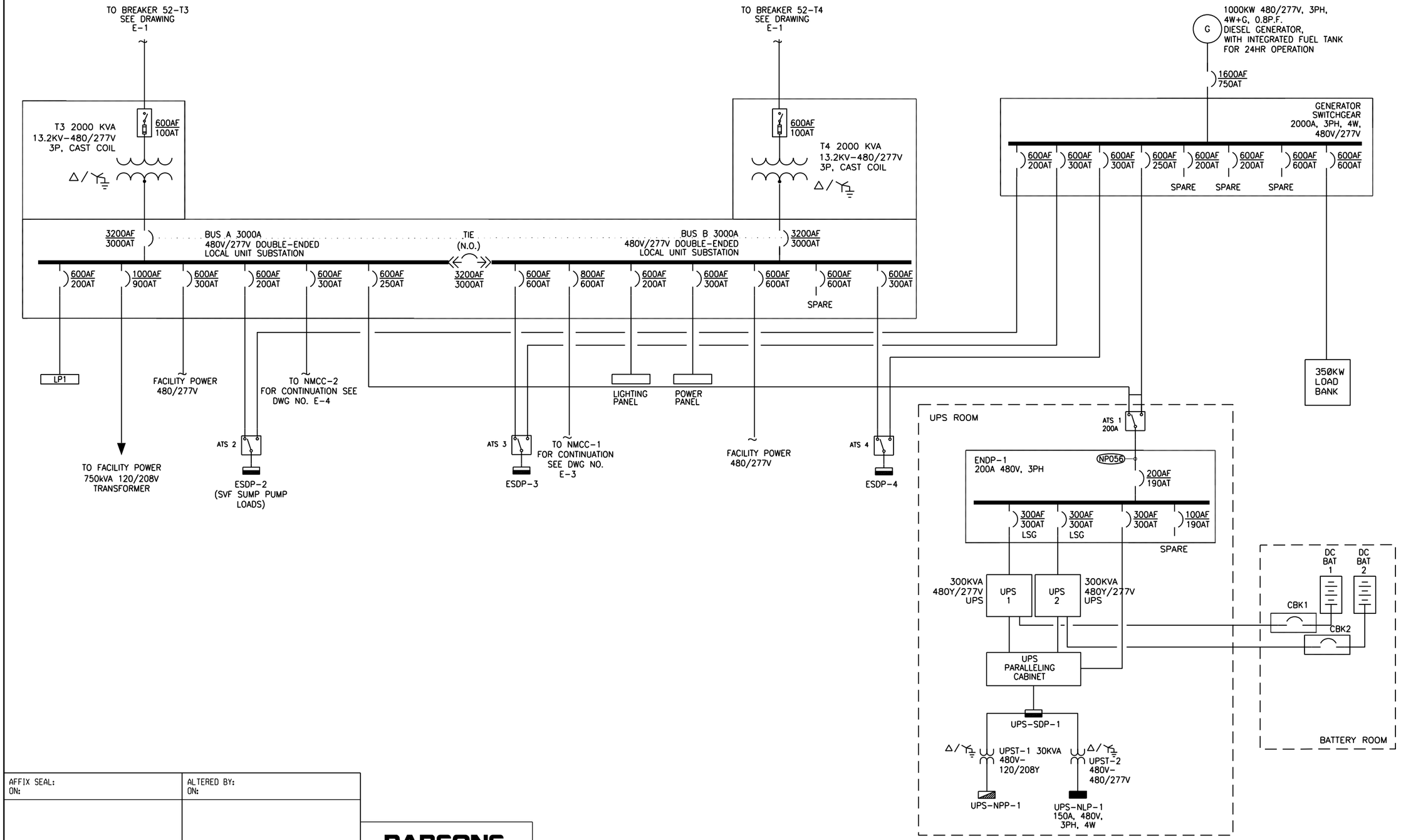
NORTH VENTILATION FACILITY
ELECTRICAL SERVICE SUBSTATION
ONE LINE DIAGRAM
SHEET 1

CONTRACT NUMBER

DRAWING NO. E-1
SHEET NO.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION 'ALTERED BY' FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

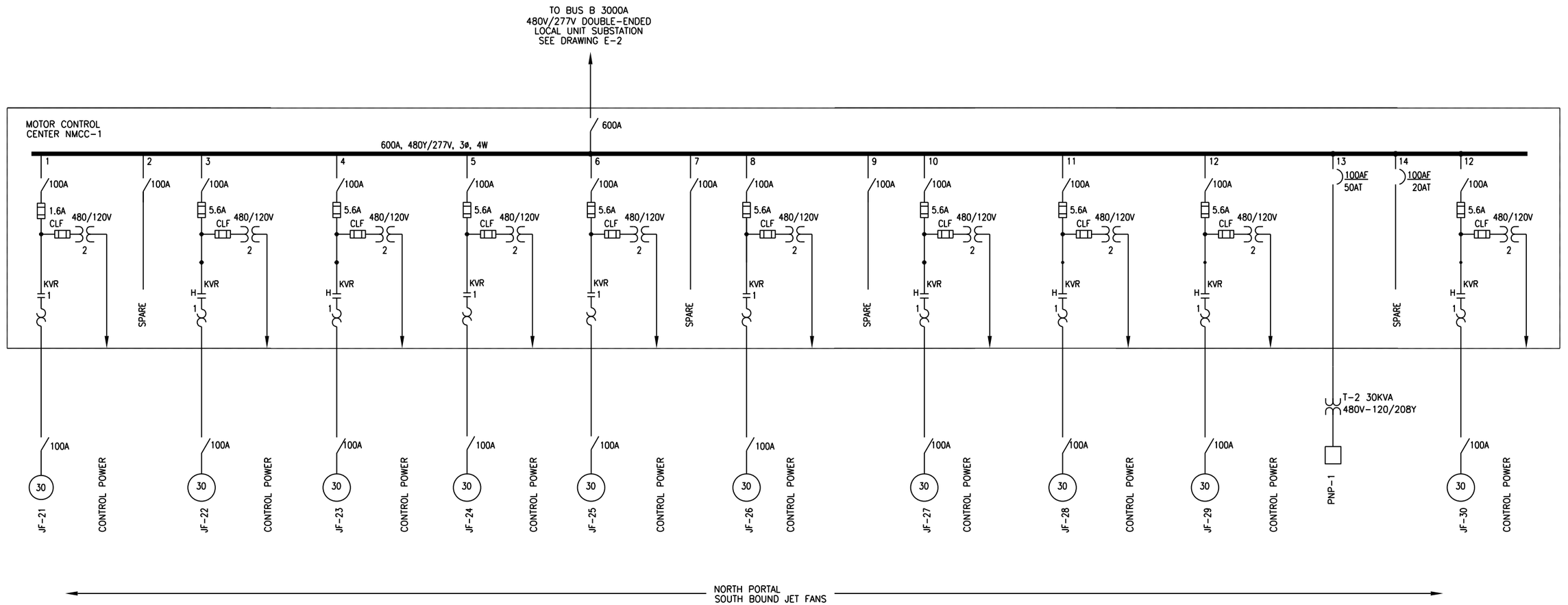
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					NORTH VENTILATION FACILITY DOUBLE-ENDED SUBSTATION ONE LINE DIAGRAM SHEET 2	DRAWING NO. E-2 SHEET NO.
	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
CHECK
DRAFTING
CHECK
DESIGN
JOB MANAGER
DESIGN SUPERVISOR

FILE NAME = \\Nynew01fs01\projects\647xxx\647875\I-81_Markups\1-CAD\350160_cph_Elec_altT_H10_E-2.dgn
DATE/TIME = 8/31/2018
USER = p0009882



AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

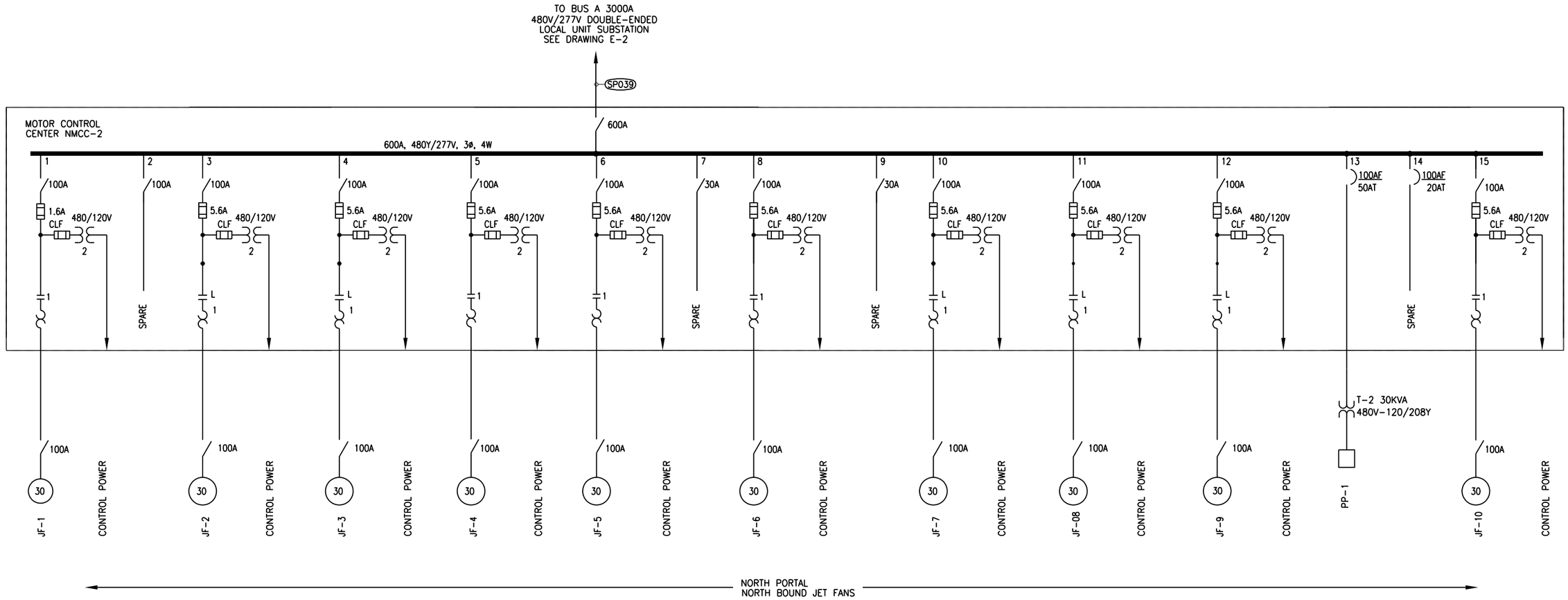
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IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION 'ALTERED BY' FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

PROJECT MANAGER H. UNGAR
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DRAFTING
CHECK
JOB MANAGER
DESIGN
DESIGN SUPERVISOR

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DATE/TIME = 8/31/2018
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PARSONS

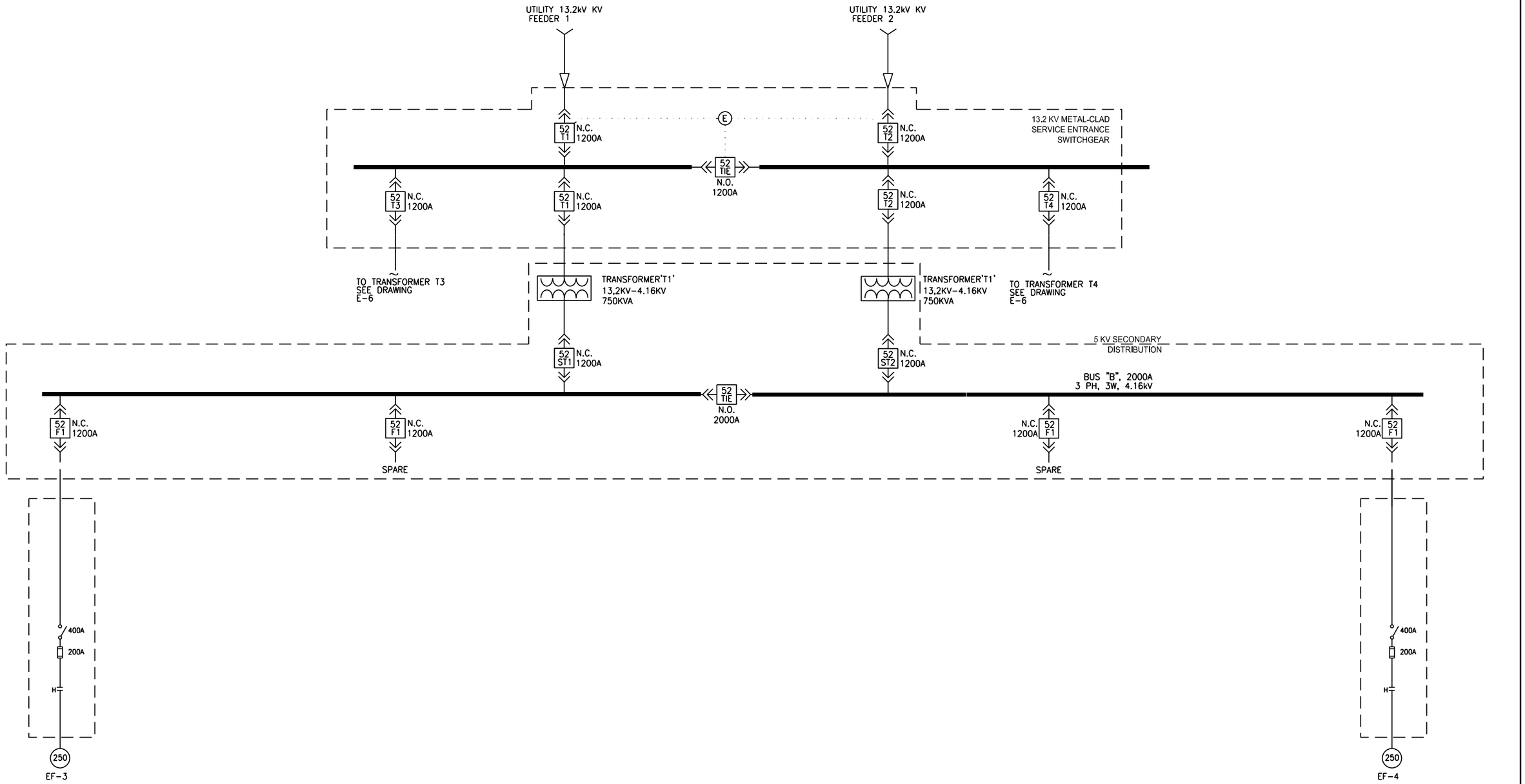
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

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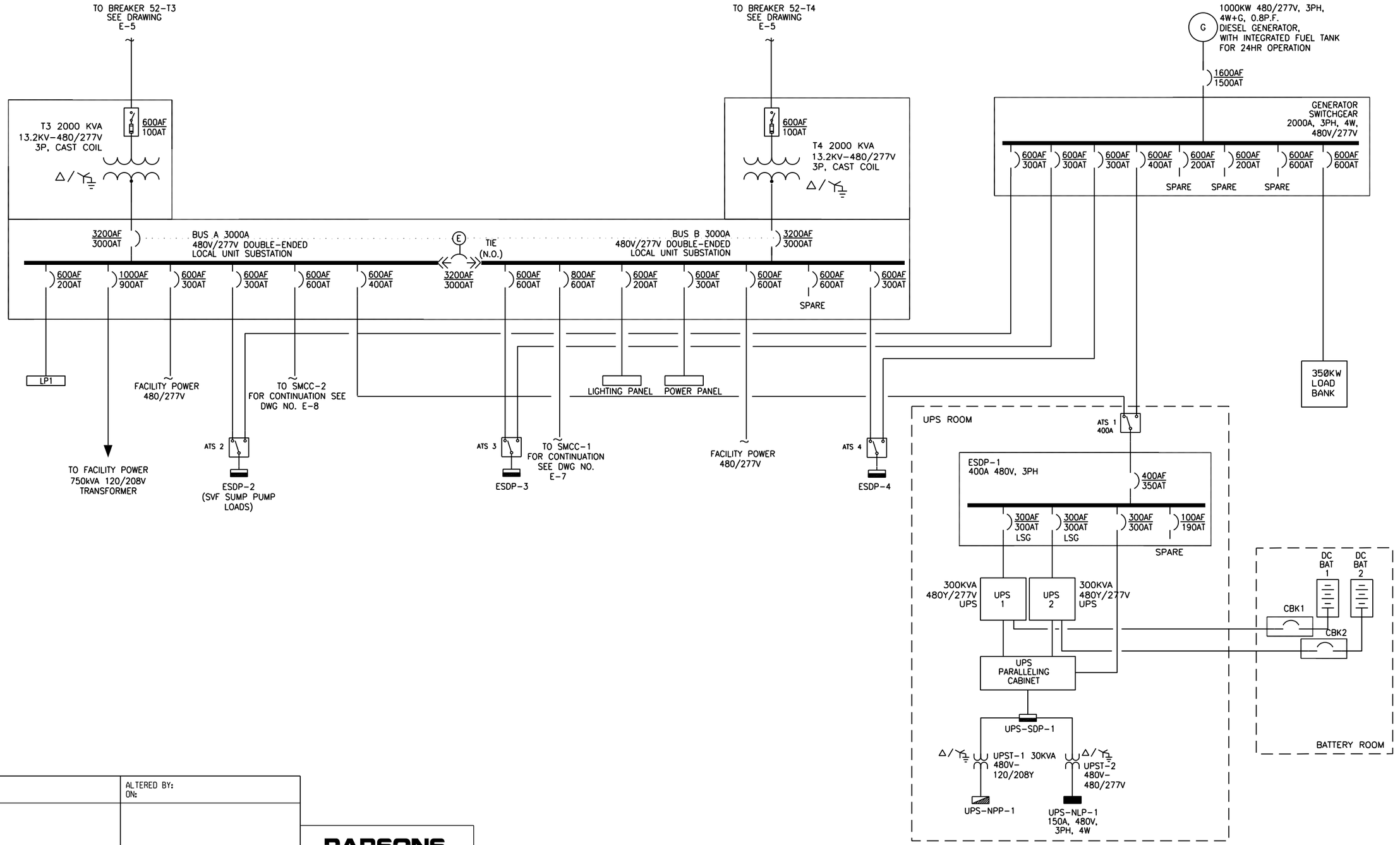
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					SOUTH VENTILATION FACILITY ELECTRICAL SERVICE SUBSTATION ONE LINE DIAGRAM SHEET 5	DRAWING NO. E-5 SHEET NO.
	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

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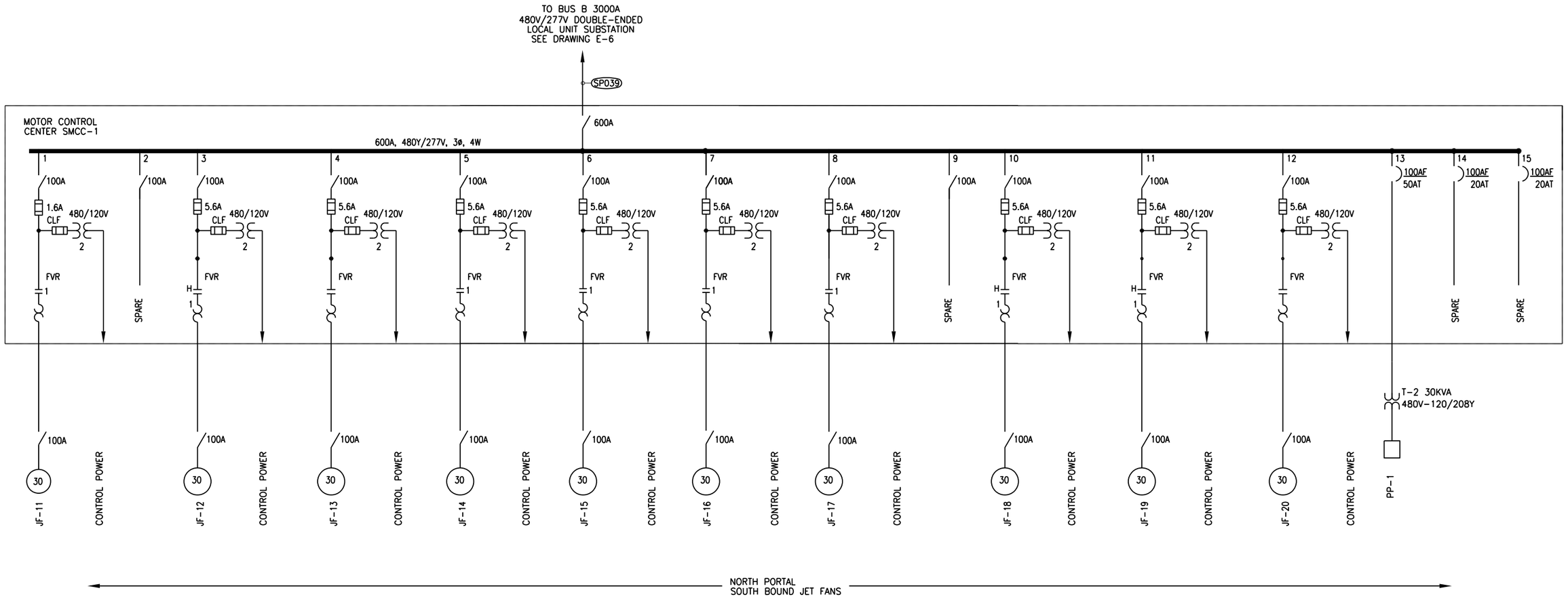
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3					

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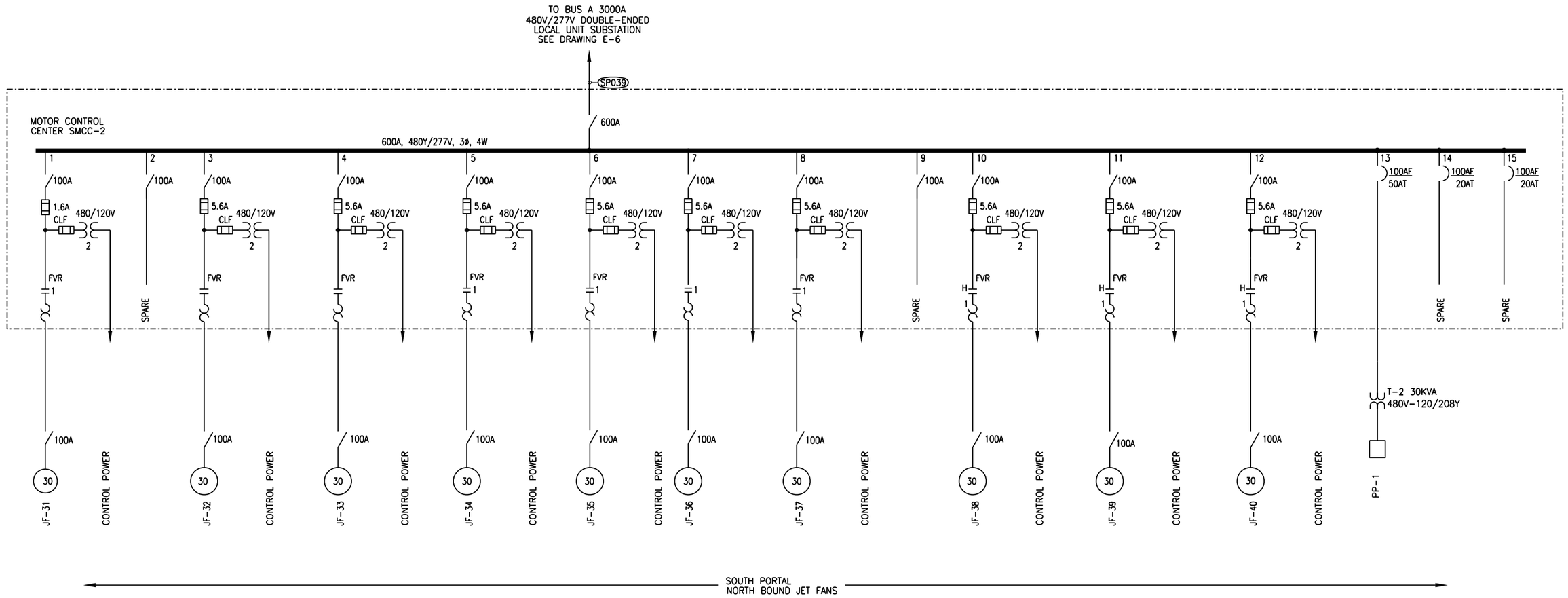
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USER = p0009882



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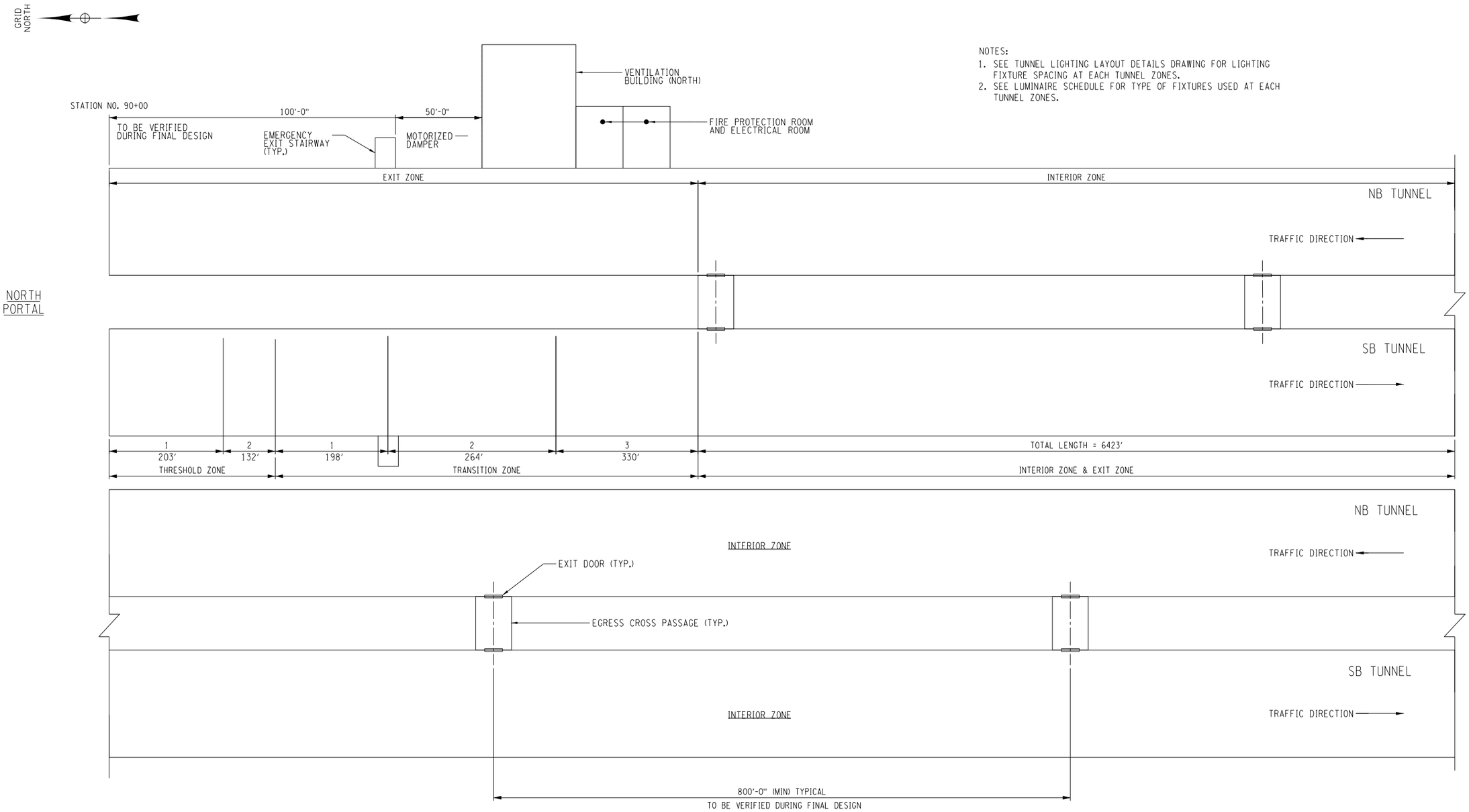
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DATE/TIME = 8/31/2018
USER = p0009882



NOTES:
1. SEE TUNNEL LIGHTING LAYOUT DETAILS DRAWING FOR LIGHTING FIXTURE SPACING AT EACH TUNNEL ZONES.
2. SEE LUMINAIRE SCHEDULE FOR TYPE OF FIXTURES USED AT EACH TUNNEL ZONES.

TUNNEL LIGHTING LAYOUT SCHEMATIC-1

NOT TO SCALE

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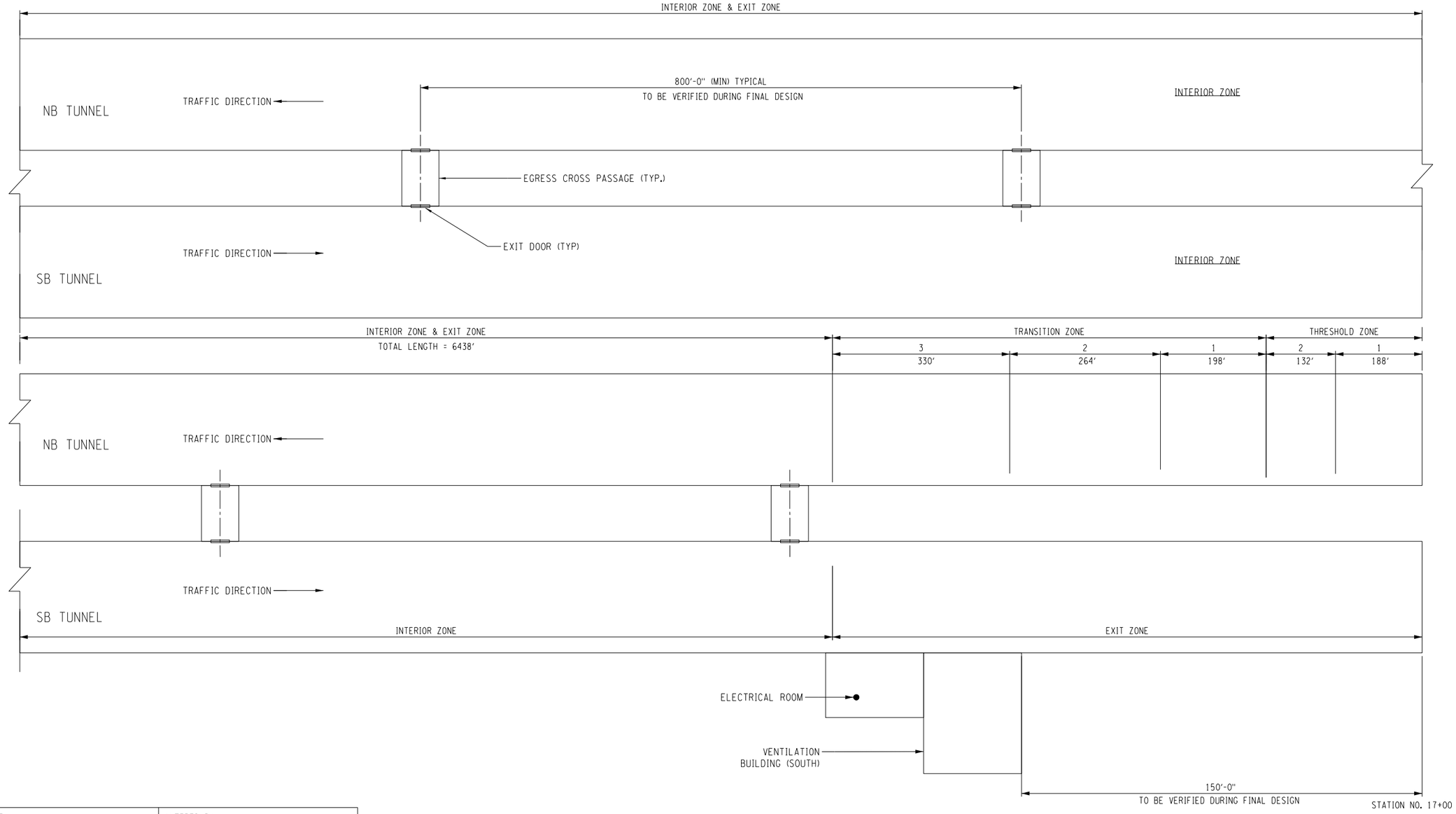
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	COUNTY: ONONDAGA COUNTY, NY REGION: 3				TUNNEL LIGHTING LAYOUT SCHEMATIC-1	DRAWING NO. TL-1 SHEET NO.

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NOTES:
1. SEE TUNNEL LIGHTING LAYOUT DETAILS DRAWING FOR LIGHTING FIXTURE SPACING AT EACH TUNNEL ZONES.
2. SEE LUMINAIRE SCHEDULE FOR TYPE OF FIXTURES USED AT EACH TUNNEL ZONES.

GRID NORTH



TUNNEL LIGHTING LAYOUT SCHEMATIC-2

NOT TO SCALE

AFFIX SEAL: ON:	ALTERED BY: ON:

PARSONS

AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

ALL DIMENSIONS IN FT UNLESS OTHERWISE NOTED

TUNNEL LIGHTING LAYOUT SCHEMATIC-2

CONTRACT NUMBER

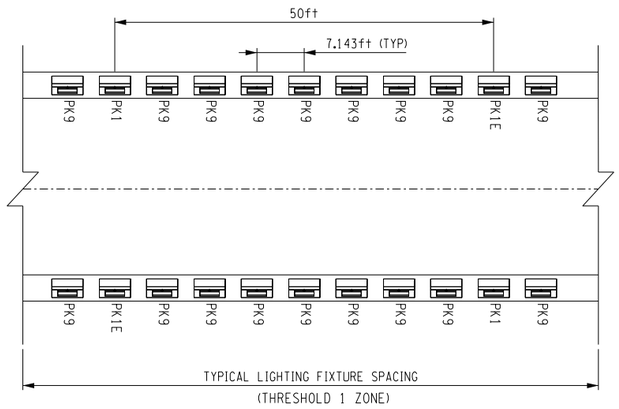
DRAWING NO. TL-2
SHEET NO.

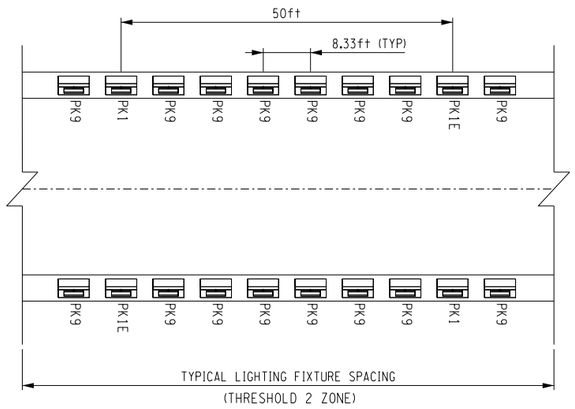
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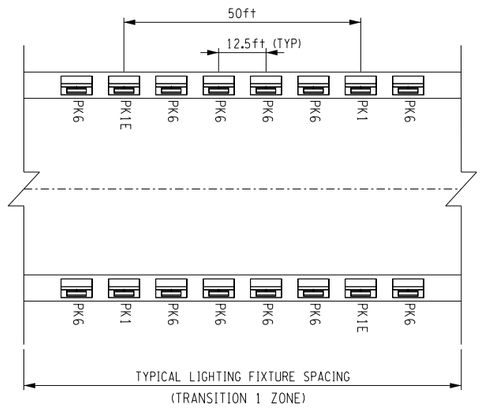
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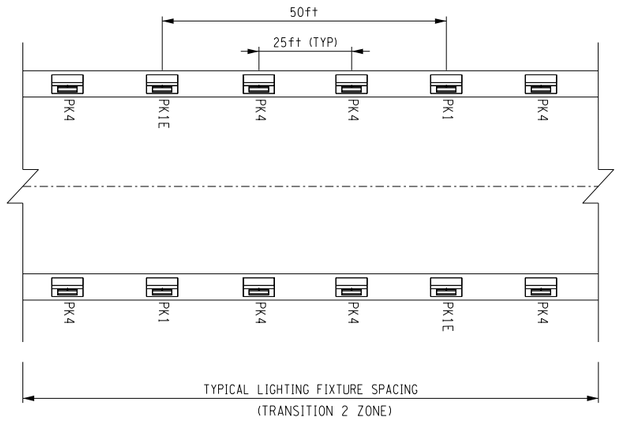
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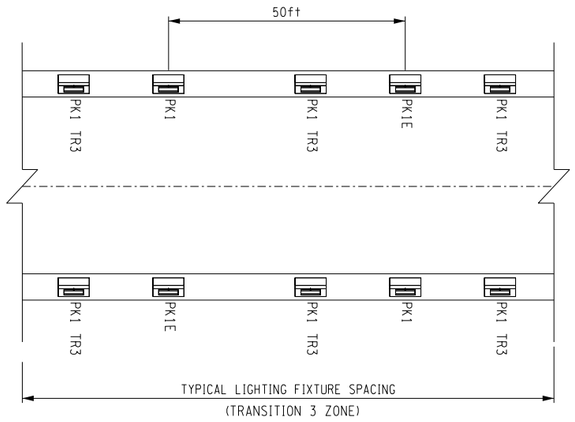
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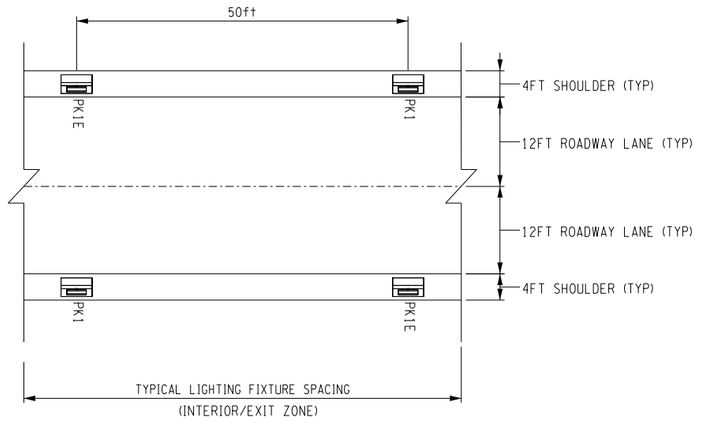












TUNNEL LIGHTING LAYOUT DETAILS

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Luminaire Schedule
Scene: DAY

Symbol	Qty	Label	Arrangement	LLF	Description	Manufacturer	Lum. Watts	Lum. Lumens
	88	PK9	SINGLE	0.702	TNLEDMED PK9 40K WCR 100K HRS	HOLOBHANE	312	34925
	31	PK1	SINGLE	0.765	TNLEDMED PK1 40K WCR AT 100K HRS	HOLOBHANE	57	7020
	31	PK1 E	SINGLE	0.765	TNLEDMED PK1 40K WCR AT 100K HRS	HOLOBHANE	57	7020
	32	PK6	SINGLE	0.729	TNLEDMED PK6 40K WCR AT 100K HRS	HOLOBHANE	182	20237
	12	PK1 TR3	SINGLE	0.765	TNLEDMED PK1 40K WCR AT 100K HRS	HOLOBHANE	57	7020
	20	PK4	SINGLE	0.729	TNLEDMED PK4 40K XXXXX WCR	HOLOBHANE	125	15419

NOTES:
1. FOR FIXTURE DESIGNATION, SEE LUMINAIRE SCHEDULE LABEL FOR FIXTURE DESCRIPTION.

AFFIX SEAL: ON:	ALTERED BY: ON:

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AS-BUILT REVISIONS
DESCRIPTION OF ALTERATIONS:

I-81 VIADUCT

COUNTY: ONONDAGA COUNTY, NY REGION: 3

PIN 3501.60

BRIDGES

CULVERTS

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TUNNEL LIGHTING LAYOUT DETAILS

CONTRACT NUMBER

DRAWING NO. TL-3

SHEET NO.

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Part 2: Transportation Considerations

14. TRAFFIC ANALYSES

Traffic analyses of the Orange tunnel concept were performed using the SMTC Regional Travel Demand Model and the VISSIM microsimulation model developed for the Project. The SMTC model was used to identify travel pattern changes that would be induced by the Orange tunnel concept, while the VISSIM model was used to assess performance of the transportation system under the Orange tunnel concept. Details of the I-81 Viaduct Project modeling process and model development are included in Chapter 5 and Appendix C-2 of the DDR/DEIS. Several traffic performance measures were used for the analyses of the Orange tunnel concept, including origin-destination (O-D) travel times, traffic volumes, freeway level of service, intersection level of service, and system-wide safety. These performance measures were used to compare the Orange tunnel concept with the No Build alternative for the 2050 design year.

Origin-Destination Travel Times

Travel times for key origin-destination pairs in Onondaga County were estimated using output from VISSIM traffic simulations as well as the SMTC Regional Travel Demand Model. **Table 14-1** summarizes the average travel times for trips between these origin-destination pairs during the AM and PM peak periods.

Table 14-1
No Build and Orange Tunnel Concept 2050 Peak Hour Origin-Destination Travel Times (Minutes)

Peak		AM		PM	
Origin	**Destination**	**No Build Alternative**	**Orange Tunnel Concept**	**No Build Alternative**	**Orange Tunnel Concept**
Baldwinsville	Cicero	23	23	23	23
	Destiny USA	23	24	21	22
	Downtown	22	21	21	21
	Fairmont	18	18	18	18
	Fayetteville/ Manlius	31	30	31	31
	Lafayette	33	32	32	32
	Liverpool	15	15	16	16
	St. Joseph's Hospital	23	22	21	22
	University Hill	25	25	23	22
Cicero	Baldwinsville	21	21	23	23
	Destiny USA	11	11	11	11
	Downtown	15	12	13	13
	Fairmount	21	20	22	21
	Fayetteville/ Manlius	18	17	19	18
	Lafayette	27	24	24	24
	Liverpool	13	13	13	13
	St. Joseph's Hospital	15	13	12	13
	University Hill	19	17	16	15
Destiny USA	Baldwinsville	22	23	26	27
	Cicero	10	11	11	12
	Downtown	7	7	8	9
	Fairmount	11	11	15	14
	Fayetteville/ Manlius	17	18	19	20
	Lafayette	19	19	19	21
	Liverpool	8	9	9	11
	St. Joseph's Hospital	7	8	7	9
	University Hill	11	12	11	12
Downtown	Baldwinsville	19	21	21	23
	Cicero	13	13	14	14
	Destiny USA	5	5	5	5
	Fairmount	12	14	13	15
	Fayetteville/ Manlius	14	15	16	17
	Lafayette	16	17	17	17
	Liverpool	8	9	9	10
	St. Joseph's Hospital	3	4	3	4
	University Hill	6	8	7	6

Table 14-1 (cont'd)
No Build and Orange Tunnel Concept 2050 Peak Hour
Origin-Destination Travel Times (Minutes)

Peak		AM		PM	
Origin	Destination	No Build Alternative	Orange Tunnel Concept	No Build Alternative	Orange Tunnel Concept
Fairmount	Baldwinsville	18	18	19	19
	Cicero	22	22	22	22
	Destiny USA	13	13	13	13
	Downtown	13	13	13	13
	Fayetteville/ Manlius	23	22	23	23
	Lafayette	25	23	24	23
	Liverpool	17	17	17	17
	St. Joseph's Hospital	14	14	13	14
	University Hill	17	16	15	14
Fayetteville/ Manlius	Baldwinsville	28	28	30	30
	Cicero	16	16	16	16
	Destiny USA	14	13	14	13
	Downtown	15	15	14	15
	Fairmount	21	20	22	22
	Lafayette	18	18	19	19
	Liverpool	18	17	18	18
	St. Joseph's Hospital	14	14	13	13
	University Hill	16	16	16	15
LaFayette	Baldwinsville	31	31	32	32
	Cicero	25	24	25	24
	Destiny USA	17	15	16	15
	Downtown	18	17	16	17
	Fairmount	24	23	24	24
	Fayetteville/ Manlius	18	18	18	18
	Liverpool	21	20	20	20
	St. Joseph's Hospital	19	18	16	17
	University Hill	17	18	14	15
Liverpool	Baldwinsville	14	14	14	14
	Cicero	13	13	14	14
	Destiny USA	6	7	6	7
	Downtown	10	8	9	8
	Fairmount	15	15	17	17
	Fayetteville/ Manlius	20	18	20	19
	Lafayette	21	20	20	20
	St. Joseph's Hospital	10	8	8	9
	University Hill	14	13	12	11

Table 14-1 (cont'd)
No Build and Orange Tunnel Concept 2050 Peak Hour
Origin-Destination Travel Times (Minutes)

Peak		AM		PM	
Origin	**Destination**	**No Build Alternative**	**Orange Tunnel Concept**	**No Build Alternative**	**Orange Tunnel Concept**
St. Joseph's Hospital	Baldwinsville	20	21	22	23
	Cicero	12	12	12	12
	Destiny USA	3	3	4	3
	Downtown	3	3	3	4
	Fairmount	13	14	14	15
	Fayetteville/ Manlius	14	15	15	16
	Lafayette	18	18	18	19
	St. Joseph's Hospital	7	7	8	8
	University Hill	7	9	7	8
University Hill	Baldwinsville	21	22	24	25
	Cicero	15	16	16	17
	Destiny USA	7	7	7	8
	Downtown	6	6	6	6
	Fairmount	14	15	16	17
	Fayetteville/ Manlius	15	16	17	17
	Lafayette	16	16	16	17
	Liverpool	10	11	12	13
	St. Joseph's Hospital	6	6	6	7

Traffic Volumes

Design year 2050 AM and PM peak hour traffic volumes under the Orange tunnel concept were developed for all interstate segments, ramp connections, and intersection turning movements within the traffic study area. **Table 14-2** shows the weekday AM and PM peak hour traffic volumes for key segments on the interstate freeways and several local roadways in the Project Area.

Table 14-2
No Build Alternative and Orange Tunnel Concept
2050 Peak Hour Traffic Volumes (Vehicles)

Location	Direction	AM		PM	
		No Build Alternative	Orange Tunnel Concept	No Build Alternative	Orange Tunnel Concept
I-81/Former I-81 Tunnel Segment Just North of Colvin Street Interchange	NB	3,223	1,491	3,044	2,405
	SB	2,442	2,137	3,748	2,678
I-81/Former I-81 Just South of Court/Spencer Street Interchange	NB	2,637	2,034	6,209	5,609
	SB	5,582	4,347	3,752	3,534
I-481 Just South of I-690 Interchange	NB	3,668	4,255	2,906	3,217
	SB	2,206	2,391	3,746	4,279
I-481 Just North of I-690 Interchange	NB	2,503	2,841	3,209	3,370
	SB	3,036	3,323	2,747	3,121
I-690 Just West of West Street Interchange	EB	4,794	4,608	2,751	3,031
	WB	2,142	2,518	4,308	4,882
I-690 Just East of Teall Avenue Interchange	EB	3,672	3,463	4,877	4,781
	WB	4,198	4,467	3,989	4,446
West Street Just South of Fayette Street	NB	430	486	768	916
	SB	1,062	1,006	685	608
Clinton Street Just North of Onondaga Street	NB	192	--	260	--
	SB	410	630	321	512
Salina Street Just North of Onondaga Street	NB	277	350	429	450
	SB	431	454	363	356
State Street Just North of Harrison Street	NB	150	225	273	416
	SB	421	503	323	384
Almond Street Just North of Harrison Street	NB	728	641	508	1,077
	SB	1,561	806	1,139	479
Irving Avenue Just North of Harrison Street	NB	137	196	312	464
	SB	622	883	384	452
Crouse Avenue Just North of Harrison Street	NB	171	91	364	234
	SB	--	519	--	230

Table 14-2 (cont'd)
No Build Alternative and Orange Tunnel Concept
2050 Peak Hour Traffic Volumes (Vehicles)

Location	Direction	AM		PM	
		No Build Alternative	Orange Tunnel Concept	No Build Alternative	Orange Tunnel Concept
Erie Boulevard Just East of Almond Street	EB	410	327	392	259
	WB	307	342	439	383
Fayette Street Just East of Almond Street	EB	280	161	181	123
	WB	154	116	292	138
Genesee Street Just East of Almond Street	EB	363	157	470	360
	WB	379	301	428	345
Harrison Street Just East of Almond Street	EB	110	99	77	64
	WB	902	824	1,834	1,282
Adams Street Just East of Almond Street	EB	1,827	1,713	946	771

Generally, traffic volume in the evening peak would be greater than in the morning peak in terms of overall traffic in 2050 for both the No Build Alternative and Orange tunnel concept.

Under the Orange tunnel concept, traffic volumes on I-81 would be lower than they would be under the No Build Alternative because additional traffic would be attracted to former I-481 as a result of improvements along this corridor under the Orange tunnel concept. Also, the Orange tunnel concept would not include a major service interchange on former I-81 in the Downtown area comparable to interchange at Harrison and Adams Streets under the No Build Alternative. That interchange would draw additional Downtown commuters onto the I-81 corridor under No Build Alternative.

Traffic increases would occur on westbound I-690 west of the West Street interchange under the Orange tunnel concept. This is largely due to the nearby ramp between southbound former I-81 and westbound I-690 that would be provided under the Orange tunnel concept but not under the No Build Alternative. This additional ramp would attract traffic from local streets and parallel routes west of Onondaga Lake onto the interstate segments west and north of the existing I-81/I-690 interchange.

Under the Orange tunnel concept, the southbound former I-81 exit to Butternut Street and the slip ramp to Salina Street would not be provided. Traffic exiting southbound former I-81 heading to Downtown would be consolidated onto the Clinton Street exit, resulting in increased traffic along southbound Clinton Street. High traffic volumes would persist on Almond Street, which would provide access to University Hill destinations.

Freeway Level of Service

Based on VISSIM density calculations, Orange tunnel concept freeway levels of service (LOS) were calculated for all the basic freeway segments, freeway ramps, and weaving segments within the Project Area (see Appendix C-3). **Table 14-3** shows the 2050 freeway LOS under the Orange tunnel concept on selected critical sections of former I-81, former I-481, and I-690.

Since the Orange tunnel concept would correct most non-standard and non-conforming highway features within the Project Area and make improvements at existing/No Build locations identified as congested, it would substantially improve traffic operational conditions on former I-81, former I-481, and I-690 during the AM and PM peak hours. The Orange tunnel concept would relieve congestion on all freeway segments, ramp junctions, and weaving sections operating unacceptably under the No Build Alternative. All freeway merge and diverge segments would operate at LOS D or better.

Table 14-3

Orange Tunnel 2050 Peak Hour Freeway LOS and Density

Segment	Type	AM		PM	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Former Northbound I-81					
between Interchange 16 (US 11) on-ramp and Exit 16A (northbound former I-81)	BFS	16.5	B	12.4	B
between Interchange 16A (northbound former I-481) off-ramp and newly created diamond interchange	BFS	10.5	A	8.4	A
between the newly created diamond interchange and S. Salina St off-ramp	BFS	14.3	B	12.1	B
between Interchange 17 (after split to northbound Almond St)	BFS	9.3	A	9.4	A
Tunnel section between south portal and exit to westbound I-690	BFS	16.3	B	26.5	D
between off-ramp to westbound I-690 and Salina St on-ramp	BFS	11.2	B	18.4	C
between off-ramp and on-ramp from Court St	BFS	7.3	A	20.1	C
between Interchange 23 (Park St, Hiawatha Blvd) off- and on-ramps	BFS	6.7	A	18.8	C
between Interchange 23 (Hiawatha Blvd) on-ramp and Exit 25 (7th North St)	BFS	8.7	A	19.9	C
between Interchange 25 (7th North St) off- and on-ramps	BFS	9.0	A	23.1	C
between Interchange 25A (I-90) off- and on-ramps	BFS	8.5	A	24.3	C
between Interchange 25A (I-90) on-ramp and Exit 26 (US 11)	BFS	9.2	A	24.2	C
between Exit 26 (US 11) and Exits 27-28 (Airport Rd)	BFS	9.0	A	21.6	C
between Interchange 27 (Airport Blvd) off- and on-ramp	BFS	5.8	A	16.9	B
between Interchange 27 (Airport Blvd) on-ramp and Interchange 28 (Taft Rd) on-ramp	BFS	8.4	A	21.6	C
between Interchange 28 (Taft Rd) on-ramp and Exit 29S (southbound I-481)	BFS	10.5	A	24.9	C
between Exit 29S (southbound I-481) and southbound NY 481 on-ramp	BFS	9.5	A	23.6	C
between Exit 29N (northbound NY 481) and northbound former I-481 on-ramp (3 lane)	BFS	6.8	A	14.6	B
between Exit 29N (northbound NY 481) and northbound former I-481 on-ramp (2 lane)	BFS	10.0	A	21.1	C
between Interchange 29N (former I-481) and Exit 30 (NY 31)	BFS	8.7	A	18.6	C
at Exit 16A (northbound former I-481)	Diverge	7.9	A	5.5	A
at Exit 17 (S. Salina St, Brighton Ave) to E Brighton St	Diverge	8.7	A	7.6	A

Table 14-3 (cont'd)
Orange Tunnel 2050 Peak Hour Freeway LOS and Density

Segment	Type	AM		PM	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
between Exit 17 and Colvin St (before split to northbound Almond St)	Diverge	10.2	B	8.2	A
before exit to westbound I-690	Diverge	10.7	B	17.4	B
at Exit 22 to Court St	Diverge	6.0	A	12.8	B
at Exit 23 (Hiawatha Blvd) to Hiawatha Blvd W	Diverge	3.7	A	11.8	B
at Exit 25 (7th North St)	Diverge	10.2	B	21.3	C
at Exit 26 (US 11)	Diverge	8.6	A	17.5	B
at Exit 27 (Airport Blvd)	Diverge	9.0	A	21.6	C
at Exit 29S (former southbound I-481)	Diverge	9.8	A	19.5	B
merge with westbound I-690 and Salina St on-ramps	Merge	6.5	A	19.2	B
after off-ramp to Hiawatha Blvd	Merge	4.4	A	13.9	B
at Interchange 17 (S. Salina St) on-ramp	Merge	9.6	A	7.5	B
at Interchange 19 (N. Salina St, Pearl St) on-ramp	Merge	6.5	A	19.2	A
at Interchange 22 (Court St) on-ramp	Merge	5.0	A	18.1	B
at Interchange 23 (Hiawatha Blvd) on-ramp	Merge	12.0	B	25.9	B
at Interchange 27 (Airport Blvd) on-ramp	Merge	8.5	A	20.9	C
at Interchange 28 (Taft Rd) on-ramp	Merge	10.8	B	22.1	C
at Interchange 29S (former I-481) on-ramp	Merge	6.7	A	13.8	B
at Interchange 17 (E. Colvin St) on-ramp	Merge	7.8	A	14.9	B
between Interchange 25 (7th North St) on-ramp and Exit 25A (I-90)	Weave	7.7	A	22.2	C
between Interchange 29N (NY 481) on- and off-ramps	Weave	7.2	A	21.1	C
Former Southbound I-81					
between Interchange 30 (NY 31) on-ramp and Exit 29N (former I-481)	BFS	23.7	C	13.6	B
between southbound former I-481 off-ramp and westbound NY 481 off-ramp	BFS	27.3	D	14.4	B
between northbound NY 481 off-ramp and northbound former I-481 on-ramp	BFS	24.2	C	13	B
between Interchange 29S (former I-481) and southbound NY 481 on-ramps	BFS	17.3	B	9.7	A
between Interchange 29S (former I-481) on-ramp and Exit 28 (Taft Rd)	BFS	28.1	D	15.6	B
between Exit 28 (Taft Rd) and Exits 27-26 (Airport Rd) off-ramps	BFS	25.3	C	13.5	B
between Interchange 27 (Airport Rd) off- and on-ramps	BFS	20.2	C	10.9	A
between Interchange 27 (Airport Rd) and Interchange 27-26 (US 11) on-ramps	BFS	23.1	C	15.2	B
between Interchange 26 (US 11) on-ramp and Exit 25A (I-90)	BFS	20.5	C	16.3	B
between Exit 25A (I-90) and westbound I-90 Exit 36	BFS	24.9	C	18.4	C
between Exit 25 (7th North St) and on-ramp from 7th N St	BFS	21.9	C	15.8	B
between Exits 23A (Hiawatha Blvd) and Old Liverpool Rd on-ramp	BFS	22.7	C	15.9	B
between N Clinton St off-ramp and N Clinton St on-ramp	BFS	22.3	C	14.8	B
between off-ramp to eastbound I-690 and on-ramp from eastbound I-690	BFS	14.1	B	16	B
Tunnel section between north and south portals	BFS	22.6	C	21.7	C
between Exit 17 (S. State St, Brighton Ave) and on-ramp from E Brighton Ave	BFS	6.2	A	9.2	A
between Brighton Ave off-ramp and on-ramp	BFS	9.6	A	14.7	B
between Glen Ave interchange	BFS	7.8	A	11.9	B
at Exit to eastbound I-690	Diverge	19.8	B	19.1	B
at Exit southbound former I-81	Diverge	29	D	13.1	B
at Exit 29N (NY 481)	Diverge	17.4	B	9.7	A
at Exit 28 (Taft Rd)	Diverge	23.9	C	14.5	B
at Exit 27(Airport Blvd)	Diverge	17.5	B	10.4	B
at Exit I-90	Diverge	20.5	C	16.3	B
at Exit 20 eastbound I-690 off-ramp	Diverge	17.8	B	18.9	B

Table 14-3 (cont'd)
Orange Tunnel 2050 Peak Hour Freeway LOS and Density

Segment	Type	AM		PM	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
at Exit 19 (Clinton St)	Diverge	21.7	C	14.9	B
at Exit 17 (S. Salina St, Brighton Ave)	Diverge	11.2	B	11.3	B
at Exit to Glen Ave	Diverge	9.4	A	12.9	B
on-ramp from N Clinton St	Merge	21.3	C	19.5	B
on-ramp from eastbound I-690	Merge	16.5	B	15.1	B
on-ramp from southbound Almond St	Merge	10.6	B	13	B
between Interchange 16A (Glen Ave Interchange)	Merge	8.2	A	12.7	B
at Interchange 29N (NY 481) on-ramp	Merge	25.3	C	15	B
at Interchange 29S (NY 481) on-ramp	Merge	18.1	B	10.9	B
at Interchange 27 (Airport Rd) on-ramp	Merge	19.6	B	14.7	B
at Interchange 26 (US 11) on-ramp	Merge	17.1	B	15.6	B
at Old Liverpool Rd on-ramp	Merge	21.7	C	17.7	B
at Interchange 16A (former I-481) on-ramp	Merge	7	A	10.8	B
between Old Liverpool Rd on-ramp and N Clinton St off-ramp	Weave	19.7	B	13.5	B
between Exit 17 (S. State St, Brighton Ave) off- and on-ramps	Weave	8.6	A	11.4	B
between Interchange 25A (I-90) on-ramp and Exit 25 (7th North St)	Weave	20.1	C	14.6	B
between Interchange 25 (7th North St) on-ramp and Exits 23A (Hiawatha Blvd)	Weave	19.9	B	15.1	B
Former Northbound I-481					
between Interchange 1 (Brighton Ave, Rock Cut Rd) off- and on-ramps	BFS	7.3	A	5.3	A
between Interchange 1 (Brighton Ave, Rock Cut Rd) and Exit 2 (Jamesville Rd)	BFS	13.6	B	10.8	A
between Interchange 2 (Jamesville Rd) off- and on-ramps	BFS	12.1	B	9.7	A
between Interchange 2 (Jamesville Rd) on-ramp and Exit 3E (East NY 5)	BFS	19.8	C	15.4	B
between Interchange 3E (East NY) off- and on-ramps	BFS	18.4	C	13.8	B
between Interchange 3W (West NY 5) off- and on-ramps	BFS	18.2	C	14.9	B
between Interchange 3W (West NY 5) on-ramp and Exit 4 (West I-690)	BFS	25.9	C	18.3	C
between Interchange 4 (West I-690) off- and on-ramps	BFS	15.7	B	13.4	B
between Interchange 4 (East I-690) on-ramp and Exit 5E (Kirkville Rd)	BFS	15.5	B	17.8	B
between Interchange 5E (Kirkville Rd) off- and on-ramps	BFS	21.2	C	22.2	C
between Interchange 5W (Kirkville Rd) off- and on-ramps	BFS	16.3	B	22.3	C
between Interchange 5W (Kirkville Rd) on-ramp and Exit 6 (I-90)	BFS	12.4	B	16.4	B
between Interchange 6 (I-90) off- and on-ramps	BFS	12.9	B	14.6	B
between Interchange 7 (NY 298 Bridgeport Rd) off- and on- ramps	BFS	11	B	13.5	B
between Interchange 7 (NY 298 Bridgeport Rd) on-ramp and Exit 8 Northern Blvd)	BFS	12.3	B	18.4	C
between Interchange 8 (Northern Blvd) off- and on-ramps	BFS	9.3	A	14.3	B
between interchange 8 (Northern Blvd) on-ramp and NY481 westbound off-ramp	BFS	7.2	A	15.6	B
between split to northbound former I-81 and northbound-former I-81 on-ramp	BFS	8.5	A	17.6	B
between Interchange 9S (former I-81) off- and on-ramps	BFS	10.5	A	29.5	D
between split to former I-481 mainline and northbound former I-81 merge	BFS	4.6	A	7	A
at Exit 1 (Rock Cut Rd)	Diverge	4.8	A	3.4	A
at Exit 2 (Jamesville Rd)	Diverge	9	A	7.1	A
at Exit 3E (East NY 5)	Diverge	14.1	B	10.8	B
at Exit 4 (West I-690)	Diverge	18.1	B	13.4	B
at Exit 5E (Kirkville Rd)	Diverge	14.3	B	17.3	B
at Exit 6 (I-90)	Diverge	12.5	B	16.7	B

Table 14-3 (cont'd)
Orange Tunnel 2050 Peak Hour Freeway LOS and Density

Segment	Type	AM		PM	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
at Exit 7 (NY 298 Bridgeport Rd)	Diverge	13.7	B	15.4	B
at Exit 8 (Northern Blvd)	Diverge	8.7	A	13.1	B
at Exit to former I-81	Diverge	6.7	A	14.7	B
at Interchange 1 (Brighton Ave, Rock Cut Rd) on-ramp	Merge	11.2	B	8.7	A
at Interchange 2 (Jamesville Rd) on-ramp	Merge	14.8	B	11.4	B
at Interchange 3W (West NY 5) on-ramp	Merge	22.2	C	15.1	B
at Interchange 4 (East I-690) on-ramp	Merge	16.1	B	19.1	B
at Interchange 5W (Kirkville Rd) on-ramp	Merge	12.5	B	16.4	B
at Interchange 6 (I-90) on-ramp	Merge	10.9	B	12.5	B
at Interchange 7 (NY 298 Bridgeport Rd) on-ramp	Merge	8.2	A	12.6	B
at Interchange 8 (Northern Blvd) on-ramp	Merge	8.3	A	14.9	B
at Interchange 9N (former I-81) on-ramp	Merge	7.9	A	20.5	C
between Interchange 3E (East NY 5) on-ramp and Exit 3W (West NY 5)	Weave	14.4	B	12	B
between Interchange 5E (Kirkville Rd) on-ramp and Exit 5W (Kirkville Rd)	Weave	14	B	17.3	B
between Interchange 9N (former I-81) on-ramp and Exit 9S (former I-81)	Weave	8.8	A	22.6	C
Former Southbound I-481					
between southbound former I-81 off-ramp and northbound former I-81 off-ramp	BFS	19.2	C	11.7	B
between Interchange 9N (former northbound I-81) off- and on-ramps	BFS	19.9	C	10.8	A
between Interchange 9N (northbound former I-81) on-ramp and southbound former I-81 on-ramp	BFS	16.6	B	6.6	A
between Interchange 8 (Northern Blvd) off- and on-ramps	BFS	17.6	B	12.2	B
between Interchange 8 (Northern Blvd) on-ramp and Exit 7 (NY 298 Bridgeport Rd)	BFS	21.9	C	14.7	B
between Interchange 7 (NY 298 Bridgeport Rd) off- and on- ramp	BFS	17.3	B	13.1	B
between Interchange 7 (NY 298 Bridgeport Rd) and Exit 6 (I-90)	BFS	21	C	19.7	C
between Interchange 6 (I-90) off- and on-ramp	BFS	18.7	C	16.1	B
between Interchange 6 (I-90) on-ramp and Exit 5W (Kirkville Rd)	BFS	26.6	D	22.7	C
between Interchange 5W (Kirkville Rd) off- and on-ramps	BFS	22.6	C	20.9	C
between Interchange 5E (Kirkville Rd) off- and on-ramps	BFS	23.8	C	20.5	C
between Interchange 5E (Kirkville Rd) on-ramp and Exit 4 (westbound I-690)	BFS	18.3	C	17.2	B
between Interchange 4 (eastbound I-690) on- and off-ramps	BFS	11.8	B	15.1	B
between Interchange 4 (eastbound I-690) on-ramp and Exit 3W (westbound NY 5)	BFS	12.9	B	24.4	C
between Interchange 3W (westbound NY 5) off- and on-ramps	BFS	11.4	B	26.1	D
between Interchange 3E (East NY 5) off- and on-ramps	BFS	7.6	A	11	A
between Interchange 3E (East NY 5) on-ramp and Exit 2 (Jamesville Rd)	BFS	8.2	A	12.4	B
between Interchange 2 (Jamesville Rd) off- and on-ramps	BFS	7.9	A	10.9	A
between Interchange 2 (Jamesville Rd) on-ramp and Exit 1 (Brighton Ave)	BFS	9.2	A	11.8	B
between Exit 1 (Brighton Ave) and southbound former I-81 merge	BFS	4.4	A	6.4	A
at Exit 9N to Brighton Ave	Diverge	13.5	B	7.9	A
at Exit 9S (former I-81)	Diverge	29.1	D	16	B
at Exit 8 (Northern Blvd) off-ramp	Diverge	16.5	B	10.1	B
at Exit 7 (NY 298 Bridgeport Rd)	Diverge	19.6	B	10.9	B
at Exit 6 (I-90)	Diverge	16.1	B	15.9	B
at Exit 5W (Kirkville Rd)	Diverge	17.8	B	14.8	B
at Exit 4 (westbound I-690)	Diverge	19.2	B	16.8	B
at Exit 3W (westbound NY 5)	Diverge	11.8	B	24.3	C

Table 14-3 (cont'd)
Orange Tunnel 2050 Peak Hour Freeway LOS and Density

Segment	Type	AM		PM	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
at Exit 2 (Jamesville Rd)	Diverge	12.3	B	18.7	B
at Exit 1 (Brighton Ave)	Diverge	5.9	A	8.1	A
at Interchange 9N (former I-81) on-ramp	Merge	14	B	7.4	A
at southbound former I-81 on-ramp	Merge	13.4	B	7.5	A
at Interchange 8 (Northern Blvd) on-ramp	Merge	14.8	B	9.8	A
at Interchange 7 (NY 298 Bridgeport Rd) on-ramp	Merge	14.6	B	14	B
at Interchange 6 (I-90) on-ramp	Merge	19.2	B	16.2	B
at Interchange 5E (Kirkville Rd) on-ramp	Merge	18.6	B	17.9	B
at Interchange 4 (East I-690) on-ramp	Merge	10.4	B	19.9	B
at Interchange 3E (East NY 5) on-ramp	Merge	8	A	11.7	B
at Interchange 2 (Jamesville Rd) on-ramp	Merge	6.2	A	7.8	A
between Interchange 5W (Kirkville Rd) on-ramp and Exit 5E (Kirkville Rd)	Weave	18.4	B	15.9	B
between Interchange 3W (West NY 5) on-ramp and Exit 3E (East NY 5)	Weave	10.2	B	33.4	D
Eastbound I-690					
between Interchange 7 (NY 297) and Interchange 8 (State Fair Blvd) on-ramps	BFS	30.3	D	15.8	B
between Exit 8 (Hiawatha Blvd) and Exit 9 (Bear St)	BFS	27.3	D	13.9	B
between Exit 9 (Bear St) and Interchange 10 (N. Geddes St) on-ramp	BFS	23.1	C	11.9	B
between Exit to southbound former I-81 (Southbound Tunnel) and West St on-ramp	BFS	14.6	B	11	A
between Exit to southbound Almond St and Catherine St on-ramp	BFS	21.7	C	22.3	C
between Almond St on-ramp and Teall Ave off-ramp	BFS	21.9	C	25.2	C
between Interchange 14 (Teall Ave) off- and on-ramps	BFS	15.9	B	20.9	C
between Interchange 15 (Midler Ave) off- and on-ramps	BFS	14.2	B	22.5	C
between Interchange 15 (Midler Ave) on-ramp and Exits 16S-N (Thompson Rd)	BFS	16.1	B	25.8	C
between Interchange 16S-N (Thompson Rd) off- and on-ramps	BFS	8.4	A	16.7	B
between Interchange 16S-N (Thompson Rd) and Interchange 17 (Bridge St) on-ramps	BFS	10.7	A	22.2	C
between Almond St on-ramp and Teall Ave off-ramp	BFS	16	B	18.6	C
at Exit 14 (Teall Ave)	Diverge	18.6	B	20.4	C
at Exit 8 (Hiawatha Blvd)	Diverge	25.8	C	15.3	B
at Exit 9 (Bear St)	Diverge	21.1	C	10.8	B
at Exit 11 (West St) off-ramp	Diverge	19.6	B	11.9	B
at Exit to southbound former I-81 (southbound tunnel)	Diverge	13.7	B	11.3	B
at Exit 15 (Midler Ave)	Diverge	17.8	B	21.6	C
at Exits 16S-N (Thompson Rd) and Exit 17 (Bridge St)	Diverge	11.9	B	18.1	B
at former I-481 ramps	Diverge	12.1	B	26	C
at on-ramp from northbound Almond St	Merge	16.8	B	21.8	C
at Interchange 8 (State Fair Blvd) on-ramp	Merge	21.2	C	26	C
at Interchange 11 (West St) on-ramp	Merge	12.2	B	14.5	B
at Interchange 14 (Teall Ave) on-ramp	Merge	17	B	13.5	B
at Interchange 15 (Midler Ave) on-ramp	Merge	13.2	B	22.2	C
at Interchange 16S-N (Thompson Rd) on-ramp	Merge	10	B	18.8	B
at Interchange 17 (Bridge St) on-ramp	Merge	9.1	A	18.5	B
at Interchange 10 (N. Geddes St) on-ramp and West St off-ramp	Merge	20.3	C	19.4	B
between southbound I-81 on-ramp and Almond St off-ramp	Weave	21.8	C	14.9	B
Westbound I-690					
between Interchange 16N-S (Thompson Rd) off- and on-ramps	BFS	24.4	C	19.5	C

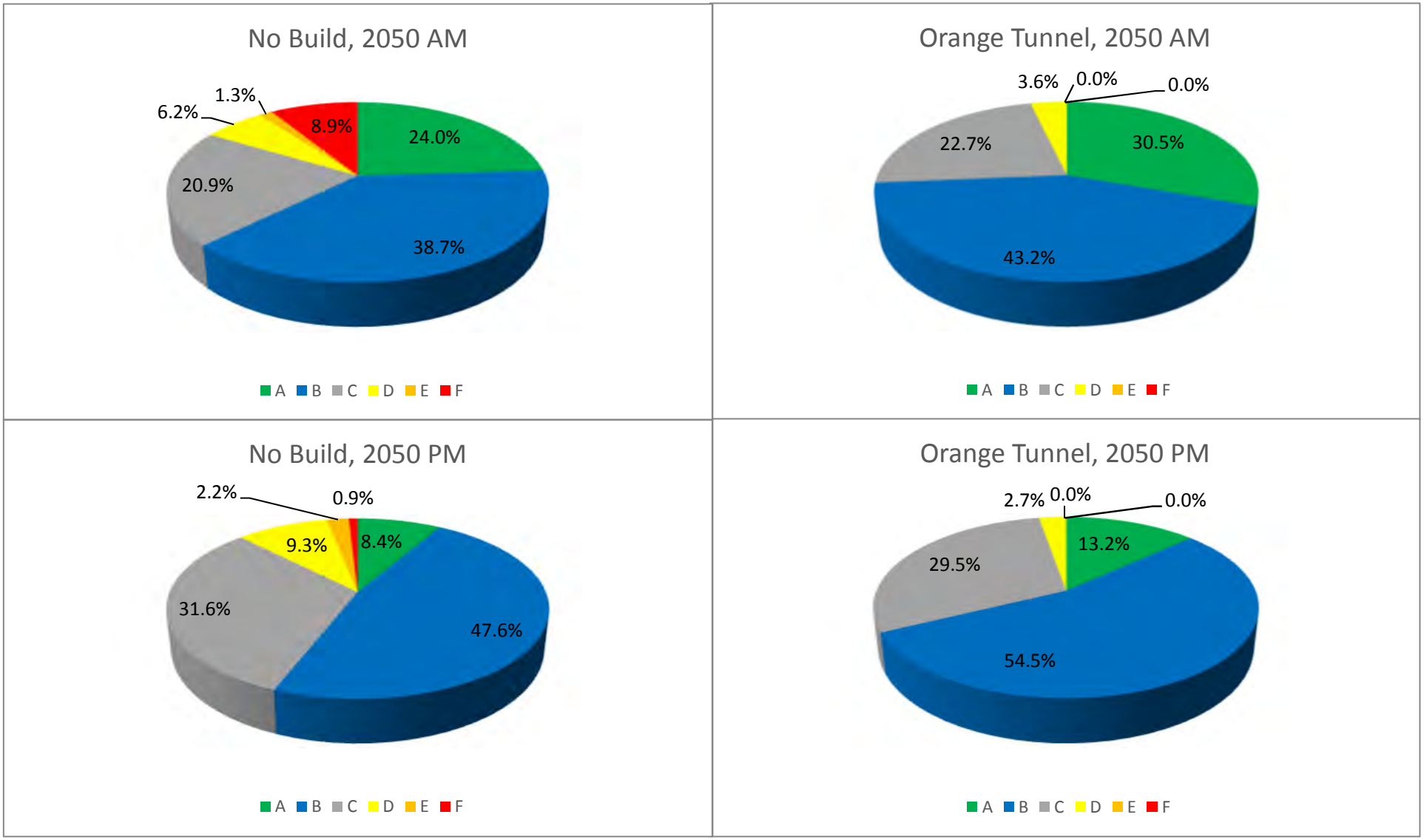
Table 14-3 (cont'd)
Orange Tunnel 2050 Peak Hour Freeway LOS and Density

Segment	Type	AM		PM	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
between Interchange 15 (Midler Ave) off- and on-ramps	BFS	23.3	C	25.1	C
between Teall Ave off- and on-ramps	BFS	20.1	C	24.4	C
between Catherine St off-ramp and Almond St on-ramp	BFS	15.4	B	24.1	C
between Exit to West St and on-ramps of southbound former I-81/eastbound I-690	BFS	12.4	B	20	C
between Exit 10 (N. Geddes St) and Interchange 9 (Bear St) on-ramp	BFS	11.8	B	25.7	C
between Interchange 9 (Bear St) and Interchange 8 (State Fair Blvd) on-ramps	BFS	13.9	B	30.6	D
between Interchange 8 (State Fair Blvd) on-ramp and Exit 7 (NY 297, Fairgrounds)	BFS	15.5	B	33.5	D
at Exit 17 (Bridge St)	Diverge	20.1	C	15.6	B
at Exit 16N-S (Thompson Rd)	Diverge	21.3	C	17	B
at Exit 15 (Midler Ave)	Diverge	20.2	C	22	C
at Exit 14 (Teall Ave)	Diverge	20.4	C	23.9	C
at Exit 11 (West St) off-ramp	Diverge	17.6	B	24.7	C
at new exit to Catherine St	Diverge	33.4	D	24.1	C
at Exit 10 to S Geddes St	Diverge	12.9	B	20.5	C
at former I-481 on-ramp	Merge	26.2	C	19.6	B
at Interchange 16N-S (Thompson Rd) on-ramp	Merge	19.7	B	21.4	C
at Interchange 15 (Midler Ave) on-ramp	Merge	22.9	C	25.4	C
at Interchange 14 (Teall Ave) on-ramp	Merge	25.3	C	23.4	C
at merge with southbound former I-81 off-ramp and northbound tunnel off-ramp	Merge	8.1	A	13.4	B
at Interchange 9 (Bear St) on-ramp	Merge	13.7	B	26.8	C
at Interchange 8 (Hiawatha Blvd) on-ramp	Merge	14.5	B	25.9	C
at West St on-ramp	Merge	7	A	18.3	B
between off-ramp to northbound I-81 and West St off-ramp	Weave	17.5	B	24.4	C
between Almond St on-ramp and off-ramp to former northbound I-81	Weave	16.1	B	27.5	C

Figure 14-1 compares the proportional distribution of LOS on all freeway segments under the Orange tunnel concept and under the No Build Alternative during the 2050 AM and PM peak hours. The proportion of segments operating at LOS C or better would increase under the Orange tunnel concept by 12.8 and 9.6 percent for the 2050 AM and 2050 PM peak hours, respectively. In addition, several freeway segments would operate at LOS E or F under the No Build Alternative, but all segments would operate at LOS D or better under the Orange tunnel concept.

Intersection Level of Service

Based on VISSIM delay calculations, **Table 14-4** shows the projected intersection LOS under the Orange tunnel concept. All intersections would operate at LOS D or better during 2050 AM and PM peak hours. Compared with the No Build Alternative, the Orange tunnel concept would result in a reduced number of intersections (from three to zero) operating at LOS E or F in 2050.



No Build Alternative and Orange Tunnel Concept
Freeway Segment LOS Comparison (2050)

Table 14-4

Intersection Level of Service (2050) Under the Orange Tunnel Concept

Intersection	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Almond St & Burt St	7.8	A	14.5	B
Almond St & E. Adams St	30.0	C	16.6	B
Almond St & E. Fayette St	24.3	C	33.4	C
Almond St & E. Washington St	5.6	A	7.0	A
Almond St & E. Water St	13.1	B	10.4	B
Almond St & Harrison St	31.3	C	20.8	C
Almond St & NY 92/E. Genesee St	22.2	C	32.7	C
Almond St & Van Buren St	4.7	A	17.7	B
Almond St and Cedar St	2.0	A	1.5	A
Almond St and Jackson	0.6	A	1.4	A
Almond St and Madison St	10.0	B	6.5	A
Almond St and Taylor St	9.8	A	21.0	C
Almond St/Catherine St & NY 5/Erie Blvd E.	17.7	B	14.1	B
Beech St & Canal St	13.6	B	7.7	A
Beech St & Erie Blvd E.	12.7	B	13.6	B
Catherine St & Burnet Ave	9.1	A	15.9	B
Catherine St & Eastbound I-690 On-ramp	18.6	C	20.4	C
Catherine St & James St	8.8	A	21.8	C
Catherine St & Westbound I-690 Off-Ramp	34.1	C	34.6	C
Columbus Ave & E. Fayette St	11.0	B	8.3	A
Columbus Ave & NY 92/E. Genesee St	19.9	B	22.3	C
Colvin St and Northbound Former I-81	5.0	A	4.2	A
Comstock Ave & E. Adams St	25.5	C	8.0	A
Comstock Ave & Euclid Av	2.8	A	11.4	B
Comstock Ave & Harrison St	14.4	B	5.0	A
Comstock Ave & NY 92/E. Genesee St	5.9	A	6.2	A
Comstock Ave & Stratford St	19.0	C	19.7	C
Comstock Ave & University Pl	9.8	A	10.7	B
Comstock Ave & Waverly Ave	24.8	C	27.5	C
Cortland Ave & Tallman St/Coyne Corners	9.2	A	8.6	A
Cortland Ave & W. MLK, Jr East	6.5	A	6.6	A
Dewitt St & James St	10.5	B	16.8	B
E. Glenn Ave & Former I-81 Ramps	32.8	C	25.8	C
E. Glenn Ave & Brighton Ave	21.1	C	19.1	B
Elizabeth Blackwell Dr & E. Adams St	13.3	B	1.3	A
Elizabeth Blackwell Dr & Harrison St	1.4	A	2.2	A
Forman Ave & E. Water St	8.4	A	6.1	A
Genant Dr & NY 298/W. Court St	3.7	A	5.7	A
I-690 East Off-Ramp & Hiawatha Blvd W.	14.1	B	22.1	C
Former I-81 South On-Ramp/Genant Dr & Bear St	26.6	C	33.9	C
Irving Ave & E. Adams St	26.2	C	12.0	B
Irving Ave & E. Fayette St	27.7	C	14.3	B
Irving Ave & Harrison St	16.8	B	15.8	B
Irving Ave & NY 92/E. Genesee St	17.0	B	13.5	B
Irving Ave & University Pl	14.3	B	20.4	C
Irving Ave & Van Buren St	32.7	C	6.7	A
Irving Ave & Waverly Ave	17.5	B	26.2	C
Leavenworth Ave & NY 5/W. Genesee St	9.1	A	7.8	A

Table 14-4 (cont'd)

Intersection Level of Service (2050) Under the Orange Tunnel Concept

Intersection	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Lexington Ave/ & NY 92/E. Genesee St	2.1	A	3.8	A
Lodi St & Erie Blvd E.	5.9	A	7.9	A
Lodi St & James St	10.2	B	13.7	B
Lodi St & Oak St	8.2	A	2.4	A
Midland Ave & Cortland Ave	30.1	C	11.1	B
Midland Ave & W. MLK, Jr East	1.0	A	4.0	A
Montgomery St & E. Adams St	7.5	A	10.4	B
Montgomery St & E. Fayette St	22.3	C	12.0	B
Montgomery St & E. Jefferson St	14.9	B	4.0	A
Montgomery St & E. Washington St	12.3	B	5.8	A
Montgomery St & E. Water St	12.0	B	10.8	B
Montgomery St & Harrison St	12.4	B	6.8	A
Montgomery St & Madison St	7.8	A	9.2	A
Montgomery St and & E. Onondaga St	13.2	B	14.2	B
N. Clinton St & Herald Pl	10.7	B	24.2	C
N. Clinton St & NY 5/W. Genesee St	21.7	C	16.4	B
N. Clinton St & Southbound Former I-81 Ramps	12.5	B	14.3	B
N. Crouse Ave & Burnet Ave	16.0	B	20.1	C
N. Franklin St & Herald Pl	12.6	B	17.3	B
N. Franklin St & NY 5/W. Genesee St	15.7	B	24.0	C
N. Franklin St/Butternut St & N. Franklin St/	1.2	A	1.6	A
N. Geddes St & Edison St	3.9	A	2.3	A
N. Geddes St & Westbound I-690 Off-Ramp	16.5	B	15.0	B
N. Geddes St & NY 5/W. Genesee St	22.9	C	20.0	C
N. Geddes St & Park Ave	13.2	B	20.5	C
N. Geddes St & Richmond Ave	8.6	A	5.5	A
N. Geddes St & Van Rensselaer St	5.5	A	9.9	A
N. Geddes St & W. Belden Ave	12.4	B	9.8	A
N. Geddes St & W. Kirkpatrick St	25.9	C	15.3	B
N. Geddes St & Wilkinson St	2.7	A	2.8	A
N. McBride St & James St	13.1	B	15.5	B
N. Salina St & E./W. Willow St	11.4	B	6.1	A
N. Salina St & Herald Pl	6.5	A	16.8	B
N. Salina St & NY 5/W. Genesee St/James St	17.0	B	16.9	B
N. Salina St & Pearl St	26.0	C	13.5	B
N. State St & Butternut St	33.8	C	25.4	C
N. Townsend St & Burnet Ave	15.3	B	14.5	B
N. Townsend St & James St	18.0	B	16.5	B
N. Warren St & NY 5/James St	17.3	B	13.4	B
N. Warren St. & E. Erie Blvd	9.7	A	16.0	C
N. West St & NY 5/W. Genesee St	24.7	C	37.5	D
N./S. Clinton St & Erie Blvd W.	1.4	A	1.5	A
N./S. Crouse Ave & Erie Blvd E.	18.3	B	17.3	B
N./S. Franklin St & Erie Blvd W.	24.7	C	16.7	B
N./S. Geddes St & Erie Blvd W.	20.1	C	24.5	C
N./S. McBride St & NY 5/Erie Blvd E.	30.7	C	15.9	B
N./S. Townsend St & NY 5/Erie Blvd E.	30.4	C	12.5	B
Northbound S. West St & W. Fayette St	21.1	C	25.3	C
NY 5/Oswego Blvd/ & Montgomery St	8.9	A	16.9	B
Oak St & James St	12.3	B	13.9	B
Oakwood Ave & E. MLK, Jr East	13.2	B	6.5	A
Oswego Blvd & James St	10.8	B	14.1	B

Table 14-4 (cont'd)

Intersection Level of Service (2050) Under the Orange Tunnel Concept

Intersection	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Park St & Butternut St	10.5	B	11.3	B
Park St & Court St	10.3	B	12.0	B
Park St & Farmers Market Pl	3.0	A	6.2	A
Park St & Hiawatha Blvd E.	23.4	C	28.1	C
Park St & Oak St	10.2	B	11.4	B
Park St & Wolf St	14.5	B	14.1	B
Pine St & E. Fayette St	12.9	B	11.5	B
Pine St & E. Washington St	5.9	A	7.5	A
Pine St & E. Water St	6.1	A	9.1	A
Pine St & Erie Blvd E.	0.7	A	2.2	A
Pine St & NY 92/E. Genesee St	2.7	A	1.7	A
Plum St & NY 5/W. Genesee St	7.2	A	17.4	C
S. Clinton St & Tallman St	3.5	A	9.6	A
S. Clinton St & W. Adams St	11.8	B	17.7	B
S. Clinton St & W. Fayette St	10.3	B	10.0	B
S. Clinton St & W. Jefferson St	6.0	A	7.9	A
S. Clinton St & W. Onondaga St	10.4	B	12.6	B
S. Clinton St & W. Washington St	8.7	A	16.1	B
S. Clinton St & W. Water St	0.7	A	0.4	A
S. Crouse Ave & E. Adams St	11.4	B	6.4	A
S. Crouse Ave & E. Fayette St	28.5	C	10.7	B
S. Crouse Ave & E. Water St	7.3	A	12.1	B
S. Crouse Ave & Harrison St	18.3	B	19.7	B
S. Crouse Ave & NY 92/E. Genesee St	15.6	B	13.3	B
S. Crouse Ave & Waverly Ave	19.5	B	9.8	A
S. Franklin St & W. Fayette St	15.2	B	13.8	B
S. Franklin St & W. Washington St	8.3	A	11.5	B
S. Franklin St & W. Water St	1.6	A	10.4	B
S. Franklin St & Walton St	3.2	A	3.8	A
S. Geddes St & Fitch St	0.8	A	1.5	A
S. Geddes St & Gifford St	13.9	B	6.0	A
S. Geddes St & Grand Ave/Shonnard St	18.1	B	15.8	B
S. Geddes St & Marcellus St	2.4	A	1.5	A
S. Geddes St & Otisco St	12.1	B	7.7	A
S. Geddes St & Seymour St	10.4	B	14.4	B
S. Geddes St & W. Fayette St	24.9	C	24.0	C
S. McBride St & E. Adams St	6.2	A	0.9	A
S. McBride St & E. Fayette St	7.1	A	20.6	C
S. McBride St & E. Washington St	23.0	C	21.0	C
S. McBride St & E. Water St	13.0	B	15.4	B
S. McBride St & NY 92/E. Genesee St	10.8	B	20.5	C
S. Salina St & Burt St and Cortland Ave	11.1	B	9.9	A
S. Salina St & E./W. Adams St	19.0	B	29.8	C
S. Salina St & E./W. Fayette St	13.5	B	11.0	B
S. Salina St & E./W. Jefferson St	15.4	B	9.4	A
S. Salina St & E./W. Taylor St	12.8	B	11.6	B
S. Salina St & E./W. Washington St	16.4	B	16.0	B
S. Salina St & E./W. Water St	10.9	B	8.3	A
S. Salina St & Harrison St and Onondaga St	30.7	C	31.6	C
S. Salina St & Tallman St/Coyne Corners	4.0	A	4.7	A
S. State St & Burt St	11.7	B	12.8	B

Table 14-4 (cont'd)

Intersection Level of Service (2050) Under the Orange Tunnel Concept

Intersection	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
S. State St & E. MLK, Jr East	9.1	A	8.5	A
S. Townsend St & E. Adams St	24.2	C	27.3	C
S. Townsend St & E. Fayette St	11.7	B	12.6	B
S. Townsend St & E. Washington St	12.5	B	11.8	B
S. Townsend St & E. Water St	11.8	B	11.0	B
S. Townsend St & Harrison St	11.4	B	12.7	B
S. Townsend St & NY 92/E. Genesee St	10.8	B	14.2	B
S. Warren St & E. Adams St	10.1	B	10.1	B
S. Warren St & E. Fayette St	18.5	B	15.7	B
S. Warren St & E. Jefferson St	8.2	A	19.1	B
S. Warren St & E. Onondaga St and Madison St	18.2	B	15.2	B
S. Warren St & E. Washington St	11.0	B	10.7	B
S. Warren St & E. Water St	12.6	B	11.6	B
S. Warren St & Harrison St	15.2	B	10.3	B
S. West St & Seymour St	21.8	C	12.7	B
S. West St & Shonnard St	15.2	B	20.7	C
S. West St & W. Onondaga St	26.0	C	28.6	C
S. West St & Gifford St	8.7	A	12.1	B
Sarah Loguen Dr & E. Adams St	14.2	B	11.8	B
Sarah Loguen Dr & Harrison St	13.8	B	23.2	C
Sedgwick Dr & James St	1.8	A	2.3	A
Slocum Ave/South Ave & W. Onondaga St	16.9	B	11.4	B
Solar St & Hiawatha Blvd W.	17.6	B	30.0	C
Solar St & Bear St	43.8	D	25.1	C
Southbound S. West St & W. Fayette St	18.6	B	17.5	B
Spencer St & Bear St/I-690 Ramps	15.0	B	13.1	B
Spencer St & Hiawatha Blvd W.	18.0	B	23.3	C
Sunset Ave & Bear St	16.3	C	13.6	B
Sunset Ave & NY 298/Court St	13.7	B	17.1	C
Teall Ave & Canal St	0.5	A	4.2	A
Teall Ave & Erie Blvd E.	26.5	C	35.6	D
Teall Ave & James St	21.3	C	27.5	C
Teall Ave & Lynch St	0.6	A	1.5	A
University Ave & E. Adams St	25.8	C	15.8	B
University Ave & E. Fayette St	16.1	B	17.2	B
University Ave & E. Water St	7.1	A	9.6	A
University Ave & Erie Blvd E.	4.4	A	2.7	A
University Ave & Harrison St	28.9	C	21.3	C
University Ave & NY 92/E. Genesee St	12.0	B	11.1	B
University Ave & Waverly Ave	30.4	C	24.3	C
US 11/N. Salina St & Ash St	18.5	B	18.1	B
US 11/N. Salina St & Butternut St	17.4	B	23.1	C
US 11/N. Salina St & Catawba St	11.8	B	11.4	B
US 11/N. Salina St & Danforth St	14.0	B	10.2	B
US 11/N. Salina St & E. Division St	9.1	A	9.7	A
US 11/N. Salina St & Hiawatha Blvd E.	22.9	C	41.5	D
US 11/N. Salina St & Isabella St	9.0	A	9.2	A
US 11/N. Salina St & Lodi St & Kirkpatrick St	22.3	C	25.0	C
US 11/N. Salina St & NY 298/Court St & Alford St	37.7	D	41.4	D
US 11/N. Salina St & Wolf St	16.5	B	18.3	B
US 11/N. State St & E. Willow St	12.8	B	16.2	B
US 11/N. State St & Hickory St	1.3	A	3.8	A

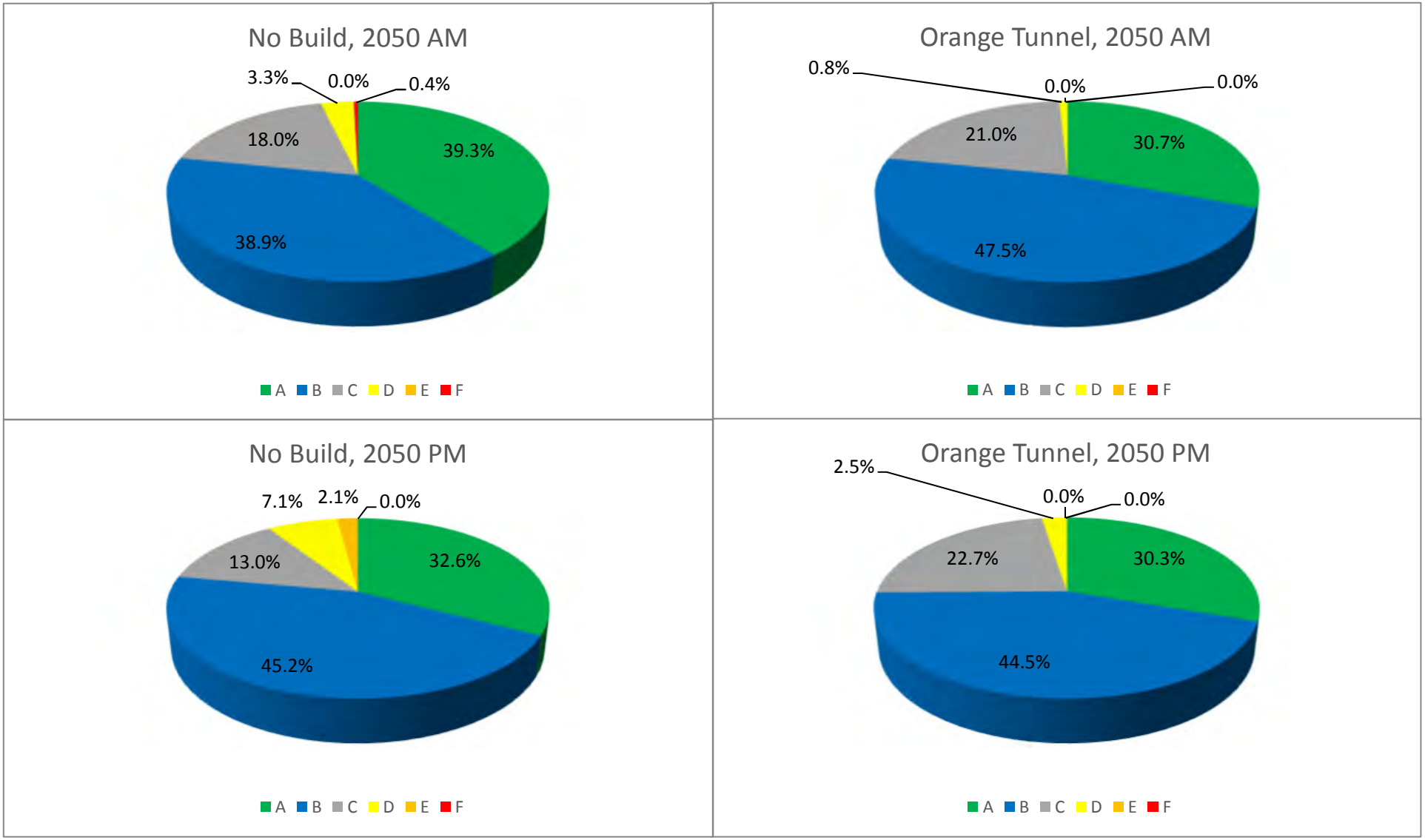
Table 14-4 (cont'd)
Intersection Level of Service (2050) Under the Orange Tunnel Concept

Intersection	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
US 11/N. State St & James St	25.3	C	28.5	C
US 11/N. State St & US 11/N. Salina St	16.3	B	17.1	B
US 11/S. Salina St & E./W. MLK, Jr East	10.8	B	11.8	B
US 11/S. Salina St & US 11/E. Raynor St	9.9	A	10.1	B
US 11/S. State St & E. Adams St	13.6	B	15.7	B
US 11/S. State St & E. Fayette St	20.4	C	31.6	C
US 11/S. State St & E. Jefferson St	8.9	A	14.2	B
US 11/S. State St & E. Washington St	11.2	B	39.7	D
US 11/S. State St & E. Water St	9.9	A	30.6	C
US 11/S. State St & Harrison St	11.6	B	22.1	C
US 11/S. State St & Madison St	16.1	B	28.9	C
US 11/S. State St & NY 5/Erie Blvd E.	12.3	B	26.3	C
US 11/S. State St & NY 92/E. Genesee St	17.6	B	13.8	B
Van Rensselaer St & Bear St	7.3	A	8.3	A
Van Rensselaer St & NY 5/W. Genesee St	13.1	B	13.2	B
W. Onondaga St & Seymour St, Shonnard St,	18.5	B	23.5	C
W. Onondaga St/Onondaga Ave & Delaware St/Tallman St	19.2	B	18.2	B
Wallace St & NY 5/W. Genesee St	9.5	A	16.8	B
Walnut Ave & E. Adams St	11.2	B	5.9	A
Walnut Ave & E. Fayette St	11.0	B	7.3	A
Walnut Ave & E. Water St	7.6	A	8.0	A
Walnut Ave & Erie Blvd E.	12.9	B	11.5	B
Walnut Ave & Harrison St	3.6	A	4.6	A
Walnut Ave & NY 92/E. Genesee St	14.9	B	10.7	B
Walnut Ave & Waverly Ave	31.9	C	8.0	A
Walnut Pl & Waverly Ave	18.4	B	17.2	B
West St & Eastbound I-690 Ramps	22.4	C	16.9	B
West St & Westbound I-690 Ramps	10.8	B	21.5	C
Westcott St & E. Fayette St	8.8	A	10.3	B
Westcott St & Euclid Ave	11.6	B	11.1	B
Westcott St & Lexington Ave	8.4	A	9.3	A
Westcott St & NY 92/E. Genesee St	12.6	B	12.6	B
Westmoreland Ave & Burnet Ave	15.0	C	21.4	C
Westmoreland Ave & Erie Blvd E.	31.5	C	38.2	D
Wilson St & James St	6.3	A	9.9	A

Figure 14-2 compares the proportional distribution of LOS on all intersections under the Orange tunnel concept with the No Build condition for the 2050 AM and PM peak hours. The proportion of segments operating at LOS C or better would increase under the Orange tunnel concept by 3.0 and 6.7 percent for the 2050 AM and 2050 PM peak hours, respectively, and all intersections would operate at LOS D or better.

Safety

Vehicle trajectories produced by the VISSIM simulation model were input to SSAM (see Chapter 5, Future No Build Safety Considerations, of the DDR/DEIS for a description of SSAM) to generate traffic conflicts and associated surrogate safety measures. Safety MOEs for the Orange tunnel



No Build Alternative and Orange Tunnel Concept
Intersection LOS Comparison (2050)

concept are compared to the No Build condition for 2050 peak hours in **Table 14-5**. The frequency of rear-end conflicts under the Orange tunnel concept would increase by 44 percent compared to No Build conditions. Congestion and following too closely are conditions known to precipitate rear-end conflicts. Decreased congestion on the interstate system under the Orange tunnel concept would contribute to a system-wide decrease in rear-end conflicts. In addition, lane-changing conflicts would decrease by 18 percent, due to a reduction in the number of interchange on- and off-ramps, the addition of auxiliary lanes, and the lengthening of acceleration/deceleration lanes. Crossing conflicts would decrease by three percent. The total for all conflict types would decrease by 16 percent, indicating that a substantial safety benefit in the form of a reduction in the number of crashes could be expected compared to the No Build condition.

Table 14-5
Safety Measures of Effectiveness – No Build and Viaduct (2050)

Scenario	No Build			Viaduct		
MOE/Peak	AM	PM	AM+PM	AM	PM	AM+PM
Rear End Conflicts	57,045	73,760	130,805	25,795	47,134	72,929
Lane Change Conflicts	50,648	87,829	138,477	39,139	73,785	112,924
Crossing Conflicts	103,830	181,200	285,030	99,870	177,186	277,056
Total Conflicts	211,523	342,789	554,312	164,804	298,106	462,910

Part 3: Social, Economic, and Environmental Considerations

This section identifies social, economic, and environmental considerations for the Orange tunnel concept. NYSDOT considered a partial range of environmental topics consistent with FHWA guidance and *The Environmental Manual (TEM)*. In many cases, the Orange tunnel concept would have limited potential to result in substantial environmental effects. Therefore, this report focuses on topic areas where the Orange tunnel concept or certain elements of it could result in environmental effects that would require further study if this concept is advanced.

15. SOCIAL CONSIDERATIONS

Figure 15-1 shows land uses along the proposed tunnel alignment. By removing the existing I-81 viaduct as described in **Part 1, Engineering Considerations**, the Orange tunnel concept would improve neighborhood cohesion in the Central Study Area. Compared with the No Build Alternative, the Orange tunnel concept would provide improved pedestrian and bicycle amenities and connections between the Downtown/Southside and University Hill/Near Eastside neighborhoods.

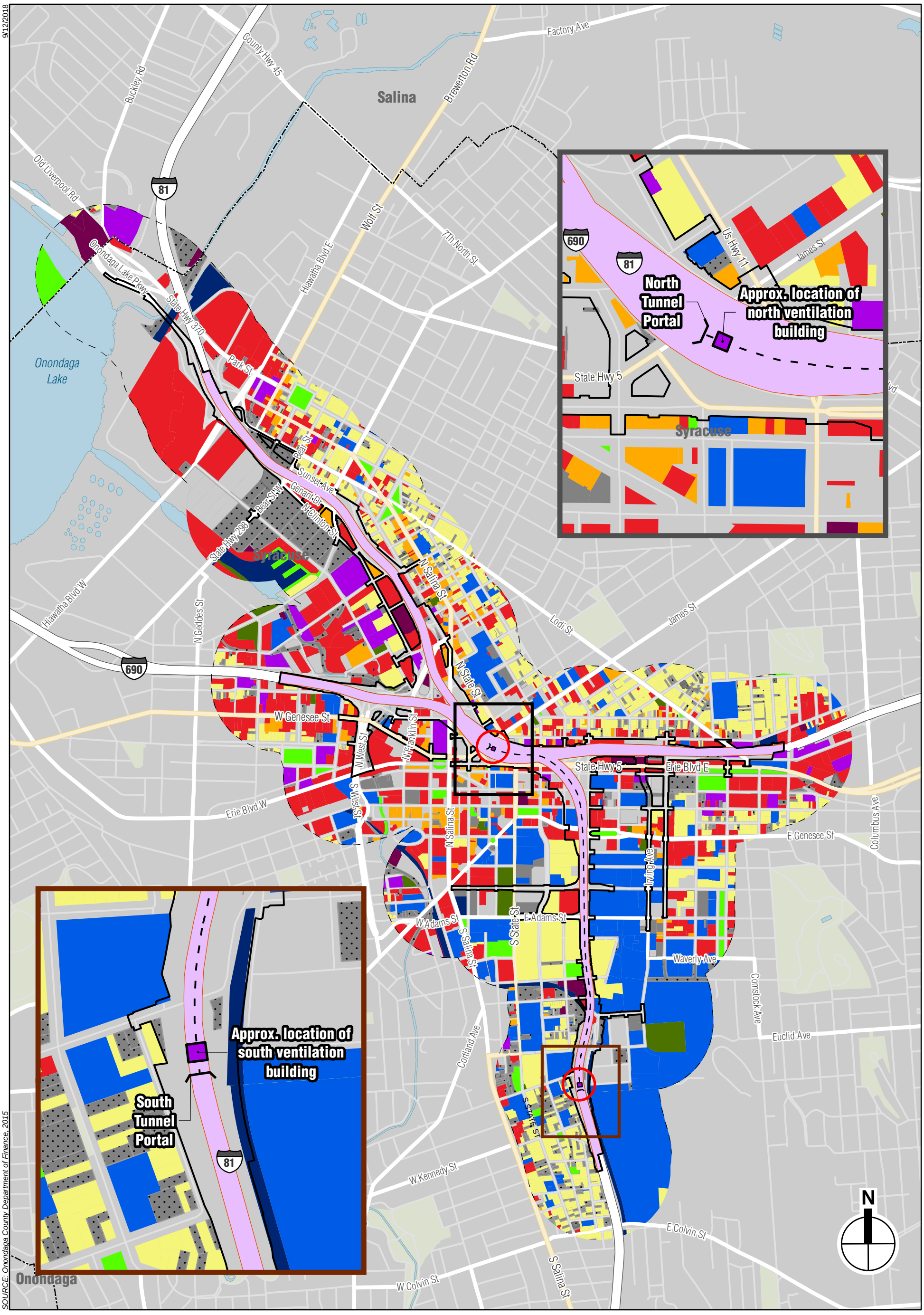
Additional transportation right-of-way would be required in these areas to accommodate the tunnel, its portals, ventilation structures, and highway ramps. As shown in **Table 15-1**, the Orange tunnel concept would require the removal of 17 buildings, which would displace 53 residential units and 237 employees. One partial building acquisition, a smokestack, would occur at 118.-04-01 (706-16 North Clinton Street). There would also be a partial impact for use of a freight or pedestrian tunnel at 030.-05-01 (400 Burnet Avenue), but no building would be impacted.

16. ENVIRONMENTAL JUSTICE

Table 16-1 and **Figure 16-1** show the census block groups that exceed the thresholds for low-income and minority populations identified for the I-81 Viaduct Product, and accordingly, these block groups are characterized as environmental justice communities. Twenty-nine of the block groups are considered environmental justice communities.

The presence of I-81 and I-690 has heavily influenced development in the Central Study Area. The construction of I-81 resulted in the acquisition of residential and commercial properties as well as relocation of the residents within its alignment through the center of the City. The construction of I-690 also resulted in further displacement of residences and businesses. Even today, vacant and underused sites remain that were associated with the original construction of these highways. The Orange tunnel concept represents a continuation of the operation of highway infrastructure through environmental justice communities. While much of the highway would be underground, it would introduce new above ground structures within identified environmental justice communities. These new structures, ventilation buildings and portals, would have a visible presence in these communities and would introduce noise or emissions sources that are not present in the No Build Alternative.

9/12/2018



SOURCE: Onondaga County Department of Finance, 2015

Project Limits
Study Area (1/4 Mile Boundary)
City/Town Boundary
Proposed Tunnel ROW
Proposed Tunnel Alignment

Residential
Commercial
Mixed Use Residential/Commercial
Industrial

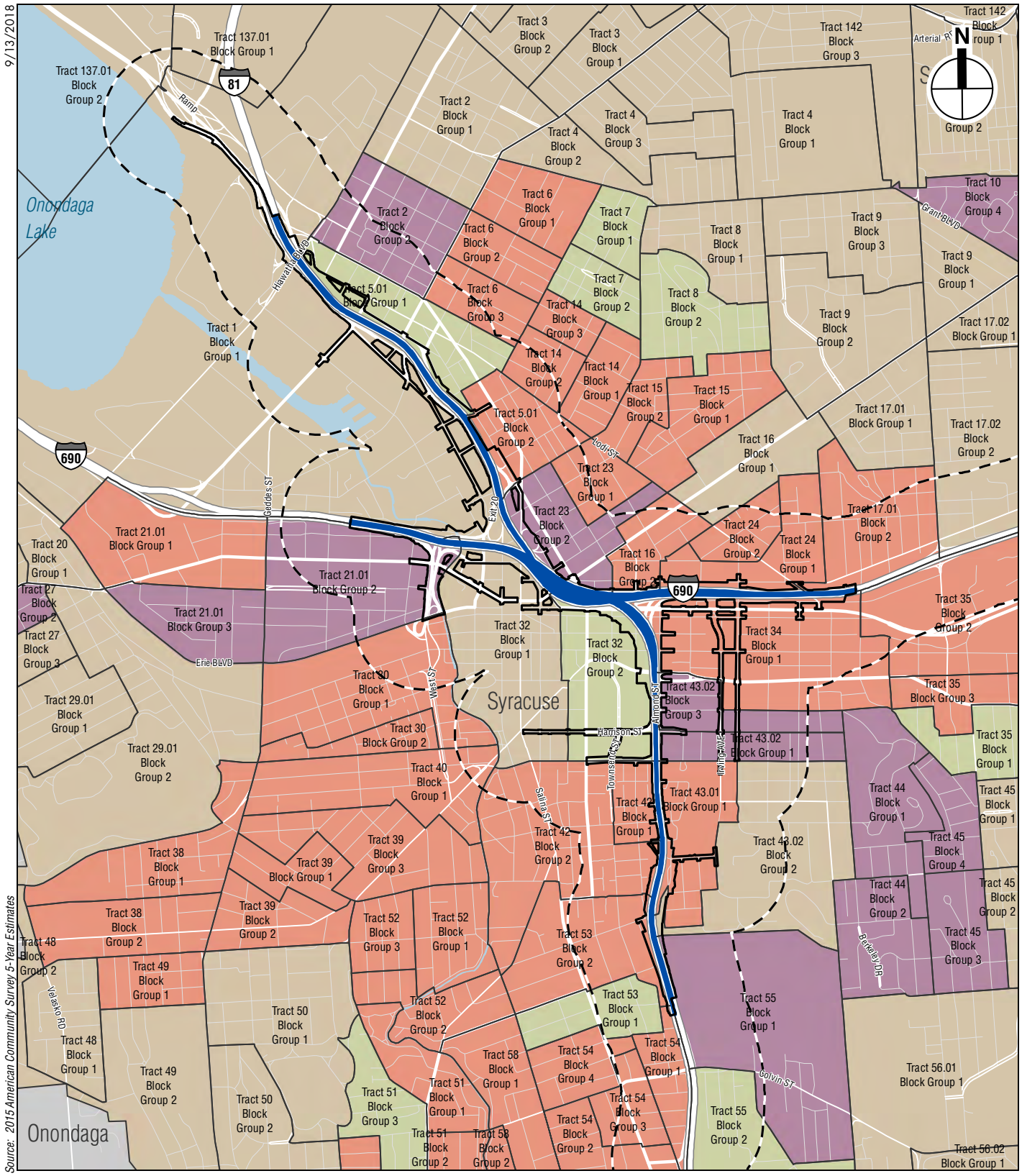
Institutional/Government/Quasi Public
Public Parks/Open Space
Private Recreation/Private Open Space
Transportation

Public Utilities
Parking/Surface
Parking/Garage
Vacant Land

I-81 Viaduct Project

Orange tunnel concept - Land Use

Figure 15-1



Environmental Justice Communities in the Central Study Area

I-81 Viaduct Project

Figure 16-1

Table 15-1
Building Impacts of Orange Tunnel Concept

Tax ID	Address	Land Use	Business	Res. Units	Est. Employees
008.-20-01.0	117 Butternut Street	Distribution Facility	Veteran's Fastener Supply corporation	-	7
017.-01-01.0	329 North Salina Street	Office Building	Learbury Centre (Syracuse Behavioral Healthcare; D'Arcangilo Co., LLP; FairHealth)	-	41
017.-01-02.0	319-325 North Salina Street	Detached Row Building	Dales E-Cig and Vape shop, Apple Nails & African Braiding hair salon	26	30
017.-22-03.0	323-25 James Street	Detached Row Building	1st Point Construction & Results Marketing LLC	-	50
050.-10-01.0	500 Renwick Avenue	Distribution Facility	Maintenance Garage	-	13
103.-09-01.0	122-124 Burnet Avenue	Manufacturing	Currently Vacant	-	-
103.-10-02.0	204 Burnet Avenue	Manufacturing	Manufacturing	-	3
103.-10-04.0	212 Burnet Ave	Detached Row Building	Midtown Auto Body	-	3
103.-10-05.0	216 Burnet Ave	Manufacturing	Hansen QP	-	19
103.-11-02.0	306 Burnet Ave	Distribution Facility	VIP Auto Sales	-	2
103.-14-01.0	421 East Water Street	Drive-In Bank Branch	M&T Bank	-	3
103.-14-02.0	99 State Street	Mini-Mart: Gas & Snacks	Hess Express	-	7
103.-22-02.2	110 Almond Street	Fast Food Franchise	Dunkin Donuts	-	15
103-20-01	110-112 South Townsend Street	Auto Body or Tire Shop	Goodyear Auto Service Center	-	15
104.-02-02.0	212 Herald Place	Office Building	CNY Neurodiagnostics & Press Room Pub	27	30
104.-05-01.0	123-129 East Willow Street	Detached Row Building	2018 - appears to be vacant	-	-
118.-04-01.0	706-16 North Clinton Street	Manufacturing	Financial firm and a medical office	-	-
118.-07-01.0	215 Genant Drive	Manufacturing	SCI Corporation	-	-
TOTALS				**53**	**297**

Table 16-1

Environmental Justice in the Central Study Area – Race, Ethnicity, and Poverty

Census Tract	Block Group	Total Population	Race and Ethnicity										Total Minority	Poverty Status
			White	%	Black	%	Asian	%	Other	%	Hispanic	%		
1	1	644	457	71.0%	79	12.3%	85	13.2%	4	0.6%	19	3.0%	29.0%	22.8%
2	1	1,549	1,125	72.6%	33	2.1%	43	2.8%	118	7.6%	230	14.8%	27.4%	29.6%
2	**2**	1,493	910	61.0%	197	13.2%	121	8.1%	92	6.2%	173	11.6%	39.0%	**55.1%**
5.01	**1**	946	461	48.7%	168	17.8%	96	10.1%	63	6.7%	158	16.7%	**51.3%**	31.2%
5.01	**2**	1,210	337	27.9%	254	21.0%	448	37.0%	69	5.7%	102	8.4%	**72.1%**	**59.8%**
6	**2**	1,340	597	44.6%	176	13.1%	508	37.9%	50	3.7%	9	0.7%	**55.4%**	**41.8%**
6	**1**	1,366	668	48.9%	238	17.4%	105	7.7%	87	6.4%	268	19.6%	**51.1%**	**31.6%**
6	**3**	1,010	424	42.0%	343	34.0%	63	6.2%	163	16.1%	17	1.7%	**58.0%**	**53.0%**
14	**3**	1,192	257	21.6%	192	16.1%	507	42.5%	188	15.8%	48	4.0%	**78.4%**	**48.8%**
14	**2**	1,103	274	24.8%	365	33.1%	180	16.3%	95	8.6%	189	17.1%	**75.2%**	**53.8%**
14	**1**	1,470	363	24.7%	264	18.0%	630	42.9%	136	9.3%	77	5.2%	**75.3%**	**60.4%**
16	**2**	1,346	633	47.0%	484	36.0%	65	4.8%	101	7.5%	63	4.7%	**53.0%**	**33.3%**
16	1	1,784	1,270	71.2%	313	17.5%	48	2.7%	31	1.7%	122	6.8%	28.8%	20.2%
17.01	1	1,047	928	88.6%	27	2.6%	6	0.6%	66	6.3%	20	1.9%	11.4%	25.5%
17.01	**2**	1,506	480	31.9%	283	18.8%	8	0.5%	291	19.3%	444	29.5%	**68.1%**	**57.6%**
21.01	**3**	1,454	824	56.7%	380	26.1%	0	0.0%	47	3.2%	203	14.0%	43.3%	**56.2%**
21.01	**1**	719	353	49.1%	134	18.6%	92	12.8%	18	2.5%	122	17.0%	**50.9%**	**68.7%**
21.01	**2**	899	547	60.8%	147	16.4%	11	1.2%	59	6.6%	135	15.0%	39.2%	**34.4%**
23	**1**	830	262	31.6%	230	27.7%	214	25.8%	53	6.4%	71	8.6%	**68.4%**	**48.2%**
23	**2**	854	451	52.8%	270	31.6%	68	8.0%	32	3.7%	33	3.9%	47.2%	**33.7%**
24	**2**	946	436	46.1%	282	29.8%	131	13.8%	39	4.1%	58	6.1%	53.9%	47.7%
24	**1**	984	370	37.6%	286	29.1%	35	3.6%	101	10.3%	192	19.5%	**62.4%**	**53.7%**
30	**2**	838	84	10.0%	339	40.5%	0	0.0%	33	3.9%	382	45.6%	**90.0%**	**64.6%**
30	**1**	989	263	26.6%	204	20.6%	3	0.3%	6	0.6%	513	51.9%	**73.4%**	**64.1%**
32	1	706	443	62.7%	110	15.6%	49	6.9%	96	13.6%	8	1.1%	37.3%	23.8%
32	**2**	1,722	743	43.1%	427	24.8%	371	21.5%	101	5.9%	80	4.6%	**56.9%**	28.6%
34	**1**	1,213	411	33.9%	352	29.0%	167	13.8%	179	14.8%	104	8.6%	**66.1%**	**55.0%**
35	**3**	846	225	26.6%	455	53.8%	42	5.0%	24	2.8%	100	11.8%	**73.4%**	**66.5%**
35	**1**	803	362	45.1%	223	27.8%	169	21.0%	29	3.6%	20	2.5%	**54.9%**	25.5%
35	**2**	642	151	23.5%	277	43.1%	0	0.0%	8	1.2%	206	32.1%	**76.5%**	**78.5%**
40	**1**	1,803	541	30.0%	897	49.8%	0	0.0%	130	7.2%	235	13.0%	**70.0%**	**32.2%**
42	**1**	999	43	4.3%	742	74.3%	7	0.7%	69	6.9%	138	13.8%	**95.7%**	**71.4%**
42	**2**	1,204	72	6.0%	784	65.1%	0	0.0%	65	5.4%	283	23.5%	**94.0%**	**63.0%**
43.01	**1**	1,592	693	43.5%	529	33.2%	79	5.0%	101	6.3%	190	11.9%	**56.5%**	**32.6%**
43.02	**1**	551	434	78.8%	71	12.9%	36	6.5%	7	1.3%	3	0.5%	21.2%	**39.0%**
43.02	**3**	749	424	56.6%	156	20.8%	87	11.6%	25	3.3%	57	*7.6%*	*43.4%*	**67.8%**
43.02	2	5,162	3,362	65.1%	351	6.8%	900	17.4%	213	4.1%	336	6.5%	34.9%	0.9%
53	2	1,368	174	12.7%	1,022	74.7%	0	0.0%	12	0.9%	160	11.7%	**87.3%**	**58.8%**
53	1	636	16	2.5%	575	90.4%	0	0.0%	21	3.3%	24	3.8%	**97.5%**	30.3%
54	1	783	19	2.4%	473	60.4%	0	0.0%	143	18.3%	148	18.9%	**97.6%**	**65.9%**
54	2	1,042	102	9.8%	726	69.7%	119	11.4%	0	0.0%	95	9.1%	**90.2%**	**32.1%**
54	4	717	22	3.1%	663	92.5%	0	0.0%	0	0.0%	32	4.5%	**96.9%**	**41.7%**
54	3	300	34	11.3%	252	84.0%	0	0.0%	13	4.3%	1	0.3%	**88.7%**	**47.3%**
55	1	654	372	56.9%	191	29.2%	60	9.2%	31	4.7%	0	0.0%	43.1%	**33.6%**
55	2	1,538	575	37.4%	794	51.6%	91	5.9%	30	2.0%	48	3.1%	**62.6%**	29.0%
City of Syracuse		144,564	74,088	51.2%	40,897	28.3%	9,495	6.6%	7,983	5.5%	12,101	8.4%	48.8%	31.5%

Notes: Bold/shading indicates an environmental justice community.
The racial and ethnic categories provided are further defined as: White (White alone, not Hispanic or Latino); Black (Black or African American alone, not Hispanic or Latino); Asian (Asian alone, not Hispanic or Latino); Other (American Indian and Alaska Native alone, not Hispanic or Latino; Native Hawaiian and Other Pacific Islander alone, not Hispanic or Latino; Some other race alone, not Hispanic or Latino; Two or more races, not Hispanic or Latino); Hispanic (Hispanic or Latino; Persons of Hispanic origin may be of any race).
Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates.

The impacts of the Orange tunnel concept would mostly occur within environmental justice communities. The Orange tunnel concept would result in 11 years of construction activities, adverse effects from the displacement of residents and businesses as well as the demolition of historic structures. It would also introduce new tunnel portals and ventilation buildings within the Central Study Area. To accommodate ramps connecting southern Almond Street to BL 81/I-81 (to and from the south) and ramps connecting northern Almond Street to I-690 (to and from the west), east-west, through traffic would be severed at Washington, Jackson, and Burt Streets, as well as at Almond Street between Van Buren Street and Burt Street. These street severances would result in a loss of connectivity, particularly for those living on the west side of I-81 (including the Southside). Without mitigation or abatement, the Orange tunnel concept may result in adverse effects to environmental justice communities.

17. HISTORIC AND CULTURAL RESOURCES

A Phase IA Archaeological Sensitivity Assessment was completed in September 2016 (see DDR/DEIS **Appendix E-3**). The extent of previous disturbance in many areas within the Area of Potential Effect (APE) for the Orange tunnel concept have the potential for archaeological resources to be present. Potential Pre-Contact Native American archaeological sites within the APE would necessarily pre-date the substantial filling and engineering of the landscape that took place as part of the development of the City of Syracuse throughout the nineteenth and twentieth centuries. Therefore, potential Native American archaeological sites are anticipated to be located only in areas with undisturbed soils. Potential historic-period archaeological resources in the APE include sites and features related to the Erie and Oswego Canals; large-scale commercial, industrial, and institutional sites; residential and small-scale commercial sites; and military sites (although none of the latter are known to be located within the project limits).

All properties within the APE that contain buildings that are 50 years old or older have been previously evaluated by SHPO. These properties are listed in **Table 17-1**. Of these total properties located in the preliminary study area for the Orange tunnel concept, a total of seven properties that are individually NR-eligible; one individually NR-listed property; and two properties that contribute to the NR-eligible North Salina Street Historic District 2016 Expansion could be adversely affected by the Project.

Multiple known historic properties are in relatively close proximity to the proposed tunnel portal but outside of the previously described APE for the Orange tunnel concept. The following historic properties are within approximately 500 feet of the north tunnel portal and in relatively close proximity to two historic districts (the NR-listed North Salina Street Historic District (and NR-eligible Expansions) and the NR-listed Hanover Square Historic District (and NR-eligible Expansion)) and fifteen individually NR-eligible buildings. One historic property is within 500 feet of the southern tunnel portal: Oakwood Cemetery (Building ID #20). No direct impacts to Oakwood Cemetery are anticipated because of the proposed project, and the proposed facilities would take the place of existing transportation facilities in the setting of the historic property. However, additional analysis would be necessary to fully evaluate the potential for direct and indirect effects of the Orange tunnel concept, including the tunnel portals, ventilation buildings, and other infrastructure.

Table 17-1
Orange Tunnel Concept Historic Impacts

Tax ID	Address/ Name	National Register (NR) Status	Description of Historic Property/ Applicable NR Criteria	≤ 50 Years Old
008.-20-01.0	117 Butternut Street and Salt Street/ Veteran's Fastener Supply Corp	NR-eligible	The Veteran's Fastener Supply Corp building meets National Register of Historic Places Criteria A and C as a relatively intact circa 1927 Neoclassical-style municipal building constructed by the City of Syracuse to house a City meat inspection facility as a response to health concerns related to the industry, which was a regionally important economic engine. The building also housed a municipal archery facility, and later served as the Syracuse Transportation Department's offices.	
017.-01-01.0	329 North Salina Street/ Learbury Centre/ Syracuse Behavioral Healthcare	Contributing to the NR-eligible North Salina Street Historic District 2016 Expansion	North Salina Street Historic District and North Salina Street Historic District Boundary Expansions were determined eligible for the NR in 1978 under Criterion C (distinctive architecture) with two boundary expansions determined eligible in 1999 and 2016. The district contains the largest collection of architecturally distinctive nineteenth and twentieth century brick commercial row buildings in Syracuse, including examples of Italianate, Victorian Gothic, Romanesque Revival, Queen Anne, Neo-Classical, and Mediterranean Revival styles. The residences range from modest wood frame examples of the Federal and Greek Revival styles to large-scale late Victorian period brick buildings with Queen Anne and Neoclassical style features. The area was home to the city's German community in the nineteenth century and the Italian immigrants in the early twentieth century.	
017.-01-02.0	319-325 North Salina Street/ Britton Block	Contributing to the NR-eligible North Salina Street Historic District 2016 Expansion	(see North Salina Street Historic District description above)	
017.-22-03.0	323-25 James Street	NR-eligible	The building at 323-325 James Street was originally known as the "Crichton Apartments," or the "Crichton Flats," and is eligible for the National Register of Historic Places under Criterion C as a relatively intact example of a Romanesque Revival-style mixed use commercial and apartment building in downtown Syracuse.	
103.-09-01.0	122-124 Burnet Avenue Brayton-Folker House/ Caldwell & Ward Brass Co Office/ "Cab Fab"	NR-eligible	The Cabinet Fabrication Group property located at 122-124 Burnet Avenue was constructed between 1864 and 1940s. The complex is eligible under Criterion A and C; the 1940s cinderblock addition is not considered eligible for the NR.	
103.-14-01.0	421 East Water Street	Not NRE		
030.-05-01.0	400 Burnet Avenue/ New York Central Railroad Passenger and Freight Station	NR-listed	The New York Central Railroad Passenger and Freight Station located at 815 Erie Boulevard East and 400 Burnet Avenue was designed by J.P. Gallagher and constructed ca. 1934. It is eligible under Criteria A and C for its place in the history of railroads in Syracuse, and as an outstanding example of the Art Deco style.	
104.-02-02.0	212 Herald Place/ Syracuse Herald Building	NR-eligible	The Syracuse Herald Building at 220 Herald Place is a Classical Revival-style building constructed in 1928. It is eligible under Criteria A and C for its association with the newspaper, The Herald, and as an example of industrial design.	
104.-05-01.0	123-129 East Willow Street/ Howard & Jennings Pump Factory/ Colella Galleries Building	NR-eligible	The Colella Galleries Building was constructed in 1879 and designed by Charles E. Colton in the Gothic Revival style. It is eligible under Criterion C as one of the few Victorian Gothic commercial building facades remaining in Syracuse.	
103.-14-02.0	99 State Street	Not NRE		
103.-20-01	110-112 South Townsend Street	Not NRE		
103.-10-02.0	204 Burnet Avenue/ Corner Block Factory Shop	NR-eligible	The Syracuse Corner Block Company factory is a three-story red brick factory located at 204 Burnet Avenue and constructed in 1895. The factory is significant under Criterion C for its associated with the Industrial Boom and Diversification period.	
118.-04-01.0	706-16 North Clinton Street	Not NRE		
050.-10-01.0	500 Renwick Avenue	Not NRE		
118.-07-01.0	215 Genant Drive	Not NRE		
103.-22-02.2	110 Almond Street	Not NRE		X
103.-10-04.0	212 Burnet Avenue	NR-eligible	The one-story brick building at 212 Burnet Avenue was constructed as an automobile garage circa 1924. It is eligible under Criterion C as an example of early twentieth century industrial architecture.	
103.-10-05.0	216 Burnet Avenue	Not NRE		
103.-11-02.0	306 Burnet Avenue	Not NRE		

18. VISUAL AND AESTHETIC RESOURCES

The Orange tunnel concept would be located within the visual context of Downtown Syracuse. Much of the Orange tunnel concept would result in no or beneficial changes in visual character compared to the No Build Alternative. However, the tunnel portals and ventilation structures may have potential effect on the visual environment.

- Tunnel portals: Given their depressed location relative to adjacent areas and the mass of their construction, the tunnel portals would be prominent new features in the urban landscape that would not be analogous or like other transportation infrastructure in the region. Views of the portals would primarily be available to travelers on the highway using the tunnels and may also be available to residents or other viewers from adjacent areas, especially from elevated buildings near the portals. At night, the portals would be illuminated, which would attract viewer attention.
- Ventilation buildings: A tunnel ventilation building would be constructed near both the north and south tunnel portals. The buildings would each include an approximately 30-by-40-foot ventilation structure, atop of which would stand two 12-foot diameter, 60-foot-tall ventilation stacks. These stacks would result in a prominent new feature in the visual environment, especially from nearby visual sensitive and/or high-public-use areas, such as the Dr. King Elementary School.
- Tunnel ramps/depressed highways: The ramped sections of the depressed portion of the tunnel would be contained within vertical concrete walls leading into and out of the tunnels, which would be prominent new transportation infrastructure in the visual environment. Travelers using the tunnel ramps would be enclosed in a hardscape environment. As viewers descend the ramps, views of the surrounding urban landscape would be impeded by concrete barrier walls and viewer attention would be focused on the tunnel portals. For residents and other viewers in adjacent areas, the extents and scale of transportation infrastructure would increase and result in a prominent visual separation between the areas east and west of the Project, especially near the ramps for the southern portal.
- Elevated ramps at southern portal: New elevated ramps would be constructed adjacent to the depressed highway leading to the southern portal. The width of the corridor necessary to accommodate the ramps would bring transportation infrastructure closer to some visual sensitive and/or high-public-use areas, such as Dr. King Elementary School, Oakwood Cemetery, and the State University of New York College of Environmental Science and Forestry (SUNY ESF), resulting in increased viewer awareness of the highway.
- Elevated ramps at I-690 interchange: Ramps would be constructed near the I-690 interchange. Due to their height, these reconfigured ramps would be prominent features in the visual landscape. In addition, construction of the depressed highway to the northern portal would require an expansion of transportation infrastructure to accommodate the ramps, which would result in removal of buildings and would bring transportation infrastructure closer to some visual sensitive and/or high-public-use areas, such as Franklin Square.

19. AIR QUALITY

The Orange tunnel concept would result in a net decrease in vehicle miles travel as compared to the No Build Alternative. Due to the reduced VMT, the Orange tunnel concept would result in lower emissions of all modeled criteria pollutants

A screening analysis was performed using the U.S. Environmental Protection Agency's (USEPA) AERSCREEN model to evaluate potential air quality effects of the ventilation fan structures that would serve the proposed tunnel. 1-hour average nitrogen dioxide (NO_2), 24-hour and annual average of particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), 24-hour average concentrations of particulate matter less than 10 micrometers in diameter (PM_{10}), and CO were considered.

Emissions of project vehicles in the proposed tunnel were calculated using the MOVES2014a emissions. While emissions would be split between the two fan structures, it was conservatively assumed that all emissions would be exhausted from a single exhaust fan. The fan structures would exhaust pollutants from the tunnel at a height of 100 feet. It was conservatively assumed that the plume would be exhausted with limited exhaust velocity (0.001 m/s) and at ambient temperature.

Maximum predicted concentrations (including background) from the ventilation fan structures proposed for the Orange tunnel concept are presented in **Table 19-1**. As shown, total maximum screening concentrations are predicted to be well below the corresponding NAAQS for NO_2, $PM_{2.5}$, PM_{10}, and CO.

Table 19-1
Maximum Modeled Pollutant Concentrations (in µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS
NO_2	1-hour	13	102	115	188
	Annual	1	18	19	100
CO	1-hour	137	1,718	1855	40,000
	8-hour	123	802	925	10,000
PM_{10}	24-hour	0.3	36.5	36.8	150
$PM_{2.5}$	24-hour	0.2	14.3	14.5	35
	Annual	0.01	6.1	6.2	12

Notes:
PM_{10} and CO background concentrations were based on 2014-2016 data at the Rochester 2 monitoring station.
$PM_{2.5}$ background concentrations for 24-hour and annual $PM_{2.5}$ were based on 2014-2016 data at the East Syracuse monitoring station

20. NOISE

Given that the tunnel would be deep underground, traffic within the tunnel section would not be audible from the ground surface. Most of the current noise in the area is from the City streets network and traffic on the existing I-81 viaduct. While the current vehicles on the viaduct are a large contributor to noise, this noise is generally indirect (i.e., through vibration noise or echo)

since the line-of-sight between the overhead tire noise and most of the exhaust pipes (excluding some heavy trucks and buses) is obstructed by the bridge deck. While receivers immediately adjacent to the viaduct would benefit from its removal, the current indirect noise from the viaduct is overshadowed by noise from the traffic on the at-grade City streets, meaning that many receivers would not realize an appreciable decrease in noise. Given the substantial noise contribution from dense local street traffic and the expected additional traffic on Almond Street under the Orange tunnel concept, it was qualitatively determined that most Noise Abatement Criteria (NAC) impacts predicted for the Viaduct Alternative would also occur under the Orange tunnel concept.

Reconfiguration of some of the ramps would be required to accommodate street network access to vehicles bypassing the portal entrances. The current noise profile would be altered in the areas with the revised ramp locations. The effects of the ramps on each individual receiver in the area are too complex for qualitative analysis; however, overall, much less traffic would be present within this area due to the removal of the viaduct.

The southern portal is approximately 400 feet south of MLK, Jr. East (at Station T 17+00) and the northern portal is just south of James Street (at Station T 90+00). At the proposed tunnel portals, there is a potential to increase traffic noise because the hard-sound reflective surfaces of tunnel portals would amplify the traffic noise. According to the "Final Technical Report: NCHRP 25-34 – Supplemental Guidance on the Application of FHWA's TNM Appendix L Tunnel Openings," the effects of the tunnel openings would be less than 3 dBA at approximately 100 feet from the portals. The closest receiver to the northern portal is approximately 300 feet and the closest receiver to the southern portal is approximately 300 feet; therefore, the increase in noise from the portals would generally not be noticeable. Moreover, the portals can be designed to control and minimize traffic noise by using sound absorptive finishes and treatments at the tunnel portal surfaces. The landscape and site formations would need to integrate identified noise mitigation within the constructed features and landscape design after a full environmental analysis.

In addition, given the planned depth as the roadways entering the tunnel (approximately 25 to 30 feet), the grade of the roadway would be lowered to an extent that would require retaining walls. It is anticipated that the retaining walls and reduction in grade would reduce the line-of-sight to nearby receivers and act as noise walls. This would likely reduce reflective noise from the tunnel portals and overall traffic noise for nearby receivers.

Two tunnel venting structures are planned, which would be located in the vicinity of the portals. Venting structures are not subject to any noise level limits when operated during an emergency, but under normal operating conditions the fan noise would comply with appropriate noise ordinances for the City of Syracuse to the extent feasible.

The closest receiver to the northern vent structure would likely be approximately 250 feet away. This receiver would be located within a relatively noisy urban area that was identified as a NAC impact for the existing condition; therefore, it is anticipated that noise levels in this area would be above the NAC for the Orange tunnel concept.

The closest receptor to the southern vent structure would likely be approximately 150 feet away. The addition of this adjacent ramp and the increases in traffic volume are expected to somewhat offset the noise reduction from loss of the above-ground freeway traffic. Given these factors and

the fact that a NAC impact was predicted at this location under the existing conditions, it is likely that this receptor would remain a NAC impact under the Orange tunnel concept.

The anticipated background nighttime noise levels would be 60 to 69 dBA for the north structure and 54 to 59 dBA for the south structure; therefore, even at night, noise from the vents (43 to 51 dBA, depending on separation distance) is not expected to be the dominant noise source. The vents would increase average nighttime noise levels by approximately 1 to 2 dBA at the closest receiver (150 feet). In accordance with Table 3 of FHWA's "Highway Traffic Noise Analysis and Abatement Policy and Guidance," a noise level change of 3 dBA or less is generally imperceptible to the human ear; hence, a change in noise levels of 1-2 dBA would normally go unnoticed. However, the vent noise is constant, and the traffic noise can be highly variable, even from moment to moment. Therefore, while the venting structures are not expected to cause a NAC impact, noise may be discernible to nearby receivers at certain times during the night or even during daytime lulls in traffic.

Under the Orange tunnel concept, the Central Study Area would continue to consist mostly of city streets that are at grade with the adjacent land uses. Construction of noise barriers along Almond Street and other city streets that would be improved or would experience increased traffic as part of this concept would be not feasible and/or reasonable. Since barriers must be continuous and extend beyond the actual locations of impacted receptors to be effective, the presence of many cross streets through Downtown corridors prevents the ability to achieve this abatement design. In addition, if barriers were placed on city streets, visual and pedestrian access to and from city buildings, as well as vehicular access to driveways, would be blocked. Outside Downtown in areas near the interchanges with I-481, along I-481 itself, and along I-690, barriers are feasible and could be used to mitigate predicted NAC impacts.

21. GROUNDWATER RESOURCES

Groundwater is not used as a potable water supply within the Central Study Area. The primary water supply for the City of Syracuse is Skaneateles Lake, a Finger Lake approximately 20 miles southwest of the city. The closest USEPA-designated sole source aquifer (SSA) to the Project Area is the Cortland-Homer-Preble SSA, located approximately 14 miles to the south of the Central Study Area. The Central Study Area is within a principal aquifer (Baldwinsville, see **Figure 25-5**, defined by the NYSDEC (Technical and Operational Guidance Series (TOGS) 2.1.3) as "aquifers known to be highly productive or whose geology suggests abundant potential water supply, but which are not intensively used as sources of water supply by major municipal systems at the present time."

Under the Orange tunnel concept, the decrease in impervious area would have an overall beneficial effect on groundwater resources. Stormwater BMPs would be implemented to receive stormwater runoff from the new impervious surfaces constructed under the Orange tunnel concept. The BMPs would increase groundwater infiltration of stormwater and would result in a beneficial effect on groundwater quality, as the stormwater runoff would have reduced sediment, nutrient, and heavy metal concentrations. The depressed roadway with Soldier Pile Tremie Concrete Wall and tunnel would have the potential to intercept the groundwater table but would be designed to minimize groundwater infiltration into these elements of the Orange tunnel concept. Therefore, the Orange tunnel concept would not result in adverse impacts to

groundwater resources due to pumping of infiltrating groundwater. While groundwater would be intercepted by the depressed roadway, cut and cover tunnel elements, and bored tunnel elements, measures would be implemented to ensure that groundwater flow is maintained around these structures (e.g., equalization well). Therefore, the Orange tunnel concept would not result in adverse effects to groundwater resources.

To minimize the potential for adverse effects to groundwater resources, the Orange tunnel concept would include relatively impermeable Support of Excavation (SOE) walls (i.e., Soldier Pile Tremie Concrete Wall Excavation Support [SPTC]) to limit the need for dewatering within the excavation for the portions of the depressed roadway, tunnel approaches, and cut-and cover tunnel construction that would occur below the groundwater table. With these measures in place, construction of the Orange tunnel concept would not result in adverse effects to groundwater resources.

22. CONSTRUCTION EFFECTS

Construction of the Orange tunnel concept would occur over an 11-year period. Construction would result in traffic detours, increases in traffic on certain roadways, and emissions and noise from construction equipment. Property acquisition and temporary easements would also be required, which would be undertaken prior to the start of construction.

Seventy-six (76) properties, totaling 9.99 acres, would be temporarily impacted by construction. However, in most cases, the property owner would retain the use of the property.

The two tubes of the tunnel would be bored by two tunnel boring machines (TBMs) simultaneously. TBMs are very large pieces of equipment that are delivered in pieces for on-site assembly. The delivery of components for the TBM to be used for the Project would occur over approximately one month. The Orange tunnel concept would involve locating construction activities near a number of sensitive receptor locations, including the Dr. King Elementary School, SUNY ESF, the Tucker Missionary Baptist Church, and residential buildings. Due to their duration and intensity, construction activities associated with the Orange tunnel concept may result in adverse air quality impacts at these receptor locations.

Construction of the Orange tunnel concept would potentially include excavation, sub-base preparation, roadway/bridge construction, tunnel construction (cut and cover and tunnel boring), and other miscellaneous work. This work would result in temporary construction noise at nearby receivers. The levels of noise would vary widely, depending on the construction activities undertaken and the anticipated duration of the construction. Construction noise in the area of the tunnel portals would be dominated by both demolition of the existing structures as well as excavation and transport of soils for the cut and cover portion of the tunnel. In general, as the excavations grow deeper, the sideslopes of the excavation would act as noise barriers, which would tend to reduce construction noise. It is anticipated that tunnel boring operations would generally not be audible from the ground surface, but spoils removal would occur at the the tunnel portals. This would require a large number of heavy trucks that may impact noise levels along the chosen haul route.

During certain phases of construction, various segments of roads would be closed. As a result, detour routes would be in effect to accommodate traffic through the construction zone. The

detour routes would generally serve increased traffic during construction, and therefore, noise levels at receivers adjacent to these routes would potentially increase while traffic is detoured. Construction noise abatement strategies would be included within the contract documents to the extent practicable. Potential noise abatement measures could include training programs for contractors, designated construction time periods, and designated haul roads in areas with fewer noise sensitive receivers. Where appropriate, the use of an alternative technology could also be employed for impact equipment.

Tunnel boring operation and rock hauling by trucks are two sources of the vibration from tunneling activities. Rock hauling is not expected to impact building structures. Vibration levels generated by the tunnel boring operations are directly related to the type of the soil and geological formations through which the tunnel boring must be conducted. Once the tunnel boring hits solid rock or a void area, there could be spikes at the vibration levels. There are 17 building structures located above the bored tunnel alignment. None of these buildings would be considered fragile and all were assessed as modern structures built with contemporary building techniques, and consequently these buildings would not be expected to experience construction vibration at a level that could potentially cause damage.

Potential vibration levels that would be perceptible and annoying due to pile driving and drilling. Potential human annoyance due to tunnel boring has been assessed for boring through rock and soil with vibration attenuation rates of 1.67 and 1.00 based on information from the Construction Vibration book by Dowding and the Caltrans Transportation and Construction Vibration Guidance Manual. Typically, a vibration level of 72 VdB would cause a human annoyance impact, which is predicted for six multi-family residences, five office/retail buildings, Peck Hall, and the McMahon/Ryan Child Advocacy Center. Construction of the Orange tunnel concept would occur in environmental justice communities. The construction activities cannot be relocated to areas that do not house environmental justice communities; therefore, the construction effects on environmental justice communities are unavoidable. To minimize construction effects to the extent practicable, extensive measures would be implemented in all areas of construction, including environmental justice communities, in conformance with NYSDOT Standard Specifications and specific measures developed for this Project.