

SCOPE OF WORK

REPLACE EXISTING TUNNEL AND ROADWAY LIGHTING FOR TUNNELS 15, 17 AND 104. PROVIDE NEW LIGHTING SYSTEMS UTILIZING LED LUMINAIRES AND PROVIDE NEW POWER SYSTEMS THAT INCLUDE NEW EMERGENCY GENERATORS AND NEW UTILITY SERVICES.

INSTALL LED LUMINAIRES, LIGHT CONTROL SYSTEM PANELS, CIRCUITRY, GENERATORS, AND PACKAGED EQUIPMENT ENCLOSURES THAT HOUSE THE NEW ELECTRIC SERVICE EQUIPMENT. CIRCUITRY INCLUDES TRENCHED PVC CONDUIT OUTSIDE THE TUNNELS, RGS CONDUIT ON THE PORTAL FACES, AND SURFACE MOUNTED SCHEDULE 80 PVC CONDUIT AND RGS CONDUIT INSIDE THE TUNNEL.

DEMOLISH AND REMOVE THE EXISTING LIGHTING SYSTEMS (LUMINAIRES, LIGHT CONTROL SYSTEM PANELS, CIRCUITRY) AND THE EXISTING POWER DISTRIBUTION SYSTEMS (SERVICE EQUIPMENT, PANELSBOARDS, TRANSFORMERS, GENERATORS, ATS, FEEDERS AND BRANCH CIRCUITS), INCLUDING CONDUITS, BOXES AND SUPPORTS, AS CALLED OUT ON THE DRAWINGS AND IN THE SPECIAL PROVISIONS. DEMOLITION AND REMOVAL OF THE EXISTING SYSTEMS MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW SYSTEMS IS COMPLETE AND THE NEW SYSTEMS HAVE BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE.

DESIGN CRITERIA

- 2005 AASHTO ROADWAY LIGHTING DESIGN GUIDE
- 2009 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 5TH EDITION, AND LATEST INTERIM SPECIFICATIONS VALID AT THE TIME OF LETTING
- 2011 NATIONAL ELECTRICAL CODE
- 2002 AASHTO ROADSIDE DESIGN GUIDE

ROADWAY STANDARDS

THE FOLLOWING ROADWAY ENGLISH STANDARDS AS APPEAR IN "NCDOT ROADWAY STANDARD DRAWINGS", ROADWAY DESIGN UNIT-N.C. DEPARTMENT OF TRANSPORTATION RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD NO.	TITLE
1408D01	LIGHT CONTROL SYSTEM
(USE DETAIL DRAWING 1408D01 ON SHEET E-021 IN LIEU OF STANDARD DETAIL DRAWING 1408.01 FOR SHEET 1 OF 3. SHEETS 2 OF 3 AND 3 OF 3 OF STANDARD DETAIL DRAWING 1408.01 ARE NOT USED.)	

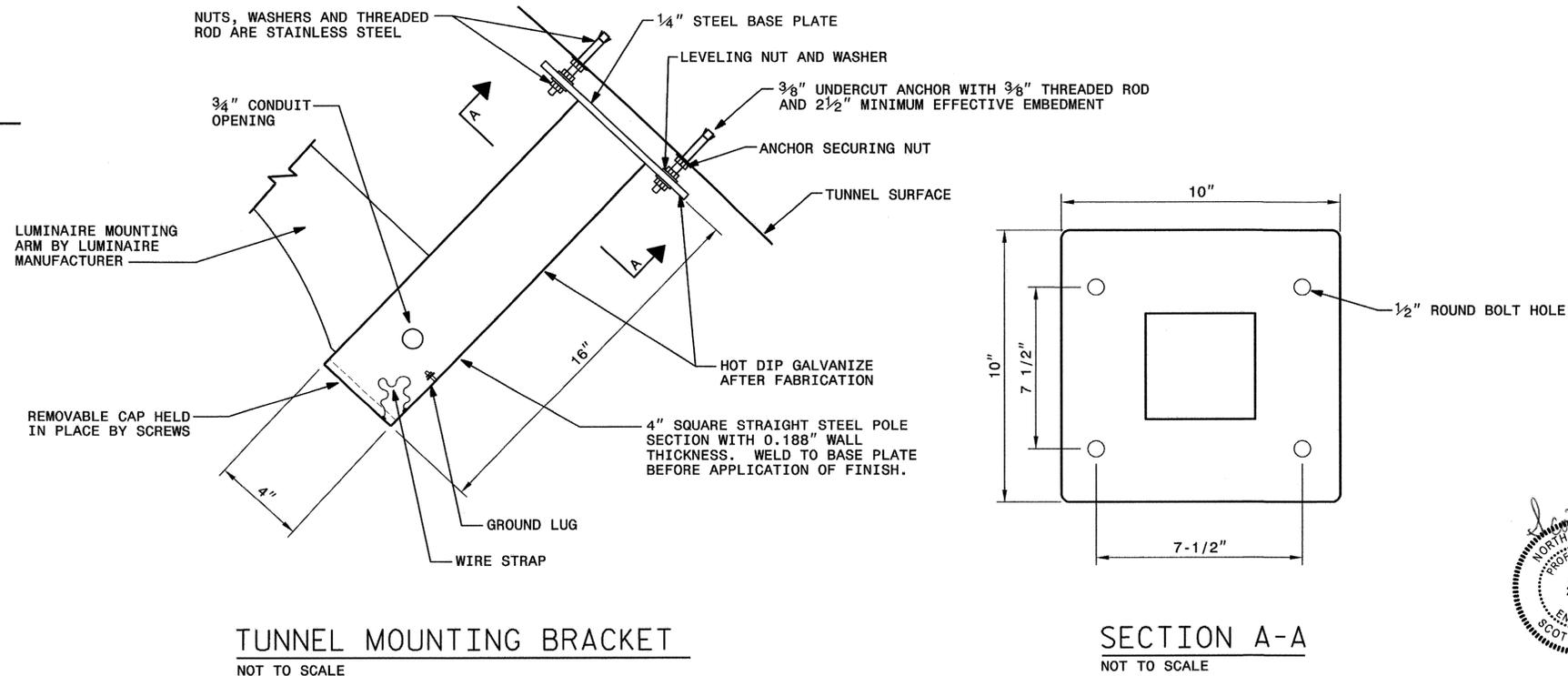
ALL WORK SHALL BE IN CONFORMANCE WITH DIVISION 14 OF THE STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, DATED JANUARY 2012.

ABBREVIATIONS			
BD	BURIED	C	CONDUIT
LT	LIGHT	CKT	CIRCUIT
MH	MOUNTING HEIGHT	N	NEUTRAL
∅	PHASE	G	GROUND
PVC	PVC SCHEDULE 40 CONDUIT		
PVC80	PVC SCHEDULE 80 CONDUIT		
RGS	RIGID GALVANIZED STEEL		
U/G	UNDERGROUND		

PLANS AND DETAILS FOR PROPOSED LIGHTING / ELECTRICAL INSTALLATION

LIGHTING FIXTURE SCHEDULE

DESCRIPTION	MANUFACTURER	CATALOG NO.	LAMPS				BALLAST			FIXTURE WATTS	FIXTURE VOLTAGE
			QTY	TYPE	LUMENS	WATTS	QTY	TYPE	WATTS		
TUNNEL LUMINAIRE: LED AREA LUMINAIRE WITH DIE-CAST ALUMINUM HOUSING AND GRAY FINISH. INTEGRAL OR SEPARATE MOUNTING ARM NOMINALLY 6-INCHES IN LENGTH. UL LISTED FOR WET LOCATIONS AND MINIMUM RATING OF IP 66. 3G VIBRATION RATING. TYPE V SQUARE MEDIUM OPTICS WITH LED/DRIVER SYSTEM RATED FOR MINIMUM OF 100,000 HOURS AT AMBIENT TEMPERATURE OF 25 DEGREES CELCIUS. LM-79 TESTS AND REPORTS PERFORMED IN ACCORDANCE WITH IESNA STANDARDS. SEE PROJECT SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.	COOPER McGRAW-EDISON	GLEON-AA-06-LED-480-5MQ-AP	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	24,687	-	1	SOLID STATE LED DRIVER	309	309	480
	PHILIPS GARDCO	P32-A2-1-5M-260LA-NW-HVU-NP	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	23,607	-	1	SOLID STATE LED DRIVER	260	260	480
	CREE LIGHTING	ARE-EDG-5M-DA-16-E-UH-SV-525-40K	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	24,683	-	1	SOLID STATE LED DRIVER	263	263	480
ROADWAY LUMINAIRE: LED ROADWAY LUMINAIRE WITH DIE-CAST ALUMINUM HOUSING, TENON MOUNTED. UL LISTED FOR WET LOCATIONS AND MINIMUM RATING OF IP 66. 2G VIBRATION RATING. TYPE II OPTICS WITH LED/DRIVER SYSTEM RATED FOR MINIMUM OF 100,000 HOURS AT AMBIENT TEMPERATURE OF 25 DEGREES CELCIUS. LM-79 TESTS AND REPORTS PERFORMED IN ACCORDANCE WITH IESNA STANDARDS. SEE PROJECT SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.	CREE LIGHTING	STR-LWY-2M-HT-06-E-UH-SV-525-40K-PD	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	9,000	-	1	SOLID STATE LED DRIVER	103	103	480
	GE LIGHTING SOLUTIONS	ERS2-H-HX-EX-5-40-1-GRAY	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	10,000	-	1	SOLID STATE LED DRIVER	140	140	480
	HOLOPHANE	LEDG-084-53-4K-AH-G-L2	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	9,156	-	1	SOLID STATE LED DRIVER	148	148	480
	LEOTEK	GC1-80E-HV-NW-2-GY-530	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	9,000	-	1	SOLID STATE LED DRIVER	148	148	480
	LED ROADWAY LIGHTING	SAT-96M-7-S-T2-350-GY-3-A-UL	1	LED ASSEMBLY CCT <= 5000K CCT >= 4000K	10,000	-	1	SOLID STATE LED DRIVER	110	110	480



- GENERAL NOTES**
- DIMENSIONS AND MATERIALS ARE TYPICAL FOR ALL BRACKETS.
 - ALL DIMENSIONS FOR MOUNTING BRACKET ARE NOMINAL. PROVIDE MINOR ADJUSTMENT TO DIMENSIONS AS REQUIRED.

PROJECT NO. I-5512.50136.3.FS1
HAYWOOD COUNTY
 STATION: _____

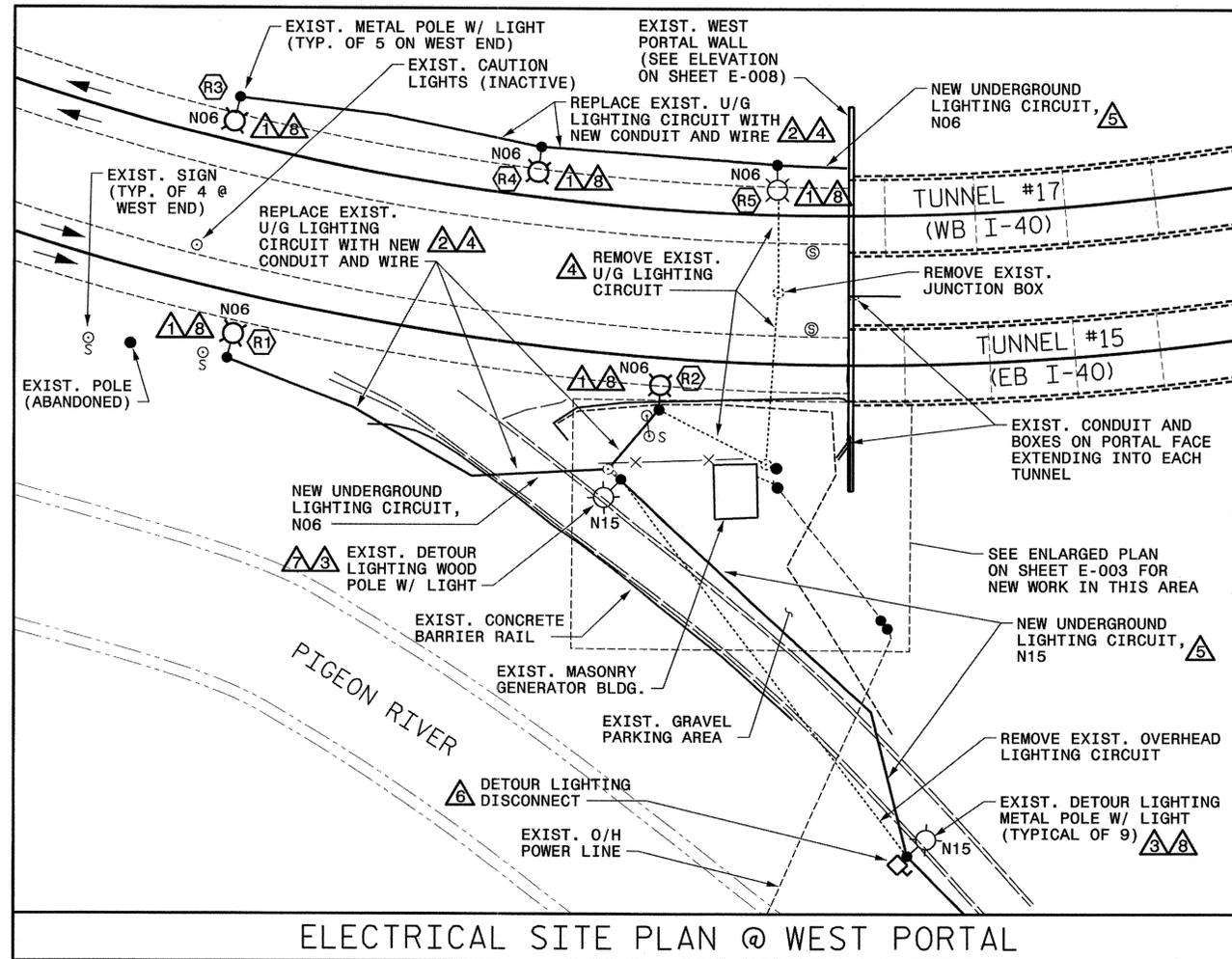


STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
GENERAL DRAWING TUNNEL LIGHTING					
REVISIONS					
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					SHEET NO. E-001 TOTAL SHEETS 25

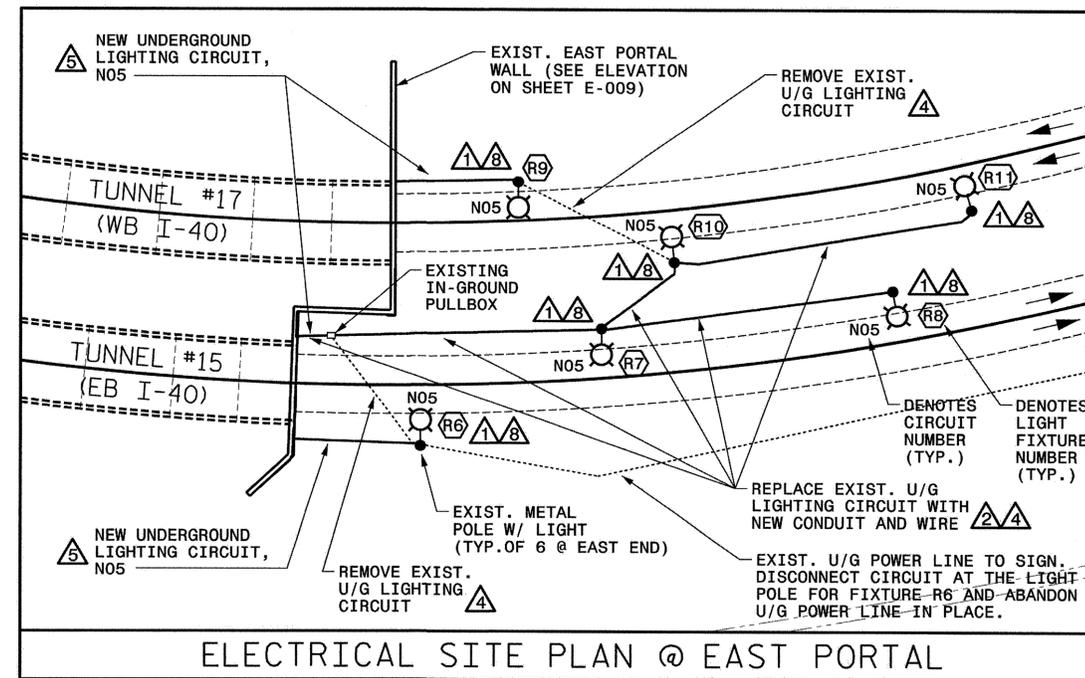
DRAWN BY : C. SHAW DATE : 11/13
 CHECKED BY : S. QUIN DATE : 11/13

HDR HDR Engineering, Inc. of the Carolinas
 3733 National Drive, Suite 207 Raleigh, N.C. 27612
 N.C.B.E.L.S. License Number: F-0116

PLOT DRIVER: \$PLTDRV\$\$
 USER: \$USER\$ DATE: \$DATE\$
 FILE: \$FILE\$



ELECTRICAL SITE PLAN @ WEST PORTAL



ELECTRICAL SITE PLAN @ EAST PORTAL

GENERAL NOTES

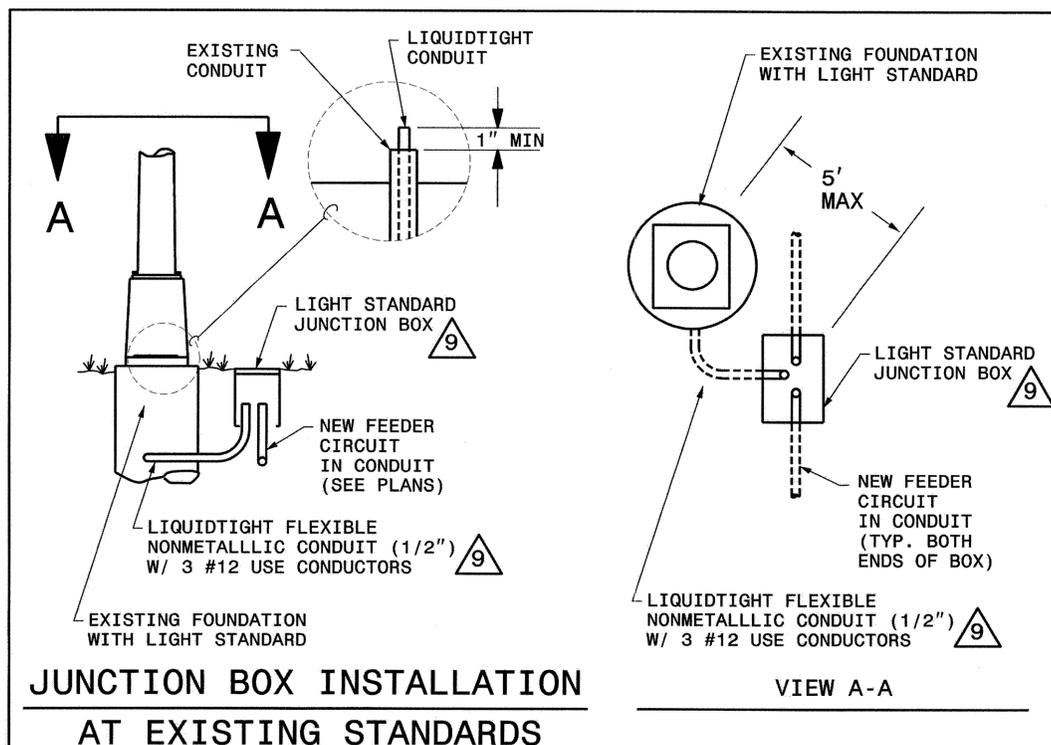
- DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE.
- DOWNTIME IS NOT PERMITTED FOR THE POLE MOUNTED ROADWAY LIGHTING ON THE INTERSTATE. PROVIDE TEMPORARY WIRING AND/OR PORTABLE LIGHTING, AS REQUIRED TO MAINTAIN THE ROADWAY LIGHTING. DOWNTIME IS PERMITTED FOR THE DETOUR ROUTE POLE MOUNTED LIGHTING, BUT DOWNTIME SHALL BE MINIMIZED.
- FOR CONDUITS INSTALLED BELOW GRADE, ALL ELBOWS AND ALL CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.

NOTES

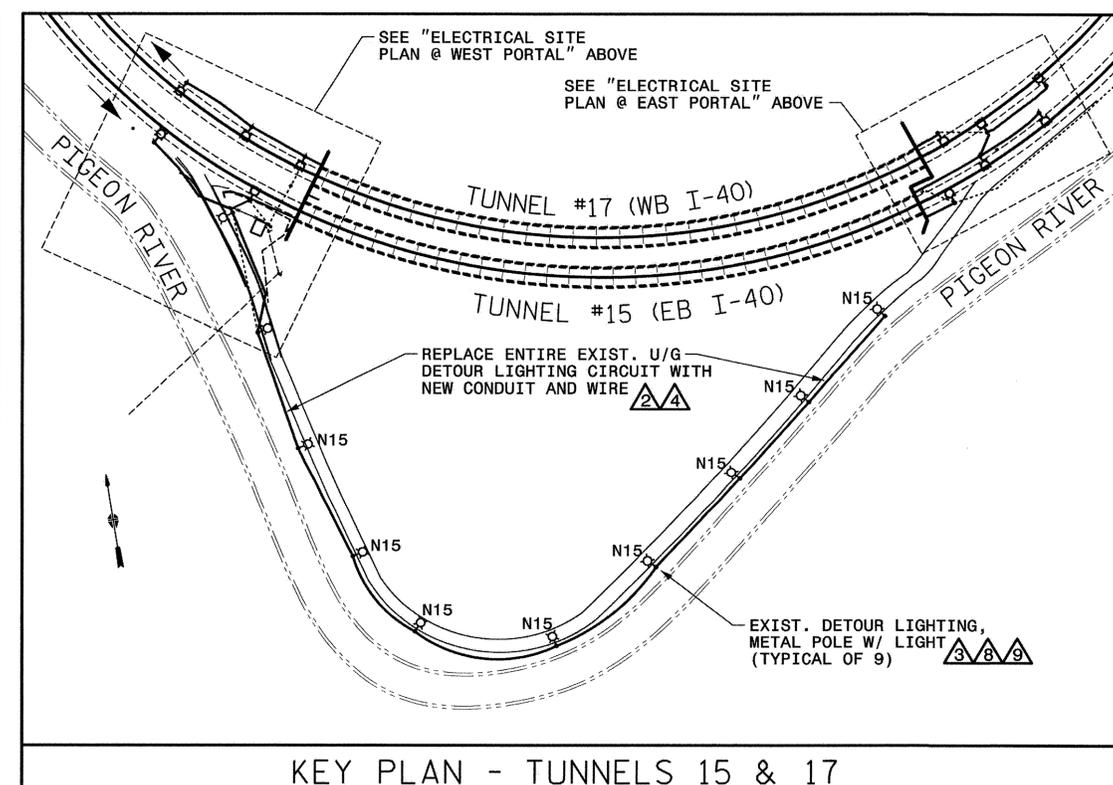
- REPLACE EXISTING LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON SHEET E-001. EXISTING POLE AND MAST ARM TO REMAIN. PROVIDE NEW CONDUIT CONNECTION TO POLE AND PROVIDE NEW WIRE IN POLE AND MAST ARM, 2#12,1#12G (TYPE SO WIRE). REMOVE EXISTING FUSE HOLDER AND INSTALL NEW BREAKAWAY FUSE HOLDER.
- PROVIDE NEW UNDERGROUND LIGHTING CIRCUIT ROUTED ALONG PATH OF EXISTING CIRCUIT. PROVIDE NEW CONDUIT AND WIRE, 2#8,1#8G,1 1/2" C (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-010.
- PROVIDE NEW WIRE IN POLE AND MAST ARM, 2#12,1#12G (TYPE SO WIRE). PROVIDE NEW TERMINATIONS IN EXISTING FIXTURE AND PROVIDE NEW CONDUIT CONNECTION TO POLE. REMOVE EXISTING PHOTOCELL FROM FIXTURE AND REPLACE WITH NEW SHORTING CAP. REMOVE EXISTING FUSE HOLDER AT BASE OF POLE AND INSTALL NEW BREAKAWAY FUSE HOLDER.
- REMOVE WIRES FROM EXISTING UNDERGROUND CONDUITS. ABANDON UNDERGROUND CONDUITS IN PLACE.
- NEW CONDUIT AND WIRE, 2#8,1#8G (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-010.
- PROVIDE 600V, 30A, 2-POLE, NEMA 3R, LOCKABLE DISCONNECT FOR LOCKING OUT DETOUR LIGHTING CIRCUIT. MOUNT DISCONNECT TO POLE.
- PROVIDE 1 1/2" C FOR ROUTING CONDUCTORS UP EXISTING WOOD POLE.
- PROVIDE A LIGHT STANDARD JUNCTION BOX FOR INTERCEPTING AND FEEDING THE CIRCUITRY INTO THE EXISTING POLE FOUNDATION. SEE LIGHT STANDARD JUNCTION BOX DETAIL THIS SHEET.
- REFER TO PROJECT SPECIAL PROVISIONS TITLED LIGHT STANDARD JUNCTION BOXES FOR MATERIALS, CONSTRUCTION METHODS AND PAYMENT.

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 ELECTRICAL SITE PLANS
 TUNNEL 15 (EB I-40)
 TUNNEL 17 (WB I-40)



JUNCTION BOX INSTALLATION AT EXISTING STANDARDS



KEY PLAN - TUNNELS 15 & 17

DRAWN BY: C. SHAW DATE: 11/13
 CHECKED BY: S. QUIN DATE: 11/13

NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1	--	--	3	--	--	TOTAL SHEETS
2	--	--	4	--	--	25

PLOT DRIVER: \$PLTDVRS\$
 USER: \$USER\$
 FILE: \$FILE\$
 PENTABLE: \$PENTBL\$
 TIME: \$TIME\$
 DATE: \$DATE\$

GENERAL NOTES

1. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE. SEE GENERAL NOTE 2 ON SHEET E-002.
2. FOR CONDUITS INSTALLED BELOW GRADE, ALL ELBOWS AND ALL CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
3. REMOVE ALL WIRE FROM UNDERGROUND CONDUITS NO LONGER USED. ABANDON UNDERGROUND CONDUITS IN PLACE.
4. REFER TO CIRCUITING DIAGRAM ON SHEET E-010, POWER RISER DIAGRAM ON SHEET E-011, AND SITE PLANS ON SHEET E-002 FOR ADDITIONAL INFORMATION ON CONDUIT AND WIRE.

NOTES

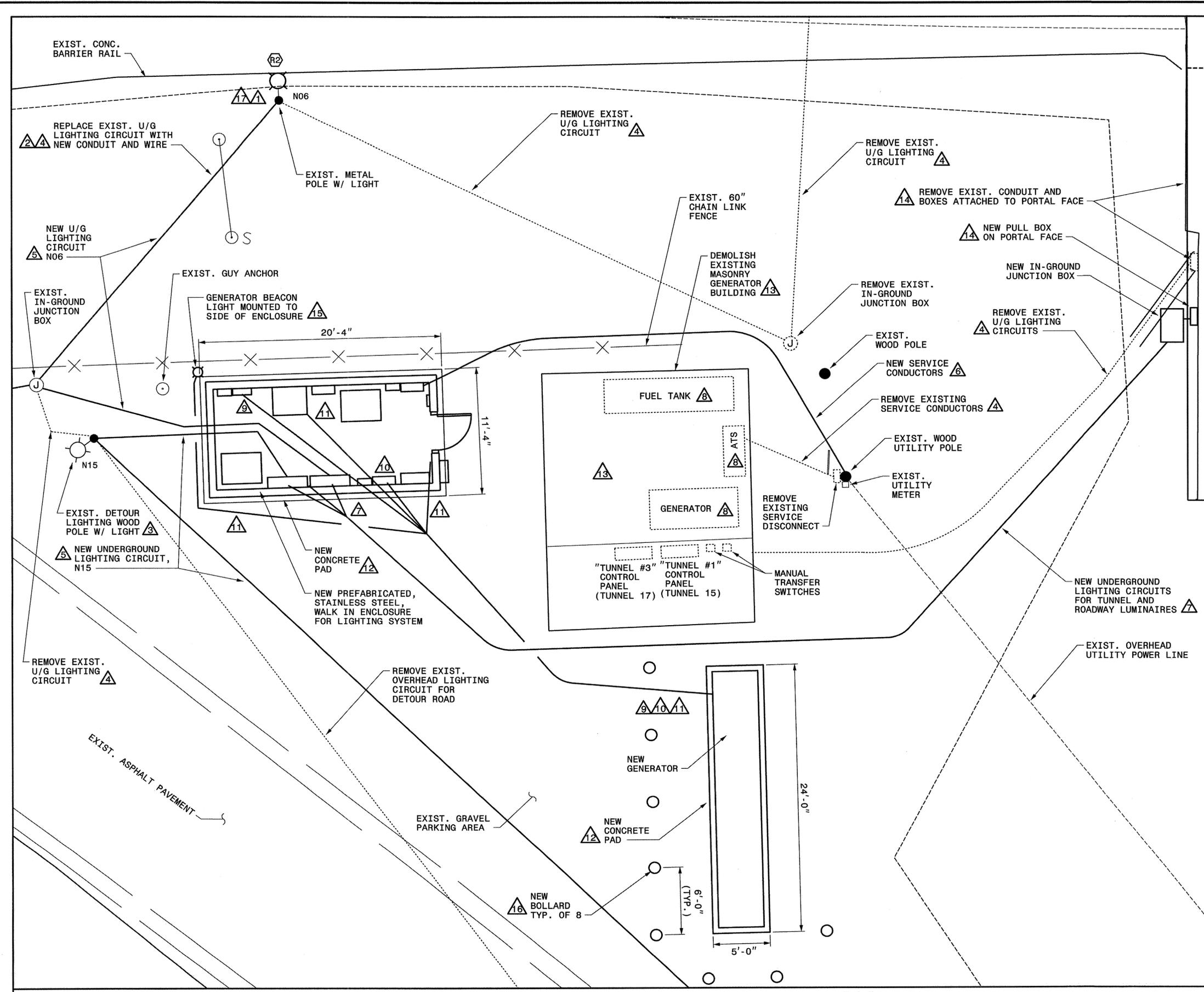
- △ REPLACE EXISTING LIGHT FIXTURE. SEE KEY NOTE 1 ON SHEET E-002.
- △ PROVIDE NEW UNDERGROUND LIGHTING CIRCUIT ROUTED ALONG PATH OF EXISTING CIRCUIT. PROVIDE NEW CONDUIT AND WIRE, 2#8, 1#8G, 1 1/2" C (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-010.
- △ PROVIDE NEW WIRE AND TERMINATIONS. SEE KEY NOTE 3 ON SHEET E-002.
- △ REMOVE WIRES FROM UNDERGROUND CONDUITS. ABANDON UNDERGROUND CONDUITS IN PLACE.
- △ NEW CONDUIT AND WIRE, 2#8, 1#8G, 1 1/2" C (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-010.
- △ NEW UNDERGROUND CONDUIT AND WIRE FOR NEW ELECTRICAL SERVICE. SEE POWER RISER DIAGRAM ON SHEET E-011.
- △ NEW UNDERGROUND CONDUIT AND WIRE FOR NEW LIGHTING CIRCUITS. SEE CIRCUITING DIAGRAM ON SHEET E-010.
- △ PRIOR TO BUILDING DEMOLITION, REMOVE EXISTING GENERATOR AND APPURTENANCES, AUTOMATIC TRANSFER SWITCH AND GENERATOR FUEL TANK. DELIVER THE REMOVED ITEMS TO THE STORAGE FACILITY DESIGNATED BY THE NCDOT DIVISION REPRESENTATIVE.
- △ NEW CONDUIT AND WIRE FOR 240V AND 120V CIRCUITS FOR THE GENERATOR. PROVIDE 2 SETS OF CONDUIT, EACH SET CONSISTING OF 2#8, 1#8G, 1 1/2" C (TYPE USE WIRE AND PVC CONDUIT).
- △ NEW UNDERGROUND CONDUIT AND WIRE FOR NEW GENERATOR FEEDER. SEE POWER RISER DIAGRAM ON SHEET E-011.
- △ FOR GENERATOR CONTROLS, PROVIDE NEW UNDERGROUND CONDUITS: 8#12, 1 1/2" C (TYPE USE WIRE AND PVC CONDUIT) RUN TO ATS; 3#12, 1#12G, 1 1/2" C (TYPE USE WIRE AND PVC CONDUIT) RUN TO ALARM LIGHT; SPARE 1 1/2" C WITH PULL STRING STUBBED UP AND CAPPED IN THE PREFABRICATED ENCLOSURE.
- △ COORDINATE PAD DIMENSIONS WITH EQUIPMENT TO BE INSTALLED. SEE SHEET S-110.
- △ FOR THE BUILDING DEMOLITION, ALL BUILDING COMPONENTS SHALL BE DEMOLISHED AND REMOVED FROM THE SITE. DISPOSE OF ALL ITEMS IN ACCORDANCE WITH NC DENR GUIDELINES.
- △ SEE ELEVATION ON SHEET E-008. SEE CIRCUITING DIAGRAM ON SHEET E-010.
- △ MOUNT BEACON LIGHT 9'-0" AFG AND LOCATED AT THE CORNER OF THE PREFABRICATED ENCLOSURE SO THAT IT IS VISIBLE FROM TWO SIDES. PROVIDE ALL HARDWARE AND SUPPORTS REQUIRED FOR MOUNTING ALARM LIGHT.
- △ TOP OF BOLLARD SHALL BE 5'-0" AFG. SEE BOLLARD DETAIL ON SHEET E-022.
- △ PROVIDE A LIGHT STANDARD JUNCTION BOX FOR INTERCEPTING AND FEEDING THE CIRCUITRY INTO THE EXISTING POLE FOUNDATION. SEE LIGHT STANDARD JUNCTION BOX DETAIL ON SHEET E-002.

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**ENLARGED ELECTRICAL
 SITE PLAN
 TUNNELS 15 & 17**

REVISIONS						SHEET NO. E-003
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 25
2			4			



ENLARGED ELECTRICAL SITE PLAN @ WEST PORTAL

DRAWN BY : C. SHAW DATE : 11/13
 CHECKED BY : S. QUIN DATE : 11/13

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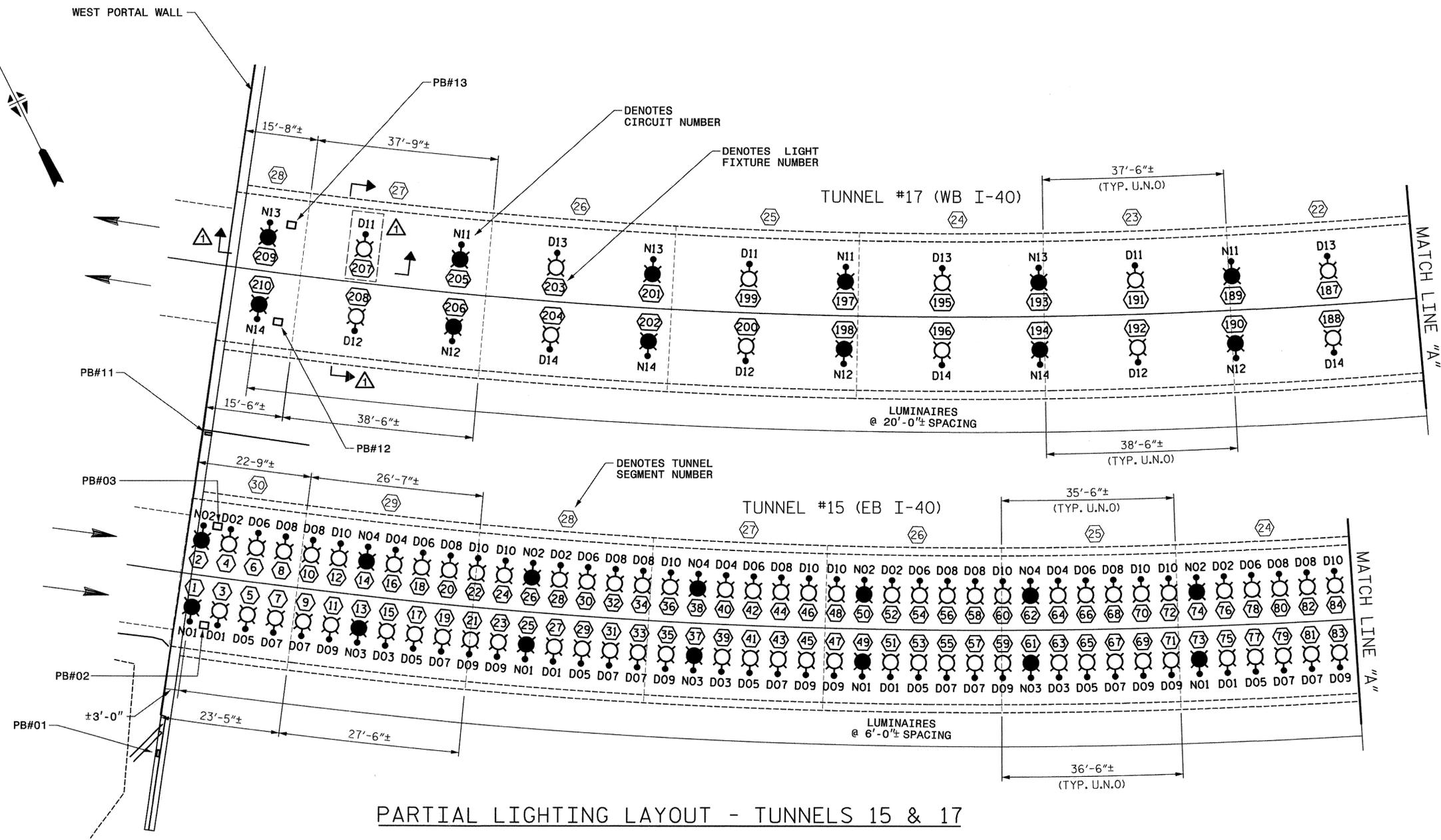
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GENERAL NOTES

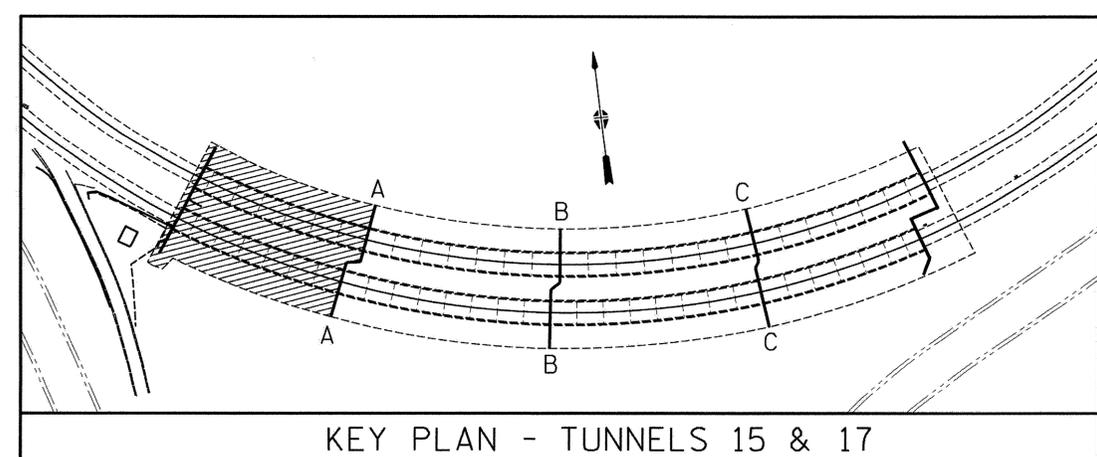
- SEE SHEET E-022 FOR INSTALLATION AND MATERIALS REQUIREMENTS FOR THE TUNNEL LIGHT FIXTURES AND FOR THE LIGHT CIRCUIT RACEWAYS.
- SEE CIRCUITING DIAGRAM ON SHEET E-010 FOR CONDUIT, WIRE AND PULL BOX SIZES.
- FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
- MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL.
- PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
- PROVIDE 3/8" UNDERCUT ANCHORS WITH 3/8" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE LUMINAIRE MOUNTING BRACKETS TO WALL OF TUNNEL. SEE MOUNTING BRACKET DETAIL ON SHEET E-001.
- PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
- JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAIN-TIGHT, THREADED CONDUIT HUB FITTINGS.
- PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDUITS.
- PROVIDE BREATHERS AND DRAINS THROUGHOUT THE TUNNEL RACEWAYS, WITH A MAXIMUM SPACING OF 100'.
- PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X. SEE SHEET E-010 FOR PULL BOX SIZES. PROVIDE A BREATHER AND DRAIN IN EACH PULL BOX.
- ADJUST ANY FIXTURE LOCATED ON OR NEAR AN EXPANSION JOINT SO THAT THE CENTERLINE OF THE FIXTURE IS 10" MINIMUM FROM THE EXPANSION JOINT. THIS ADJUSTMENT SHALL NOT AFFECT THE PLACEMENT OF ADJACENT FIXTURES.

△ NOTES

△ SEE SHEET E-022 FOR TYPICAL SECTION, TYPICAL ELEVATION VIEW, AND TYPICAL FIXTURE CONNECTION DETAIL.



PARTIAL LIGHTING LAYOUT - TUNNELS 15 & 17



KEY PLAN - TUNNELS 15 & 17

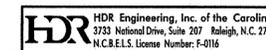
PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)

SHEET 1 OF 4

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TUNNELS 15 & 17
 ELECTRICAL LIGHTING
 LAYOUT



REVISIONS						SHEET NO. E-004 TOTAL SHEETS 25
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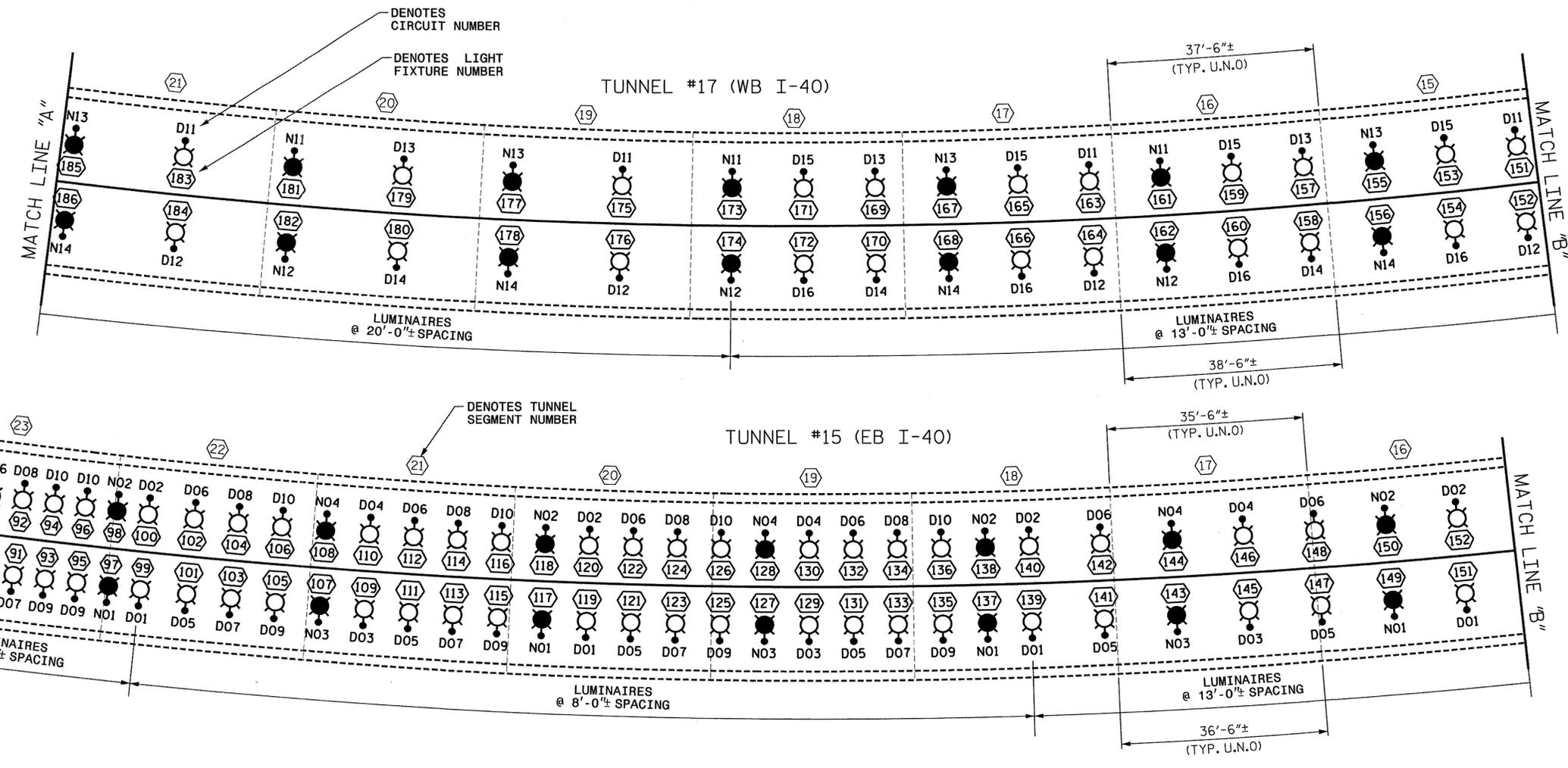


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 CHECKED BY : S. QUIN DATE : 11/13

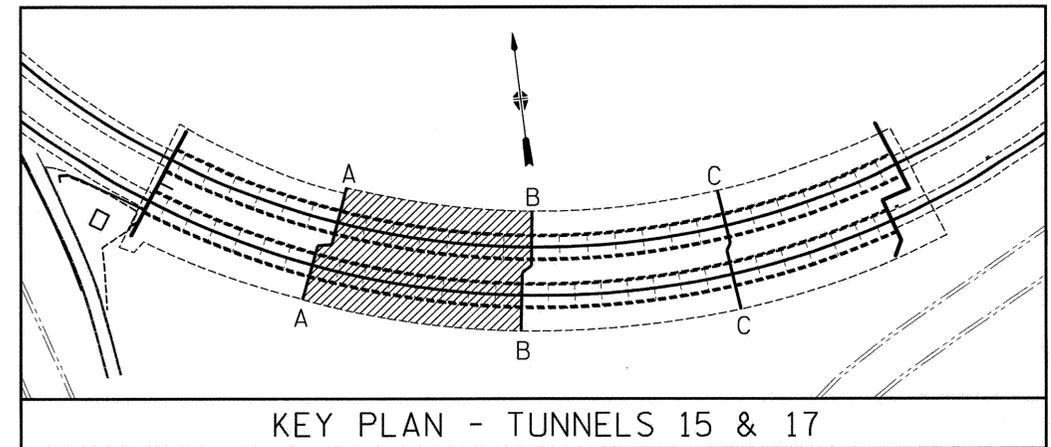
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GENERAL NOTES

- SEE SHEET E-022 FOR INSTALLATION AND MATERIALS REQUIREMENTS FOR THE TUNNEL LIGHT FIXTURES AND FOR THE LIGHT CIRCUIT RACEWAYS.
- SEE CIRCUITING DIAGRAM ON SHEET E-010 FOR CONDUIT, WIRE AND PULL BOX SIZES.
- FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
- MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL.
- PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
- PROVIDE 3/8" UNDERCUT ANCHORS WITH 3/8" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE LUMINAIRE MOUNTING BRACKETS TO WALL OF TUNNEL. SEE MOUNTING BRACKET DETAIL ON SHEET E-001.
- PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
- JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAIN-TIGHT, THREADED CONDUIT HUB FITTINGS.
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PARTIAL LIGHTING LAYOUT - TUNNELS 15 & 17



KEY PLAN - TUNNELS 15 & 17

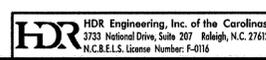
PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)
 SHEET 2 OF 4



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TUNNELS 15 & 17
 ELECTRICAL LIGHTING
 LAYOUT

REVISIONS						SHEET NO. E-005 TOTAL SHEETS 25
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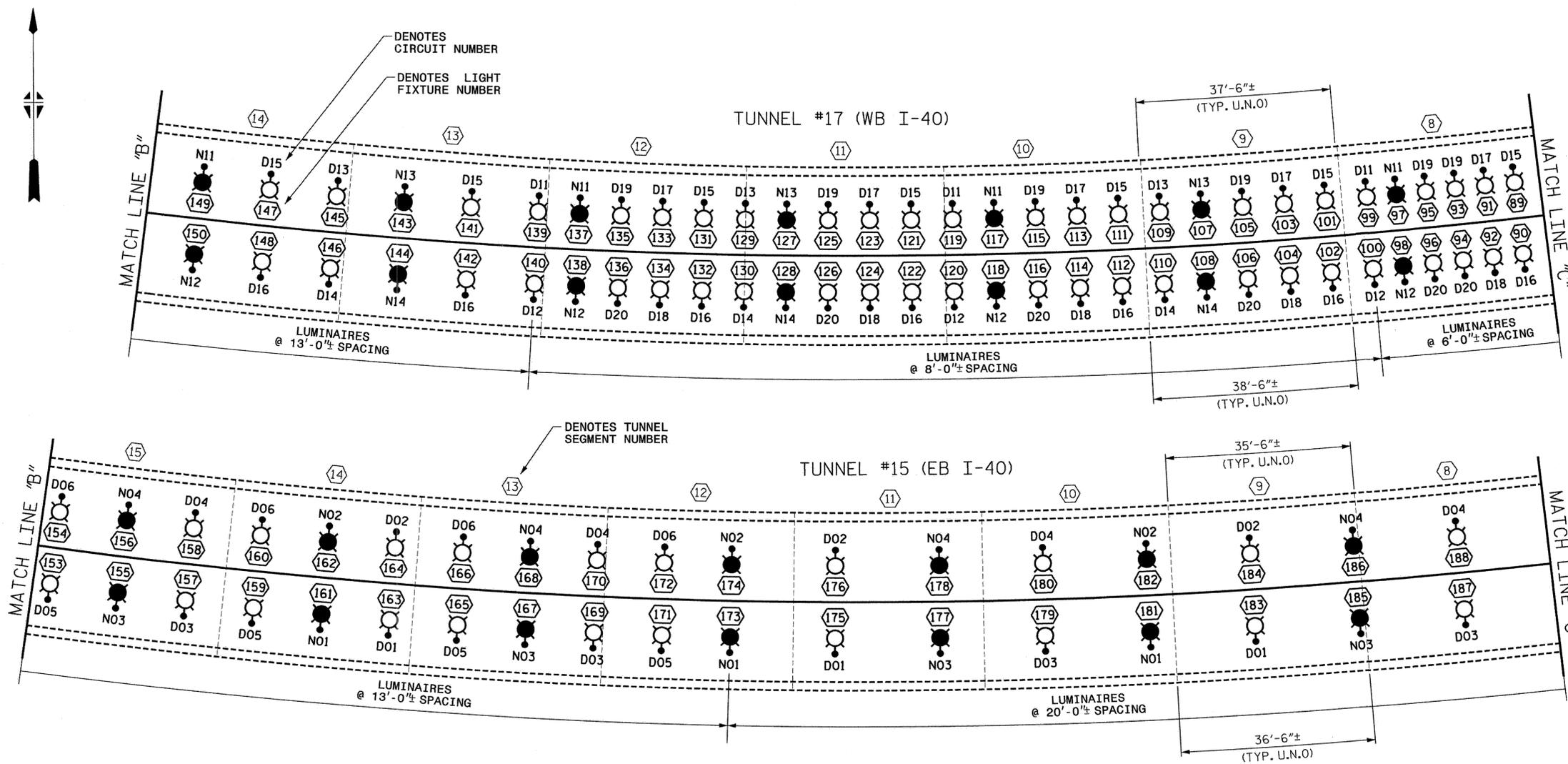


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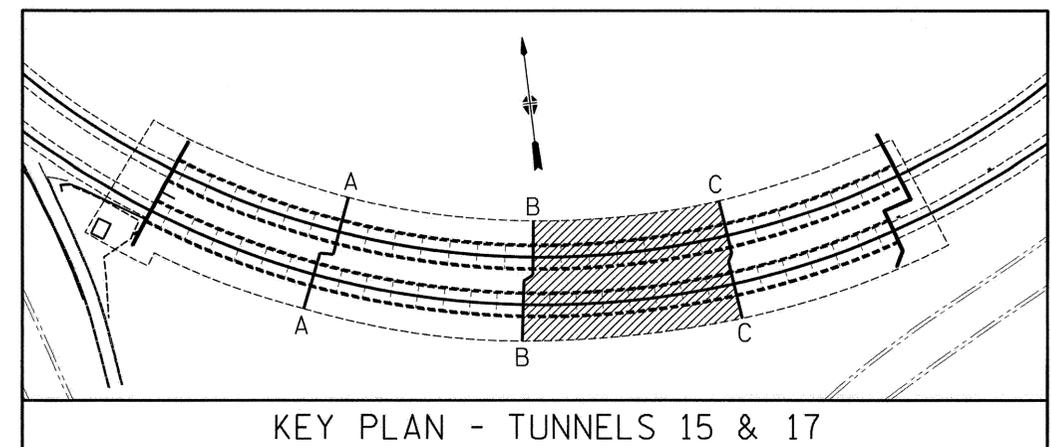
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 USER: \$USER\$ DATE: \$DATE\$
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 TIME: \$TIME\$
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GENERAL NOTES

- SEE SHEET E-022 FOR INSTALLATION AND MATERIALS REQUIREMENTS FOR THE TUNNEL LIGHT FIXTURES AND FOR THE LIGHT CIRCUIT RACEWAYS.
- SEE CIRCUITING DIAGRAM ON SHEET E-010 FOR CONDUIT, WIRE AND PULL BOX SIZES.
- FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
- MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL.
- PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
- PROVIDE 3/8" UNDERCUT ANCHORS WITH 3/8" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE LUMINAIRE MOUNTING BRACKETS TO WALL OF TUNNEL. SEE MOUNTING BRACKET DETAIL ON SHEET E-001.
- PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
- JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAIN-TIGHT, THREADED CONDUIT HUB FITTINGS.
- PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDULETS.
- PROVIDE BREATHERS AND DRAINS THROUGHOUT THE TUNNEL RACEWAYS, WITH A MAXIMUM SPACING OF 100'.
- PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X. SEE SHEET E-010 FOR PULL BOX SIZES. PROVIDE A BREATHER AND DRAIN IN EACH PULL BOX.
- ADJUST ANY FIXTURE LOCATED ON OR NEAR AN EXPANSION JOINT SO THAT THE CENTERLINE OF THE FIXTURE IS 10" MINIMUM FROM THE EXPANSION JOINT. THIS ADJUSTMENT SHALL NOT AFFECT THE PLACEMENT OF ADJACENT FIXTURES.



PARTIAL LIGHTING LAYOUT - TUNNELS 15 & 17



KEY PLAN - TUNNELS 15 & 17

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)

SHEET 3 OF 4

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TUNNELS 15 & 17
 ELECTRICAL LIGHTING
 LAYOUT



REVISIONS						SHEET NO. E-006
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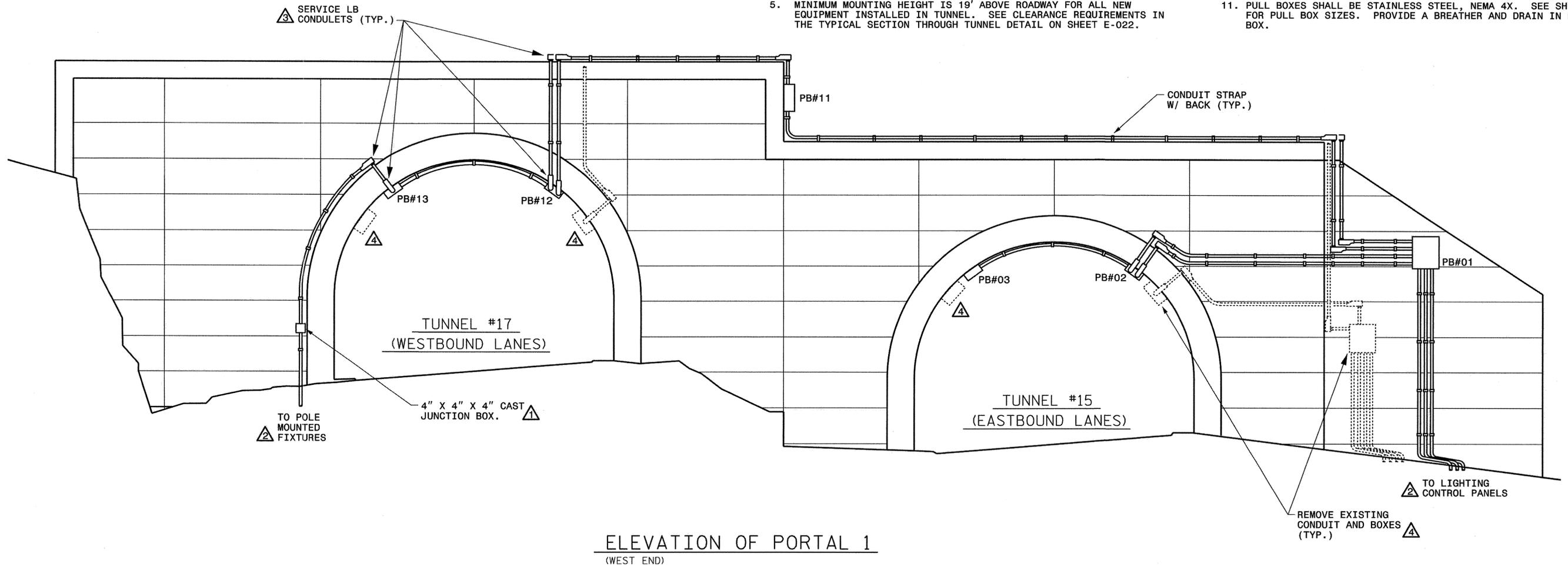
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NOTES

- 1. AT JUNCTION BOX, TRANSITION ROADWAY LIGHTING CIRCUIT CONDUCTORS FROM TYPE THHN/THWN WIRE TO TYPE USE.
- 2. TRANSITION FROM RGS CONDUIT TO PVC80 CONDUIT SHALL OCCUR BELOW GRADE. SEE GENERAL NOTE 2.
- 3. PROVIDE SERVICE LB CONDULETS ON PORTAL FACE AND FOR NEW CONDUIT TRANSITIONS BETWEEN PORTAL FACE AND TUNNEL INTERIOR.
- 4. DURING REMOVAL OF THE EXISTING CONDUITS, BOXES AND SUPPORTS, CUT ANCHORS FLUSH WITH THE TUNNEL AND PORTAL SURFACES.

GENERAL NOTES

- 1. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE. SEE GENERAL NOTE 2 ON SHEET E-002.
- 2. FOR ALL CONDUITS INSTALLED BELOW GRADE, ELBOWS TURNING UP AND CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
- 3. REMOVE ALL WIRE FROM UNDERGROUND CONDUITS NO LONGER USED. ABANDON UNDERGROUND CONDUITS IN PLACE.
- 4. SEE CIRCUITING DIAGRAM ON SHEET E-010 FOR CONDUIT AND WIRE SIZES. REFER TO SITE PLANS ON SHEETS E-002 AND E-003 FOR CONTINUATION OF CIRCUITS TO POLE MOUNTED LIGHT FIXTURES.
- 5. MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL. SEE CLEARANCE REQUIREMENTS IN THE TYPICAL SECTION THROUGH TUNNEL DETAIL ON SHEET E-022.
- 6. PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
- 7. PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
- 8. JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAIN TIGHT, THREADED CONDUIT HUB FITTINGS.
- 9. PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDULETS.
- 10. ALL CONDUIT MOUNTED TO PORTAL SHALL BE RGS.
- 11. PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X. SEE SHEET E-010 FOR PULL BOX SIZES. PROVIDE A BREATHER AND DRAIN IN EACH PULL BOX.



ELEVATION OF PORTAL 1
(WEST END)

PROJECT NO. I-5512, 50136.3.FS1
HAYWOOD COUNTY
STATION: 217+01 -L- (EB I-40)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TUNNELS 15 & 17
WEST PORTAL WALL
ELEVATIONS



REVISIONS						SHEET NO. E-008 TOTAL SHEETS 25
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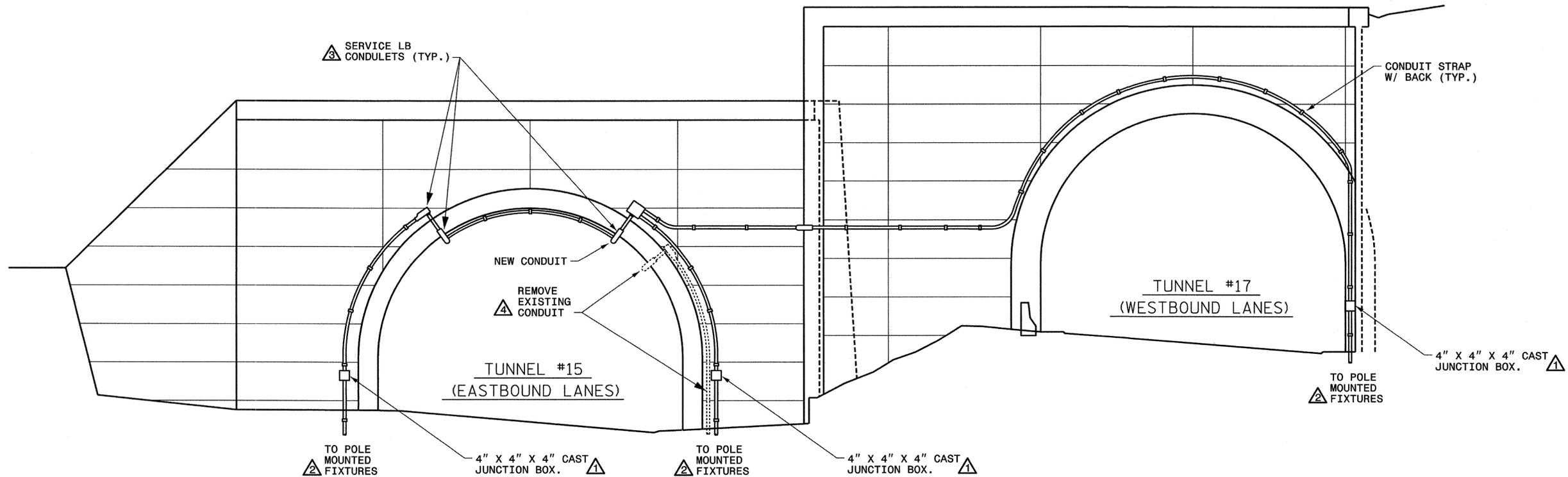
NOTES

- 1. AT JUNCTION BOX, TRANSITION ROADWAY LIGHTING CIRCUIT CONDUCTORS FROM TYPE THHN/THWN WIRE TO TYPE USE.
- 2. TRANSITION FROM RGS CONDUIT TO PVC80 CONDUIT SHALL OCCUR BELOW GRADE. SEE GENERAL NOTE 2.
- 3. PROVIDE SERVICE LB CONDULETS ON PORTAL FACE AND FOR NEW CONDUIT TRANSITIONS BETWEEN PORTAL FACE AND TUNNEL INTERIOR.
- 4. DURING REMOVAL OF THE EXISTING CONDUITS, BOXES AND SUPPORTS, CUT ANCHORS FLUSH WITH THE TUNNEL AND PORTAL SURFACES.

GENERAL NOTES

- 1. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE. SEE GENERAL NOTE 2 ON SHEET E-002.
- 2. FOR ALL CONDUITS INSTALLED BELOW GRADE, ELBOWS TURNING UP AND CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
- 3. REMOVE ALL WIRE FROM UNDERGROUND CONDUITS NO LONGER USED. ABANDON UNDERGROUND CONDUITS IN PLACE.
- 4. SEE CIRCUITING DIAGRAM ON SHEET E-010 FOR CONDUIT AND WIRE SIZES. REFER TO SITE PLANS ON SHEETS E-002 AND E-003 FOR CONTINUATION OF CIRCUITS TO POLE MOUNTED LIGHT FIXTURES.
- 5. MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL. SEE CLEARANCE REQUIREMENTS IN THE TYPICAL SECTION THROUGH TUNNEL DETAIL ON SHEET E-022.

- 6. PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
- 7. PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
- 8. JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAIN TIGHT, THREADED CONDUIT HUB FITTINGS.
- 9. PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDULETS.
- 10. ALL CONDUIT MOUNTED TO PORTAL SHALL BE RGS.



ELEVATION OF PORTAL 2
(EAST END)

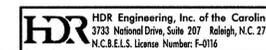
PROJECT NO. I-5512, 50136.3.FS1
HAYWOOD COUNTY
STATION: 217+01 -L- (EB I-40)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TUNNELS 15 & 17
EAST PORTAL WALL
ELEVATIONS



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GENERAL NOTES

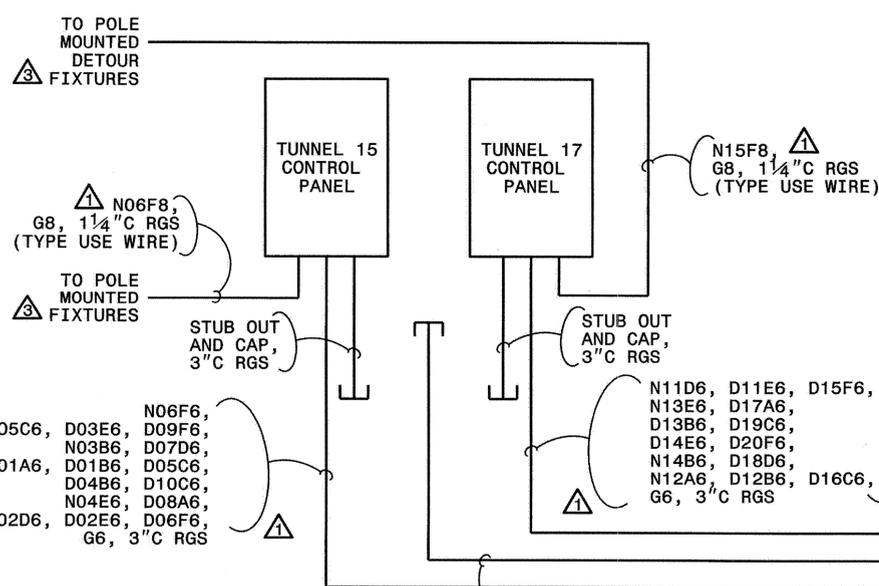
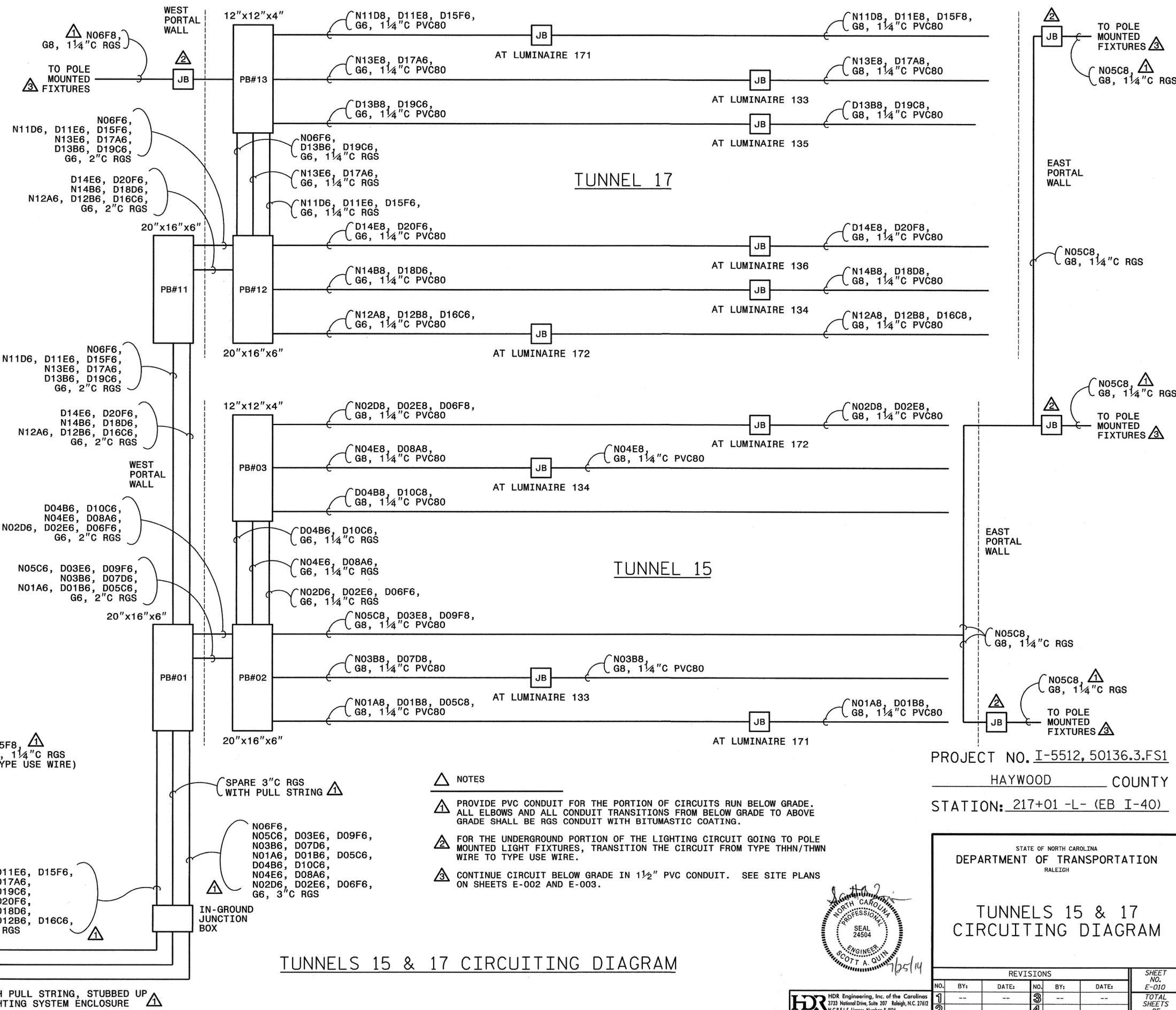
- FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
- SEE SITE PLANS E-002 AND E-003 FOR CONTINUATION OF LIGHTING CIRCUITS TO LIGHT POLE FIXTURES.
- CHANGES IN WIRE SIZE FOR THE LIGHTING CIRCUITS MAY ONLY BE DONE IN THE PULL BOXES AND JUNCTION BOXES SHOWN ON THE CIRCUITING DIAGRAM.
- ALL PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X RATED, WITH LOCKABLE HINGED COVER.
- INSTALL A BREATHER AND DRAIN IN EACH STAINLESS STEEL PULL BOX.
- PROVIDE AT LEAST ONE GROUND WIRE IN EVERY CONDUIT AND BOND EACH GROUND WIRE TO EVERY METALLIC BOX THROUGH WHICH IT PASSES.
- SEE TYPICAL ELEVATION AND TYPICAL SECTION ON SHEET E-022 FOR MATERIALS AND INSTALLATION REQUIREMENTS OF THE TUNNEL LIGHTING EQUIPMENT.
- PROVIDE TYPE THHN/THWN STRANDED WIRE FOR ALL LIGHTING CIRCUITS RUN FROM THE LIGHTING CONTROL PANELS TO THE TUNNEL AND FOR ALL LIGHTING CIRCUITS IN THE TUNNEL. PROVIDE TYPE USE WIRE FOR UNDERGROUND CIRCUITS WHERE INDICATED.
- FOR SPlicing CONDUCTORS, CONTRACTOR SHALL USE CONNECTION METHODS SPECIFIED IN SECTION 1400-4(F) OF THE STANDARD SPECIFICATIONS.

EXPLANATION OF CIRCUITING AND CONDUIT FILL DESIGNATIONS

- CIRCUIT DESIGNATIONS INDICATE NIGHT OR DAY OPERATION (NO FIXTURES OPERATE CONTINUOUSLY), CIRCUIT CONDUCTOR SIZE AND COLOR.
- CONDUIT CALL OUTS INDICATE CIRCUITING, GROUNDING CONDUCTOR, AND CONDUIT SIZE AND TYPE.
- ALL WIRING SHALL HAVE COLORED INSULATION ALONG ITS ENTIRE LENGTH. NO CIRCUIT MAY CHANGE COLOR AT ANY POINT, EXCEPT WHEN TRANSITIONING TO TYPE USE WIRE.
- CIRCUIT DESIGNATIONS ARE AS FOLLOWS:

CIRCUIT#	COLOR	SIZE (AWG)
D (DAY)	A (BLACK)	6
01-10 (TUNNEL 15)	B (RED)	8
11-20 (TUNNEL 17)	C (YELLOW)	
21-30 (TUNNEL 104)	D (BLUE)	
N (NIGHT)	E (ORANGE)	
01-06 (TUNNEL 15)	F (BROWN)	
11-15 (TUNNEL 17)		
21-26 (TUNNEL 104)		
(BLANK)	G (GREEN - FOR GROUND WIRE ONLY)	

- LIGHTING CIRCUITS ARE 480V (LINE TO LINE), 2 WIRE, WITH GROUND. BOTH CONDUCTORS OF A LIGHTING CIRCUIT WILL HAVE THE SAME COLOR INSULATION.



- NOTES
- PROVIDE PVC CONDUIT FOR THE PORTION OF CIRCUITS RUN BELOW GRADE. ALL ELBOWS AND ALL CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
 - FOR THE UNDERGROUND PORTION OF THE LIGHTING CIRCUIT GOING TO POLE MOUNTED LIGHT FIXTURES, TRANSITION THE CIRCUIT FROM TYPE THHN/THWN WIRE TO TYPE USE WIRE.
 - CONTINUE CIRCUIT BELOW GRADE IN 1/2" PVC CONDUIT. SEE SITE PLANS ON SHEETS E-002 AND E-003.

TUNNELS 15 & 17 CIRCUITING DIAGRAM

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TUNNELS 15 & 17
 CIRCUITING DIAGRAM



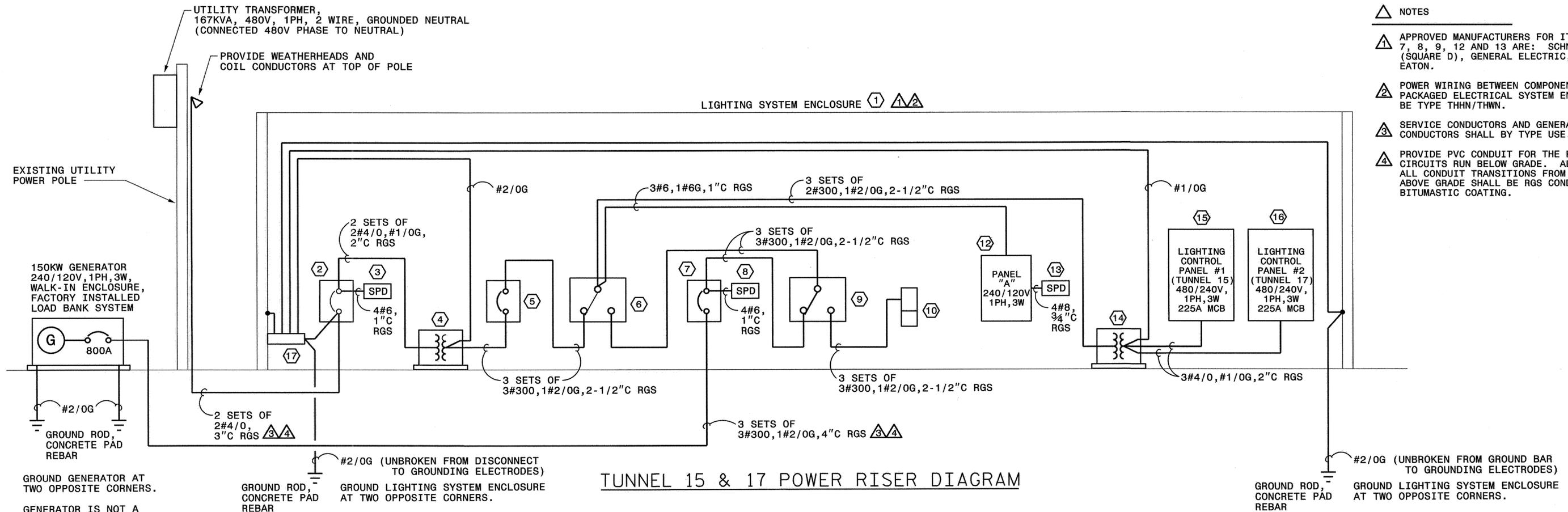
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TOTAL SHEETS 25

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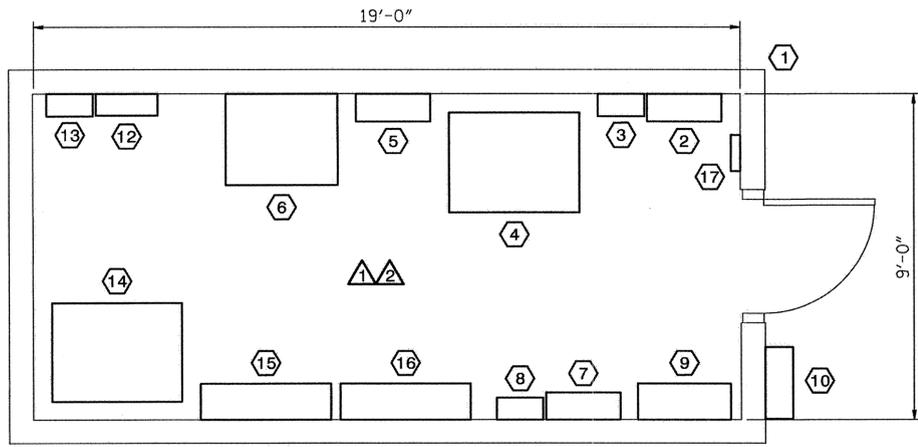
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- NOTES
- 1 APPROVED MANUFACTURERS FOR ITEMS 1, 2, 3, 5, 7, 8, 9, 12 AND 13 ARE: SCHNEIDER ELECTRIC (SQUARE D), GENERAL ELECTRIC, SIEMENS AND EATON.
 - 2 POWER WIRING BETWEEN COMPONENTS IN THE PACKAGED ELECTRICAL SYSTEM ENCLOSURE SHALL BE TYPE THHN/THWN.
 - 3 SERVICE CONDUCTORS AND GENERATOR FEEDER CONDUCTORS SHALL BY TYPE USE.
 - 4 PROVIDE PVC CONDUIT FOR THE PORTION OF CIRCUITS RUN BELOW GRADE. ALL ELBOWS AND ALL CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.

TUNNEL 15 & 17 POWER RISER DIAGRAM



LIGHTING SYSTEM ENCLOSURE - PLAN VIEW

- 1 LIGHTING SYSTEM ENCLOSURE: PACKAGED ELECTRICAL SYSTEM ENCLOSURE, WALK-IN TYPE, WITH STAINLESS STEEL HOUSING AND VANDAL RESISTANT DOOR HARDWARE; VENTILATION EXHAUST FANS, SPACE HEATERS, INTERIOR LIGHT FIXTURES, AND 120V CONVENIENCE RECEPTACLES PROVIDED INTEGRAL TO FABRICATED UNIT; ALL COMPONENTS INSTALLED AND WIRED DURING FABRICATION; ALL COMPONENTS UL/ETL LISTED; PACKAGED ELECTRICAL SYSTEM TO HAVE OVERALL UL/ETL LABEL. (SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS)
- 2 480V MAIN SERVICE BREAKER: 450A/2P (OR 3P WITH CENTER POLE UNUSED), 65KAIC, SEPARATELY ENCLOSED, MOLDED CASE, THERMOMAGNETIC TYPE, SERVICE ENTRANCE RATED, NEMA 1 HOUSING.
- 3 SURGE PROTECTION DEVICE (SPD): UL 1449 3RD EDITION LABEL, SURGE CURRENT RATING OF 150KA/MODE, 300KA/PHASE, VOLTAGE PROTECTION RATINGS OF 1200V (FOR LINE-NEUTRAL, LINE-GROUND, NEUTRAL-GROUND) AND 2000V (FOR LINE-LINE), NOMINAL DISCHARGE CURRENT RATING OF 10,000A MINIMUM, SPD UNIT CLOSE NIPPLED TO 480V MAIN SERVICE BREAKER, 18" MAXIMUM LEAD LENGTH, NEMA 4X STAINLESS STEEL HOUSING.
- 4 SINGLE PHASE ISOLATION TRANSFORMER: 167 KVA, STEP DOWN CONNECTED, 480/240V DUAL PRIMARY WINDINGS, 240/120V DUAL SECONDARY WINDINGS, SECONDARY WINDINGS CENTER CONNECTED TO GROUND, 3.5% MINIMUM IMPEDANCE, NEMA 1 HOUSING.
- 5 240V MAIN BREAKER: 800A/2P (OR 3P WITH CENTER POLE UNUSED), 22KAIC, SEPARATELY ENCLOSED, MOLDED CASE, THERMOMAGNETIC TYPE, NEMA 1 HOUSING.
- 6 AUTOMATIC TRANSFER SWITCH (ATS): 800A, 3P, NEMA 1 HOUSING, SOLID NEUTRAL CONNECTION (NEUTRAL NOT SWITCHED), (ATS PROVIDED BY GENERATOR SUPPLIER).
- 7 240V GENERATOR BREAKER: 800A/2P (OR 3P WITH CENTER POLE UNUSED), 22KAIC, SEPARATELY ENCLOSED, MOLDED CASE, THERMOMAGNETIC TYPE, NEMA 1 HOUSING.
- 8 SURGE PROTECTION DEVICE (SPD): UL 1449 3RD EDITION LABEL, SURGE CURRENT RATING OF 150KA/MODE, 300KA/PHASE, VOLTAGE PROTECTION RATINGS OF 900V (FOR LINE-NEUTRAL, LINE-GROUND, NEUTRAL-GROUND) AND 1200V (FOR LINE-LINE), NOMINAL DISCHARGE CURRENT RATING OF 10,000A MINIMUM, SPD UNIT CLOSE NIPPLED TO 240V GENERATOR BREAKER, 18" MAXIMUM LEAD LENGTH, NEMA 4X STAINLESS STEEL HOUSING.
- 9 DOUBLE THROW, MANUAL TRANSFER SWITCH: 800A, 3P, NEMA 1 HOUSING, SOLID NEUTRAL CONNECTION (NEUTRAL NOT SWITCHED).
- 10 PORTABLE GENERATOR CONNECTION BOXES: TOP BOX - 36"H X 24"W X 12"D, NEMA 4X STAINLESS STEEL BOX WITH HINGED, PADLOCKABLE DOOR AND BIRD DETERRENTS ON TOP OF ENCLOSURE; POWER DISTRIBUTION BLOCKS FOR PHASE, NEUTRAL AND GROUND CONNECTIONS MOUNTED IN ENCLOSURE. BOTTOM BOX - 24"H X 24"W X 12"D, NEMA 4X STAINLESS STEEL BOX WITH HINGED, PADLOCKABLE DOOR; CLOSE NIPPLED TO THE TOP BOX WITH FOUR (4) 4" CONDUIT OPENINGS; BOTTOM OF BOX AT 24" AFF.
- 11 NOT USED.
- 12 120/240V PANELBOARD (PANEL "A"): 100A BUS, 1 PHASE, 3 WIRE, 60A/2P MAIN BREAKER, 22KAIC, 24 POLES, BREAKERS AS NEEDED FOR LIGHTING SYSTEM ENCLOSURE (LIGHTS, VENTILATION, HEATING, 120V CONVENIENCE RECEPTACLES), 30A/2P BREAKER FOR GENERATOR BLOCK HEATER, 20A/1P BREAKER FOR GENERATOR BATTERY CHARGER, AND 20A/1P BREAKERS FOR ALL UNUSED POLES.
- 13 SURGE PROTECTION DEVICE (SPD): UL 1449 3RD EDITION LABEL, SURGE CURRENT RATING OF 100KA/MODE, 200KA/PHASE, VOLTAGE PROTECTION RATINGS OF 900V (FOR LINE-NEUTRAL, LINE-GROUND, NEUTRAL-GROUND) AND 1200V (FOR LINE-LINE), NOMINAL DISCHARGE CURRENT RATING OF 10,000A MINIMUM, SPD UNIT CLOSE NIPPLED TO PANEL "A", 18" MAXIMUM LEAD LENGTH, NEMA 4X STAINLESS STEEL HOUSING.
- 14 SINGLE PHASE ISOLATION TRANSFORMER: 167 KVA, STEP UP CONNECTED, 480/240V DUAL PRIMARY WINDINGS, 240/120V DUAL SECONDARY WINDINGS, PRIMARY WINDINGS CENTER CONNECTED TO GROUND, 3.5% MINIMUM IMPEDANCE, NEMA 1 HOUSING.
- 15 LIGHTING CONTROL CABINET #2 (TUNNEL 17): SEE REQUIREMENTS ON SHEET E-021.
- 16 LIGHTING CONTROL CABINET #1 (TUNNEL 15): SEE REQUIREMENTS ON SHEET E-021.
- 17 MAIN GROUND BAR: PRE-DRILLED COPPER GROUND BAR, 1/4" THICK X 4" WIDE X 12" LONG.

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TUNNELS 15 & 17
 POWER RISER DIAGRAM

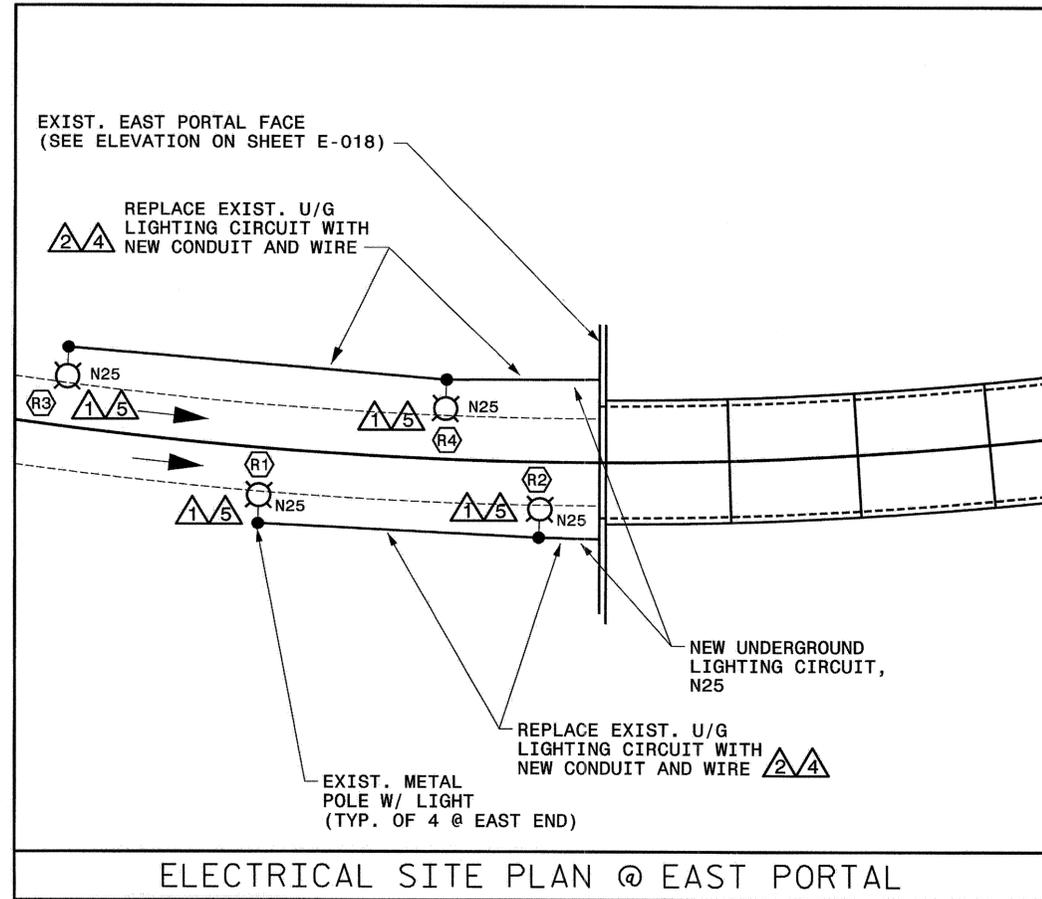
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SHEET NO. E-011
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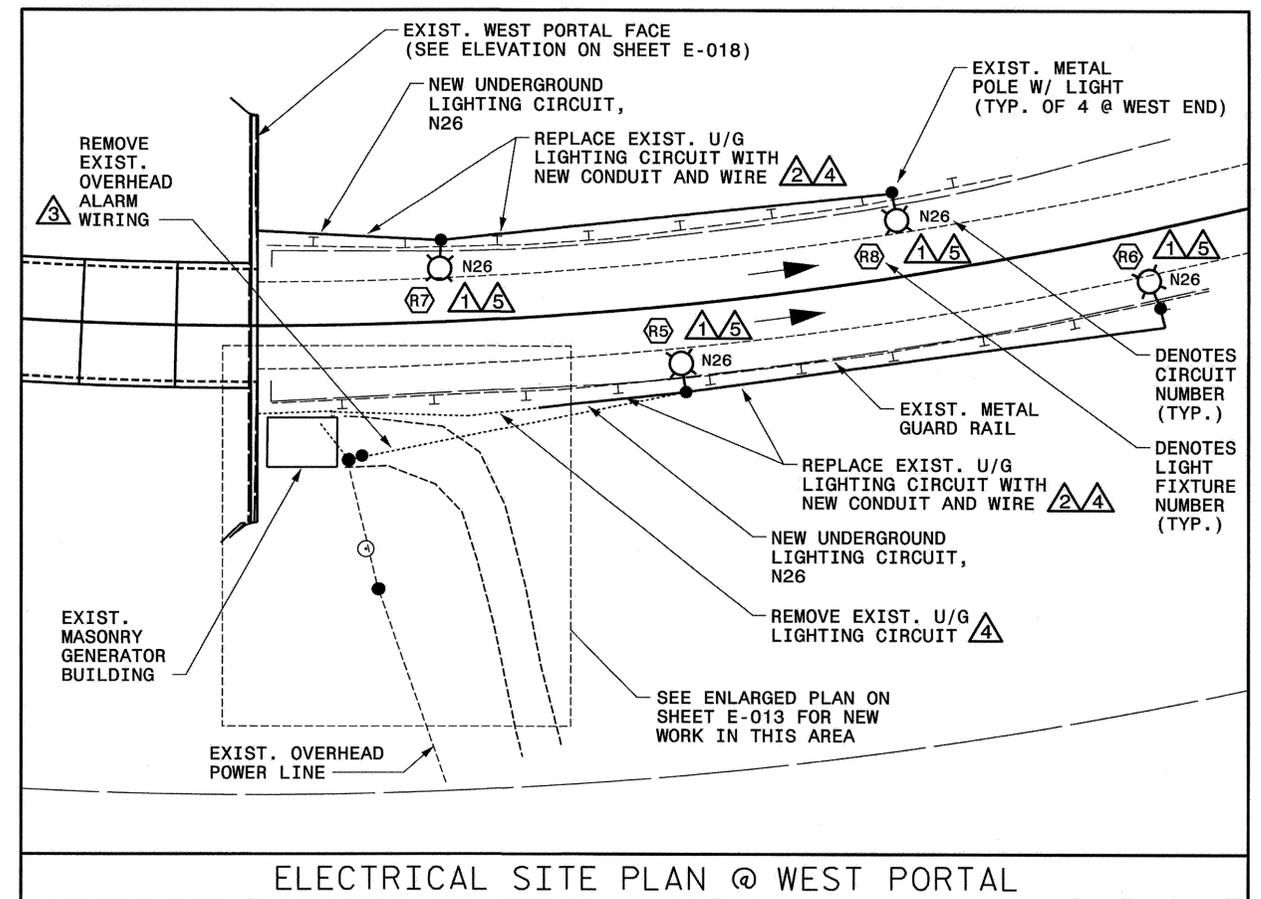
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ELECTRICAL SITE PLAN @ EAST PORTAL



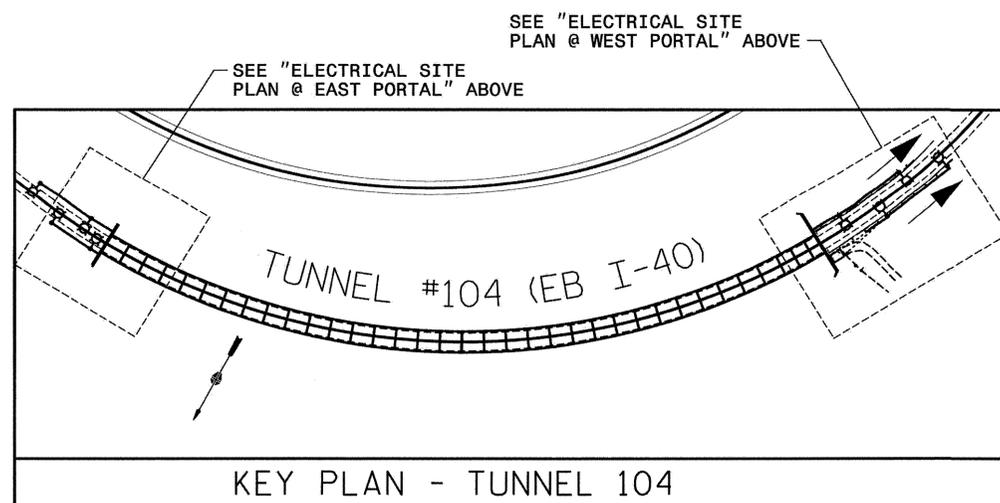
ELECTRICAL SITE PLAN @ WEST PORTAL

NOTES

- 1 REPLACE EXISTING LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON SHEET E-001. EXISTING POLE AND MAST ARM TO REMAIN. PROVIDE NEW CONDUIT CONNECTION TO POLE AND PROVIDE NEW WIRE IN POLE AND MAST ARM, 2#8,1#8G (TYPE SO WIRE). REMOVE EXISTING FUSE HOLDER AND INSTALL NEW BREAKAWAY FUSE HOLDER.
- 2 PROVIDE NEW UNDERGROUND LIGHTING CIRCUIT ROUTED ALONG PATH OF EXISTING CIRCUIT. PROVIDE NEW CONDUIT AND WIRE, 2#8,1#8G,1 1/2" C (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-019.
- 3 REMOVE EXISTING ALARM INDICATING LIGHT FROM POLE AND REMOVE EXISTING OVERHEAD ALARM WIRING BACK TO EXISTING BUILDING.
- 4 REMOVE WIRES FROM EXISTING UNDERGROUND CONDUITS. ABANDON UNDERGROUND CONDUITS IN PLACE.
- 5 PROVIDE A LIGHT STANDARD JUNCTION BOX FOR INTERCEPTING AND FEEDING THE CIRCUITRY INTO THE EXISTING POLE FOUNDATION. SEE LIGHT STANDARD JUNCTION BOX DETAIL ON SHEET E-002.

GENERAL NOTES

- 1. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE.
- 2. DOWNTIME IS NOT PERMITTED FOR THE POLE MOUNTED ROADWAY LIGHTING ON THE INTERSTATE. PROVIDE TEMPORARY WIRING AND/OR PORTABLE LIGHTING, AS REQUIRED TO MAINTAIN THE ROADWAY LIGHTING.
- 3. FOR ALL CONDUITS INSTALLED BELOW GRADE, ELBOWS TURNING UP AND CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.



KEY PLAN - TUNNEL 104

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 100+00 -L- (EB I-40)

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

ELECTRICAL SITE PLANS
 TUNNEL 104 (EB I-40)



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SHEET NO. E-012
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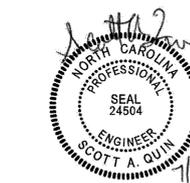
GENERAL NOTES

1. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE. SEE GENERAL NOTE 2 ON SHEET E-012.
2. FOR ALL CONDUITS INSTALLED BELOW GRADE, ELBOWS TURNING UP AND CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
3. REMOVE ALL WIRE FROM UNDERGROUND CONDUITS NO LONGER USED. ABANDON UNDERGROUND CONDUITS IN PLACE.
4. REFER TO CIRCUITING DIAGRAM ON SHEET E-019, POWER RISER DIAGRAM ON SHEET E-020, AND SITE PLANS ON SHEET E-012 FOR ADDITIONAL INFORMATION ON CONDUIT AND WIRE.

NOTES

- △ NOT USED THIS SHEET.
- △ PROVIDE NEW UNDERGROUND LIGHTING CIRCUIT ROUTED ALONG PATH OF EXISTING CIRCUIT. PROVIDE NEW CONDUIT AND WIRE, 2#8,1#8G,1½"C (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-019.
- △ NOT USED THIS SHEET.
- △ REMOVE WIRES FROM UNDERGROUND CONDUITS. ABANDON UNDERGROUND CONDUITS IN PLACE.
- △ NEW CONDUIT AND WIRE, 2#8,1#8G,1½"C (TYPE USE WIRE AND PVC CONDUIT). SEE CIRCUITING DIAGRAM ON SHEET E-019.
- △ NEW UNDERGROUND CONDUIT AND WIRE FOR NEW ELECTRICAL SERVICE. SEE POWER RISER DIAGRAM ON SHEET E-020.
- △ NEW UNDERGROUND CONDUIT AND WIRE FOR NEW LIGHTING CIRCUITS. SEE CIRCUITING DIAGRAM ON SHEET E-019.
- △ PRIOR TO BUILDING DEMOLITION, REMOVE EXISTING GENERATOR AND APPURTENANCES, AUTOMATIC TRANSFER SWITCH AND GENERATOR FUEL TANK. DELIVER THE REMOVED ITEMS TO THE STORAGE FACILITY DESIGNATED BY THE NCDOT DIVISION REPRESENTATIVE.
- △ NEW CONDUIT AND WIRE FOR 240V AND 120V CIRCUITS FOR THE GENERATOR. PROVIDE 2 SETS OF CONDUIT, EACH SET CONSISTING OF 2#8,1#8G,1½"C (TYPE USE WIRE AND PVC CONDUIT).
- △ NEW UNDERGROUND CONDUIT AND WIRE FOR NEW GENERATOR FEEDER. SEE POWER RISER DIAGRAM ON SHEET E-020.
- △ FOR GENERATOR CONTROLS, PROVIDE NEW UNDERGROUND CONDUITS: 8#12,1½"C (TYPE USE WIRE AND PVC CONDUIT) RUN TO ATS; 3#12,1#12G,1½"C (TYPE USE WIRE AND PVC CONDUIT) RUN TO ALARM LIGHT; SPARE 1½"C WITH PULL STRING STUBBED UP AND CAPPED IN THE PREFABRICATED ENCLOSURE.
- △ COORDINATE PAD DIMENSIONS WITH EQUIPMENT TO BE INSTALLED. SEE SHEET S-110.
- △ FOR THE BUILDING DEMOLITION, ALL BUILDING COMPONENTS SHALL BE DEMOLISHED AND REMOVED FROM THE SITE. DISPOSE OF ALL ITEMS IN ACCORDANCE WITH NC DENR GUIDELINES.
- △ SEE ELEVATION ON SHEET E-018. SEE CIRCUITING DIAGRAM ON SHEET E-019.
- △ MOUNT BEACON LIGHT TO TOP OF BOLLARD. PROVIDE ALL HARDWARE AND SUPPORTS REQUIRED FOR MOUNTING ALARM LIGHT 9'-0" AFG.
- △ TOP OF BOLLARD SHALL BE 8'-0" AFG. SEE BOLLARD DETAIL ON SHEET E-022.

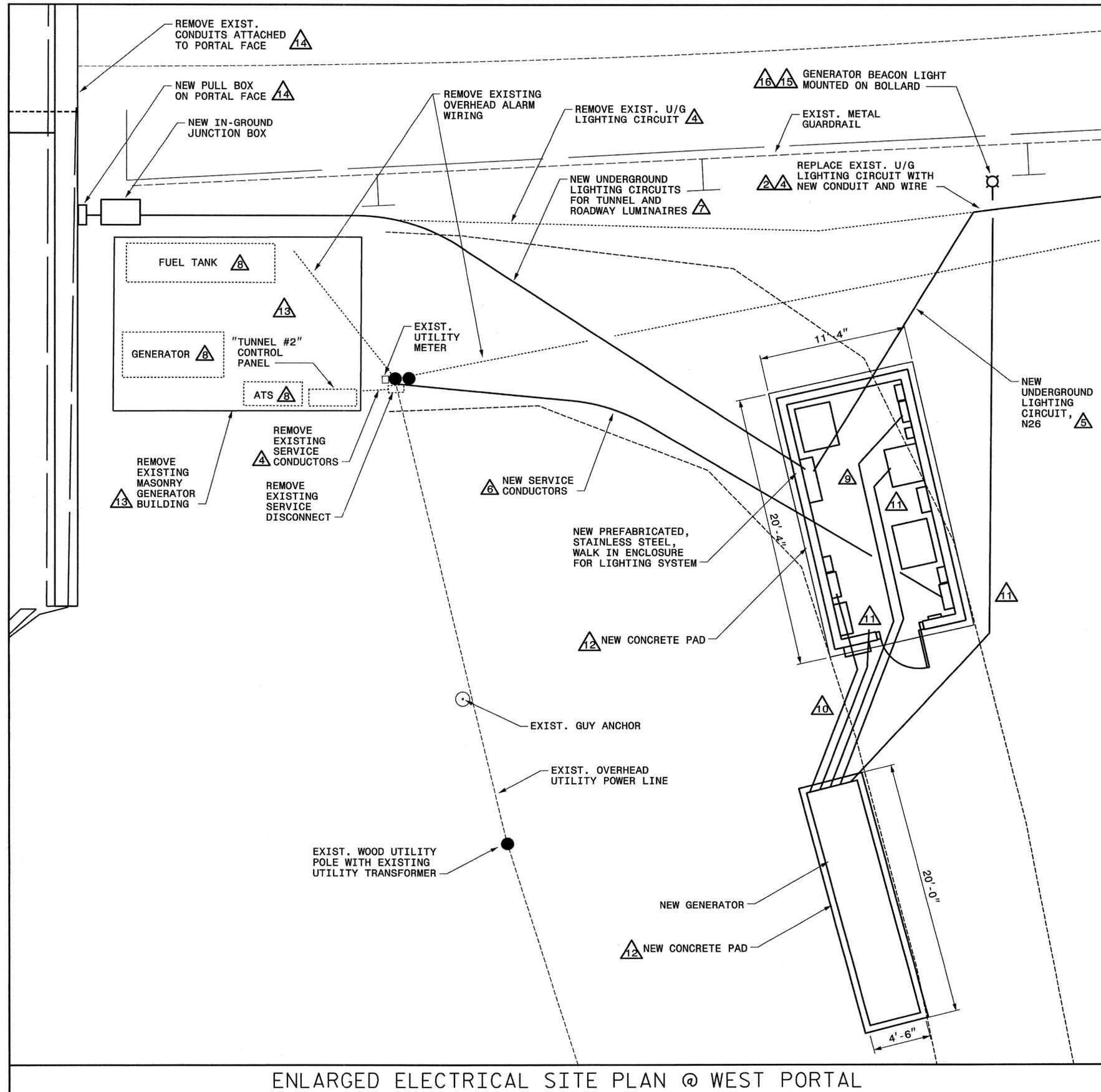
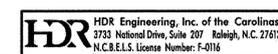
PROJECT NO. I-5512, 50136.3.FS1
HAYWOOD COUNTY
 STATION: 100+00 -L- (EB I-40)



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**ENLARGED ELECTRICAL
 SITE PLAN
 TUNNEL 104**

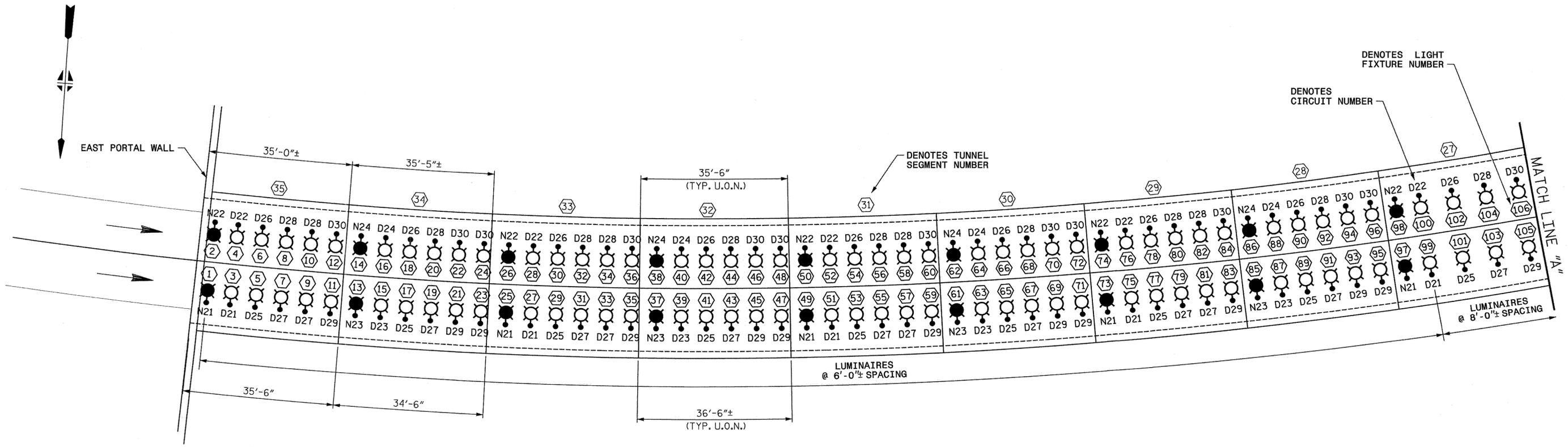
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ENLARGED ELECTRICAL SITE PLAN @ WEST PORTAL

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 CHECKED BY : S. QUIN DATE : 11/13

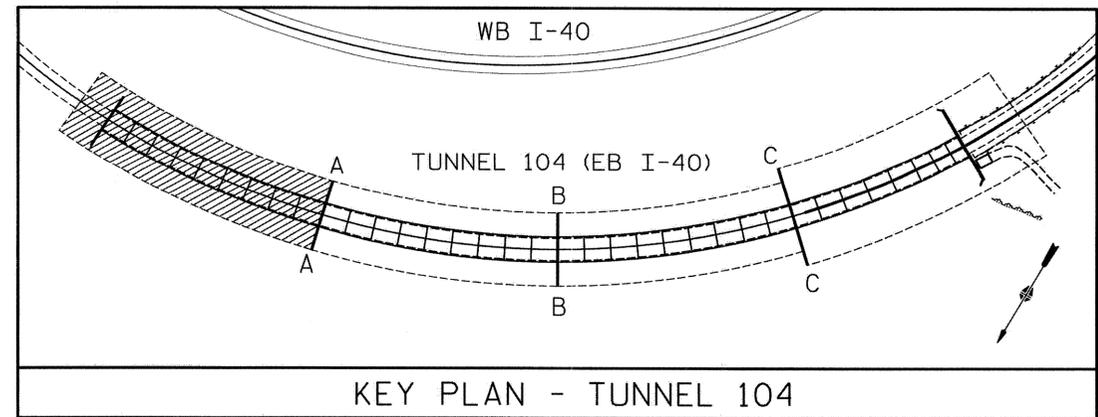
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PARTIAL LIGHTING LAYOUT - TUNNEL 104

GENERAL NOTES

1. SEE SHEET E-022 FOR INSTALLATION AND MATERIALS REQUIREMENTS FOR THE TUNNEL LIGHT FIXTURES AND FOR THE LIGHT CIRCUIT RACEWAYS.
2. SEE CIRCUITING DIAGRAM ON SHEET E-019 FOR CONDUIT, WIRE AND PULL BOX SIZES.
3. FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
4. MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL.
5. PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
6. PROVIDE 3/8" UNDERCUT ANCHORS WITH 3/8" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE LUMINAIRE MOUNTING BRACKETS TO WALL OF TUNNEL. SEE MOUNTING BRACKET DETAIL ON SHEET E-001.
7. PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
8. JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAINTIGHT, THREADED CONDUIT HUB FITTINGS.
9. PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDULETS.
10. PROVIDE BREATHERS AND DRAINS THROUGHOUT THE TUNNEL RACEWAYS, WITH A MAXIMUM SPACING OF 100'.
11. PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X. SEE SHEET E-019 FOR PULL BOX SIZES. PROVIDE A BREATHER AND DRAIN IN EACH PULL BOX.
12. ADJUST ANY FIXTURE LOCATED ON OR NEAR AN EXPANSION JOINT SO THAT THE CENTERLINE OF THE FIXTURE IS 10" MINIMUM FROM THE EXPANSION JOINT. THIS ADJUSTMENT SHALL NOT AFFECT THE PLACEMENT OF ADJACENT FIXTURES.



PROJECT NO. I-5512, 50136.3.FS1
HAYWOOD COUNTY
 STATION: 100+00 -L- (EB I-40)

SHEET 1 OF 4

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TUNNEL 104
 ELECTRICAL LIGHTING
 LAYOUT**

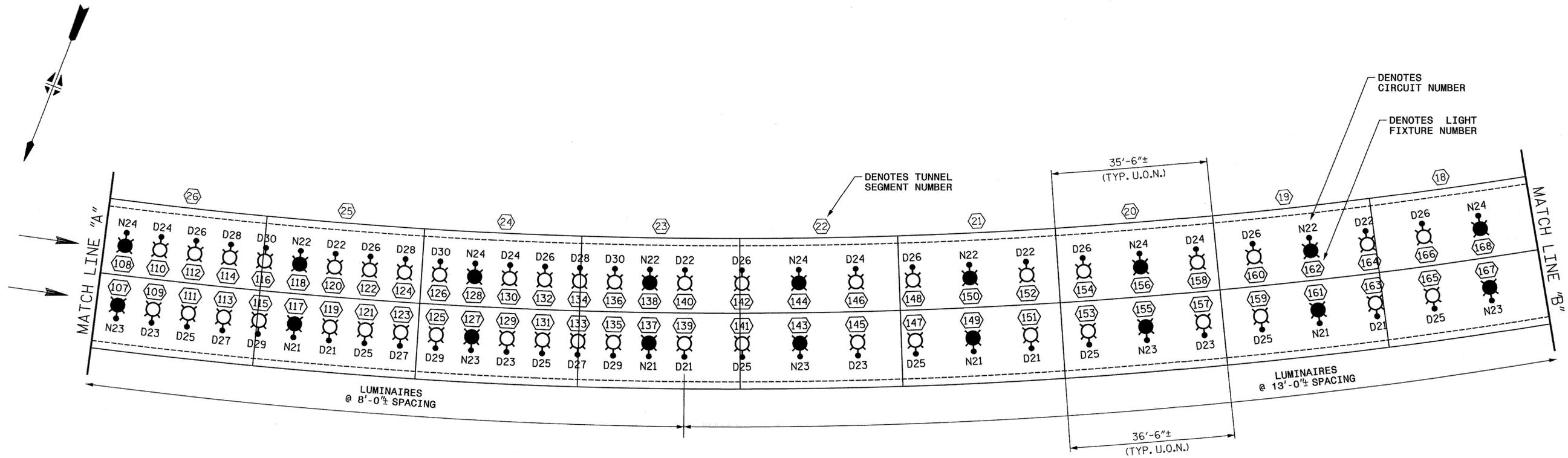


REVISIONS						SHEET NO. E-014 TOTAL SHEETS 25
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HDR HDR Engineering, Inc. of the Carolinas
 3733 National Drive, Suite 207 Raleigh, N.C. 27612
 N.C.B.E.L.S. License Number: F-0116

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 USER: \$USER\$ DATE: \$DATE\$
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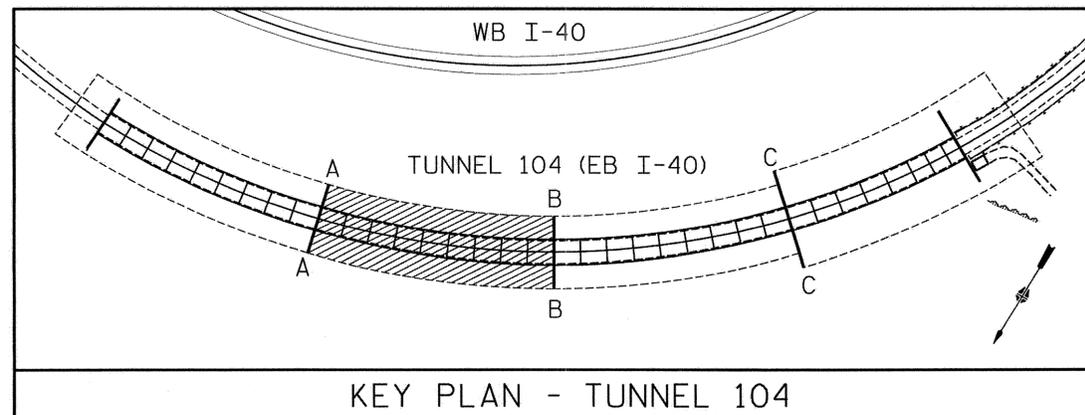
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 CHECKED BY : S. QUIN DATE : 11/13



PARTIAL LIGHTING LAYOUT - TUNNEL 104

GENERAL NOTES

- SEE SHEET E-022 FOR INSTALLATION AND MATERIALS REQUIREMENTS FOR THE TUNNEL LIGHT FIXTURES AND FOR THE LIGHT CIRCUIT RACEWAYS.
- SEE CIRCUITING DIAGRAM ON SHEET E-019 FOR CONDUIT, WIRE AND PULL BOX SIZES.
- FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
- MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL.
- PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
- PROVIDE 3/8" UNDERCUT ANCHORS WITH 3/8" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE LUMINAIRE MOUNTING BRACKETS TO WALL OF TUNNEL. SEE MOUNTING BRACKET DETAIL ON SHEET E-001.
- PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
- JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAINTIGHT, THREADED CONDUIT HUB FITTINGS.
- PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDULETS.
- PROVIDE BREATHERS AND DRAINS THROUGHOUT THE TUNNEL RACEWAYS, WITH A MAXIMUM SPACING OF 100'.
- PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X. SEE SHEET E-019 FOR PULL BOX SIZES. PROVIDE A BREATHER AND DRAIN IN EACH PULL BOX.
- ADJUST ANY FIXTURE LOCATED ON OR NEAR AN EXPANSION JOINT SO THAT THE CENTERLINE OF THE FIXTURE IS 10" MINIMUM FROM THE EXPANSION JOINT. THIS ADJUSTMENT SHALL NOT AFFECT THE PLACEMENT OF ADJACENT FIXTURES.



KEY PLAN - TUNNEL 104

PROJECT NO. I-5512, 50136.3.FS1

HAYWOOD COUNTY

STATION: 100+00 -L- (EB I-40)

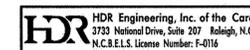
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TUNNEL 104 ELECTRICAL LIGHTING LAYOUT

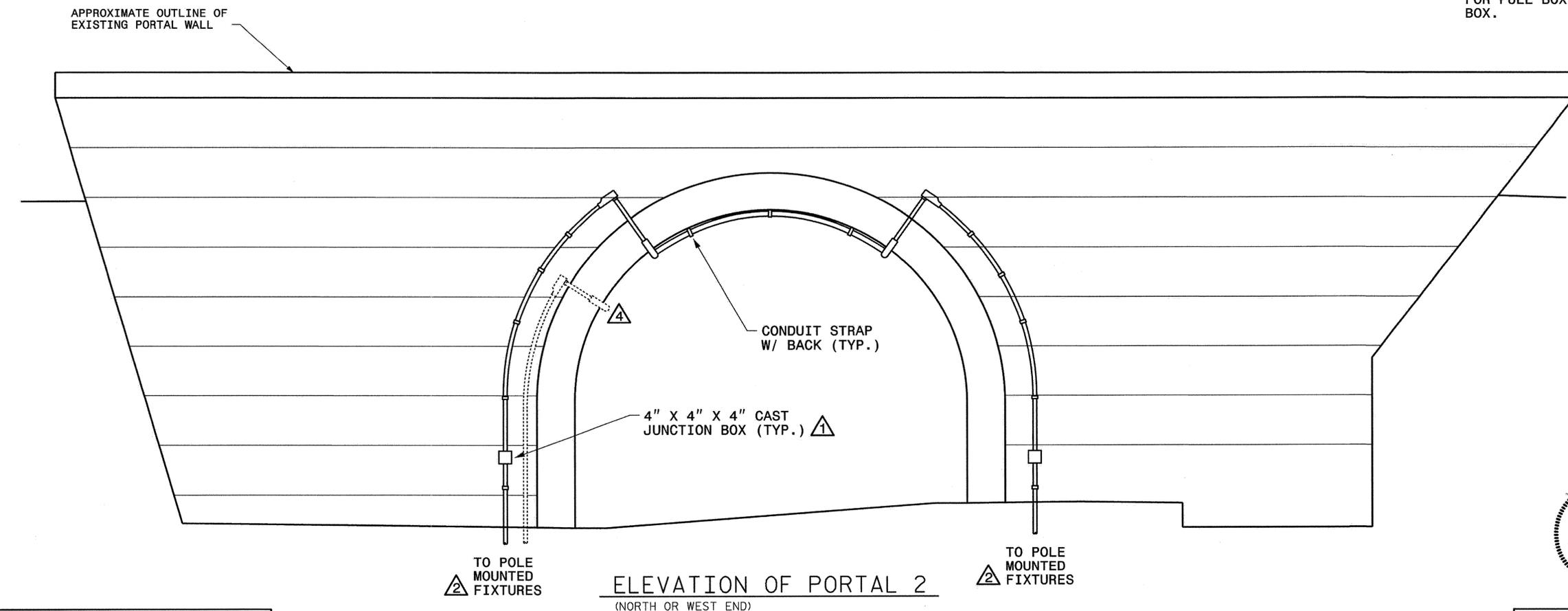
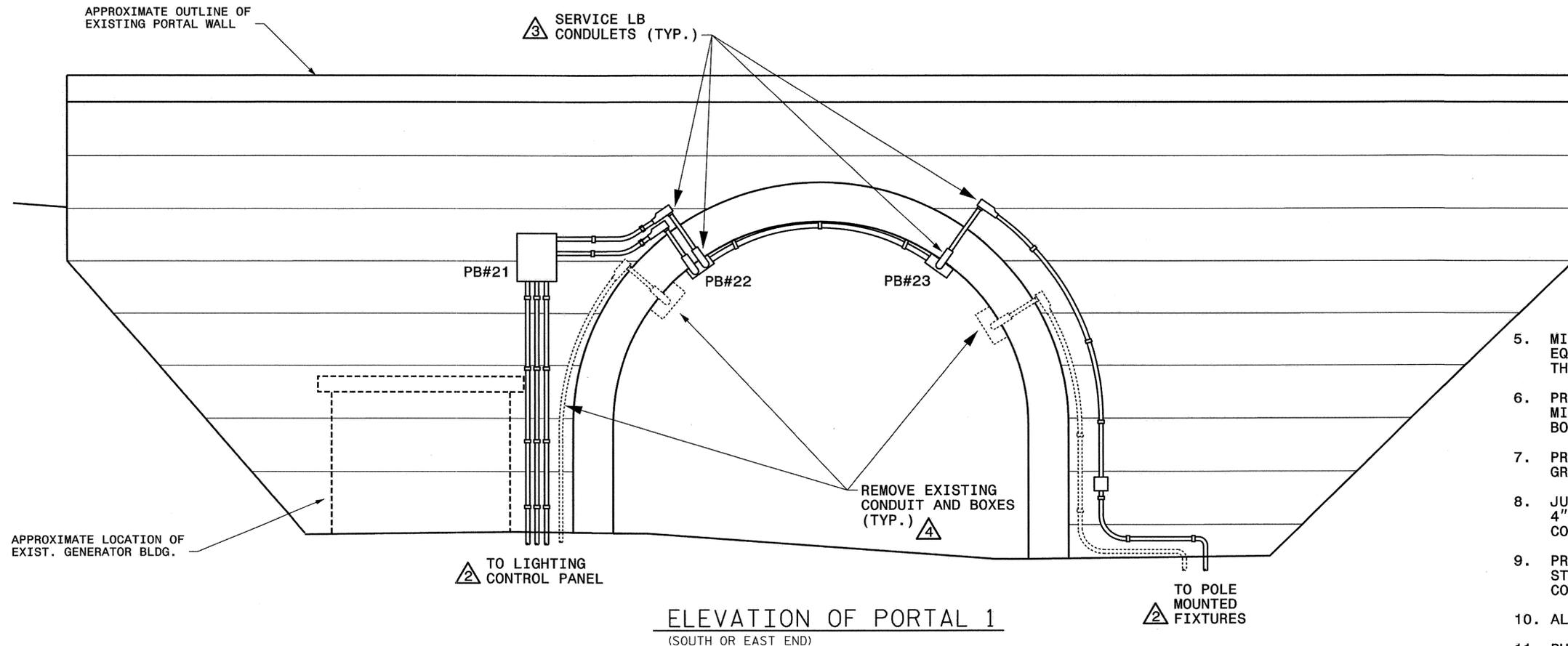


REVISIONS						SHEET NO. E-015 TOTAL SHEETS 25
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GENERAL NOTES

1. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING, OTHER THAN POLE MOUNTED ROADWAY LIGHTING, MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE. SEE GENERAL NOTE 2 ON SHEET E-012.
2. FOR ALL CONDUITS INSTALLED BELOW GRADE, ELBOWS TURNING UP AND CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
3. REMOVE ALL WIRE FROM UNDERGROUND CONDUITS NO LONGER USED. ABANDON UNDERGROUND CONDUITS IN PLACE.
4. SEE CIRCUITING DIAGRAM ON SHEET E-019 FOR CONDUIT AND WIRE SIZES. REFER TO SITE PLANS ON SHEETS E-012 AND E-013 FOR CONTINUATION OF CIRCUITS TO POLE MOUNTED LIGHT FIXTURES.
5. MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL. SEE CLEARANCE REQUIREMENTS IN THE TYPICAL SECTION THROUGH TUNNEL DETAIL ON SHEET E-022.
6. PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
7. PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
8. JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAIN TIGHT, THREADED CONDUIT HUB FITTINGS.
9. PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF BOXES AND CONDULETS.
10. ALL CONDUIT MOUNTED TO PORTAL SHALL BE RGS.
11. PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X. SEE SHEET E-022 FOR PULL BOX SIZES. PROVIDE A BREATHER AND DRAIN IN EACH PULL BOX.

NOTES

- 1 AT JUNCTION BOX, TRANSITION ROADWAY LIGHTING CIRCUIT CONDUCTORS FROM TYPE THHN/THWN WIRE TO TYPE USE WIRE.
- 2 TRANSITION FROM RGS CONDUIT TO PVC80 CONDUIT SHALL OCCUR BELOW GRADE. SEE GENERAL NOTE 2.
- 3 PROVIDE SERVICE LB CONDULETS ON PORTAL FACE AND FOR NEW CONDUIT TRANSITIONS BETWEEN PORTAL FACE AND TUNNEL INTERIOR.
- 4 DURING REMOVAL OF THE EXISTING CONDUITS, BOXES AND SUPPORTS, CUT ANCHORS FLUSH WITH THE TUNNEL AND PORTAL SURFACES.

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 100+00 -L- (EB I-40)



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**TUNNEL 104
 PORTAL WALL
 ELEVATIONS**

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
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HDR HDR Engineering, Inc. of the Carolinas
 3733 National Drive, Suite 207 Raleigh, N.C. 27612
 N.C.B.E.L.S. License Number: F-0116

DRAWN BY : C. SHAW DATE : 11/13
 CHECKED BY : S. QUIN DATE : 11/13

PLOT DRIVER: \$PLTDVRS\$
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GENERAL NOTES

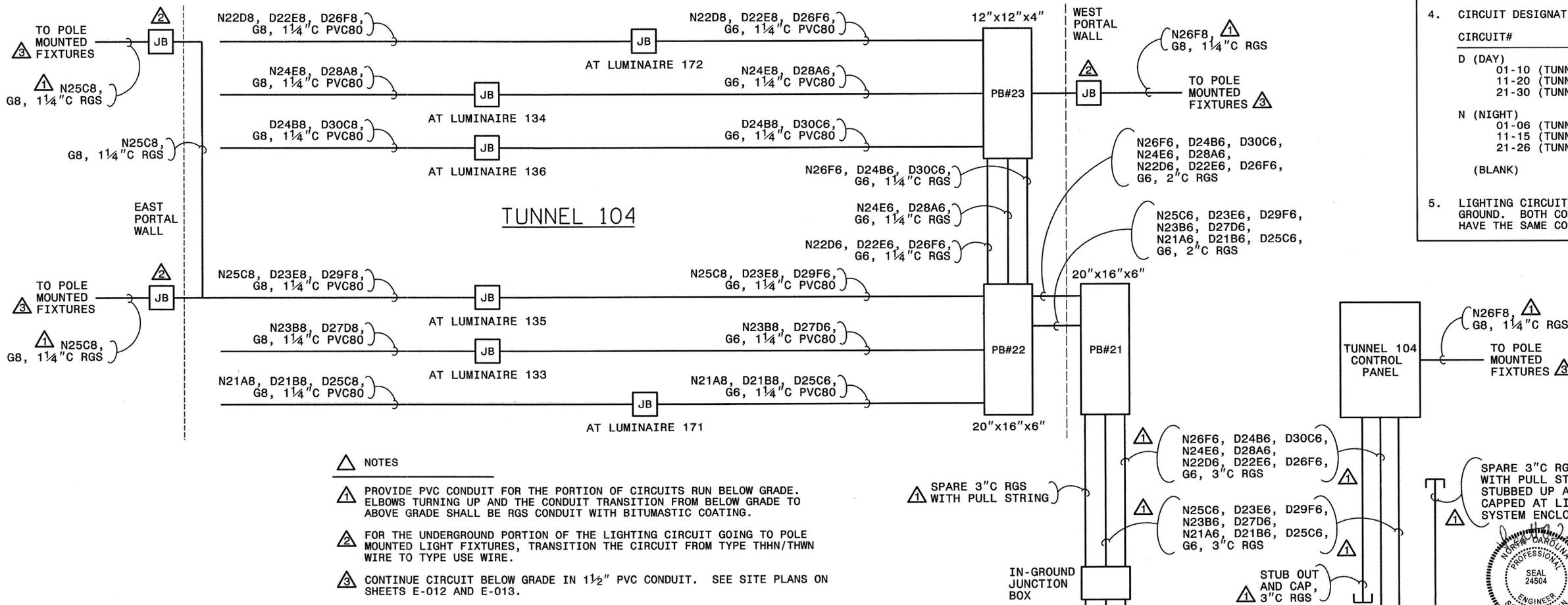
- FOR CONNECTION OF THE LIGHT FIXTURES TO THE LIGHTING CIRCUITS, SEE TYPICAL FIXTURE CONNECTION DETAIL ON SHEET E-022.
- SEE SITE PLANS E-012 AND E-013 FOR CONTINUATION OF LIGHTING CIRCUITS TO LIGHT POLE FIXTURES.
- CHANGES IN WIRE SIZE FOR THE LIGHTING CIRCUITS MAY ONLY BE DONE IN THE PULL BOXES AND JUNCTION BOXES SHOWN ON THE CIRCUITING DIAGRAM.
- ALL PULL BOXES SHALL BE STAINLESS STEEL, NEMA 4X RATED, WITH LOCKABLE HINGED COVER.
- INSTALL A BREATHER AND DRAIN IN EACH STAINLESS STEEL PULL BOX.
- PROVIDE AT LEAST ONE GROUND WIRE IN EVERY CONDUIT AND BOND EACH GROUND WIRE TO EVERY METALLIC BOX THROUGH WHICH IT PASSES.
- SEE TYPICAL ELEVATION AND TYPICAL SECTION ON SHEET E-022 FOR MATERIALS AND INSTALLATION REQUIREMENTS OF THE TUNNEL LIGHTING EQUIPMENT.
- PROVIDE TYPE THHN/THWN STRANDED WIRE FOR ALL LIGHTING CIRCUITS RUN FROM THE LIGHTING CONTROL PANELS TO THE TUNNEL AND FOR ALL LIGHTING CIRCUITS IN THE TUNNEL. PROVIDE TYPE USE WIRE FOR UNDERGROUND CIRCUITS WHERE INDICATED.
- FOR SPLICING CONDUCTORS, CONTRACTOR SHALL USE CONNECTION METHODS SPECIFIED IN SECTION 1400-4(F) OF THE STANDARD SPECIFICATIONS.

EXPLANATION OF CIRCUITING AND CONDUIT FILL DESIGNATIONS

- CIRCUIT DESIGNATIONS INDICATE NIGHT OR DAY OPERATION (NO FIXTURES OPERATE CONTINUOUSLY), CIRCUIT CONDUCTOR SIZE AND COLOR.
- CONDUIT CALL OUTS INDICATE CIRCUITING, GROUNDING CONDUCTOR, AND CONDUIT SIZE AND TYPE.
- ALL WIRING SHALL HAVE COLORED INSULATION ALONG ITS ENTIRE LENGTH. NO CIRCUIT MAY CHANGE COLOR AT ANY POINT, EXCEPT WHEN TRANSITIONING TO TYPE USE WIRE.
- CIRCUIT DESIGNATIONS ARE AS FOLLOWS:

CIRCUIT#	COLOR	SIZE (AWG)
D (DAY)	A (BLACK)	6
01-10 (TUNNEL 15)	B (RED)	8
11-20 (TUNNEL 17)	C (YELLOW)	
21-30 (TUNNEL 104)	D (BLUE)	
N (NIGHT)	E (ORANGE)	
01-06 (TUNNEL 15)	F (BROWN)	
11-15 (TUNNEL 17)		
21-26 (TUNNEL 104)		
(BLANK)	G (GREEN - FOR GROUND WIRE ONLY)	

- LIGHTING CIRCUITS ARE 480V (LINE TO LINE), 2 WIRE, WITH GROUND. BOTH CONDUCTORS OF A LIGHTING CIRCUIT WILL HAVE THE SAME COLOR INSULATION.



NOTES

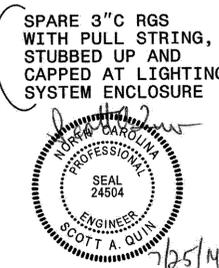
- PROVIDE PVC CONDUIT FOR THE PORTION OF CIRCUITS RUN BELOW GRADE. ELBOWS TURNING UP AND THE CONDUIT TRANSITION FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.
- FOR THE UNDERGROUND PORTION OF THE LIGHTING CIRCUIT GOING TO POLE MOUNTED LIGHT FIXTURES, TRANSITION THE CIRCUIT FROM TYPE THHN/THWN WIRE TO TYPE USE WIRE.
- CONTINUE CIRCUIT BELOW GRADE IN 1 1/2" PVC CONDUIT. SEE SITE PLANS ON SHEETS E-012 AND E-013.

SPARE 3" C RGS WITH PULL STRING

IN-GROUND JUNCTION BOX

STUB OUT AND CAP, 3" C RGS

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 100+00 -L- (EB I-40)

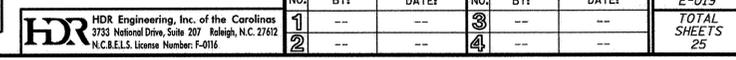


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TUNNEL 104
 CIRCUITING DIAGRAM

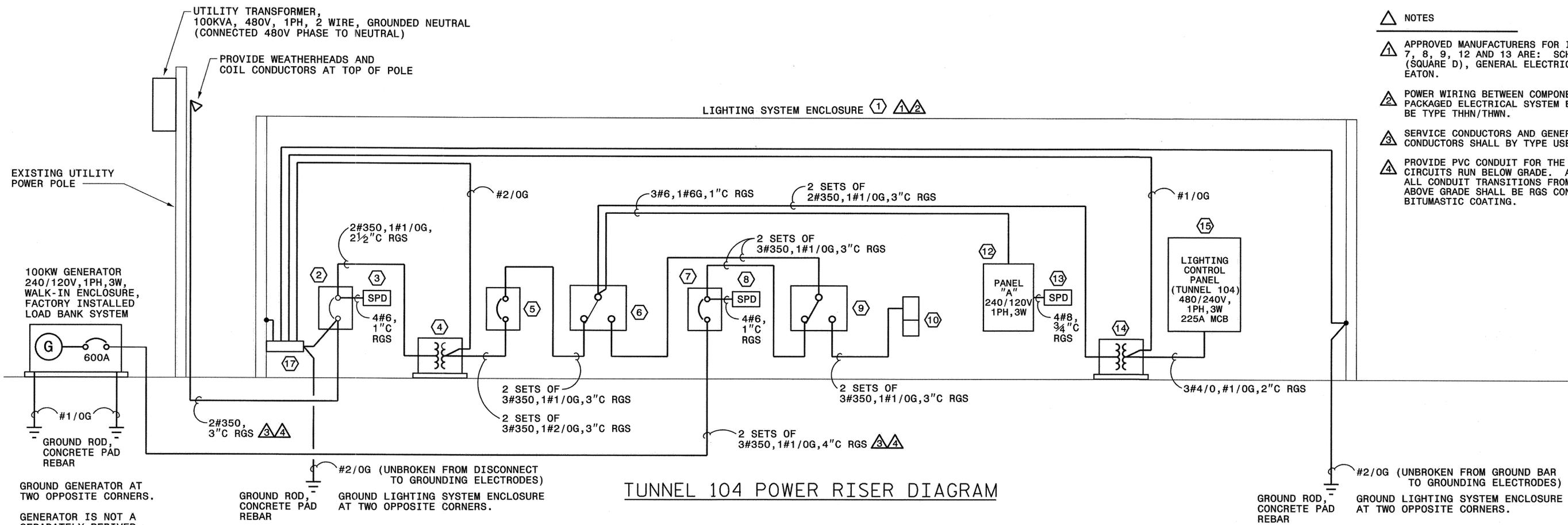
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 CHECKED BY : S. QUIN DATE : 11/13

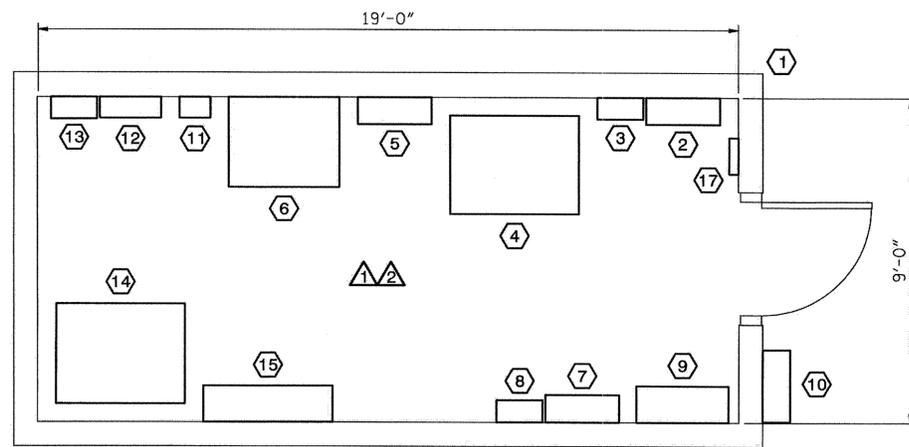
TUNNEL 104 CIRCUITING DIAGRAM



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- NOTES
- 1 APPROVED MANUFACTURERS FOR ITEMS 1, 2, 3, 5, 7, 8, 9, 12 AND 13 ARE: SCHNEIDER ELECTRIC (SQUARE D), GENERAL ELECTRIC, SIEMENS AND EATON.
 - 2 POWER WIRING BETWEEN COMPONENTS IN THE PACKAGED ELECTRICAL SYSTEM ENCLOSURE SHALL BE TYPE THHN/THWN.
 - 3 SERVICE CONDUCTORS AND GENERATOR FEEDER CONDUCTORS SHALL BY TYPE USE.
 - 4 PROVIDE PVC CONDUIT FOR THE PORTION OF CIRCUITS RUN BELOW GRADE. ALL ELBOWS AND ALL CONDUIT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE SHALL BE RGS CONDUIT WITH BITUMASTIC COATING.



- 1 LIGHTING SYSTEM ENCLOSURE: ELECTRICAL PACKAGED EQUIPMENT ENCLOSURE, WALK-IN TYPE, WITH STAINLESS STEEL HOUSING AND VANDAL RESISTANT DOOR HARDWARE; VENTILATION EXHAUST FANS, SPACE HEATERS, INTERIOR LIGHT FIXTURES, AND 120V CONVENIENCE RECEPTACLES PROVIDED INTEGRAL TO FABRICATED UNIT; ALL COMPONENTS INSTALLED AND WIRED DURING FABRICATION; ALL COMPONENTS UL/ETL LISTED; PACKAGED ELECTRICAL SYSTEM TO HAVE OVERALL UL/ETL LABEL. (SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS)
- 2 480V MAIN SERVICE BREAKER: 300A/2P OR 3P (ONLY ONE POLE WILL BE USED), 65KAIC, SEPARATELY ENCLOSED, MOLDED CASE, THERMOMAGNETIC TYPE, SERVICE ENTRANCE RATED, NEMA 1 HOUSING.
- 3 SURGE PROTECTION DEVICE (SPD): UL 1449 3RD EDITION LABEL, SURGE CURRENT RATING OF 150KA/MODE, 300KA/PHASE, VOLTAGE PROTECTION RATINGS OF 1200V (FOR LINE-NEUTRAL, LINE-GROUND, NEUTRAL-GROUND) AND 2000V (FOR LINE-LINE), NOMINAL DISCHARGE CURRENT RATING OF 10,000A MINIMUM, SPD UNIT CLOSE NIPPLED TO 480V MAIN SERVICE BREAKER, 18" MAXIMUM LEAD LENGTH, NEMA 4X STAINLESS STEEL HOUSING.
- 4 SINGLE PHASE ISOLATION TRANSFORMER: 100 KVA, STEP DOWN CONNECTED, 480/240V DUAL PRIMARY WINDINGS, 240/120V DUAL SECONDARY WINDINGS, SECONDARY WINDINGS CENTER CONNECTED TO GROUND, 3.5% MINIMUM IMPEDANCE, NEMA 1 HOUSING.
- 5 240V MAIN BREAKER: 600A/2P (OR 3P WITH CENTER POLE UNUSED), 22KAIC, SEPARATELY ENCLOSED, MOLDED CASE, THERMOMAGNETIC TYPE, NEMA 1 HOUSING.
- 6 AUTOMATIC TRANSFER SWITCH (ATS): 600A, 3P, NEMA 1 HOUSING, SOLID NEUTRAL CONNECTION (NEUTRAL NOT SWITCHED), (ATS PROVIDED BY GENERATOR SUPPLIER).
- 7 240V GENERATOR BREAKER: 600A/2P (OR 3P WITH CENTER POLE UNUSED), 22KAIC, SEPARATELY ENCLOSED, MOLDED CASE, THERMOMAGNETIC TYPE, NEMA 1 HOUSING.
- 8 SURGE PROTECTION DEVICE (SPD): UL 1449 3RD EDITION LABEL, SURGE CURRENT RATING OF 150KA/MODE, 300KA/PHASE, VOLTAGE PROTECTION RATINGS OF 900V (FOR LINE-NEUTRAL, LINE-GROUND, NEUTRAL-GROUND) AND 1200V (FOR LINE-LINE), NOMINAL DISCHARGE CURRENT RATING OF 10,000A MINIMUM, SPD UNIT CLOSE NIPPLED TO 240V GENERATOR BREAKER, 18" MAXIMUM LEAD LENGTH, NEMA 4X STAINLESS STEEL HOUSING.
- 9 DOUBLE THROW, MANUAL TRANSFER SWITCH: 600A, 3P, NEMA 1 HOUSING, SOLID NEUTRAL CONNECTION (NEUTRAL NOT SWITCHED).
- 10 PORTABLE GENERATOR CONNECTION BOXES: TOP BOX - 36"H X 24"W X 12"D, NEMA 4X STAINLESS STEEL BOX WITH HINGED, PADLOCKABLE DOOR AND BIRD DETERRENTS ON TOP OF ENCLOSURE; POWER DISTRIBUTION BLOCKS FOR PHASE, NEUTRAL AND GROUND CONNECTIONS MOUNTED IN ENCLOSURE. BOTTOM BOX - 24"H X 24"W X 12"D, NEMA 4X STAINLESS STEEL BOX WITH HINGED, PADLOCKABLE DOOR; CLOSE NIPPLED TO THE TOP BOX WITH FOUR (4) 4" CONDUIT OPENINGS; BOTTOM OF BOX AT 24" AFF.
- 11 NOT USED.
- 12 120/240V PANELBOARD (PANEL "A"): 100A BUS, 1 PHASE, 3 WIRE, 60A/2P MAIN BREAKER, 22KAIC, 24 POLES, BREAKERS AS NEEDED FOR LIGHTING SYSTEM ENCLOSURE (LIGHTS, VENTILATION, HEATING, 120V CONVENIENCE RECEPTACLES), 30A/2P BREAKER FOR GENERATOR BLOCK HEATER, 20A/1P BREAKERS FOR ALL UNUSED POLES.
- 13 SURGE PROTECTION DEVICE (SPD): UL 1449 3RD EDITION LABEL, SURGE CURRENT RATING OF 100KA/MODE, 200KA/PHASE, VOLTAGE PROTECTION RATINGS OF 900V (FOR LINE-NEUTRAL, LINE-GROUND, NEUTRAL-GROUND) AND 1200V (FOR LINE-LINE), NOMINAL DISCHARGE CURRENT RATING OF 10,000A MINIMUM, SPD UNIT CLOSE NIPPLED TO PANEL "A", 18" MAXIMUM LEAD LENGTH, NEMA 4X STAINLESS STEEL HOUSING.
- 14 SINGLE PHASE ISOLATION TRANSFORMER: 100 KVA, STEP UP CONNECTED, 480/240V DUAL PRIMARY WINDINGS, 240/120V DUAL SECONDARY WINDINGS, PRIMARY WINDINGS CENTER CONNECTED TO GROUND, 3.5% MINIMUM IMPEDANCE, NEMA 1 HOUSING.
- 15 LIGHTING CONTROL CABINET (TUNNEL 104): SEE REQUIREMENTS ON SHEET E-021.
- 16 NOT USED.
- 17 MAIN GROUND BAR: PRE-DRILLED COPPER GROUND BAR, 1/4" THICK X 4" WIDE X 12" LONG.

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 100+00 -L- (EB I-40)



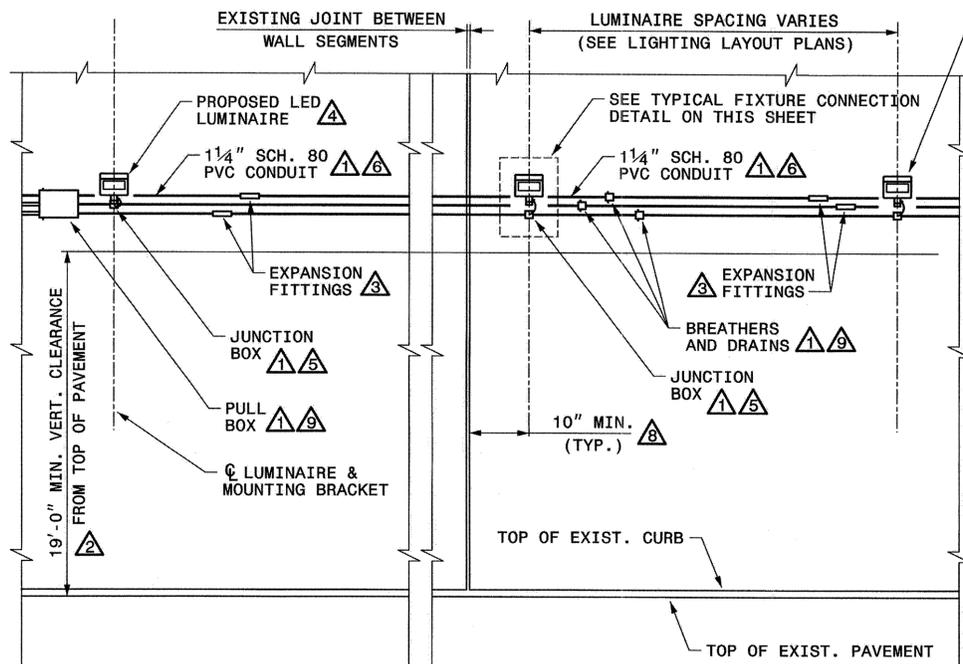
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TUNNEL 104 POWER RISER DIAGRAM

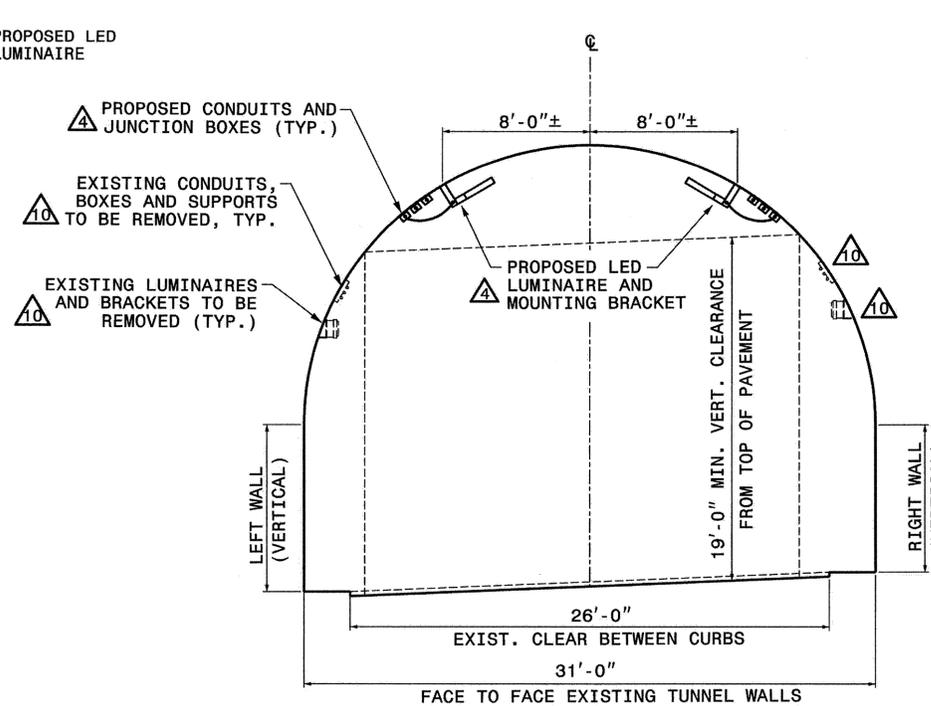
REVISIONS						SHEET NO. E-020
NO.	BY:	DATE:	NO.	BY:	DATE:	
1	--	--	3	--	--	TOTAL SHEETS 25
2	--	--	4	--	--	

PLOT DRIVER: \$PLTDRVS\$
 USER: \$USER\$
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 DATE: \$DATE\$
 TIME: \$TIME\$

DRAWN BY: C. SHAW DATE: 11/13
 CHECKED BY: S. QUIN DATE: 11/13

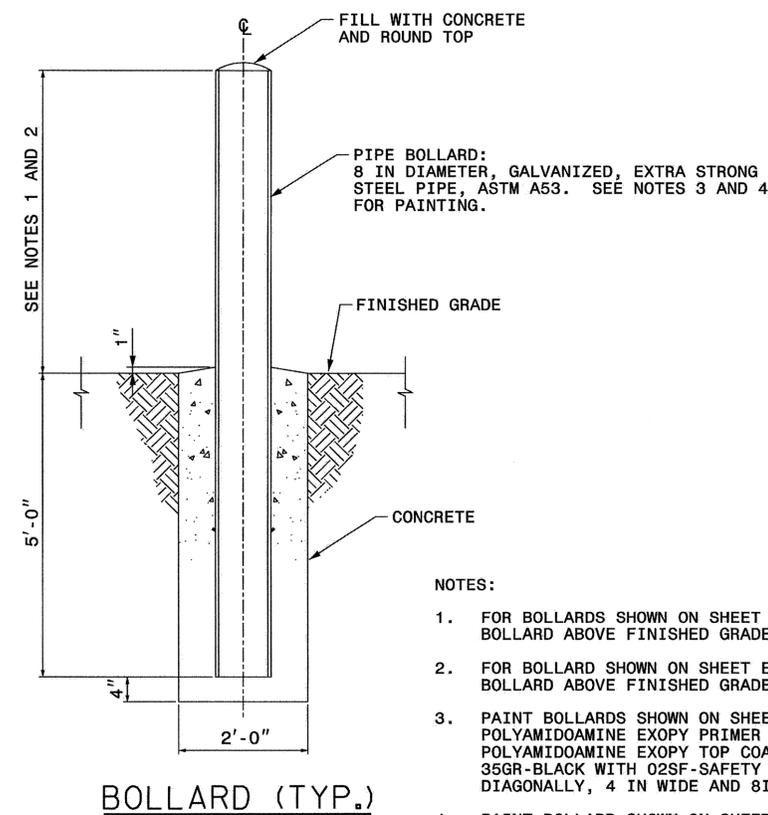


TYPICAL ELEVATION VIEW OF TUNNEL LIGHTING



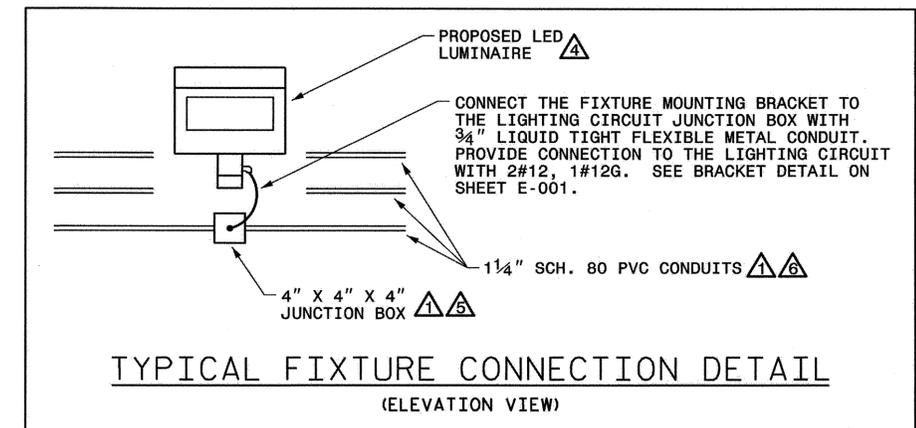
TYPICAL SECTION THROUGH TUNNEL

- NOTES
1. PROVIDE 1/4" UNDERCUT ANCHORS WITH 1/4" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE JUNCTION BOXES, PULL BOXES AND CONDUIT STRAPS TO WALL OF TUNNEL.
 2. MINIMUM MOUNTING HEIGHT IS 19' ABOVE ROADWAY FOR ALL NEW EQUIPMENT INSTALLED IN TUNNEL.
 3. PROVIDE EXPANSION FITTINGS IN EACH SECTION OF CONDUIT THAT IS GREATER THAN 20' LONG BETWEEN TERMINATIONS AT JUNCTION BOXES.
 4. PROVIDE 3/8" UNDERCUT ANCHORS WITH 3/8" THREADED ROD AND 2 1/2" MINIMUM EFFECTIVE EMBEDMENT TO SECURE LUMINAIRE MOUNTING BRACKETS TO WALL OF TUNNEL. SEE MOUNTING BRACKET DETAIL ON SHEET E-001.
 5. PROVIDE GALVANIZED CAST IRON JUNCTION BOX, 4" SQUARE, 4" DEEP WITH GASKETED COVER AND GALVANIZED, RAINLIGHT, THREADED CONDUIT HUB FITTINGS. PROVIDE A 1 1/4" HUB ON TWO OPPOSITE SIDES AND A 3/4" HUB ON THE COVERPLATE. CENTER JUNCTION BOX UNDER LIGHT FIXTURE. ATTACH A PERMANENT PHENOLIC IDENTIFICATION TAG ON THE COVERPLATE, ENGRAVED WITH THE LIGHT FIXTURE NUMBER.
 6. PROVIDE CONDUIT STRAPS W/BACK FOR SUPPORTING CONDUITS. INSTALL STRAPS @ 5' SPACING, MAXIMUM, AND INSTALL WITHIN 3' OF JUNCTION BOXES AND CONDULETS.
 7. EQUIPMENT MOUNTING HEIGHTS AND GENERAL ARRANGEMENT ARE TYPICAL FOR ALL SECTIONS OF THE TUNNELS. SEE SHEETS E-004, E-005, E-006, E-007, E-014, E-015, E-016, E-017 FOR LUMINAIRE LOCATIONS AND SPACING.
 8. ADJUST ANY FIXTURE LOCATED ON OR NEAR AN EXPANSION JOINT SO THAT THE CENTERLINE OF THE FIXTURE IS 10" MINIMUM FROM THE EXPANSION JOINT. THIS ADJUSTMENT SHALL NOT AFFECT THE PLACEMENT OF ADJACENT FIXTURES.
 9. PROVIDE BREATHERS AND DRAINS THROUGHOUT THE TUNNEL RACEWAYS. INSTALL A BREATHER AND DRAIN IN EACH STAINLESS STEEL PULL BOX AND IN DEDICATED JUNCTION BOXES, WITH A MAXIMUM SPACING OF 100'. JUNCTION BOXES SHALL BE GALVANIZED CAST IRON TYPE, 4" SQUARE, 4" DEEP WITH GASKETED COVER, AND SHALL HAVE GALVANIZED, RAINLIGHT, THREADED CONDUIT HUB FITTINGS. PROVIDE A 1 1/4" HUB ON TWO OPPOSITE SIDES OF THE BOX AND A 3/4" HUB ON THE OTHER TWO SIDES. INSTALL EACH BREATHER AND DRAIN AS A PAIR, EACH ON A DEDICATED THREADED HUB, AND LOCATE THE DRAIN ON THE BOTTOM SIDE OF THE BOX.
 10. DEMOLITION AND REMOVAL OF EXISTING EQUIPMENT AND WIRING MAY NOT TAKE PLACE UNTIL THE INSTALLATION OF THE NEW TUNNEL LIGHTING SYSTEM IS COMPLETE AND THE NEW SYSTEM HAS BEEN ACCEPTED BY THE NCDOT DIVISION REPRESENTATIVE. DURING REMOVAL OF THE EXISTING LUMINAIRES, CONDUITS, BOXES AND SUPPORTS, CUT ANCHORS FLUSH WITH THE TUNNEL SURFACE.



BOLLARD (TYP.)

- NOTES:
1. FOR BOLLARDS SHOWN ON SHEET E-003, HEIGHT OF BOLLARD ABOVE FINISHED GRADE WILL BE 5'-0".
 2. FOR BOLLARD SHOWN ON SHEET E-013, HEIGHT OF BOLLARD ABOVE FINISHED GRADE WILL BE 8'-0".
 3. PAINT BOLLARDS SHOWN ON SHEET E-003 WITH POLYAMIDOAMINE EXOPY PRIMER BASE COAT AND POLYAMIDOAMINE EXOPY TOP COAT. PROVIDE 35GR-BLACK WITH 02SF-SAFETY YELLOW STRIPING, DIAGONALLY, 4 IN WIDE AND 8IN ON CENTER.
 4. PAINT BOLLARD SHOWN ON SHEET E-013 WITH POLYAMIDOAMINE EXOPY PRIMER BASE COAT AND POLYAMIDOAMINE EXOPY TOP COAT. PROVIDE 35GR-BLACK FINISH.



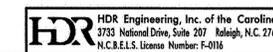
TYPICAL FIXTURE CONNECTION DETAIL (ELEVATION VIEW)

PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: _____



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
TYPICAL TUNNEL ELEVATIONS AND BOLLARD DETAIL					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1	--	--	3	--	--
2	--	--	4	--	--

SHEET NO. E-022
TOTAL SHEETS 25



DRAWN BY : C. SHAW DATE : 11/13
 CHECKED BY : S. QUINN DATE : 11/13

PLOT DRIVER: \$PLTDVRS\$
 USER: \$USER\$
 FILE: \$FILE\$
 PENTABLE: \$PENTBL\$
 TIME: \$TIME\$
 DATE: \$DATE\$

ESTIMATED MATERIALS (TUNNEL 17)

QTY	UNIT	DESCRIPTION
210	EA	LED TUNNEL LUMINAIRE
10	EA	LED TUNNEL LUMINAIRE (SPARE TURNED OVER TO NCDOT DIVISION TRAFFIC SERVICE SUPERVISOR)
210	EA	TUNNEL LUMINAIRE MOUNTING BRACKET
10	EA	TUNNEL LUMINAIRE MOUNTING BRACKET (SPARE TURNED OVER TO NCDOT DIVISION TRAFFIC SERVICE ENGINEER)
268	EA	GALVANIZED, 4" X 4" X 4" CAST JUCTION BOX W/ COVER AND GASKET
596	EA	GALVANIZED RAIN TIGHT THREADED 1 1/4" CONDUIT HUB
310	EA	GALVANIZED RAIN TIGHT THREADED 3/4" CONDUIT HUB
30	FT	3" RIGID GALVANIZED STEEL CONDUIT
300	FT	2" RIGID GALVANIZED STEEL CONDUIT
280	FT	1 1/4" RIGID GALVANIZED STEEL CONDUIT
100	FT	3" PVC SCHEDULE 40 CONDUIT
6100	FT	1 1/4" PVC SCHEDULE 80 CONDUIT
525	FT	3/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT
4	EA	2" GALVANIZED CAST IRON SERVICE LB CONDULET FITTING WITH THREADED HUBS
3	EA	1 1/4" GALVANIZED CAST IRON SERVICE LB CONDULET FITTING WITH THREADED HUBS
3	EA	GALVANIZED EXPANSION FITTING FOR 2" RIGID GALVANIZED CONDUIT
6	EA	GALVANIZED EXPANSION FITTING FOR 1 1/4" RIGID GALVANIZED CONDUIT
110	EA	PVC EXPANSION FITTING FOR 1 1/4" RIGID PVC SCHEDULE 80 CONDUIT
1	LOT	ZINC RICH PAINT
2	EA	20" X 16" X 6" STAINLESS STEEL PULL BOX
1	EA	12" X 12" X 4" STAINLESS STEEL PULL BOX
14500	FT	#6 AWG, THHN/THWN, COLOR CODED INSULATION (PHASE CONDUCTORS)
3600	FT	#6 AWG, THHN/THWN, GREEN GROUND
22300	FT	#8 AWG, THHN/THWN, COLOR CODED INSULATION (PHASE CONDUCTORS)
3800	FT	#8 AWG, THHN/THWN, GREEN GROUND
2100	FT	#12 AWG, THHN/THWN, COLOR CODED INSULATION (PHASE CONDUCTORS)
1050	FT	#12 AWG, THHN/THWN, GREEN GROUND

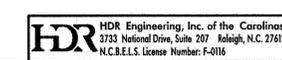
PROJECT NO. I-5512, 50136.3.FS1
 HAYWOOD COUNTY
 STATION: 217+01 -L- (EB I-40)



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**TUNNEL 17
 ESTIMATED MATERIALS**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	E-024
1	--	--	3	--	--	TOTAL SHEETS
2	--	--	4	--	--	25



PLOT DRIVER: \$PLTDVRS\$
 USER: \$USER\$ DATE: \$DATE\$
 TIME: \$TIME\$
 FILE: \$FILE\$

DRAWN BY : C. SHAW DATE : 11/13
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