

AMERICAN SOCIETY OF HIGHWAY ENGINEERS

National Project of the Year Award

OFFICIAL ENTRY FORM

AWARD CATEGORY (Check One):

□ Under \$20 Million

☑ Over \$20 Million

SPONSORING REGION (Check One):

- ☑ Northeast
- □ Mid-Atlantic
- □ Southeast

Great LakesNorth CentralSouth Central

 \Box Northwest

□ Rocky Mountain

□ Southwest

CONTACT INFORMATION FOR SUBMITTING REGION:

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PROJECT INFORMATION:

ENTERING AGENCY/COMPANY'S NAME: Greet	nman-Pedersen, Inc.	
PROJECT NAME: Garden State Parkway Intercha	TYPE: Interchange Reconstruction	
PROJECT LOCATION: East Orange, Essex Coun	ty, New Jersey	
CITY: City of East Orange	COUNTY: Essex	STATE: New Jersey
FINAL CONSTRUCTION COST: \$78,300,000 Mill	ion BUDGETED CONSTR	UCTION COST:
PROJECT COMPLETION DATE: July 2022		
PROJECT ASHE SECTION: ASHE-NCNJ	ASHE SECTION CONTACT NA	ME: Stella Karnick
PHONE (OFFICE): <u>609-512-3475</u> PHONE	(MOBILE): E-MA	IL: Stella.karnick@wsp.com
PROJECT TEAM:		
PROJECT OWNER: New Jersey Turnpike Authority		
STREET ADDRESS: 1 Turnpike Plaza		
CITY: Woodbridge	STATE: New Jersey	ZIP: 07095
CONTACT PERSON: Michael Garofalo	PHONE: 732-750-5300	
	E-MAIL ADDRESS: garofalo@nj	ta.com
DROJECT DEGICALEIRA Creamer Dederson las		
PROJECT DESIGN FIRM: <u>Greenman-Pedersen</u> , Inc. STREET ADDRESS: <u>520 US Highway 22</u> , Suite 200		
CITY: Bridgewater	STATE: New Jersey	ZIP: 08807
CONTACT PERSON: Judith Bowen, PE	PHONE: 908-236-9001	<u></u> ZII : 00001
CONTACT TERSON. Oddan Bonon, TE	E-MAIL ADDRESS: jbowen@g	pinet.com
PRIME CONTRACTOR: George Harms Construction	n Company, Inc.	
STREET ADDRESS: <u>62</u> Yellowbrook Road		07704
CITY: Howell Township	STATE: New Jersey	ZIP: 07731
CONTACT PERSON: Tom Hardell	PHONE: 732-938-4004	
	E-MAIL ADDRESS:	
Entry Form Completed By: Kimberly McKenna	Date: 1/23/2024	



PROJECT DESCRIPTION

The New Jersey Turnpike Authority completed improvements at Garden State Parkway (GSP) Interchange 145 in East Orange to improve safety and traffic operations to accommodate the high traffic volume this congested interchange, where the GSP connects with I-280. High traffic volumes, combined with narrow lanes, poor sight distance and substandard auxiliary lane lengths contributed to significant crash rates, poor levels of service, and congestion, with queues backing up onto the GSP NB and the I-280 ramps for traffic entering onto GSP SB. In 2014, *NJ Monthly* described this stretch of the GSP as, "a narrow chute through city neighborhoods that border it so tightly that it has nowhere to expand". Indeed, widening through this urban corridor was particularly challenging as it is flanked by full height retaining walls which support the parallel Oraton Parkway NB and SB. Businesses, residences, aging utilities, and signalized intersections immediately adjacent to the Central Avenue Bridge over the GSP further complicated design and construction.

Project improvements involved widening the GSP from four to five lanes in each direction to provide a second acceleration and deceleration lane along the GSP in both directions. The existing two-span Central Avenue Bridge was replaced with a single span to increase the width available for the additional travel lanes below. New abutments were aligned with the flanking retaining walls. The existing concrete median was replaced and realigned toward the east to better balance the NB and SB lane and shoulder widths. Toll Plaza improvements included widening the ramp between the toll plaza and GSP SB to provide a two-lane entrance ramp, conversion of the toll plaza to one-way tolling, and eliminating the toll plaza located at the GSP northbound exit. This \$78 million project also incorporated additional State of Good Repair projects involving deck rehabilitation and structural improvements at five sites outside the limits of the interchange.

Complexity:

The project traverses through a densely developed urban community with a plethora of existing underground utilities, significant traffic volumes, and no obvious room for expansion. Maintaining traffic on the GSP and Central Avenue during peak travel hours was required. CareWell Health Medical Center (formerly East Orange General Hospital), which is the only acute care hospital in Essex County is also accessed from Central Avenue. GPI's design approach balanced the complexities of the project setting and the importance of meeting the transportation needs while being sensitive to the community.

New Application of Existing Technologies/Originality/Innovation:

GPI's multi-disciplinary approach to project design exercised a variety of geometric and structural tools to widen the GSP while limiting impacts to the adjacent community and infrastructure.

Foundation design considered existing utilities within the intersections, the shallow depth of rock and the proximity of the hospital, all of which eliminated the possibility of using piles for foundation support. Since construction of standard width spread footings would have encroached into the flanking intersections, <u>vertical tie-down anchors</u> were used to reduce footing size. Tie-down anchors resist additional uplift and overturning movements associated with a smaller footing and transfer tensile forces into the ground.



Project: Garden State Parkway Interchange 145 Category: Over \$20M Construction Cost

Widening the GSP shifted live load closer to the flanking retaining walls which could weaken or undermine the wall foundation. <u>Underpinning</u> was performed to strengthen the wall foundations and involved excavating beneath the existing foundation in alternating sections and constructing the additional depth of foundation.

The existing two-span Central Avenue Bridge was replaced with a single span structure to increase the available pavement width of the GSP below. The new bridge maintains the existing vertical clearance while minimizing changes to the Central Avenue profile by utilizing a <u>welded plate girder composed of thicker plates</u> than typically used, to reduce superstructure depth.

Since the project is located in the heart of an urban environment, lengthening the bridge had significant impacts to existing underground utilities. GPI coordinated closely with the utility liaisons to minimize impacts where feasible while also "cleaning up" the intersection to remove abandoned/redundant features. A critical concern was an aging PSE&G 42" cast iron gas main with leaking joints. Relocation was not economically feasible due to both the relocation costs and the associated impacts to the surrounding infrastructure. GPI designed a protective structure with micropile foundations to impacts to the aging facility. The main's leaking mechanical joints were lined using Cured-in-Place-Lining (CIPL), which involves inserting and curing a resin impregnated tube within the existing pipe to seal cracks and gaps. CIPL of this 42" main <u>set the world record for the largest gas pipeline renewed using CIPL</u>.

GPI/PSE&G/NJTA also partnered to construct a new 69kV service connection as part of PSE&G's electric service reliability /system redundancy initiative. PSE&G requested this change after the project was bid. The entire project team worked collaboratively to incorporate this betterment into the construction sequence while still meeting the overall project completion date.

Social/Economic Considerations:

Public Involvement played a critical role in project development. East Orange nicknamed "The Crossroads of New Jersey" is divided into four sections. GSP construction in 1956 divided the city in two; followed by I-280 construction in 1967. The community contended that construction of these two roadways contributed to the city's decline from its earlier heyday. The project team coordinated with community leaders to address concerns regarding dust and noise mitigation during construction, pedestrian safety and walkability for children crossing over the GSP at four existing overpasses, and the condition of pavement, sidewalks, and exposed utilities. The contract included replacement of all traffic signals to meet current MUTCD requirements; sidewalk replacement at the intersections and along Oraton Parkway NB and SB with ADA compliant sidewalks; Oraton Parkway was repaved; and utilities were upgraded. Overgrown trees which had contributed to the degradation of pavement and sidewalks along Oraton Parkway were removed and a shade tree planting program was included. Refurbishment of the community's aging infrastructure transformed this residential neighborhood.

Safety:

Traffic management during construction was key to project success. The Central Avenue Bridge needed to be replaced in only two primary stages; consequently, during construction, the bridge would need to be



reduced from six lanes to three. During construction, the bridge was reduced to one eastbound and two westbound lanes and left turns from Central Avenue were detoured.

An extensive traffic data collection and analysis program, including turning movement counts, a Skycomp aerial survey, and development of a Vissim microsimulation model were used to develop an MPT approach that would provide satisfactory traffic operations during construction.

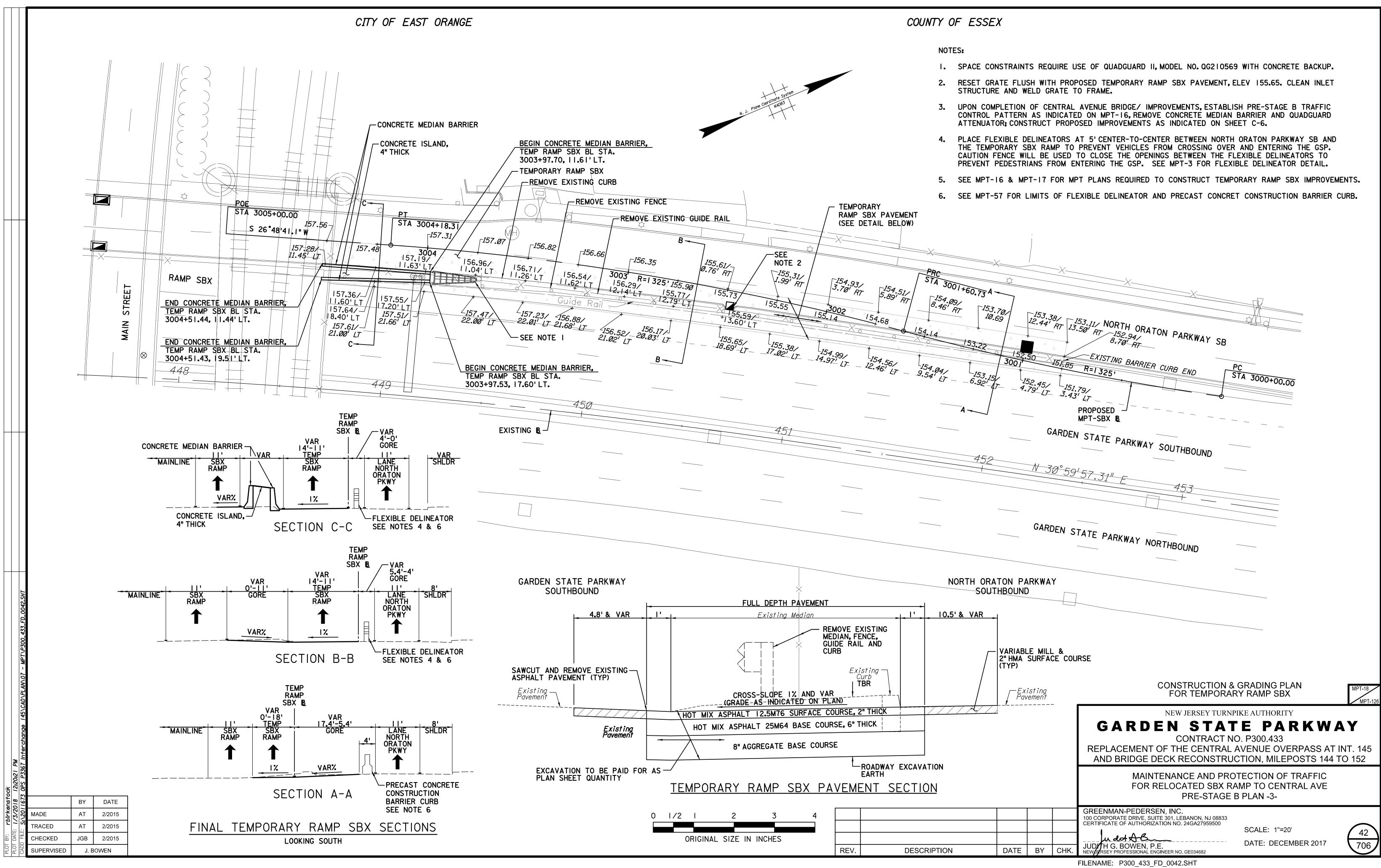
The Vissim model was developed to analyze traffic operations within the existing roadway network and revealed that excess capacity was available along Sussex Avenue, located to the north and parallel to Central Avenue. This provided an excellent diversion route for Central Avenue eastbound traffic. GPI recommended construction of a temporary exit ramp north of I-280 to redistribute the diverted traffic within this existing network. Traffic operations of multiple construction scenarios were then evaluated using the Vissim model to ensure that the MPT plan would provide satisfactory traffic operations during all construction stages.

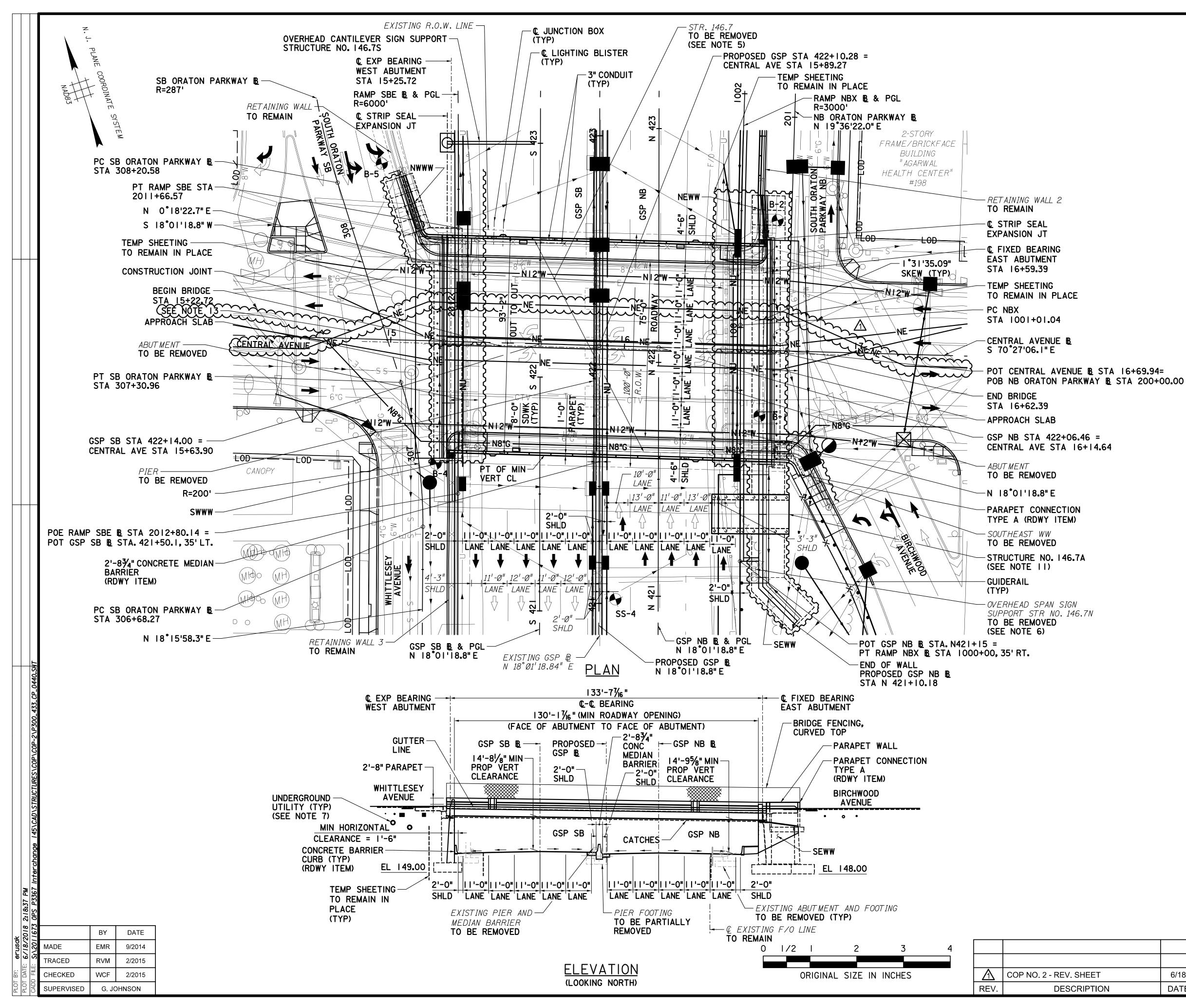
Aesthetics and Sustainable Features:

The project is located within a densely developed urban community, so preservation of the natural environment was not a key project component; however, Environmental Justice concerns and contaminated materials were addressed. Local road improvements, lighting upgrades and significant utility upgrades were included to address the community's safety concerns. A known contaminated site, located at the southwest quadrant of the Central Avenue bridge required the services of a Licensed Site Remediation Professional. Excavation for abutment construction and utility improvements required material testing and disposal. Asbestos utility pipes were also removed from the bridge. The new abutments and reconstructed retaining walls incorporated the decorative scoring of the existing structures.

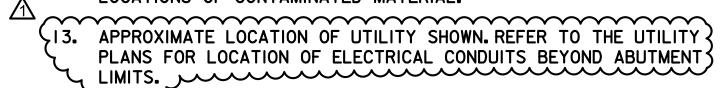
Meeting and Exceeding Owner's/Client's Needs:

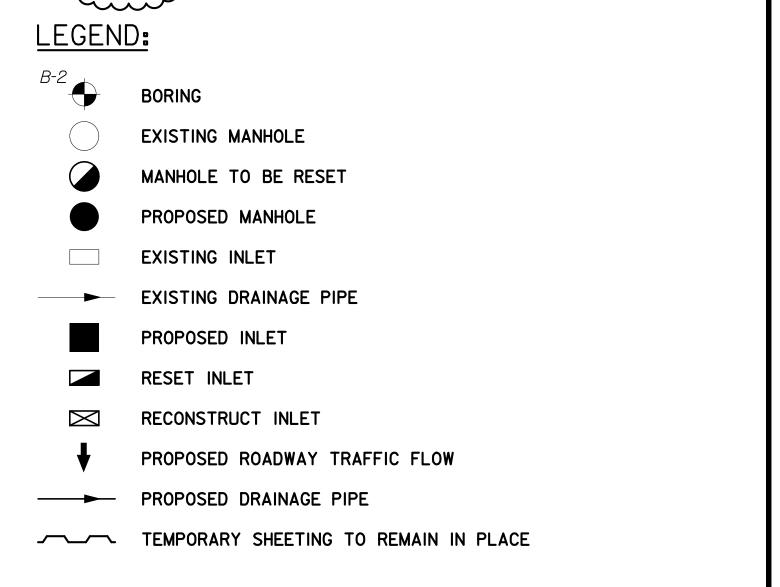
The NJTA's Strategic Plan's Core Values include the following: Safety; Diversity; Innovation; Transparency; State of Good Repair; Customer Satisfaction; Resiliency & Sustainability; and Long-Term Financial Stability. This project addressed nearly all of these Core Values. Primary to any transportation agency and professional, <u>Safety</u> for all road users and construction workers is paramount and the project improved safety on the GSP and the flanking intersections while our approach to MPT improved safety within the construction zone. <u>Diversity</u> - The project met all Disadvantaged Business Enterprise Goals in both design and construction. Innovative geometric and structure design elements were employed to make improvements possible within the constrained project limits. The contract included pavement reconstruction, widening, bridge replacement, retaining wall rehabilitation, as well as additional deck replacement and structural improvements which raised the <u>State of Good Repair</u> of the NJTA facilities; and utility improvements addressed <u>resiliency and sustainability</u> of this section of the GSP. The project was completed on time, in spite of the additional utility work, and PSE&G paid for design revisions required to address their additional improvements. Based on the design and construction efforts, the interchange improvements improve <u>Customers Satisfaction</u>, and the NJTA's Core Values were met. The cooperation of all organizations involved in design and construction led to a successful completion of this program.



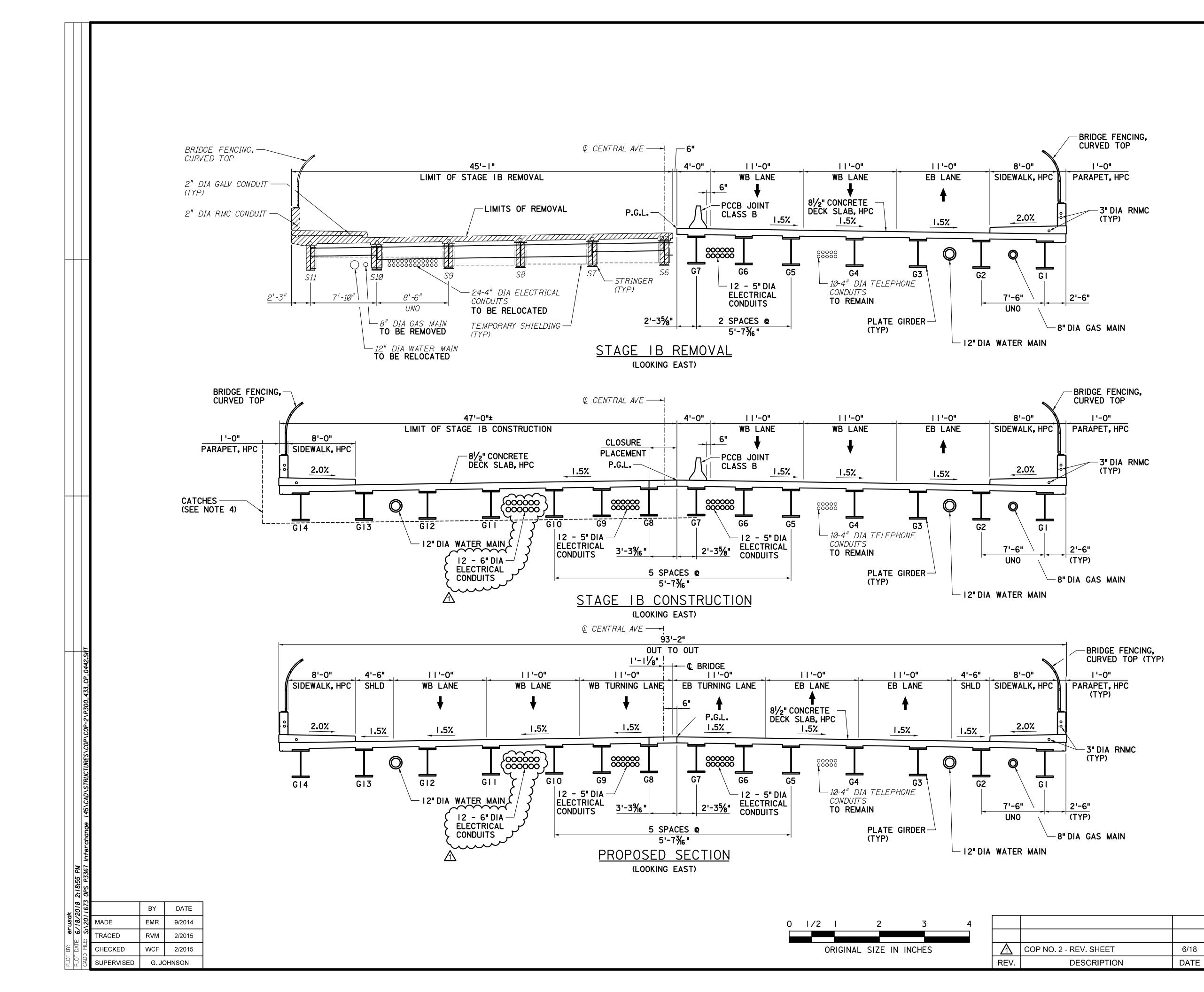


- I. FOR GENERAL NOTES, SEE SHEET SI-I.
- 2. FOR TYPICAL SECTIONS AND CONSTRUCTION STAGING. SEE SHEETS SI-3 TO SI-4.
- 3. FOR RETAINING WALL 2, SEE SHEETS S6-1 TO S6-13.
- 4. FOR RETAINING WALL 3. SEE SHEETS S7-1 TO S7-10.
- 5. THE EXISTING BRIDGE SUPERSTRUCTURE, APPROACH SLABS, ABUTMENTS, PIER CAP BEAM, AND PIER COLUMNS ARE TO BE REMOVED IN THEIR ENTIRETY. PORTIONS OF THE EXISTING PIER FOOTINGS ARE TO BE REMOVED AS INDICATED ON THE DEMOLITION PLANS. FOR DETAILS ON THE DEMOLITION PLANS AND DETAILS, SEE SHEETS SI-6 TO SI-16.
- 6. THE EXISTING OVERHEAD SIGN STRUCTURE IS TO BE REMOVED PRIOR TO CONSTRUCTION OF THE PROPOSED BRIDGE. OVERHEAD CANTILEVER SIGN SUPPORT STRUCTURE NO. 146.7N WILL BE CONSTRUCTED PRIOR TO THE PROPOSED BRIDGE. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE SIGN STRUCTURE DURING CONSTRUCTION OF THE PROPOSED BRIDGE. FOR STRUCTURE NO. 146.7N PLANS, SEE SHEET S8-2.
- 7. REFER TO UTILITY CONSTRUCTION PLANS FOR EXISTING UTILITIES TO BE REMOVED OR RELOCATED.
- 8. PROPOSED UNDERBRIDGE LIGHTING WILL BE MOUNTED TO THE ABUTMENT. REFER TO ROADWAY LIGHTING PLANS FOR UNDERBRIDGE LIGHTING LAYOUT AND DETAILS.
- REFER TO DRAINAGE PLANS FOR EXISTING AND PROPOSED DRAINAGE 9 INLETS AND PIPES.
- IO. FOR CONCRETE MEDIAN BARRIER DETAILS AND CONCRETE BARRIER CURB DETAILS, SEE SHEET CD-6.
- II. FOR STRUCTURE NO. 146.7A, SEE SHEETS S2-1 TO S2-6.
- 12. REFER TO THE REGULATED MATERIAL MANAGEMENT PLAN FOR LOCATIONS OF CONTAMINATED MATERIAL.





				\$1-2 \$1-52				
				NEW JERSEY TURNPIKE AUTHORITY				
				GARDEN STATE PARKWAY CONTRACT NO. P300.433 REPLACEMENT OF THE CENTRAL AVENUE OVERPASS AT INT. 145 AND BRIDGE DECK RECONSTRUCTION, MILEPOSTS 144 TO 152				
				STRUCTURE NO. 146.7R CENTRAL AVENUE BRIDGE OVER GSP NB AND SB GENERAL PLAN AND ELEVATION				
				GREENMAN-PEDERSEN, INC. 100 CORPORATE DRIVE, SUITE 301, LEBANON, NJ 08833				
				CERTIFICATE OF AUTHORIZATION NO. 24GA27959500 SCALE: 1"=20'				
6/	5/18	EMR	WCF					
	ATE	BY	CHK.	GREGORY P. JOHNSON NEW JERSEY PROFESSIONAL ENGINEER NO. 24GE03543000 DATE: DECEMBER 2017				



- I. FOR GENERAL NOTES, SEE SHEET SI-I.
- 2. FOR GENERAL PLAN AND ELEVATION, SEE SHEET SI-2.
- 3. FOR MAINTENANCE AND PROTECTION OF TRAFFIC, REFER TO THE MAINTENANCE AND PROTECTION OF TRAFFIC PLANS.
- TEMPORARY CATCHES SHOWN ARE DRAWN SCHEMATICALLY. CATCHES ARE TO EXTEND A MINIMUM OF 2 FEET ABOVE THE TOP OF THE EXISTING AND PROPOSED BARRIER PARAPETS. THE CATCHES SHALL NOT DECREASE THE EXISTING VERTICAL CLEARANCE.

STAGE IB:

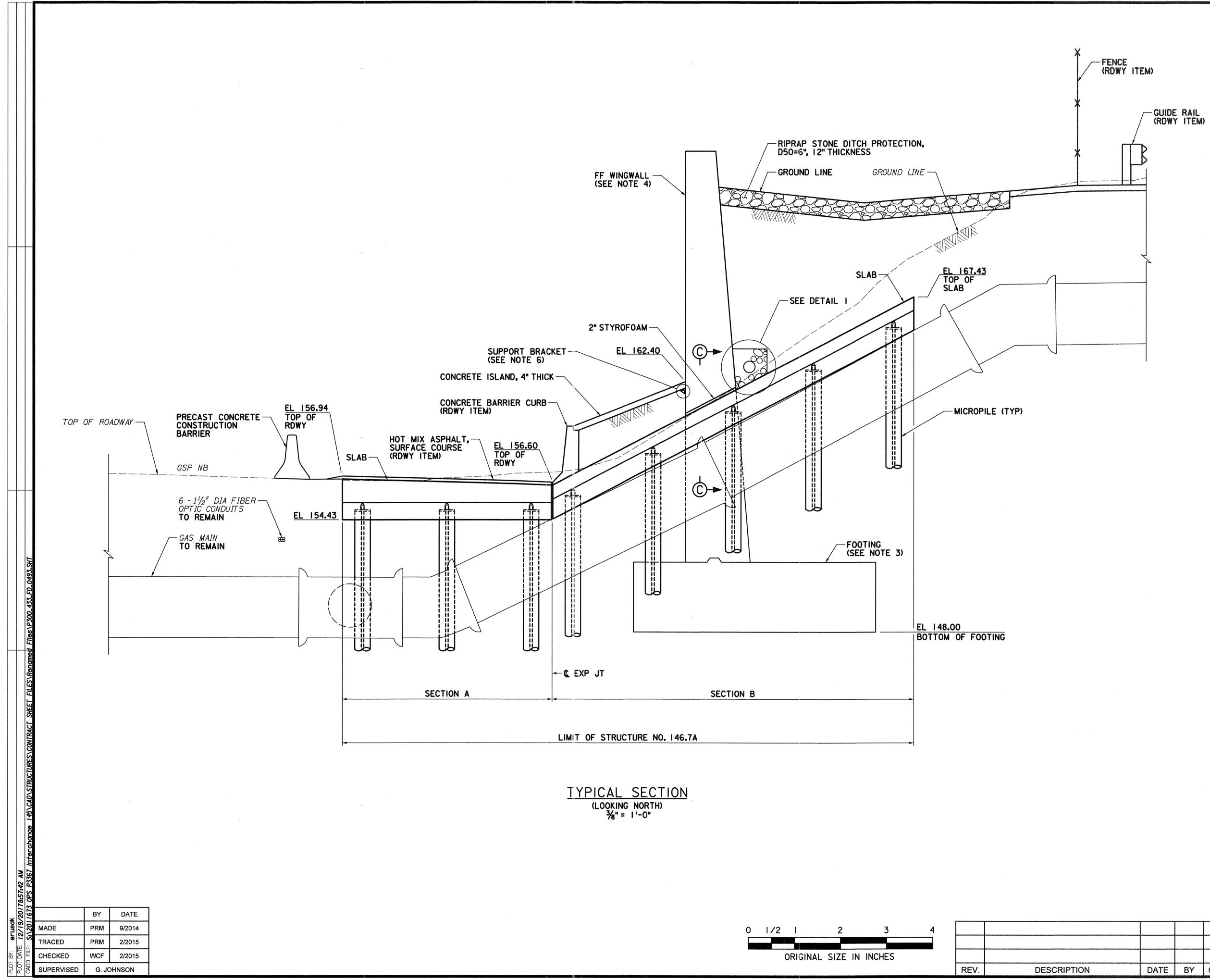
- I. INSTALL PRECAST CONCRETE CONSTRUCTION BARRIER, CLASS B TO ACCOMMODATE THREE II'-O" TRAFFIC LANES, A 6" LEFT SHOULDER AND AN 8'-O" SIDEWALK.
- 2. REMOVE TEMPORARY SHIELDING.
- 3. INSTALL CATCHES.
- 4. REMOVE EXISTING UTILITIES. PARAPET. SIDEWALK. DECK SLAB. AND SUPERSTRUCTURE. REMOVE EXISTING PIER PEDESTALS, EXISTING PIER IS TO REMAIN.
- 5. INSTALL TEMPORARY SHEETING TO REMAIN IN PLACE TO THE LIMITS SHOWN ON SHEET SI-8.
- 6. INSTALL VERTICAL SHIELDING AND REMOVE EXISTING ABUTMENTS AND WINGWALLS TO THE LIMITS SHOWN ON SHEET SI-8.
- 7. CONSTRUCT PROPOSED ABUTMENT AND WINGWALL SECTIONS AND INCIDENTAL EARTHWORK.
- ERECT PROPOSED GIRDERS, INSTALL CATCHES, AND INSTALL UTILITIES. 8.
- CONSTRUCT PROPOSED DECK, SIDEWALK, PARAPETS AND APPROACH 9. SLABS.
- IO. INSTALL TEMPORARY LANE CLOSURES FOR WB AND EB TURNING LANES.
- II. CONSTRUCT CLOSURE PLACEMENT.
- 12. REMOVE CATCHES.

STAGE 3:

I. REMOVE EXISTING PIER CAP, COLUMNS AND PARTIALLY REMOVE EXISTING PIER FOOTINGS TO THE LIMITS SHOWN ON SHEET SI-13 TO FACILITATE CONSTRUCTION OF THE MEDIAN BARRIER.

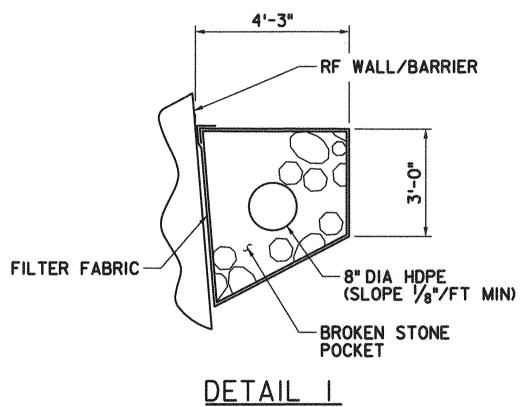
LEGEND: LIMITS OF REMOVAL EXISTING ROADWAY TRAFFIC FLOW PROPOSED ROADWAY TRAFFIC FLOW S1-4 S1-5 NEW JERSEY TURNPIKE AUTHORITY **GARDEN STATE PARKWAY** CONTRACT NO. P300.433 **REPLACEMENT OF THE CENTRAL AVENUE OVERPASS AT INT. 145** AND BRIDGE DECK RECONSTRUCTION, MILEPOSTS 144 TO 152 STRUCTURE NO. 146.7R CENTRAL AVENUE BRIDGE OVER GSP NB AND SB TYPICAL SECTIONS AND CONSTRUCTION STAGING 2 GREENMAN-PEDERSEN, INC. 100 CORPORATE DRIVE, SUITE 301, LEBANON, NJ 08833 CERTIFICATE OF AUTHORIZATION NO. 24GA27959500 SCALE: 3/16"=1'-0" 442 EMR WCF 706 DATE: DECEMBER 2017 GREGORY P. JOHNSON NEW JERSEY PROFESSIONAL ENGINEER NO. 24GE03543000 ΒY CHK

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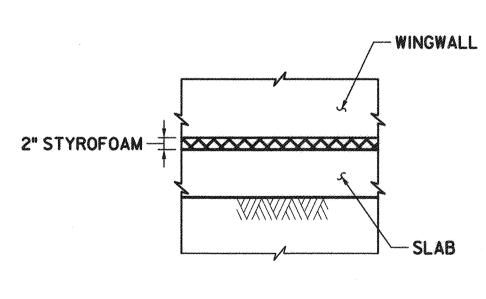


1/2		2	3	4		
	ORIGINAL	. SIZE IN	INCHES			
					REV.	DESCRIPTION

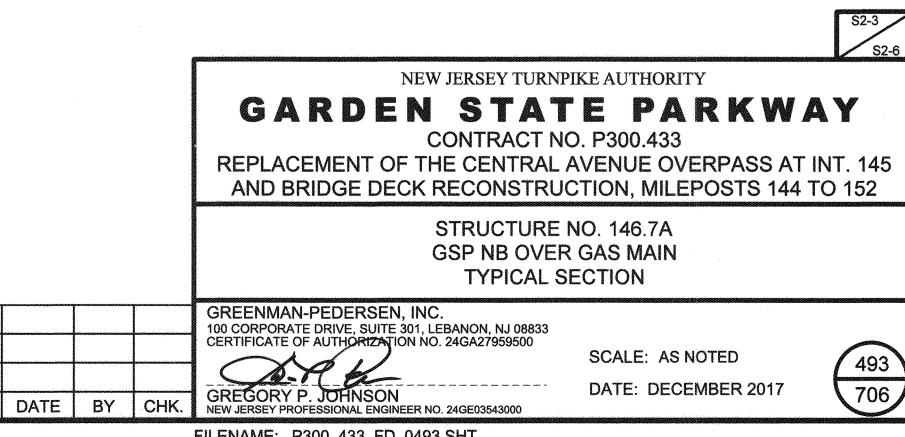
- I. FOR GENERAL NOTES, SEE SHEET S2-I.
- 2. FOR GENERAL PLAN AND ELEVATION, SEE SHEET S2-2.
- 3. FOR THE FOUNDATION PLAN OF THE WINGWALL, SEE SHEET SI-17.
- 4. FOR PLAN, ELEVATION, SECTIONS AND DETAILS OF THE WINGWALL, SEE SHEETS SI-21 AND SI-27.
- THE EXISTING GAS MAIN IS TO BE MAINTAINED DURING 5. CONSTRUCTION. THE GAS MAIN SHALL NOT BE EXPOSED DURING THE CONSTRUCTION OF THE PROTECTION STRUCTURE.
- 6. FOR SUPPORT BRACKET DETAIL, SEE SHEET S1-24.



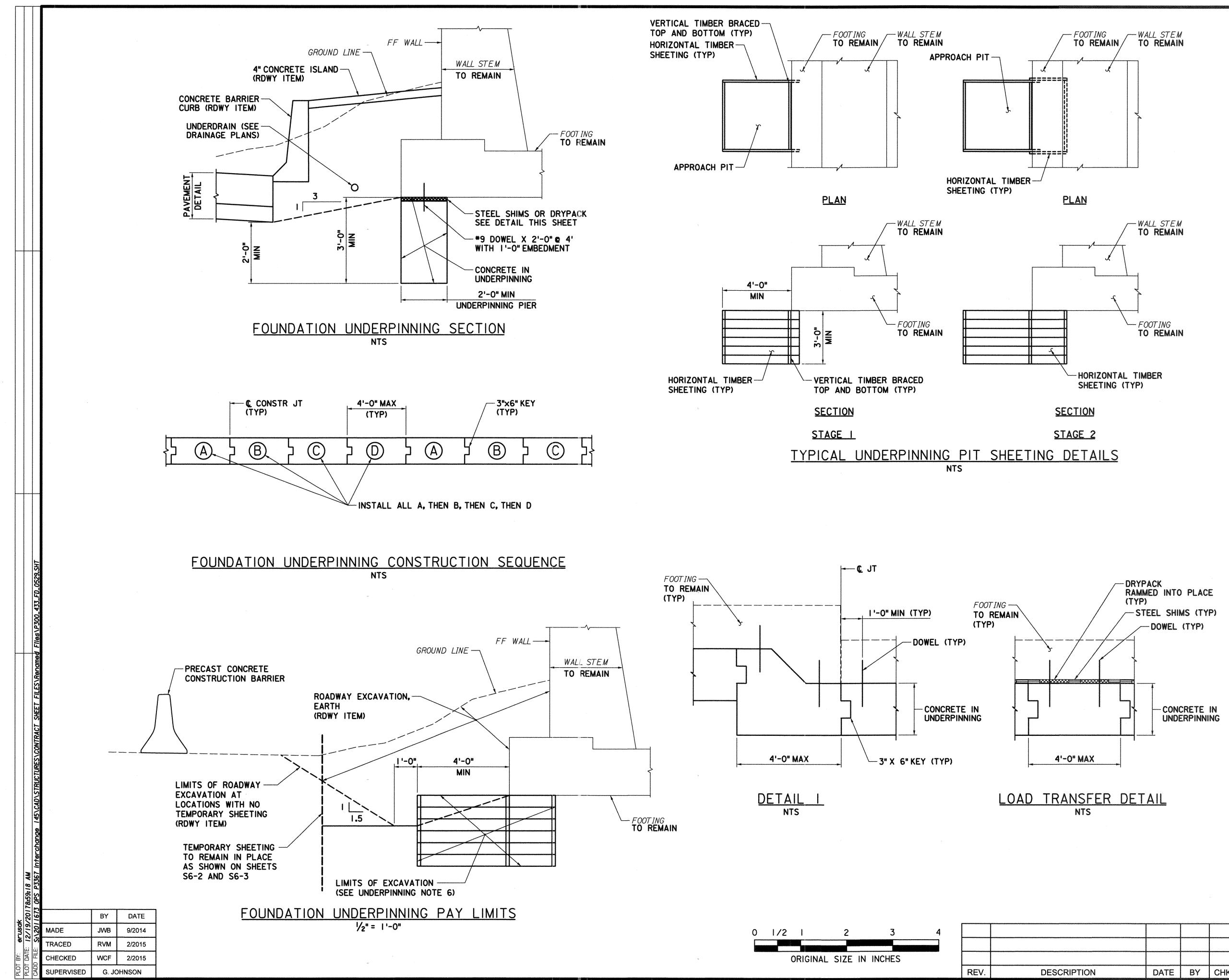
NOT TO SCALE



SECTION C-C NOT TO SCALE



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- I. FOR GENERAL NOTES, SEE SHEET S6-I.
- 2. FOR GENERAL PLAN AND ELEVATION, SEE SHEETS S6-2 AND S6-3.
- 3. FOR DEMOLITION PLAN AND ELEVATION, SEE SHEETS S6-6 AND S6-7.
- 4. REFER TO DRAINAGE PLANS FOR EXISTING AND PROPOSED DRAINAGE TO BE REMOVED OR RELOCATED.
- 5. THE COST OF THE EXCAVATION FOR THE UNDERPINNING SHALL BE INCLUDED IN THE UNIT PRICE FOR "CONCRETE IN UNDERPINNING"

SHEETING CONSTRUCTION SEQUENCE:

- I. LOWER GROUND LEVEL IN FRONT OF FOOTING TO 3 INCHES ABOVE BOTTOM OF FOOTING ELEVATION. EXCAVATION SIDE SLOPES SHOULD NOT EXCEED 1.5H:1V.
- 2. SIMULTANEOUSLY EXCAVATE FOR THE UNDERPINNING PIER TO A MAXIMUM OF 3 FT DEPTH AT ONE TIME AND INSTALL TIMBER LAGGING ON ALL SIDES OF THE BOX. CONTINUE EXCAVATION AND INSTALLATION OF TIMBER LAGGING UNTIL THE BOTTOM OF THE PIT IS REACHED. THE EXCAVATION DEPTH INTERVALS MAY BE REDUCED IN THE FIELD AT THE DIRECTION OF THE ENGINEER BASED ON ACTUAL FIELD CONDITIONS.

UNDERPINNING NOTES:

- I. ANY LOOSE DEBRIS SHALL BE REMOVED FROM THE BOTTOM OF THE PIER EXCAVATION. THE SUBGRADE OF ALL UNDERPINNING PIERS SHALL INSPECTED BY THE ENGINEER PRIOR TO PLACING THE CONCRETE.
- 2. THE CONCRETE PLACEMENT SHALL ALLOW A MINIMUM 3" SPACE BETWEEN THE BOTTOM OF FOOTING AND THE UNDERPINNING PIER FOR LOAD TRANSFER AND DRY PACKING.
- 3. INSTALL DOWEL IN PREDRILLED HOLE.
- 4. TRANSFER OF LOAD SHALL BE ACCOMPLISHED BY THE USE OF STEEL PLATES AND STEEL WEDGES AS THE PREFERRED METHOD. STEEL WEDGES SHALL BE DRIVEN INTO PLACE BEFORE ADJACENT SECTIONS ARE EXCAVATED.
- 5. THE TRANSFER OF LOAD SHOULD BE PERFORMED AFTER THE PIERS HAVE CURED FOR A MINIMUM OF 48 HOURS. AFTER TRANSFERRING THE LOAD ONTO THE UNDERPINNING PIER, THE SPACE OR VOID BETWEEN THE TOP OF THE UNDERPINNING AND THE UNDERSIDE OF THE EXISTING FOOTING SHALL BE FILLED WITH NON-SHRINK GROUT OR DRY-PACK MORTAR (5000 PSI MIN) RAMMED INTO PLACE. DRY-PACK SHALL CONSIST OF EQUAL PARTS OF SAND AND CEMENT. WITH SUFFICIENT WATER TO MAKE THE MIXTURE MOIST.
- UNDERPINNING PIERS SHALL BE CONSTRUCTED TO A MINIMUM OF 2 FEET BELOW THE BOTTOM OF THE EXCAVATION. AT THE DIRECTION OF THE ENGINEER, DEPTHS OF SOME PIERS MAY BE INCREASED TO BYPASS UNSUITABLE SOILS.
- EACH UNDERPINNING PIER SHALL BE 4'-O" WIDE UNLESS OTHERWISE INDICATED. MAINTAIN AT LEAST 12 FEET CLEAR BETWEEN EXCAVATED PIERS. ALL UNDERPINNING PIERS SHALL BE AT LEAST 2 FEET THICK OR THE WIDTH BASED ON AN IMAGINARY IV:3H LINE PROJECTING FROM THE BOTTOM OF EXCAVATION AS SHOWN.
- 8. THE BOTTOM ELEVATION OF THE EXISTING FOOTINGS IS ESTIMATED AND IS BASED ON AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD. ANY DIFFERENCES BETWEEN ACTUAL AND ESTIMATED CONDITIONS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND MODIFICATIONS TO THE DESIGN.
- 9. UNDERPINNING PIERS SHALL BE SHEETED ON FOUR SIDES WITH HORIZONTAL TIMBERS. THE HORIZONTAL TIMBER BOARDS SHALL BE SPACED 11/2" TO 2" APART (I.E., LOUVERING) TO PERMIT FILLING AND BACKPACKING OF ANY VOIDS THAT OCCUR BEHIND THE LAGGING. IF IT IS NOT POSSIBLE TO FILL AND BACKPACK ALL VOIDS WITH SOIL. THE CONTRACTOR SHALL FILL THE VOIDS WITH GROUT BY LOW PRESSURE

			PUMPING OF THE GROUT THOUGH HOL LAGGING.	ES IN THE HORIZONTAL TIM	BER 56-10 56-13		
			NEW JERSEY TURNE	PIKE AUTHORITY			
			GARDEN STAT	'E PARKWA	AY		
			CONTRACT N	O. P300.433			
		AVENUE OVERPASS AT					
			AND BRIDGE DECK RECONSTRU	CTION, MILEPOSTS 144	10 152		
			RETAINING	WALL 2			
			FOUNDATION UNDERPINNING DETAILS				
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			GREGORY P. JOHNSON	DATE: DECEMBER 2017	$\left(\begin{array}{c} 529\\ 706\end{array}\right)$		
DATE	BY	CHK.	NEW JERSEY PROFESSIONAL ENGINEER NO. 24GE03543000		Vuo		

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