

POR T AUTHORITY OF ALLEGHENY COUNTY

TRANSMITTAL MEMORANDUM

TO: All Holders of Bid Documents for the Subject Contract

SUBJECT: North Shore Connector
NSC Train Systems (System Wide)
Contract No. NSC-009

DATE: August 20, 2008

Please find enclosed the following:

- Addendum No. #3 dated August 20, 2008
 - Question and Answers 28, 38, 41-95.
-

The following signature acknowledges the receipt of this Transmittal.

Signature

Name of Company

Date

Please sign and return one (1) copy to:

Port Authority of Allegheny County
Purchasing and Materials Management Department
Heinz 57 Center
345 Sixth Avenue, Third Floor
Pittsburgh, PA 15222-2527
Attention: Ms. Toni Matessa

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Port Authority of Allegheny County

North Shore Connector

NSC Train Systems (System Wide)

Contract No. NSC-009

ADDENDUM NO. 3

August 20, 2008

This Addendum modifies Bid Documents for the subject Contract as set forth below. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Form of Proposal, Form B.

To identify revisions on the attached Contract Drawings, an irregular line joined by a diamond symbol with a number inside it appears at the revision location; and the diamond symbol with a number inside it, date and a description appear in the Revision Block.

To identify revisions on the attached pages, a vertical bar appears in the right margin at the revision location.

CHANGES TO TERMS AND CONDITIONS (VOLUME 1)

1. Table of Contents, page TOC-2. Delete and replace with page TOC-2.
2. Section 00400, Bid/Award Forms, Form B, Pages B-2 through B-3. Delete and replace with pages B-2 through B-3.
3. Section 00400, Bid/Award Forms, Form B, Page B-7. Delete and replace with page B-7.
4. Section 00500, Agreement, Pages 00500-18 through 00500-19. Delete and replace with pages 00500-18 through 00500-19.
5. Section 01300, Administrative Requirements, Page 01300-7. Delete and replace with page 01300-7.
6. North Shore Connector, North Shore Side Tunnels & Station Shell (NSC-003/006), Gateway Station Shell (NSC-004R), Aerial Structure, Retained Fill, and Demolition of Miller Printing (NSC-007), and Advanced Rail Systems Procurement – Gateway Double Crossover (Contract No. 3002) Construction Update, Page C-1, Delete and replace with page C-1.

CHANGES TO TECHNICAL PROVISIONS (VOLUME 2)

1. Table of Contents, page TOC-2. Delete and replace with page TOC-2.
2. Technical Provisions Index, page TP-2. Delete and replace with page TP-2.
3. Section 02220, Demolition, page 02220-9. Delete and replace with page 02220-9.
4. Section 02220, Demolition, page 02220-12. Delete and replace with page 02220-12.
5. Section 02220, Demolition, page 02220-20. Delete and replace with page 02220-20.
6. Section 02220, Demolition, page 02220-22. Delete and replace with page 02220-22.
7. Section 02450, General Track Construction, page 02450-6. Delete and replace with page 02450-6.
8. Section 02453, Special Track Construction, page 02453-2. Delete and replace with page 02453-2.
9. Section 02454, Rail Lubrication System. Add pages 02454-1 through 02454-3.
10. Section 13570, Signal System Requirements, page 13570-1. Delete and replace with page 13570-1.
11. Section 13570, Signal System Requirements, page 13570-3. Delete and replace with page 13750-3.
12. Section 13574, Wayside Signal Equipment, pages 13574-7 through 13574-10. Delete and replace with pages 13574-7 through 13574-10.
13. Section 13576, Circuit Requirements, page 13576-2. Delete and replace with page 13576-2.
14. Section 13579, Design Requirements, page 13579-6. Delete and replace with page 13579-6.
15. Section 13579, Design Requirements, pages 13579-11 through 13579-12. Delete and replace with pages 13579-11 through 13579-12.
16. Section 13581, Local Control Panels, pages 13581-1 through 13581-2. Delete and replace with pages 13581-1 through 13581-2.
17. Section 13581, Local Control Panels, pages 13581-6 through 13581-7. Delete and replace with pages 13581-6 through 13581-7.

CHANGES TO TECHNICAL PROVISIONS (VOLUME 3)

1. Table of Contents, page TOC-2. Delete and replace with page TOC-2.
2. Section 16703, Carrier Transmission System, Page 16703-9. Delete and replace with page 16703-9.
3. Section 16721, Telephone System, page 16721-14. Delete and replace with page 16721-14.
4. Section 16750, Digital Video System, page 16750-6. Delete and replace with page 16750-6.
5. Section 16750, Digital Video System, pages 16750-8 through 16750-13. Delete and replace with pages 16750-8 through 16750-13.
6. Section 16750, Digital Video System, page 16750-33. Delete and replace with page 16750-33.
7. Section 16901, Communication System Inspection and Test, page 16901-19. Delete and replace with page 16901-19.
8. Section 16950, Operation Control Center (OCC) System Upgrade, page 16950-14. Delete and replace with page 16950-14.
9. Section 16950, Operation Control Center (OCC) System Upgrade, pages 16950-26 through 16950-27. Delete and replace with pages 16950-26 through 16950-27.

CHANGES TO NSC-009 CONTRACT DRAWINGS (VOLUME 1)

(Modified or Added Drawings are attached here to)

1. Drawing No. GN003, Sheet No. 3. Drawing Modified.
2. Drawing No. GN006, Sheet No. 6. Drawing Modified
3. Drawing No. GN108, Sheet No. 11. Drawing Modified.
4. Drawing No. TN151, Sheet No. 69. Drawing Modified.
5. Drawing No. TK128, Sheet No. 112. Drawing Modified.
6. Drawing No. TK132, Sheet No. 114. Drawing Modified.
7. Drawing No. TK147, Sheet No. 123A. Drawing Added
8. Drawing No. TK148, Sheet No. 123B. Drawing Added
9. Drawing No. TK149, Sheet No. 123C. Drawing Added
10. Drawing No. TK150, Sheet No. 123D. Drawing Added
11. Drawing No. TK151, Sheet No. 123E. Drawing Added

12. Drawing No. OC192, Sheet No. 206. Drawing Modified.
13. Drawing No. OC193, Sheet No. 207. Drawing Modified.
14. Drawing No. OC605, Sheet No. 269. Drawing Modified.
15. Drawing No. SG021, Sheet No. 347. Drawing Modified.
16. Drawing No. SG023, Sheet No. 349. Drawing Modified.
17. Drawing No. SG024, Sheet No. 350. Drawing Modified.
18. Drawing No. SG052A, Sheet No. 354A. Drawing Added
19. Drawing No. SG100, Sheet No. 377. Drawing Modified.
20. Drawing No. SG104, Sheet No. 379. Drawing Modified
21. Drawing No. SG145, Sheet No. 400. Drawing Modified.
22. Drawing No. SG152, Sheet No. 403. Drawing Modified.
23. Drawing No. SG164, Sheet No. 411. Drawing Modified.
24. Drawing No. SH1022-2, Sheet No. 432. Drawing Modified
25. Drawing No. SH1022-16, Sheet No. 449. Drawing Modified
26. Drawing No. CM041, Sheet No. 544. Drawing Modified.
27. Drawing No. CM075, Sheet No. 559A. Drawing Modified.
28. Drawing No. CM076, Sheet No. 559B. Drawing Modified.
29. Drawing No. CM077, Sheet No. 559C. Drawing Modified.
30. Drawing No. FP100, Sheet No. 608. Drawing Modified.
31. Drawing No. FP101, Sheet No. 609. Drawing Modified.
32. Drawing No. FP103, Sheet No. 611. Drawing Modified.
33. Drawing No. FP106, Sheet No. 614. Drawing Modified.
34. Drawing No. EL020, Sheet No. 651. Drawing Modified.
35. Drawing No. EL025, Sheet No. 655. Drawing Modified.
36. Drawing No. EL026, Sheet No. 656. Drawing Modified.
37. Drawing No. EL101, Sheet No. 658. Drawing Modified.
38. Drawing No. EL110, Sheet No. 663. Drawing Modified.
39. Drawing No. EL112, Sheet No. 665. Drawing Modified.
40. Drawing No. EL113, Sheet No. 666. Drawing Modified.
41. Drawing No. EL114, Sheet No. 667. Drawing Modified.
42. Drawing No. EL115, Sheet No. 668. Drawing Modified.
43. Drawing No. EL116, Sheet No. 669. Drawing Modified.

44. Drawing No. EL117, Sheet No. 670. Drawing Modified.
45. Drawing No. EL118, Sheet No. 671. Drawing Modified.
46. Drawing No. EL119, Sheet No. 672. Drawing Modified.
47. Drawing No. EL120, Sheet No. 673. Drawing Modified.
48. Drawing No. EL150, Sheet No. 676. Drawing Modified.
49. Drawing No. EL151, Sheet No. 677. Drawing Modified.
50. Drawing No. EL152, Sheet No. 678. Drawing Modified.
51. Drawing No. EL210, Sheet No. 690. Drawing Modified.
52. Drawing No. EL212, Sheet No. 692. Drawing Modified.
53. Drawing No. EL213, Sheet No. 693. Drawing Modified.
54. Drawing No. EL214, Sheet No. 694. Drawing Modified.
55. Drawing No. EL215, Sheet No. 695. Drawing Modified.
56. Drawing No. EL216, Sheet No. 696. Drawing Modified.
57. Drawing No. EL217, Sheet No. 697. Drawing Modified.
58. Drawing No. EL218, Sheet No. 698. Drawing Modified.
59. Drawing No. EL219, Sheet No. 699. Drawing Modified.
60. Drawing No. EL220, Sheet No. 700. Drawing Modified.
61. Drawing No. EL230, Sheet No. 702. Drawing Modified.
62. Drawing No. EL231, Sheet No. 703. Drawing Modified.
63. Drawing No. EL250, Sheet No. 707. Drawing Modified.
64. Drawing No. EL251, Sheet No. 708. Drawing Modified.
65. Drawing No. EL252, Sheet No. 709. Drawing Modified.
66. Drawing No. EL253, Sheet No. 710. Drawing Modified.
67. Drawing No. EL254, Sheet No. 711. Drawing Modified.
68. Drawing No. EL260, Sheet No. 712. Drawing Modified.
69. Drawing No. EL261, Sheet No. 713. Drawing Modified.
70. Drawing No. EL262, Sheet No. 714. Drawing Modified.
71. Drawing No. EL263, Sheet No. 715. Drawing Modified.
72. Drawing No. EL264, Sheet No. 716. Drawing Modified.

CHANGES TO NSC-009 ALSO PLANS (REF DWGS) (VOLUME 2)
(Modified or Added Drawings are attached here to)

1. Drawing No. GN005A. Drawing Modified.
2. Drawing No. GN006A. Drawing Modified.
3. NSC-010, Drawing No. AR202. Drawing Modified.
4. NSC-010, Drawing No. AR203. Drawing Modified.
5. NSC-010, Drawing No. AR204. Drawing Modified.
6. NSC-010, Drawing No. AR205. Drawing Modified.
7. NSC-010, Drawing No. AR206. Drawing Modified.
8. NSC-010, Drawing No. AR207. Drawing Modified.
9. NSC-010, Drawing No. AR208. Drawing Modified.
10. NSC-010, Drawing No. AR402. Drawing Modified.
11. NSC-010, Drawing No. AR711. Drawing Modified.
12. NSC-010, Drawing No. EL002. Drawing Modified.
13. NSC-010, Drawing No. EL006. Drawing Modified.
14. NSC-010, Drawing No. EL017. Drawing Modified.
15. NSC-011, Drawing No. NGN017. Drawing Added.
16. NSC-011, Drawing No. NGN018. Drawing Added.
17. NSC-011, Drawing No. NAR109. Drawing Modified.
18. NSC-011, Drawing No. NAR113. Drawing Modified.
19. NSC-011, Drawing No. NAR910. Drawing Modified.
20. NSC-011, Drawing No. NAR911. Drawing Modified.
21. NSC-012, Drawing No. EL001. Drawing Added.
22. NSC-012, Drawing No. EL012. Drawing Modified.
23. NSC-012, Drawing No. EL013. Drawing Modified.
24. NSC-012, Drawing No. EL014. Drawing Modified.
25. NSC-012, Drawing No. EL015. Drawing Modified.
26. CY-111, Drawing No. T1373, Sheet No. 668-2. Drawing Added.
27. CY-111, Drawing No. T1373, Sheet No. 668-76. Drawing Added.
28. CY-111, Drawing No. T1373, Sheet No. 668-W3. Drawing Added.

VOLUME 2 TECHNICAL PROVISIONS NSC-009 NSC TRAIN SYSTEMS (SYSTEM WIDE) CONTINUED

- 01781 Maintenance and Protection of Authority Traffic
- 01783 Temporary Facilities
- 01784 Temporary Pedestrian Accommodations, Fence and Barricade
- 01785 Construction Surveying
- 01787 Transfer of Temporary Facilities
- 01791 Remove, Store, and Re-erect Existing Components
- 01800 Erosion and Sedimentation Control
- 01810 Off-Duty Uniformed Police Officer
- 01815 Construction Dust Control
- 01840 Spare Parts and Test Equipment
- 01850 Construction Monitoring Program
- 01900 Train Clearance Testing
- 01910 Operations, Maintenance and Repair Data
- 01911 Operations, Maintenance and Information Database
- 01920 Cutting and Patching
- 01940 Cleaning
- 02020 Handling of Unforeseen Hazardous and Contaminated Building Materials
- 02220 Demolition
- 02316 Excavation
- 02320 Backfill
- 02340 Subgrade
- 02353 Geotextile
- 02450 General Track Construction
- 02452 Direct Fixation Track Construction
- 02453 Special Track Construction
- 02454 Rail Lubrication System
- 02456 Track Appurtenances and Other Track Material
- 02462 Direct Fixation Rail Fasteners
- 02464 Special Trackwork
- 02466 Steel Rail

PORt AUTHORITY OF ALLEGHENY COUNTY
 NORTH SHORE CONNECTOR
 NSC TRAIN SYSTEM (SYSTEM WIDE)
 CONTRACT NO. NSC-009

UNIT PRICE SCHEDULE		DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
00771.001	INSURANCE DEDUCTIBLE FUND ALLOWANCE	PDA		1	\$50,000.00	\$50,000.00
01100.001	PARTNERING	PDA		1	\$50,000.00	\$50,000.00
01755.001	MOBILIZATION	LS		1		
01777.001	SYSTEMS INTEGRATION TESTING	LS		1		
01780.001	PARKING LOT NO. 1 ACCESS FOR PNC PARK EVENTS (OVER 30,000 ATTENDANCE)	EA		48		
01780.002	PARKING LOT NO. 1 ACCESS FOR HEINZ FIELD EVENTS	EA		48		
01784.001	TEMPORARY PEDESTRIAN ACCOMMODATIONS	LS		1		
01791.008	RE-INSTALL PARKING LOT SPECIAL SIGNAGE	EA		1		
01791.013	PERMANENT RELOCATION OF EXISTING PARKING LOT BOOTHS	LS		1		
01800.001	EROSION AND SEDIMENTATION CONTROL	LS		1		
01810.001	CITY OF PITTSBURGH OFF-DUTY UNIFORMED POLICE OFFICER	PDA		1	\$50,000.00	\$50,000.00
01900.001	TRAIN CLEARANCE TESTING PROGRAM	LS		1		
02020.001	CONTAMINATED MATERIALS HANDLING	PDA		1	\$50,000.00	\$50,000.00
02220.001	DEMOLITION OF EXISTING GATEWAY STATION LOOP FACILITIES	LS		1		
02220.002	UNFORESEEN FACILITY DEMOLITION	PDA		1	\$50,000.00	\$50,000.00
02220.003	DEMOLITION OF TEMPORARY TUNNEL CLOSURE WALL	LS		1		
02316.001	CLASS 1 EXCAVATION	CY		945		
02320.002	AASHTO NO. 57 COURSE AGGREGATE	CY		50		
02452.001	DIRECT FIXATION TRACK, TYPE I	LF		7,324		
02452.002	DIRECT FIXATION TRACK, TYPE II	LF		191		
02452.003	DIRECT FIXATION TRACK, TYPE III	LF		995		
02452.004	DIRECT FIXATION TRACK, TYPE IV	LF		3,423		
02453.001	NO.4 SPECIAL CONSTRUCTION CROSSOVER AT ALLEGHENY	LS		1		

POR T AUTHORITY OF ALLEGHENY COUNTY
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
CONTRACT NO. NSC-009

UNIT PRICE SCHEDULE

BID ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE	
				LS	1
02453.002	NO.6 DOUBLE CROSSOVER AT WOOD STREET				
02453.003	NO.8 SPECIAL CONSTRUCTION DOUBLE CROSSOVER AT ALLEGHENY				
02454.001	GATEWAY STATION AREA RAIL LUBRICATION SYSTEM				
02454.002	NORTH SIDE STATION AREA RAIL LUBRICATION SYSTEM				
02456.001	INSULATED FIXED RAIL ANCHOR ASSEMBLIES				
02456.002	SPECIAL HYDRAULIC BUMPING POSTS				
02456.004	SLIDING BUMPING POST				
02581.001	DUQUENSE LIGHT COMPANY SWITCH PADS				
02627.009	6" PAVEMENT BASE DRAIN, MODIFIED				
02721.003	SUBBASE, 6" DEPTH (No.2A)				
02740.001	BITUMINOUS BINDER COURSE, ID-2, 2" DEPTH				
02740.002	BITUMINOUS WEARING COURSE, ID-2, 1-1/2" DEPTH, SR-L				
02740.005	BITUMINOUS CONCRETE BASE COURSE, 4" DEPTH				
02740.006	BITUMINOUS CONCRETE BASE COURSE, 2-1/2" DEPTH				
02740.007	MILLING OF BITUMINOUS PAVEMENT SURFACE, 1-1/2" DEPTH				
02741.001	BITUMINOUS TACK COAT				
02751.001	CONCRETE DRIVEWAY				
02761.002	EPOXY RESIN PAINT, 4" WHITE EDGE LINE				
02761.008	EPOXY RESIN PAINT, 6" BROKEN WHITE SKIP LINE				
02781.002	CITY OF PITTSBURGH CONCRETE CURB				
02785.002	REINFORCED CONCRETE SIDEWALK, 6" DEPTH				
02825.004	SECURITY FENCE, 10' HEIGHT				
02825.005	SECURITY GATE, 10' HEIGHT, 12' WIDTH				
02825.006	SECURITY GATE, 10' HEIGHT, 16' WIDTH				
02840.001	TYPE 2-S GUIDE RAIL				
02840.002	TERMINAL SECTION				

POR T AUTHORITY OF ALLEGHENY COUNTY
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
CONTRACT NO. NSC-009

UNIT PRICE SCHEDULE

BID ITEM	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
16205.002	ALLEGHENY CIRCUIT BREAKER ROOM	LS	1	1	
16220.001	TRACTION POWER SUBSTATION 27 KV AC SWITCHGEAR	LS	1	1	
16221.001	TRACTION POWER SUBSTATION 27 KV INTERRUPTOR SWITCHES	EA	2	2	
16230.001	TRACTION POWER SUBSTATION TRANSFORMER - RECTIFIER UNITS	EA	2	2	
16235.001	TRACTION POWER SUBSTATION AUXILIARY POWER SYSTEM	LS	1	1	
16240.001	TRACTION POWER SUBSTATION METAL-ENCLOSED DC SWITCHGEAR	LS	1	1	
16250.001	TRACTION POWER SUBSTATION DRAINAGE AND NEGATIVE RETURN SWITCHBOARD	LS	1	1	
16270.001	TRACTION POWER SUBSTATION 125 VDC BATTERY SYSTEM	LS	1	1	
16280.001	TRACTION POWER SUBSTATION ENCLOSURE	LS	1	1	
16295.001	TRACTION POWER SUBSTATION WIRE AND CABLE	LF	2,100		
16300.001	TRACTION POWER SUBSTATION BUSWAYS	LS	1	1	
16310.001	TRACTION POWER SUBSTATION LOCAL ANNUNCIATOR PANEL	LS	1	1	
16340.001	MEDIUM VOLTAGE METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR	EA	4	4	
16360.001	FIELD TESTING OF TRACTION POWER SUBSTATION TESTING	LS	1	1	
16360.002	ACCEPTANCE TESTING OF TRACTION POWER SUBSTATION TESTING	LS	1	1	
16430.001	LOW VOLTAGE CIRCUIT BREAKER SWITCHGEAR	EA	2	2	
16602.001	OCS POLE	EA	33	33	
16602.002	OCS PORTAL	EA	1	1	
16602.003	OCS CANTILEVER	EA	51	51	
16602.004	OCS WIRING	LF	14,202		
16602.005	BALANCE WEIGHT ANCHOR ASSEMBLY	EA	5	5	
16602.006	FIXED TERMINATION ASSEMBLY	EA	13	13	

- GG. System Integration Testing involving Authority personnel and equipment will not occur during Peak Revenue Service (Working Days: 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.) and Special Events as prescribed in Article Q of this Section.
- HH. Authority will be performing Pre-Revenue Operations at the completion of milestone work associated with System Integration Testing as described in Article 2.6.A.1.b).4) of this Section. Any additional work associated with the Project will be subject to Authority LRV testing traffic and restrictions associated with an active LRV system. Contractor's remaining work shall be closely coordinated with Authority Pre-Revenue Operations schedules. Coordination shall occur through the Engineer and will be in accordance with Section 01781, "Maintenance and Protection of Authority Traffic" and Section 00700, Article 13.14.
- II. Should situations arise with Authority's Operations which require Authority's immediate attention to maintain Operations, Authority reserves the rights to cancel Contractor's scheduled work within the existing system, OCC and/or Pitt Tower, in order to facilitate Authority requirements to support Operations.
- JJ. Authority has deleted the bored tunnel internal concrete arch lining and waterproofing work from the NSC-003/006 contract. The Contractor shall be required to mount NSC-009 facilities including, but not limited to: conduit, emergency walkways, standpipes, catenaries, and signals to the bored tunnel precast segmental rings. The precast segment reinforcing and geometry Shop Drawings have been included with Appendix C. The Contractor shall be allowed a 6 inch maximum embedment depth into the tunnel segment. All NSC-009 facility attachment locations shall be positioned a minimum distance from any/all tunnel segmental joint, grout holes, and bolt pockets. Offset distance shall be greater than or equal to the depth of embedment of the anchor. The tunnel segment concrete design strength is 8,000 psi minimum with actual strength values in the range of 12,000 psi, the tunnel segments have drilling location indicators to allow the Contractor to identify areas free of reinforcing steel (see Submittal 349.6 in Appendix C), and the Contractor shall be allowed to provide attachments to the segment longitudinal installation bolts; however, the bolts shall not be completely removed for any reason. Bolts may be loosened and retightened to facilitate attachments. The Contractor shall account for the bored tunnel segment requirements in its plan and execution of Work.
- KK. The Contractor shall submit installation and testing procedures for all concrete insert applications covering cut-and-cover, bored tunnel, and aerial structure applications. Procedures shall include the proposed tunnel/structure rebar location procedure, concrete repair procedures for damaged concrete as a result of the insert drilling activities, and pull-out testing procedures. The Contractor shall successfully install six (6) demonstration anchors for each application. The Contractor shall perform a non-destructive static tensile unconfined pull test (ASTM E488) on each of the six (6) demonstration anchors. The minimum pull-out strength required shall be a 1.5 factor above the anchor design load. The demonstration anchors may be in production locations if approved by the Engineer. Insert holes (test and production) must be relocated a minimum of 3 inches if rebar or other obstructions are encountered during the drilling process to meet the minimum edge distance for each hole. The abandoned hole shall be filled in accordance with the approved repair procedures. The field drilling procedure shall provide a positive stopping measure on all equipment to prevent any over-drilling and to demonstrate the proposed embedment depth is met.

2.2 Project Schedule

A. Preliminary Project Schedule

1. The Contractor shall develop and submit for review and approval by the Engineer a preliminary Project Schedule in bar chart format, within fifteen (15) days after receipt of the Notice of Award.
2. This preliminary Project Schedule shall show the Contractor's planned operations for the first ninety (90) days including dates for construction operations, submittals and acquiring permits. The Contractor shall also include a preliminary schedule logic narrative stating the general basis of schedule logic and the Contractor's general approach to the remainder of the Work.

B. Project Schedule

1. The Contractor shall submit for review and approval by the Engineer a Project Schedule and a logic narrative, for the entire duration of the Work, within thirty (30) days after receipt of the Notice to Proceed. The approved preliminary Project Schedule shall be incorporated into the Project Schedule in its entirety.
2. The Project Schedule, and any updates thereto, shall show a logical and coordinated sequence of construction activities. The Project Schedule shall incorporate and identify the following:
 - a) Required completion dates and intermediate required completion dates;
 - b) Logic ties coordinating the Work with the work of others, including, but not limited to, other contractors, utilities, railroads, Subcontractors, and Suppliers;
 - c) Construction restrictions;
 - d) Sequence of construction;
 - e) Access constraints, including securing of permits;
 - f) Critical activities necessary to complete the Contract by the Time of Completion;
 - g) If the Project Schedule indicates a projected completion date before the Time of Completion the Contractor shall identify the time between those two dates as Project Float. Any Project Float will be available for use by both Authority and the Contractor.
 - h) Potential for, and actual occurrence of, impacts due to seasonal weather conditions and the influence of high or low ambient temperatures on the completion of the Work;
 - i) Pre-Final and Final Inspections, punch list activities for each inspection, and contractual administrative demobilization work; and
 - j) Procurement of special or long lead materials, equipment or services;
 - k) Any other requirements of the Contract Documents.
3. The Contractor shall also submit, with the Project Schedule, a complete and detailed listing of submittals that it anticipates will be required during the course of the Contract. The listing shall identify the subject matter of each submittal, the anticipated submittal date and required approval date for the identified submittals. Submittals that may affect the critical path of the Project Schedule shall be designated as critical submittals.
4. The Contractor shall submit the Project Schedule and any updates thereto to the Engineer for approval with a written certification stating that the Project Schedule is in accordance with the Contract Documents. The Project Schedule and any updates shall be submitted on sheets not larger than twenty-two inches (22") by thirty-four inches (34").
5. The Engineer will review the Project Schedule and any updates and establish a meeting with the Contractor to review its contents. The Engineer may schedule the timing of such meetings to coincide with actual submittals by the Contractor and/or following the submittals at the discretion of the Engineer. If a review of the Project Schedule indicates a work plan which will not complete the Work or portions of the Work within the Time of Completion requirements as identified in the Contract Documents, or if the logic ties, sequence of work, or planned activities are determined to be inappropriate, the Contractor shall revise the Project Schedule and resubmit it until it is acceptable.
6. If, as part of the Engineer's review of the Contractor's Project Schedule submission, the Engineer identifies any noncompliance with the

TABLE 01300-1
NSC-009 TRAIN SYSTEMS (SYSTEM WIDE)
SUMMARY OF SUBMITTALS

REFERENCED ITEM	SUBMITTAL REQUIREMENTS												
	1 PRODUCT DATA	2 CALCULATIONS / SURVEYS	3 WORKING DRAWINGS / PROCEDURES	4 SHOP DRAWINGS	5 CERTIFICATIONS	6 SAMPLES	7 WARRANTY	8 TECHNICAL DATA	9 TESTING	10 PERMITS	11 TRAINING	12 SCHEDULE	13 OPERATIONS, MAINTENANCE AND REPAIR DATA
01910 Operations Maintenance and Repair Data		X	X						X		X	X	X
01911 Operations Maintenance and Information Database				X				X					X
01920 Cutting and Patching				X									X
02020 Handling of Unforeseen Hazardous and Contaminated Building Materials				X	X					X	X		X
02220 Demolition				X						X			X
02316 Excavation				X					X		X		X
02320 Backfill													
02340 Subgrade													
02353 Geotextiles													
02450 General Track Construction				X				X					X
02452 Direct Fixation Track Construction				X				X					
02453 Special Trackwork Construction													
02454 Rail Lubrication System				X				X					X
02456 Track Appurtenances and Other Track Material								X		X			
02462 Direct Fixation Rail Fasteners								X		X			X
02464 Special Trackwork								X		X			X
02466 Steel Rail								X		X			X
02468 Rail Welding								X		X			X
02471 Track-to-Earth Resistance Testing								X					X
02581 Duquesne Light Company Switch Pads													
02627 Pipe Underdrain, Pavement Base Drain and Subsurface Drain Outlets				X									
02721 Subbase								X					X
02740 Bituminous Pavement and Sidewalk								X					
02741 Bituminous Track Coat								X					X
02751 Driveways													
02761 Painting Traffic Lines and Markings				X				X		X			X
02781 Concrete Curb								X		X			X
02785 Concrete Sidewalk and Stairs								X		X			X
02825 Security Fence								X		X			X
02840 Guide Rail								X		X			
02843 Bollards								X		X			

North Shore Connector

North Shore Connector, North Side Tunnels & Station Shell (NSC-003/006), Gateway Station Shell (NSC-004 R), Aerial Structure, Retained Fill, and Demolition of Miller Printing (NSC-007), and Advanced Rail Systems Procurement – Gateway Double Crossover (Contract No. 3002) Construction Update, as of August 20, 2008

Contract NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 are currently under construction and will interface with the NSC-009 Work. As a result of the NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 construction activities, changes to the NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 Contract Documents have occurred. Known changes include, but are not limited to, utility installations, temporary facility design and installation, cut and cover and bored tunnel design and construction, maintenance and protection of traffic and detour installation and phasing, and Double Crossover Shop Drawings and submittals. The Contractor shall coordinate with the NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 contractors and the Engineer to obtain current information before Contractor begins work which could be affected by the NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 construction activities.

Table C-1 provides a list of North Shore Connector, North Side Tunnels & Station Shell (NSC-003/006), Gateway Station Shell (NSC-004 R), Aerial Structure, Retained Fill, and Demolition of Miller Printing (NSC-007), and Advanced Rail Systems Procurement – Gateway Double Crossover (Contract No. 3002) Construction Submittals. Submittals and/or portions of Submittals reflecting NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 contractor design elements having impact on the NSC-009 Bid are bold and attached as part of Appendix C. Further information on the progress of the NSC-003/006, NSC-004 R, NSC-007, and Contract No. 3002 construction is contained in Table C-1 and available for purchase in accordance with Section 00200, Article 2.6.

Table C-1

Submittal Number	Description	Contract
S-001	Early Procurement Contract IJ Location Drawings	Contract No. 3002
S-040.1	Precast Concrete Segmental Tunnel Lining – Shop Drawings	NSC-003/006
S 349.6	Precast Segment Reinforce Steel Erection Drawing	NSC-003/006
S467	Precast Segment Concrete Repair Procedures	NSC-003/006

North Shore Constructors - Obayashi Trumbull JV
 503 Martindale St,
 DL Clark Building, 2nd Floor
 Pittsburgh, PA 15212
 Ph 412-462-9300 Fax 412-462-3002
 Submittal No. 834-00-NSC-003/006-03410-1.04.A

RECEIVED

OCT 12 2007

TRANSMITTAL MEMORANDUM

To: Trigold
Three Gateway Center, Suite 2W
Pittsburgh, PA 15222

Date: 10/11/2007
FTA Project PA-03-0315
Contract Name N. Side Tunnels & Station Shell

Attn: Dwight Chewning

Contract # NSC-003/006

We are forwarding the following:

Attached

Under Separate Cover

DRAWING NUMBER OR DOCUMENT	NO. COPIES	TITLE OR DESCRIPTION	COMMENTS																		
Spec. 03410	5	Precast Segment Concrete Repair Procedures	<table border="1"> <tr> <td>A</td> <td>APPROVED AS SUBMITTED</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>B</td> <td>APPROVED AS NOTED</td> <td><input type="checkbox"/></td> </tr> <tr> <td>C</td> <td>REVISE AND RESUBMIT</td> <td><input type="checkbox"/></td> </tr> <tr> <td>D</td> <td>REJECTED</td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="2">THIS REVIEW IS FOR GENERAL CONFORMANCE WITH THE CONTRACT, INCLUDING DEVIATIONS FROM PLANS OR SPECIFICATIONS NOT CLEARLY NOTED BY THE CONTRACTOR. IT IS NOT AN OPEN REVIEW.</td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="2">REVIEW SHALL NOT COMMUNICATE A COMPLETE CHECK OR DETAILED OR INCONSISTENCIES OR COMMENTS. IT SHALL BE LEFT TO THE CONTRACTOR TO DETERMINE THE CONTRACTOR'S CONCEPTUAL RESPONSIBILITY FOR ANY ERROR OR DEVIATION FROM CONTRACT REQUIREMENTS.</td> <td><input type="checkbox"/></td> </tr> </table>	A	APPROVED AS SUBMITTED	<input checked="" type="checkbox"/>	B	APPROVED AS NOTED	<input type="checkbox"/>	C	REVISE AND RESUBMIT	<input type="checkbox"/>	D	REJECTED	<input type="checkbox"/>	THIS REVIEW IS FOR GENERAL CONFORMANCE WITH THE CONTRACT, INCLUDING DEVIATIONS FROM PLANS OR SPECIFICATIONS NOT CLEARLY NOTED BY THE CONTRACTOR. IT IS NOT AN OPEN REVIEW.		<input type="checkbox"/>	REVIEW SHALL NOT COMMUNICATE A COMPLETE CHECK OR DETAILED OR INCONSISTENCIES OR COMMENTS. IT SHALL BE LEFT TO THE CONTRACTOR TO DETERMINE THE CONTRACTOR'S CONCEPTUAL RESPONSIBILITY FOR ANY ERROR OR DEVIATION FROM CONTRACT REQUIREMENTS.		<input type="checkbox"/>
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B	APPROVED AS NOTED	<input type="checkbox"/>																			
C	REVISE AND RESUBMIT	<input type="checkbox"/>																			
D	REJECTED	<input type="checkbox"/>																			
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THESE ARE TRANSMITTED AS INDICATED:

- | | | | |
|--|--|--|--|
| <input type="checkbox"/> As Requested | <input type="checkbox"/> Approved as Submitted | <input type="checkbox"/> Certified Mail | <input type="checkbox"/> Air Express |
| <input type="checkbox"/> For Your Information | <input type="checkbox"/> Approved as Noted | <input type="checkbox"/> Priority Mail | <input type="checkbox"/> United Parcel |
| <input checked="" type="checkbox"/> For Review and Comment | <input type="checkbox"/> Revise and Resubmit | <input type="checkbox"/> Mail | <input type="checkbox"/> FAX |
| <input type="checkbox"/> Comments Noted | <input type="checkbox"/> Reject and Resubmit | <input checked="" type="checkbox"/> Hand Carried | <input type="checkbox"/> Messenger |

NOTES:

5467

CC: 390100 Jobfile, Jobsite

In Accordance with the Contract Requirements, G.C. 01300, Article 1.6,
 I hereby Certify the Submitted Drawings & Data have been verified
 To Comply with Contract No. NSC-003/005

Certified By Shane J. H. Date 10-11-07

North Shore Constructors

BY: Dwight Chewning
FCA 100 N

TECHNOPREF INDUSTRIES INC.
A.C. MILLER CONCRETE PRODUCTS INC.

A	APPROVED AS SUBMITTED	<input checked="" type="checkbox"/>
B	APPROVED AS NOTED Segment Concrete Repair Procedures Submittal	<input type="checkbox"/>
C	REVISE AND RESUBMIT	<input type="checkbox"/>
D	REJECTED	<input type="checkbox"/>

THIS REVIEW IS FOR GENERAL CONFORMANCE WITH THE CONTRACT ONLY. ANY DEVIATION FROM PLANS OR SPECIFICATIONS NOT CLEARLY NOTED BY THE CONTRACTOR HAS NOT BEEN REVIEWED. REVIEW SHALL NOT CONSTITUTE A COMPLETE CHECK OF DETAILED DIMENSIONS OR COUNTS NOR SHALL IT SERVE TO RELIEVE THE CONTRACTOR OF CONCEPTUAL RESPONSIBILITY FOR ANY ERROR OR DEVIATION FROM CONTRACT REQUIREMENTS.

PRECAST TUNNEL LINERS
BY: *J. Miller* DATE: *11/16/08*
SHOP DRAWING REFERENCE NO. _____

SEGMENT CONCRETE REPAIR PROCEDURES SUBMITTAL

Project Port Authority of Allegheny County
North Shore Connector
North Side Tunnels and Station Shell
Contract No. NSC-003/006

Allegheny River Tunnel
Launch Pit to Receiving Pit
(NSC-003)

Owner Port Authority of Allegheny County

Prime Contractor North Shore Constructors
Obayashi Trumbull JV

Tunnel Liner Supplier Technopref Industries, Inc.

Date October 10, 2007

FOREWORD	03
I. Introduction.....	04
II. Evaluation of Product Damage or Defects.....	04
III. Proper Repair Procedures.....	05
APPENDIX A – SUMMARIZED PENNDOT REPAIR PROCEDURES FOR PRECAST CONCRETE.....	07

FOR E W O R D

The following document – Segment Concrete Repair Procedures Submittal – is a document explaining the repair procedures that are to be used to repair damage to segments – of the minor cosmetic type, and of the non-cosmetic type. This submittal responds to the requirements of the Contract Documents; Section 03410 PRECAST CONCRETE SEGMENTAL TUNNEL LINING – Article 3 – EXECUTION, 3.04 Adjustments and Repair Procedures.

Technopref Industries Inc. has teamed up with A.C. Miller Concrete Products Inc. of Blairsville, Pennsylvania to supply the precast segmental rings required for the North Shore Connector Tunnels. Both companies have a well established reputation in the precast industry. A.C. Miller's Blairsville plant is NPCA certified, and Technopref has successfully completed several tunnel liner projects.

We have chosen to provide repair procedures that are based on A.C. Miller's existing patch and repair procedures. A.C. Miller's patch and repair procedures are designed to match PennDOT intentions and requirements. As mentioned before in earlier submittals, this is a Port Authority job, but there is much reference to the PennDOT specs (we have assumed that the PennDOT people may have a role in this project).

From what can be determined through the review of the Contract Document Specifications, the principal reference standards are PennDOT 408, PennDOT publication 35 (Bulletin 15), PennDOT publication 34 (Bulletin 14), PennDOT Publication 19 (PTM) ASTM, AASHTO, and ACI, NPCA, NCHRP 350.

Damage to segments that is judged worth repairing will be determined by the guidelines listed in this document. With the guidelines, experienced personnel will make a judgment call about the procedures to use – and if any are worth implementing at all.

The typical repairable damage to be expected may come from 1) the demoulding (stripping) process; damage in the form of chipping and spalling, 2) hole forming inserts accidentally left in during demoulding; resulting in spalls, 3) the handling operations; bumping product resulting in chipping (the nature of a dynamic collision, depending on the force and angle of impact, may cause automatic rejection of the segment; a judgment call by inspection personnel will be made case by case). Cracked segments (relatively large cracking resulting from excessive stressing – such as from a dynamic collision) are simply not considered for repair and will be rejected. Segments that are cracked and have their structural integrity at risk will not be repaired even if a reliable repair method exists; they will be rejected, and new segments will be re-cast to replace them. With the casting procedure used, applying high frequency vibration to the fresh concrete through the mould intrados - there should be no presence of honeycombing on the segments.

All damage and repairs will be documented as per the Quality Control Plan (QCP).

For the repair of segments, color matching of repairs will not be a priority. Emphasis will be on choosing the proper repair material which will have desired characteristics in relation to application, workability, bond, strength, etc.

I. INTRODUCTION

Any repair work to precast concrete products must not compromise the ability of the product to meet the specifications for which it was designed. All work shall be as aesthetically pleasing as is practical for that type of structure.

All structures will be evaluated by management to determine if the product is repairable and what type of repair is needed.

It is the responsibility of all employees to alert their supervisor(s) of any product damage or defects that they have encountered.

Any problems should be noted during the stripping inspection and the pre-shipment inspection by the production manager, assistant production manager or other designated supervisor. The Quality Control Plan (QCP) provides procedures for documenting product repairs.

Management or the production lead personnel, after being notified, shall then take appropriate steps according to the following procedure.

In-plant inspector will review all repairs performed and document repairs as specified in the Quality Control Plan (QCP).

Only materials listed on the appropriate PennDOT approved materials list will be used to perform product repairs.

II. EVALUATION OF PRODUCT DEFECTS OR DAMAGES

- A. Determine the extent of the defect or damage;
 1. Will it affect the structural integrity?
 2. If defect or damage is deemed repairable, what type of repair will be needed?
 - a. If repair falls within the scope of the following procedures, complete repair in accordance with this patch and repair procedure.
 - b. If repair is not covered in the following patch and repair procedures, management will develop an appropriate repair procedure that insures the serviceability and durability of the product for its intended use. This special procedure will be submitted to the Owner for approval.
 - c. If a suitable repair that insures serviceability and durability cannot be developed, the product will be rejected for the intended use and will be remanufactured.
- B. Specify the type of repair needed;
 1. Longitudinal haunch crack repair
 2. Simple cosmetic repair
 3. Honeycomb repair
 4. Chipping and breakage repair
 5. Hole or cavity repairs
- C. Cracks less than 0.10mm (0.004") that do not penetrate through the wall, do not require patch or repair.

III. PROPER REPAIR PROCEDURES

- A. Longitudinal haunch cracks, crazing cracks, and other crack repairs;
 - 1. If crack is 0.10mm (0.004") to 0.18mm (0.007") at widest point, seal with an approved compound such as Masterseal GP.
 - 2. Epoxy injection repair will be used on cracks greater than 0.18mm (0.007") at the widest point.
 - 3. The crack will be injected with Hilti EP-IS650 or other approved low viscosity epoxy bonding compounds.
 - 4. Cracks will be prepared and sealed prior to injection of epoxy material.
 - 5. An adequate number of injection ports will be used to insure that 100 percent of crack void is filled.
 - 6. Eight (8) hour minimum curing period prior to moving the piece.
 - 7. All excess epoxy will be removed.
 - 8. A bonding agent will be applied to repaired areas and covered with patch material according to simple cosmetic repair procedure described in III-B.
- B. Simple cosmetic repairs;
 - 1. Superficial cracks will be sealed with an approved sealing compound such as Masterseal GP.
 - 2. Remove any loose material from area to be patched.
 - 3. Ensure repair area is clean and free from foreign materials.
 - 4. Select patch material to be used. Ensure that the patch material is PennDOT Bulletin 15 approved.
 - 5. Mix material according to manufacturer's instructions (water and/or mixing liquid as required).
 - 6. Apply material to area requiring repairs. (Install temporary form strip if needed.)
 - 7. Finish patched area to duplicate original appearance as close as possible.
 - 8. Allow adequate set time before moving. (See manufacturer's instructions.)
- C. Honeycomb repairs;
 - 1. Honeycomb repair must fall within the limits allowed in PennDOT's Repair Procedure for Precast Concrete (Appendix A).
 - 2. If within limits, follow relevant procedure (Appendix A).
 - 3. If honeycombing exceeds allowed limits, the product shall be rejected.
- D. Chipping or small breakage repairs;
 - 1. Follow section III-B, steps 1-8 above. Use an approved epoxy product containing a bonding agent for PennDOT products.
- E. Hole or cavity repairs;
 - 1. Remove all loose material from hole or cavity.
 - 2. Chip away any porous material.
 - 3. Install reinforcing for patch material if needed.
 - 4. Install temporary form if needed.
 - 5. Select patch material to be used. Ensure that the patch material is a PennDOT Bulletin 15 approved epoxy product.
 - 6. Mix material according to manufacturer's instruction. (Water and/or mixing liquid will be proportioned with patch material.)
 - 7. Fill void completely with material.
 - 8. Finish patched area to duplicate original appearance as close as possible.
 - 9. Allow adequate set time before moving. (See manufacturer's instructions.)

- F. Where excess concrete removal is necessitated by function, the following procedure will apply;
1. Determine the amount of excess concrete to be removed.
 2. Mark lines on concrete to proper dimension.
 3. Remove excess concrete by chipping, cutting or grinding.
 4. Apply an approved sealer such as Masterseal GP over the repaired area.

APPENDIX A

SUMMARIZED PENNDOT REPAIR PROCEDURES FOR PRECAST CONCRETE

(This appendix contains various references to PennDOT specifications)

APPENDIX A - SUMMARIZED PENNDOT REPAIR PROCEDURES FOR PRECAST CONCRETE

DEFINITIONS:

Defects:

Structural Defect

Broken corners, large spalls, reinforcement may be exposed. Depth range: greater than 50m to 150mm (2 to 6 in.) Surface area: less than 0.097m² (150 in.²).

Cosmetic Defect

Chips and/or surface defects and fractures and spalls that do not expose reinforcement. Depth range of chips/defects: up to 50mm (2 in.); surface area less than 0.065m² (100 in.²). Very small surface voids caused by entrapped air voids at formed surfaces (bug holes) are normally considered a cosmetic defect that does not require repair. Bug holes over 10mm (1/2 in.) in diameter or clusters of bug holes covering an area larger than 0.065m² (100 in.²) are required to be repaired.

Surfaces:

Exposed Surface

Any surface above normal water or grade level (when applicable), and/or a surface that is not concealed by other construction. An internal surface of a precast product is not considered an exposed surface.

Non-Exposed Surface

Any surface below normal water or grade level (when applicable), and/or a surface that will be concealed by other construction. An internal surface of a precast product is considered a non-exposed surface.

Surface Finishes:

Architectural Finish

An architectural finish represents a finish with a specified standard of uniform appearance, surface details, color and texture. Approved samples shall establish the range of acceptability with respect to color and texture variations, surface defects and overall appearance. Such samples shall be viewed at a distance consistent with the normal viewing distance of the structure, but not less than 9000mm (30 feet.)

Conventional Finish

Precast concrete surfaces may have slight irregularities that are the result of form conditions and form joints. These irregularities may include fins or protrusions less than 5mm (3/16 in.), or surface voids as described above. These defects typically do not require repairs.

Special Finish

A special finish is selected for specific projects and is to be specified as such on a project by project basis. Such a finish consists of a specified application on the exposed and/or non-exposed surfaces of a precast product. These applications can include, but are not limited to, epoxy coatings, bituminous coatings and requirements for patching extremely small holes.

REPAIR PROCEDURES:

Section 1 – For Structural Repairs of Exposed Surfaces with Conventional Finishes

- Areas to be repaired must be clean, sound and free of contaminants.
- Make a 20mm (3/4 in.) deep vertical surface along the perimeter of the damaged area.
- Remove concrete for a minimum of 25mm (1 in.) behind all exposed reinforcement where at least 50mm (2 in.) of continually exposed reinforcement is visible.
- Provide an aggregate fractured surface with a minimum surface profile of 3mm (1/8 in.).
- Drill and insert 9mm (3/8 in.) diameter steel expansion anchor pins on 100mm (4 in.) centers for damaged areas with depths greater than 75mm (3 in.) when rebar is not prevalent.
- Clean the repair surface.
- If using a PennDOT Bulletin 15 repair material, apply an approved bonding agent unless the manufacturer's instructions expressly state that a bonding agent is not required. If using the approved mix design, first apply a mortar scrub coat to the repair area, filling all voids.
- Fill the area with either a thoroughly mixed PennDOT Bulletin 15 material in accordance with manufacturer's recommendations, or with the approved concrete mix design.
- Cure the repaired area either in accordance with the PennDOT Bulletin 15 manufacturer's recommendations, or, in accordance with the approved quality control plan for a minimum of 24 hours.
- Evaluate the repaired area by applying a moderate blow with a 0.45 kg (16 ounce) hammer at several locations within the repaired area.
- The repaired area should closely match both the color and texture of the undamaged adjacent concrete surfaces.

Section 2 -- For Structural Repairs of Non-Exposed Surfaces with Conventional Finishes

- Areas to be repaired must be clean, sound and free of contaminants.
- Make a 20mm (3/4 in.) deep vertical surface along the perimeter of the damaged area, where applicable (where patch will feather to nothing.)
- Remove concrete for a minimum of 25mm (1 in.) behind all exposed reinforcement where at least 50mm of continually exposed reinforcement is visible.
- Provide an aggregate fractured surface with a minimum surface profile of 3mm (1/8 in.).
- Drill and insert 9mm (3/8 in.) diameter steel expansion anchor pins on 100mm (4 in.) centers for damaged areas with depths greater than 75mm (3 in.) when rebar is not prevalent.
- Clean the repair surface.
- If using a PennDOT Bulletin 15 repair material, apply an approved bonding agent unless the manufacturer's instructions expressly state that a bonding agent is not required. If using the approved mix design, first apply a mortar scrub coat to the repair area, filling all voids.
- Fill the area with either a thoroughly mixed PennDOT Bulletin 15 material in accordance with manufacturer's recommendations, or with the approved concrete mix design.
- Cure the repaired area either in accordance with the PennDOT Bulletin 15 manufacturer's recommendations, or, in accordance with the approved quality control plan for a minimum of 24 hours.
- Evaluate the repaired area by applying a moderate blow with a 0.45 kg (16 ounce) hammer at several locations of the repaired area.

Section 3 – For Cosmetic Repairs of Exposed Surfaces with Conventional Finishes

- Areas to be repaired must be clean, sound and free of contaminants.
- If the depth exceeds 25mm (1 in.), make a 20mm (3/4 in.) deep vertical surface along the perimeter of the damaged area.
- Provide an aggregate fractured surface with a minimum surface profile of 3mm (1/8 in.).

- Saturate the repair surface with clean water to provide a SSD condition when applicable.
- Fill the area with either a thoroughly mixed PennDOT Bulletin 15 repair material in accordance with manufacturer's recommendations, the approved concrete mix design, or if less than 25mm (1 in.) in depth, a mortar mix.
- Cure the repaired area either in accordance with the PennDOT Bulletin 15 manufacturer's recommendations, or, in accordance with the approved quality control plan for the approved mix design for a minimum of 24 hours.
- If the depth exceeds 25mm (1 in.), evaluate the repaired area by applying a moderate blow with a 0.45 kg (16 ounce) hammer at several locations of the repaired area.
- The repaired area should closely match both the color and texture of the undamaged adjacent concrete surfaces.

Section 4 – For Cosmetic Repairs of Non-Exposed Surfaces with Conventional Finishes

- Areas to be repaired must be clean, sound and free of contaminants.
- If the depth exceeds 25mm (1 in.), make a 20mm (3/4 in.) deep vertical surface along the perimeter of the damaged area.
- Provide an aggregate fractured surface with a minimum surface profile of 3mm (1/8 in.).
- Saturate the repair surface with clean water to provide a SSD condition when applicable.
- Fill the area with either a thoroughly mixed PennDOT Bulletin 15 repair material in accordance with manufacturer's recommendations, the approved concrete mix design, or if less than 25mm (1 in.) in depth, a mortar mix.
- If the depth exceeds 25mm (1 in.), evaluate the repaired area by applying a moderate blow with a 0.45 kg (16 ounce) hammer at several locations of the repaired area.

Section 5 – For Structural Repairs of Exposed Surfaces with Architectural Finishes

- Areas to be repaired must be clean, sound and free of contaminants.
- Make a 20mm (3/4 in.) deep vertical surface along the perimeter of the damaged area, where applicable.
- Remove concrete for a minimum of 25mm (1 in.) behind all exposed reinforcement where at least 50mm of continually exposed reinforcement is visible.
- Provide an aggregate fractured surface with a minimum surface profile of 3mm (1/8 in.).
- Drill and insert 9mm (3/8 in.) diameter steel expansion anchor pins on 100mm (4 in.) centers for damaged areas with depths greater than 75mm (3 in.) when rebar is not prevalent.
- Clean the repair surface
- If using a PennDOT Bulletin 15 repair material, apply an approved bonding agent unless the manufacturer's instructions expressly state that a bonding agent is not required. If using the approved mix design, first apply a mortar scrub coat to the repair area, filling all voids.
- Fill the area with either a thoroughly mixed PennDOT Bulletin 15 material in accordance with manufacturer's recommendations, or with the approved concrete mix design.
- Cure the repaired area either in accordance with the PennDOT Bulletin 15 manufacturer's recommendations, or, in accordance with the approved quality control plan for a minimum of 24 hours.
- Evaluate the repaired area by applying moderate blow with a 0.45 kg (16 ounce) hammer at several locations of the repaired area.
- Apply a finish coat to the repaired area to match the approved architectural finish. **Note:** A repair mix is typically developed through a trial and error process in order to match color and texture of the concrete surface. Slight variations can be expected due to the difference in age and curing conditions for the repair.

Section 6 – For Cosmetic Repairs of Exposed Surfaces with Architectural Finishes

- Areas to be repaired must be clean, sound and free of contaminants.
- If the depth exceeds 25mm (1 in.), make a 20mm (3/4 in.) deep vertical surface along the perimeter of the damaged area, where applicable (where patch will feather to nothing.)
- Provide an aggregate fractured surface with a minimum surface profile of 3mm (1/8 in.)
- Saturate the repair surface with clean water to provide a SSD condition when applicable.
- Fill the area with either a thoroughly mixed PennDOT Bulletin 15 repair material in accordance with manufacturer's recommendations, the approved concrete mix design, or if less than 25mm (1 in.) in depth, a mortar mix.
- Cure the repaired area either in accordance with the PennDOT Bulletin 15 manufacturer's recommendations, or, in accordance with the approved quality control plan for a minimum of 24 hours.
- If the depth exceeds 25mm (1 in.), evaluate the repaired area by applying a moderate blow with a 0.45 kg (16 ounce) hammer at several locations of the repaired area.
- Apply a finish coat to the repaired area to match the approved architectural finish. Note: A repair mix is typically developed through a trial and error process in order to match color and texture of the concrete surface. Slight variations can be expected due to the difference in age and curing conditions for the repair.

General Notes:

- Patching operations, as well as the curing cycle, shall be a temperature of at least 4°C (40° F.)
- Repairs to bearing areas must be submitted to the Owner for review and approval.
- The damaged area may not exceed a length of 600mm (24") in any direction.
- Repairs to exposed surfaces will be limited to 5% of the total exposed surface area of each face.
- PennDOT Bulletin 15 approved materials must be listed in the following sections:

Concrete Repair Materials:

1. Section 679.2(e) "Rapid Hardening Concrete Patching Materials"
2. Miscellaneous "Polymer Modified and Special Cements, Mortars and Concrete"

Bonding Agents:

1. Section 1001.2(i) "Epoxy Resin Bonding Systems", Type II Grade II only
2. Miscellaneous "Concrete Bonding Agents"

END

VOLUME 2 TECHNICAL PROVISIONS NSC-009 NSC TRAIN SYSTEMS (SYSTEM WIDE) CONTINUED

- 01781 Maintenance and Protection of Authority Traffic
- 01783 Temporary Facilities
- 01784 Temporary Pedestrian Accommodations, Fence and Barricade
- 01785 Construction Surveying
- 01787 Transfer of Temporary Facilities
- 01791 Remove, Store, and Re-erect Existing Components
- 01800 Erosion and Sedimentation Control
- 01810 Off-Duty Uniformed Police Officer
- 01815 Construction Dust Control
- 01840 Spare Parts and Test Equipment
- 01850 Construction Monitoring Program
- 01900 Train Clearance Testing
- 01910 Operations, Maintenance and Repair Data
- 01911 Operations, Maintenance and Information Database
- 01920 Cutting and Patching
- 01940 Cleaning
- 02020 Handling of Unforeseen Hazardous and Contaminated Building Materials
- 02220 Demolition
- 02316 Excavation
- 02320 Backfill
- 02340 Subgrade
- 02353 Geotextile
- 02450 General Track Construction
- 02452 Direct Fixation Track Construction
- 02453 Special Track Construction
- 02454 Rail Lubrication System
- 02456 Track Appurtenances and Other Track Material
- 02462 Direct Fixation Rail Fasteners
- 02464 Special Trackwork
- 02466 Steel Rail

DIVISION 2 – SITEWORK

- 02020 Handling of Unforeseen Hazardous and Contaminated Building Materials
- 02220 Demolition
- 02316 Excavation
- 02320 Backfill
- 02340 Subgrade
- 02353 Geotextile
- 02450 General Track Construction
- 02452 Direct Fixation Track Construction
- 02453 Special Track Construction
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- 02825 Security Fence
- 02840 Guide Rail
- 02843 Bollards
- 02891 Traffic Signing

- D. The existing tunnel ventilation systems in rooms 103, 122 and 123 are to remain operational throughout all stages of demolition and construction. This includes, but is not limited to, the following equipment:
1. Axial ventilation fans (GW-EM-9, GW-EM-10) (Room 122)
 2. Dampers (GW-ED-9, GW-BD-9) (Room 122)
 3. Motor Control Center (RM123)

2.11 TUNNEL MECHANICAL DRAINAGE SYSTEMS

- A. The existing tunnel mechanical drainage (sump pump) systems to be removed and disposed or salvaged include, but are not limited to:
1. Tunnel drainage pump (no designator)
 2. Sump Pump No. 1 (no designator)
 3. Sump Pump No. 2 (no designator)
 4. Related equipment including, but not limited to, stainless steel grates (intake strainers), pipework, valves, instruments, cables and any other equipment associated with each tunnel mechanical drainage system.

- B. The existing sump pumps are located in room Room 101.

2.12 WAYSIDE APPLICATOR

- A. There is a wayside (rail greaser) applicator located at Sta. 1003+00 approximately.
- B. The wayside applicator is manufactured by Protec Rail Products, Inc., Protector Series

2.13 EMERGENCY GENERATOR

- A. There is a gas powered emergency generator located in Room 110. The emergency generator is a Kohler 70RZ72, 70 kva, 480 V, 3 phase, 4 W, natural gas, complete with battery rack, charger, control's and associated equipment. Fuel consumption is 10 gal/hr. Original generator was supplied by Palco Generators (724) 424-3900.
- B. Emergency generator room also houses emergency power panel ELP1 and EPP, automatic transfer switch, lighting panel LPI, electrical distribution panel PP-3, 30 kva stepdown transformer, fire alarm PB13 and flashing unit, generator exhaust and silencer, gas service line and gas meter.
- C. [NOT USED]

2.14 SUSPENDED CEILING

- A. Gateway Station has a suspended ceiling consisting of perforated metal baffles (4'-0" X 4'-0") which are connected together and to the station ceiling with $\frac{1}{4}$ " flathead cap screw connections.

- B. Erect and maintain dustproof partitions and temporary enclosures where required to limit dust and dirt migration and to separate occupied portions of the buildings from fumes and noise in accordance with Section 01815, "Construction Dust Control".

3.04 POLLUTION CONTROLS

- A. Limit the spread of dust and dirt. Do not use water when it may damage existing construction or create hazardous or objectionable conditions.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas and prevent infiltration of such debris into tunnel drainage systems.
- C. Hazardous and Contaminated materials, if discovered, shall be handled and disposed in accordance with Section 02020 "Handling of Unforeseen Hazardous and Contaminated Building Materials."

3.05 DEMOLITION/DECOMMISSIONING - GENERAL

- A. The work includes, but is not limited to, the demolition, decommission, removal and/or salvage, relocation and termination of the existing tunnel facilities including, but not limited to, the following:
 1. Overhead Catenary System; NSC-009 to decommission and cut system wires; NSC-004 R to remove and dispose;
 2. Emergency Blue Lights Emergency Telephones; PAAC to relocate or remove;
 3. Dry Standpipes, valves, and fixtures; Remove and dispose, salvage expansion joints by NSC-009;
 4. 4' Fire line, 1" water line, 3" drainage line under the Gateway Station high platform; NSC-009 to remove 4" and 1"; 3" to remain;
 5. Tunnel Drainage Fiberglass inlet grates; Salvage by NSC-009;
 6. Fire extinguishers for Tunnel and Station; Salvage by NSC-009;
 7. Gateway Station and Tunnel Lighting; Remove as required and dispose by NSC-009;
 8. Smoke and Fire Detection Systems; Salvage by NSC-009;
 9. Station Speakers; Remove and dispose by NSC-009;
 10. 23 kv Electrical Feed; To be relocated by NSC-009;
 11. Signaling Systems; Remove and dispose by NSC-009;
 12. Leaky Co-axial Cable; Remove and Dispose by NSC-009;
 13. Tunnel Ventilation System; Fans, actuators, and dampers be salvaged by NSC-009
 14. Temporary tunnel closure wall; To be built, maintained and removed by NSC-009
 15. Wayside Applicator, including grease within the applicator; Salvage by NSC-009;
 16. [NOT USED]
17. Suspended Ceiling; Remove and dispose by NSC-009;
18. Wood Street Single Crossover; Remove and dispose by NSC-009
19. Safeside Chemical Detectors; PAAC to salvage
20. PAAC change machine; PAAC to salvage

3.19 [NOT USED]

3.20 DEMOLITION OF STATION SUSPENDED CEILING

- A. Remove and disassemble the suspended ceiling from the limits of the Emergency Egress at the end of the Gateway Station platform to the limits of the 23 kv feeded and Emergency Ventilation fan power and control cabling relocation limits inclusive.
- B. Contractor shall dispose of all ceiling materials.
- C. Contractor may remove suspended ceiling prior to the implementation of the Wood Street Station to facilitate the relocation of the 23 kv and EM-9 and EM-10 feeders.
- D. Relocated 23 kv feeders and EM-9 and EM-10 feeders can not be activated until the existing Gateway Station is abandoned of patron service.

3.21 DEMOLITION WOOD STREET SINGLE CROSSOVER

- A. The Contractor shall demolish the existing single crossover located just ahead (toward Steel Plaza) of the Wood Street Station. This work shall be phased as shown in the Contract Documents and will occur during weekend shutdowns of Authority Revenue Service as described in the Contract Documents.

3.28 SALVAGED MATERIALS

- A. Salvaged Items: Where indicated in the Contract Documents as salvage, carefully remove indicated items, clean and prepare for storage and delivery to Authority. Tag or otherwise identify all items for salvage. Salvaged items shall be removed intact.
- B. Prior to removal of a salvageable item the Contractor, Engineer, and Authority shall perform an item pre-assessment study to document the current condition of the salvageable item. At delivery of salvage item to Authority, Contractor, Engineer, and Authority personnel shall perform a post-assessment of the item prior to Authority acceptance. Any damage which has occurred between the two assessment dates shall be considered the responsibility of the Contractor and shall be repaired or replaced at the Contractor's expense. Repairs shall be determined to be sufficient by Authority. Both pre and post assessments shall be submitted in writing to Authority and the Engineer.
- C. Storage of items to be reinstalled shall be at a safe and secure location as agreed upon by the Engineer, clear of the NSC-004 R demolition limits.
- D. Existing Gateway Station and Loop
 1. Items including, but not limited to, the following will be removed and salvaged by the NSC-004 R contractor:
 - a. Pocket track bumper block attenuator
 2. Items including, but not limited to, the following will be removed and salvaged by the Contractor:
 - a. Circuit interrupters, transformers and AC switch gear
 - b. Tunnel standpipe expansion joints,
 - c. Ventilation fans, dampers, and actuators
 - d. Mechanical drainage systems (sump pumps), including stainless steel intake strainer grates
 - e. Tunnel drainage fiberglass inlet grates located within the NSC-004 R demolition limits
 - f. Defibrillator station; Authority will remove the Defibrillator
 - g. Fire extinguishers
 - h. VMS Signage
 - i. Smoke detectors
 - j. Wayside Applicator and grease
 - k. [NOT USED]
 3. Items including, but not limited to, the following will be removed and salvaged by the Authority:
 - a. Emergency Blue Lights and Emergency Telephones
 - b. Safeside Chemical Detectors (2)
 - c. Change Machine
 - d. CCTV cameras
 - e. Defibrillator device

- d. Running rail to running rail resistance: same as Track-to-Earth, see Section 02471, "Track-to-Earth Resistance Testing."
3. Contractor installations which fail the electrical tests will be re-tested at Contractor's expense after corrective measures have been executed by the Contractor.
4. Propulsion bonds for negative return will be inspected visually

1.08 MATERIAL FURNISHED BY THE AUTHORITY

- A. Strap Guard Rail: Authority will furnish, free of charge, Authority Standard Strap Guard Rail to Contractor for use on the Project in accordance with Section 01400, Article 4.5.B. All strap guard fixation hardware shall be provided by the Contractor. Contractor shall provide notice before any material pickup in accordance with Section 01400, Article 4.5.B. Contractor shall transport, fabricate, and install, the guard rail into the trackwork as shown in the Contract Documents, at its expense. The guard rail is stocked by Authority in nominal un-drilled straight lengths of 30', including some shorts. The guard rail ends are not square. The Contractor shall square up all guard rail ends used on the Project by use of abrasive saws only and shall drill in accordance with all applicable AREMA "Specifications for Steel Rails". Contractor shall submit a request to Engineer for the amount of strap guard rail required in the track and special trackwork. The material will be made available to Contractor at the Authority's storage yard identified in Section 01400, Article 4.5.B. Contractor shall inspect, load and assume responsibility for the material prior to moving it from the yard. All handling, transporting, shipping, bending, drilling and installation costs shall be at Contractor's expense. Contractor shall inventory, account for, and return any excess material to Authority prior to completion of the Contract. Any material damaged by the Contractor shall be replaced by the Contractor at no additional cost to Authority.

1.09 QUALIFICATION TESTS

- A. General: All qualified tests required by this and other Sections of the trackwork specifications, except as noted, shall be performed by a qualified independent testing laboratory approved by the Engineer, at Contractor's expense.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Contractor shall load, transport, unload, store and handle all trackwork materials in a manner which will prevent damage to the trackwork materials. Items which are included in the AREMA "Manual of Railway Engineering" shall be handled as described therein.
- B. All material on site shall be moved in a manner which prevents damage to existing above and below ground installations.
- C. Damage to existing installation or Authority owned materials, caused by Contractor shall be repaired, corrected, or replaced by Contractor at no cost to the Authority.

- j. Installing continuous welded rail, strap guard rail, anchoring rail, aligning and joining rail at indicated grades, lines and elevations.
 - k. Track appurtenances and other track material as required to complete the construction.
- 4. [NOT USED]
 - 5. Perform electrical tests.
 - 6. Perform final adjustments and clean up of site area.
- C. The Contract Documents provide the performance parameters and design criteria to complete the Special Track Construction portion of the Work. The Contractor shall be responsible to provide a complete design for this portion of the Work.

1.02 RELATED SECTIONS

- A. Section 01781, "Maintenance and Protection of Authority Traffic."
- B. Section 02450, "General Track Construction."
- C. Section 02452, "Direct Fixation Track Construction."
- D. Section 02456, "Track Appurtenances and Other Track Material."
- E. Section 02462, "Direct Fixation Rail Fasteners."
- F. Section 02464, "Special Trackwork."
- G. Section 02466, "Steel Rail."
- H. Section 02468, "Rail Welding."
- I. Section 02471, "Track-to-Earth Resistance Testing."
- J. Section 03630, "Plinth Anchoring Systems."

1.03 REFERENCE STANDARDS

- A. AREMA, Latest edition, "Portfolio of Trackwork Plans" and "Manual For Railway Engineering"

1.04 SUBMITTALS

- A. Contractor shall submit the following:

SECTION 02454
RAIL LUBRICATION SYSTEM

ARTICLE I GENERAL

1.01 SUMMARY

- A. The work of this Section, includes but is not limited to, providing all labor, materials, tools, equipment and incidentals for the installation of rail lubricators of the Lincoln rail lubrication type or approved equal.
- B. The system shall be of the dual track unit type (two separate pumps, controllers, axle counters and distribution block that utilize the same grease reservoir, all within the same unit housing) complete and in place at Gateway and Northside Station areas as shown on Contract Drawings.

1.02 RELATED SECTIONS

- A. Section 02452 "Direct Fixation Track Construction"
- B. Section 16120 "Low Voltage Power Cables"
- C. Section 16111 "Conduit"

1.03 SUBMITTALS

- A. The following items shall be submitted for approval:
 - 1. Submit manufacturer's literature completely describing products installed within the rail lubrication system.
 - 2. Submit complete instructions, including catalog cuts, diagram drawings showing installation and mounting methods and maintenance and adjustment of all equipment.
 - 3. Submit As-Built Drawings showing layout, location and size of system components and any other relevant information. These shall be submitted to the Engineer for approval upon completion of installation and successful operation of the rail lubrication system.

ARTICLE 2 PRODUCTS

- A. Pump and Reservoir
 - 1. Operating voltage of 220 V.A.C.
 - 2. Type two stage rotary driven shovel piston design.
 - 3. Operating temperature – 40 degrees to 160 degrees F.
 - 4. Operating pressure 4000 PSIG, allowing for multiple ports and even distribution.

5. Reservoir NEMA 4 rated.
 6. Pump has a return tank relief valve that activates if system faults
 7. Pump filtration of 420 microns.
- B. Controller
1. Pump controller monitors delivery of grease through a control valve.
 2. Controller has an adjustable run time (2-14 sec) and monitors wheel count to start lubrication cycle.
 3. Axle counter that can detect the range of 1 – 32 axles.
 4. Manual run button.
- C. Distribution Block
1. Divider valve made of carbon steel with 8 port outlet for even distribution to all outlets.
- D. Wiper Bars
1. Wiper bars to be 54 inches long with internal lube ports of a non clog design.
 2. Bars to have a nylon brush applicator, gauge face, preventing top of rail migration.
 3. Bars shall have a no drilling adjustable mounting bracket with height adjustment.
 4. Metering valve.
- E. Wheel Sensors
1. Sensor to be of an electric type with a monitoring light.
 2. Mounting bracket shall be of a non drilling type and with height adjustment.
- F. Hose
1. Hoses to be of a sufficient length and size to carry grease from pump/reservoir housing to application points. Due to length of supply hose from pumps to distribution blocks, hose shall be pre-charged with grease.

ARTICLE 3 EXECUTION

3.01 GENERAL

- A. Pump and reservoir unit shall be installed level on surfaces at locations as shown on Contract Drawings.
- B. All hoses to wiper bars and port openings and wires to wheel sensors to be installed in schedule 40 PVC conduit. Conduit runs along track to be attached to side of plinths.
- C. Wiper bars to be installed at end of high rail strap guard in accordance with manufacturers requirements.
- D. Distribution block to be installed on galvanized steel strap attached to plinths as shown on Contract Drawings.

- E. Guard straps in the low rail shall be field drilled with 3/8" drill to provide for a swedge fitting of the 3/8" nipple as shown on drawings. Location of the three port openings on each strap guard shall be coordinated with Authority to provide required lubrication at each of the curves.
- F. Wheel sensors shall be mounted at locations shown on Contract Drawings and height adjustment in accordance with manufacturer's requirements.

3.02 FIELD TESTING

- A. Field testing and adjustment shall be thorough and complete to ensure that the Rail Lubrication System provides an evenly distributed grease flow that is carried by the passing wheel flanges to lubricate the rails.

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Item 02454.001 - Gateway Station Area Rail Lubrication System shall be measured as a lump sum unit, complete in place.
- B. Item 02454.002 - North Side Station Area Rail Lubrication System shall be measured as a lump sum unit, complete in place.

4.02 PAYMENT

- A. Item 02454.001 - Gateway Station Area Rail Lubrication System will be paid at the lump sum price and shall include the cost of all related work specified in this Section.
- B. Item 02454.002 - North Side Station Area Rail Lubrication System will be paid at the lump sum price and shall include the cost of all related work specified in this Section.

END OF SECTION

SECTION 13570
SIGNAL SYSTEM REQUIREMENTS

ARTICLE 1 GENERAL

1.01 SUMMARY

- A. The work of this Section includes, but is not limited to, providing all labor, materials, tools, equipment and incidentals necessary for signal system requirements, in accordance with the Contract Documents.
- B. The work of this section includes, but is not limited to, the following activities:
 - 1. The Contractor shall install interlocking and wayside signal systems equipment according to the layout and equipment locations shown on the Contract Drawings.
 - 2. Additional modifications required by the Contractor's design must be approved by the Engineer.
 - 3. The Contractor shall install interlocking and wayside signal system equipment per the Contractor's approved design at five locations for the Project:
 - a. New Allegheny Avenue Interlocking and Terminal Relay Room
 - b. New North Side Station Relay Room
 - c. New Gateway Station Relay Room
 - d. Existing Gateway Interlocking Relay Room
 - e. Existing Wood Street Interlocking Relay Room
 - 4. The work shall include modification to existing relay-based interlockings, modifications to entrance/exit type local control panel and logic, all wayside ground equipment including, but not limited to wayside signals, automatic train stops, and electric switch machines, non-vital interlocking software modifications, control center modifications, any ancillary systems, and all equipment, hardware and software necessary to provide a complete, and working system.
 - 5. The Contractor shall provide all submittals required by Section 01300, "Administrative Requirements" and Section 13579, "Design Requirements."
 - 6. The Contractor shall perform all factory and field-testing as is described within Section 13595, "Signal System Test and Inspection."
 - 7. [NOT USED]
- 8. The Contractor shall provide new local control panels as specified within the Contract Documents for Wood Street, Gateway and Allegheny Interlockings.
- 9. The Contractor shall modify the Operations Control Center (OCC) to accommodate the new and existing interlockings and relay rooms. The Contractor shall properly interface all new controls and indications with the OCC, and shall implement and support all testing for this interface as is required by the Contract Documents.
- 10. The Contractor shall revise existing Wood Street Interlocking to convert it from an existing single crossover arrangement to a double crossover (scissors)

Interlocking to the Contractor. CADD files are not available. The Authority will provide electronic image files of the circuits in "tiff" format. The Contractor shall convert all of the provided image files to CADD files by referencing the tiff images into AutoCAD format CADD files. The Contractor shall mark the CADD files, (X=out, O=in) to portray the changes required to the circuitry as described here in. New circuitry items required shall be drawn in CADD onto the existing images. Any new drawings required shall be completely drawn in CADD format. All detail wiring diagrams, power loops, rack layouts, terminal boards, fuse panels, plug connector and intra rack cable details, entrance rack arrangements, relay rack arrangements, and relay room layout drawings shall also be marked to indicate the changes in a similar manner.

- h. All final As-built drawings shall be provided to the Authority in CADD format as specified. The Contractor shall remove the X and O markings and update the drawings to reflect the final as-wired circuitry and as-built installation of all Wood Street Interlocking signaling equipment.
11. The Contract Drawings represent required circuit modifications for the existing Gateway Interlocking Relay Room. Existing Gateway Station is to be taken out of service during the demolition of the loop and the construction of the new Gateway Station. The Contractor shall design and implement circuit and logic modifications to the existing Gateway Interlocking Relay room necessary to implement the signal routes and aspects indicated within the Contract Drawings.
 - a. The work includes modifications to the existing relay room at Gateway Interlocking, the installation of new relays within existing relay racks, site preparations, and all permits necessary to install the signal system equipment.
 - b. The Contractor shall provide all field wiring necessary to revise the control circuits for Gateway Interlocking to convert it to its new arrangement.
 - c. The Contractor shall modify the existing local Genisys non-vital microprocessors, their application logic and all related circuitry to provide for the new arrangement of Gateway Interlocking.
 - d. The Contractor shall modify the existing remote Genisys non-vital microprocessor, application logic and all related circuitry to provide for the new arrangement of Gateway Interlocking.
 - e. The Contractor shall properly interface all new or modified controls and indications with the Operations Control Center, and shall implement and support all testing for this interface as is required by these Specifications.
 - f. The Authority shall provide the existing circuit drawings for Gateway Interlocking to the Contractor. CADD files are not available. The Authority will provide electronic image files of the circuits in "tiff" format. The Contractor shall convert all of the provided image files to CADD files by referencing the tiff images into AutoCAD format CADD files. The Contractor shall mark the CADD files, (X=out, O=in) to portray the changes required to the circuitry as described here in. New circuitry items required shall be drawn in CADD onto the existing images. Any new drawings required shall be completely drawn in CADD format. All detail wiring diagrams, power loops, rack layouts, terminal boards, fuse panels, plug connector and intra rack cable details, entrance rack arrangements, relay rack arrangements, and relay room layout drawings shall also be marked to indicate the changes in a similar manner.
 - g. All final As-built drawings shall be provided to the Authority in CADD format as specified. The Contractor shall remove the X and O markings and update the drawings to reflect the final as-wired circuitry and as-built installation of all Gateway Interlocking signaling equipment.
12. New Gateway Station Relay Room:
 - a. The Contractor shall install a new Vital and Non-Vital Microprocessor

keying plan in Section 13591, "Tags, Locks and Keys."

- D. Signal Number Plates, Speed Limit Signs and Yard Limit Signs:
 - 1. Provide a signal number plate for each wayside signal.
 - 2. Provide a speed limit sign on wayside signals where indicated on the Contract Drawings.
 - 3. Signal number plates, speed limit signs, and yard limit signs shall conform to AREMA Communications and Signals Manual of Recommended Practices, Part 14.6.1, except as otherwise specified herein.
 - 4. Signal number plates, speed limit signs, and yard limit signs shall be constructed of sheet steel or aluminum with black reflex-reflecting lettering on a white synthetic enamel background. Design of the number plate and size of the lettering shall permit the plate to be read, under all conditions, at a distance of at least 50 feet from the signal while the plate is illuminated by transit vehicle headlights. Lettering for signal number plates and signs shall be minimum four inches high and shall be in conformance with the AREMA Communications and Signals Manual of Recommended Practices, Part 14.6.3.
 - 5. For all signals, two lines of lettering shall be provided on each number plate. The top line shall be the designation or name of the interlocking from which the signal is controlled. The bottom line shall be the signal number.
 - 6. Yard limit signs shall be mounted adjacent to Signals 10N and 12N at Allegheny Interlocking as indicated on the Contract Drawings.
- E. Mast and Base: 5 inches aluminum or steel pipe post equipped at the top to accommodate signal units, and with a base at the bottom mounted directly to the concrete structure. Mast mounted signals shall be provided with a junction box base.
- F. Cable shall be provided in accordance with Section 13587, "Wire and Cable."
- G. All signal housings shall be weatherproof.
- H. Wayside signals shall be provided at locations indicated on the Contract Drawings.

2.03 AUTOMATIC TRAIN STOPS (ATS)

- A. The Contractor shall provide and install ATS equipment at all signal locations as shown on Contract Drawings.
 - 1. ATS will be compatible with existing inductive train-stop equipment now in service.
- B. The wayside coils will be active at all times, unless the signal governing movements over the coils displays a permissive aspect.

2.04 WAYSIDE JUNCTION BOXES

- A. Wayside junction boxes shall be:
 - 1. Stainless steel, construction in accordance with NEMA, UL standards, or as approved by the Engineer. Enclosures shall be made from 12 gauge, 316 stainless

- steel with a NEMA 4X rating at a minimum.
2. Equipped for terminating or busing signal cables, with all wiring accessible from the front.
 3. Interior painted white or gray.
 4. Locking device on cover to prevent locking unless door is completely closed.
 5. Covers and other openings gasketed to provide dustproof and weatherproof enclosure.
 6. Size as needed to provide sufficient terminals, with all terminals accessible from the front, and to accommodate minimum bending radius of wires and cables.
 7. Container inside for storage of wiring diagram.
 8. Door or cover hinged with stops to prevent opening into path of trains. Hinges shall be replaceable castings with bronze pins.
 9. Hasp to accept a padlock. Padlocks keyed as specified by keying plan in Section 13591, "Tags, Locks and Keys."
 10. Provide a minimum of 20 percent spare terminals in each wayside junction box.

2.05 SIGNAL MOUNTING

- A. Wayside signal units shall be directly attached to the tunnel wall with mounting brackets. Mast mounted wayside signals shall be provided with a junction box base which shall be bolted to the aerial structure and concrete deck slab. Refer to the Contract Drawings for signal mounting arrangements.

2.06 TRACK CIRCUITS, POWER FREQUENCY

- A. Track circuits shall perform the function of train detection.
- B. General Performance Requirements
1. Track circuit equipment shall either detect the failure of an insulated joint or protect against it causing any unsafe condition.
 2. Track circuits shall be compatible with the traction power negative return, and not be affected by traction power return current imbalances.
 3. Track circuit equipment shall have fixed transmitter and receiver locations for accurate track circuit definition.
 4. Restoration of power after a power failure shall automatically restore track circuits to normal operation.
 5. Reset of deenergized track circuits shall not be based on adjacent track circuit occupancy.
 6. Track circuits shall function properly in an uncontrolled temperature environment from -40 to 160 degrees F.
 7. Track circuit resistors shall comply with the heat requirements of AREMA Communications and Signals Manual of Recommended Practices Part, 14.2.15.
 8. Power frequency track circuits shall use 60 Hz vane relays.
- C. Detection Requirements
1. Track circuits shall detect a shunt anywhere within track circuit boundaries.

Shunting sensitivity for all track circuits shall be 0.2 ohm impedance with a rail-to-rail leakage impedance of 3 ohms minimum per 1000 feet of track at the operating frequency, and under the following conditions:

- a. Train moving or stopped.
- b. Traction power on or off.
- c. All rail conditions for operation on any track.
2. Track circuits shall provide for double rail broken rail detection when circuit is applied as a double rail track circuit. Where single rail track circuits are used, broken rail detection shall be provided for the signal rail.
3. Failure of track circuit components shall not permit shunting sensitivity to fall below that specified after the track circuit has been properly adjusted.

D. Track Circuit Requirements

1. Contractor shall provide power frequency track circuits with the following requirements:
 - a. Shall be 60 Hz, and of the matching transformer or balancing impedance type. Feed voltage shall be adjusted through a transformer, and resistor network. Receiving end shall route the 60 Hz current from the track through a transformer to an AC vane type relay where it will be compared to a reference voltage for relay pickup. Current limiting resistors and properly sized fuses shall be provided on both the feed end and receiving end. Local reference voltage shall be fused and fed through an RC phase shifter to the track relay.
 - b. Contractor shall use single rail power frequency (PF) track circuits within interlocking limits. All other track circuits shall be double rail power frequency (PF) type.

E. Audio Frequency Overlay (AFO)

1. AFO Track Circuit equipment shall be in accordance with the requirements of the AREMA Communications and Signals Manual of Recommended Practices Part 8.2.1.
2. The Contractor shall only provide AFO track circuit equipment that has a track record of reliable service operating as a vital circuit in 600 to 700 Volt, 60 hertz, DC propulsion territory. The Contractor shall certify that the AFO equipment that he proposes to use will operate reliably in DC propulsion territory and submit this certification and history of satisfactory installations to the Engineer for review.
3. Operation of overlay apparatus shall not be adversely affected by any other signal apparatus nor shall the overlay apparatus adversely affect the operation of any other signal apparatus or the LRV. The overlay track circuit shall not affect the performance of phase selective or steady energy AC type track circuit equipment.
4. Operation of track overlay apparatus shall not be adversely affected by the presence of insulated joints.
5. Operation of overlay apparatus shall not be adversely affected by variations in rail or ballast resistance. Transmitter level and/or receiver threshold shall be adjustable by field personnel to adapt to track circuit conditions.
6. Overlay track circuits shall operate on a frequency in the audio range. Adjacent track circuit frequencies shall be coordinated to minimize track-to-track coupling or cross talk.
7. The overlay apparatus transmitter and receiver units shall operate on a rectified 12 volt D.C. power supply and shall operate properly with power supply of 10.0 to 16 volts D.C. and maximum ripple of 0.2 volts rms.
8. The overlay apparatus transmitter and receiver shall be provided with internal surge protection. System shall be protected against lightning and other voltage surges in the rail and power supply leads when installed with external surge protection as described in AREMA Communications and Signals Manual of Recommended Procedures Part 11.2.1, Recommended General Practices for Electrical Surge Protection for Signal Systems.
9. The AFO track circuit shall de-energize the receiver output relay with a track shunt of 0.25 ohms or less between the transmitter and receiver track connections.
10. Circuit boards shall be registered, keyed and color-coded to prevent frequency misapplication.
11. The overlay apparatus transmitter and receiver shall be designed to impedance match both connections directly to the rail, as well as connections to impedance bonds.
12. The relay driven by the overlay apparatus receiver shall be a biased neutral vital high resistance type conforming to the Specifications as set forth in Section 13588, "Relays and Plugboards". Vital relay drive output shall be isolated and shall provide a minimum of 7.5 volts into a load of 250 ohms or 10 volts into a load of 500 to 1000 ohms.
13. System shall meet surge withstand requirements of AREMA Communications and Signals Manual of Recommended Practices Part 11.3.3, Recommended Design Criteria for Surge Withstand Capability of Electronic Signal Equipment for Signal Systems.

F. Hardware Requirements

1. Track devices
 - a. Contractor shall provide and install insulated joints that are required for its design.
 - b. Such insulated joints shall be installed in accordance with Section 02456, "Track Appurtenances and Other Track Material"
2. Track leads: Contractor shall provide relay and transformer leads for connections to the rails, and all other material and apparatus including track and jumper bonds, as required for a complete track circuit installation in accordance with these Contract Documents.
3. Negative rail connections: Separate negative rail connections shall be provided for track relays and transformers, and shall be located opposite the insulated joint.

2.07 IMPEDANCE BONDS

- A. Contractor shall provide, install, and test all impedance bonds required for the signal system. Include all mounting hardware, connectors, cables and other appurtenances.
1. The bonds shall operate properly with a continuous capacity of 1500 amperes per rail, and an intermittent rating of three times continuously for one minute, repeated every ten minutes.
 2. The bonds shall have a minimum impedance of 0.5ohms at 60Hz.
 3. The impedance bonds shall not require tuning (untuned).
 4. The bonds shall have a minimum traction power current unbalance of 10 percent.
 5. Rail-to-rail DC resistance of the bond and its cable and connector assembly shall not exceed 0.00057 ohms.
 6. The bonds shall be interchangeable with the existing US&S bonds.

2.08 RAIL CONNECTIONS AND BONDS

A. Power Bonds

1. All non-insulated joints in single or double rail track circuit territory including guard-rail joints in curved track areas shall use 250 kcmil size, 10 inches long bonds, two for each joint, as manufactured by Erico Products, Inc., Dwight and Wilson Co., United States Steel, or an approved equal.
2. Power bonds for frog and switch fouling connections and expansion joints shall be two 500 kcmil extra flexible.

B. Signal Rail Bonds

1. Signal bonds in single rail negative return areas shall be railhead type manufactured bonds prepared for welding. The bonds shall be 7/32 inches by 6 1/2 inches and of necessary length, as shown in the Contract Drawings , two (2) for each joint, as manufactured by Erico Products, Inc., Dwight and Wilson Co., United States Steel, or approved equal.
2. These bonds shall be manufacturer bonds prepared for welding by the exothermic process. Bonds, bonding materials, and types of molds shall be as approved by the Engineer.
3. Frog and switch jumpers and end of storage track cross bonds shall be installed and welded to the base of the rail as approved by the Engineer. The cable for frog and switch jumpers and end of storage track cross bonds shall be 500 kcmil extra flexible.

2.09 SNOW MELTERS

- A. General: Contractor shall provide switch heater assemblies to keep the switch layouts at Allegheny Interlocking free and clear of snow and ice and permit operation under all adverse weather conditions. Switch Heaters shall be of the Calrod type, or approved equivalent, designed to operate from a nominal 650 VDC plus spikes with 300 watts per 1 foot uniform heating throughout the length of the heater. Snowmelter point heaters, crib heaters, contactors, contactor enclosures, controllers and miscellaneous snowmelter components shall be provided and shall be as manufactured by the Rails Co., Unitrac System, Mineral Insulated Component Systems, Inc., Chromolox Co., Fabricated Metals Corporation or approved equal.
- B. Point Heaters
1. The heater shall be composed of an active heating element as shown on the Contract Drawings.

- C. The Contractor shall submit the following information on track circuits:
 - 1. Complete circuit diagrams of track circuits.
 - 2. Explanation of operation of track circuits.
 - 3. Frequency and Electro-Magnetic Interference (EMI) analysis of track circuits shall be done to prove that the track circuit will not interfere with ATS equipment.
 - 4. Engineering data on signal strength, shunting sensitivity at various operating and ballast conditions.
- D. The Contractor shall submit wiring diagrams showing the exact routing and termination of all wires and cables in relay rooms and wayside equipment cases, and junction boxes.
- E. The Contractor shall prepare and submit as-built circuit drawings that accurately depict actual circuit conditions in service, as specified in the Contract Documents.
 - 1. As-built drawings at any location shall contain all circuits from any adjacent locations to which there is any type of interface, such as line circuits or traffic circuits.
- F. The Contractor shall submit a complete lightning/surge protection plan.
 - 1. The plan shall specify all devices and circuitry to be protected.
 - 2. Include all protection devices and the methodology in application and installation of each.
 - 3. Include product literature and theory/application manuals for all such protective devices.
 - 4. Include electrical Shop Drawings of each device/circuit to be protected exhibiting application of the protective devices.
- G. The Contractor shall submit a detailed design for Gateway Interlocking modifications as described within Section 13570, "Signal System Requirements" and as shown within the Contract Drawings. Circuit submittals shall be organized within a circuit book for each location that includes all circuitry controlled out of the location. The circuit book shall include all temporary circuit changes associated with the staging of the Work. The Contractor shall provide all additional material and design associated with the construction staging. The Contractor shall submit wiring diagrams showing the exact routing and termination of all wires and cables in the existing Gateway Interlocking Relay Room. The Contractor shall include within the circuit book, a Code and Function Assignment sheet for each relay room.
- H. The Contractor shall submit a detailed design for Wood Street Interlocking modifications as described within Section 13570, "Signal System Requirements" and as shown within the Contract Drawings. Circuit submittals shall be organized within a circuit book for each location that includes all circuitry controlled out of the location. The circuit book shall include all temporary circuit changes associated with the staging of the Work. The Contractor shall provide all additional material and design associated with the construction staging. The Contractor shall submit wiring diagrams showing the exact routing and termination of all wires and cables in the existing Wood Street Interlocking Relay Room. The Contractor shall include within the circuit book,

- j. Each circuit, the functioning of which affects safety or train operations, shall be kept free of any ground or combination of grounds which will permit a flow of current equal or in excess of 75 percent of the release value of any relay or other electromagnetic device in the circuit, except circuits which break signal control circuits using a grounded common, and alternating current power distribution circuits which are grounded in the interest of safety.
 - k. All vital relay circuits that leave or enter signal houses/rooms and instrument cases shall be double-break circuits.
4. Equipment failures and conditions which shall be considered in producing a fail-safe design include, but are not limited to the following:
- a. Vital relays: As specified in these Contract Documents.
 - b. Non-Vital Relays: Open coil, high contrast resistance, shorted coil, armature sticking, contact sticking.
 - c. Transformers: Open primary, open secondary, shorted turns, primary-to-secondary shorts, and combinations of the foregoing.
 - d. Capacitors: Shorts, opens, and leakage.
 - e. Resistors: Shorts, opens, increase and decrease in resistance.
 - f. Transistors; Diodes: Shorts, opens, leakage.
 - g. Coils: Open and shorted turns.
 - h. Loss and degradation of power sources.
 - i. Abnormal signal levels, frequencies, and delays.
 - j. Effects of electrical interference.
 - k. Absent and abnormal input signals.
 - l. Opens and shorts in internal circuitry at inputs and outputs.
 - m. Mechanical vibration and shock including but not limited to train movement, switch operation, operation of heavy machinery, the passage of motor vehicles, and seismic activity.
 - n. Drift and instability of amplifiers, receivers, transmitters, oscillators switching circuits, and power supplies.
 - o. Deterioration of contacts, connectors, terminals, solder connections, printed circuits, and mechanical devices.

O. Layout

- 1. Rack arrangement: As specified in Section 13590, "Housings and Housing Equipment."
- 2. Equipment arrangement
 - a. Relays and equipment panels shall not be mounted higher than 6.5 feet or lower than 10 inches from the finished floor.
 - b. Terminal and connector panels and power distribution panels shall be mounted above all other apparatus mounted on rack. Power distribution panels shall house power connectors and filters for equipment rack power.
 - c. All equipment and components shall be accessible for testing or replacement without removal of other components.
 - d. Two or more points of adjustment required during the same operation shall be

- B. The following submittals shall be distributed before the PDR:
1. Final Operations Scenarios.
 2. Design drawings for the first location.
 - a. Arrangement plans: Show the arrangement of equipment, facilities, or components in a room, rack, junction box, housing, or module. Include dimensions to identify locations and clearance between components.
 - b. Typical Circuit drawings: Show the control, operating, and indicating circuits logic printout and relay circuit plans identifying all circuit breaks, connectors, branches, and terminations. Show actual wire routing and termination scheme. Circuit drawings are further described in Section 13576, "Circuit Requirements."
 - c. Electrical wiring and connection diagrams: Show the details of electrical connections for various parts of the signal system equipment.
 - d. Power distributions schematics: Show the various power distribution systems or subsystems including the power calculations.
 - e. Equipment layout drawings: Show the layout of all equipment in room, including equipment locations, room dimensions, and the location of lights, wireways, and conduits.
 - f. Local Control Panel (LCP) Faceplate Layouts
 3. System design drawings.
 - a. Block diagrams: Show the system, subsystem, and modules.
 - b. Routing and locking charts for Wood Street and Gateway Interlocking.

- c. Product and equipment drawings: Include power supplies, switch machines, signal modules, etc. Show dimensions and internal mechanical and electrical details.
- d. System and subsystem drawings: Show the wiring and connection diagrams for the individual system and subsystems being provided.
4. TWC equipment Product Data, Shop Drawings and specifications.
5. Installation drawings.
 - a. Equipment layouts.
 - b. Relay room.
 - c. Junction boxes.
 - d. Mounting details.
 - e. Location plans.
 - f. Cable plans.
 - g. Conduit and cable trough layouts.
6. Inspection and Test Plan. Refer to Section 13595, "Signal System Test and Inspection."
7. Preliminary Parts List.
8. Preliminary Recommended Spare Parts List and List of Special Tool and Test Equipment. Refer to Section 18040, "Spare Parts and Test Equipment."

9. Training Program Plan. Refer to Section 01910, "Operations, Maintenance and Repair Data."
 10. Protocols and Code and Function Assignments for OCC controls and indications. Refer to Section 16950, "Operations Control Center System (OCCS) Upgrade."
 11. Other submittals as may be indicated elsewhere within these Specifications.
- C. The Contractor is encouraged to submit PDR information incrementally to reduce the duration of the formal meeting. Ideally, the formal PDR meeting should be limited to confirmation or previously reviewed, commented on, and approved-in-principle submittals and resolution of open items.
- D. At the PDR, the following issues shall be discussed:
1. Overall system design and operation.
 2. Hardware components to be supplied under the Contract.
 3. System interfaces, both internal and external.
 4. How design meets requirements for reliability, availability, and maintainability.
 5. Training program, including training materials, facilities, products, classes, and schedule.
 6. Special tools and test equipment.
 7. Impact of design decisions on the Project Schedule.
 8. Information needs and decisions required.

3.04 FINAL DESIGN REVIEW (FDR)

- A. The purpose of the FDR is to verify that the detailed design meets performance and technical requirements before implementation.
- B. The following submittals shall be distributed before the FDR:
1. System design drawings.
 - a. Cable plans: Show point-to-point cable runs and indicate cable makeup, cable identification number, conductor size, conduit identification, cable tray identification, duct identification, and splice locations.
 - b. Double line track plans: Show the track configuration, including profile/alignment, civil speed limits, type of civil structure information, and the location of wayside equipment.
 - c. [NOT USED]
 2. System integration plan.
 3. System changeover plan.
 4. Recommended Spare Parts List and List of Special Tool and Test Equipment. Refer to Section 01830: "Spare Parts and Test Equipment."
 5. Parts List.
 6. Final Inspection and Test Plan.
 7. Other submittals as may be indicated elsewhere within these Specifications.
- C. Contractor is encouraged to submit FDR information incrementally to reduce the

SECTION 13581
LOCAL CONTROL PANELS

ARTICLE 1 GENERAL

1.01 SUMMARY

- A. The work of this Section includes, but is not limited to, providing all labor, materials, tools, equipment and incidentals necessary for local control panels, in accordance with the Contract Documents.
- B. The work of this Section includes, but is not limited to, the following activities:
 - 1. [NOT USED]
 - 2. [NOT USED]
 - 3. Designing and providing a new local control panel at Wood Street, Gateway and Allegheny Interlocking new Relay Rooms.
- C. The Contract Documents provide the performance parameters and design criteria to complete the local control panels. The Contractor shall be responsible to provide a complete design for this portion of the Work.

1.02 RELATED SECTIONS

- A. Section 01300, "Administrative Requirements"
- B. Section 01739, "Quality and Configuration Management"
- C. Section 01840, "Spare Parts and Test Equipment"
- D. Section 01910, "Operations, Maintenance and Repair Data"
- E. Section 13570, "Signal System Requirements,"
- F. Section 13590, "Housing and Housing Equipment."

1.03 SUBMITTALS

- A. Product data and specifications for all components.
- B. Shop Drawings and specifications for all LCPs.
- C. Terminal board layouts and power loop circuit drawings for new LCPs.
- D. Faceplate drawings of the new LCPs.

ARTICLE 2 PRODUCTS

2.01 LOCAL CONTROL PANELS

- A. A new LCP shall be provided by the Contractor in the Relay Rooms at Wood Street, Gateway and Allegheny Interlockings.
- B. [NOT USED]
- C. [NOT USED]
- D. The LCPs shall be constructed of 1" mosaic tiles of an approved color with etched block lettering and symbols. Track diagram, signal and switch symbols, lettering and numbering shall be etched on the panel as shown on the Contract Drawings. Orientation of the panel schematic shall be such that the directions on the panel, when mounted in the Relay Room coincide with the direction of the track. Levers, switches and indication lights shall be mounted on the panel as shown on Contract Drawings.
- E. LCPs shall contain the controls and indications necessary for:
 - 1. Track Occupancy indication for all circuits within the control limits of each interlocking, as shown on the Contract Drawings.
 - 2. Traffic Direction indication.
 - 3. Switch Position control and indication.
 - 4. Signal Request/Cancel control and indication.
 - 5. Exit Inhibit control and indication.
 - 6. AC & DC Power Off and Ground indications.
 - 7. DC Ground Detection.
 - 8. Intrusion Detection.
 - 9. Fire Detection.
 - 10. Blown Fuse Indications.
 - 11. Maintainer's Indication.
 - 12. AUTO/LOCAL/OCC (Operations Control Center) Mode control and indications.
 - 13. Display activation.
 - 14. Lamp Test activation.
- F. Indication LEDs: All indications on the LCP shall be provided by colored LEDs. The operation and color of the indications will be as follows with wired circuits intact, LEDs functioning and the display switch "on":
 - 1. Maintainer Call Indicator:
 - a. White – Indicates a requirement for the maintainer(s) to contact OCC.
 - b. Off – No action required.

- 2) Pulled – Cancels call on but maintains the previously selected route.
- e. Signal Control Switch:
 - 1) Pressed –
 - a) Selects interlocking route entrance if the control point has not already been determined to be an available exit for a previously selected entrance.
 - b) Selects interlocking route exit if control point has been designated as an available exit for a previously selected entrance.
 - 2) Rotated Toward Interlocking – Establishes fleeting for a route whose entrance was selected by the same signal control switch. Effective only when signal indicator is illuminated.
 - 3) Rotated Away From Interlocking – Cancels fleeting that has been established for a route whose entrance was selected by the same signal control switch.
 - 4) Pulled – Cancels entrance selection, route, fleeting and call on of a route (if established) whose entrance was selected by the same signal control switch.
- f. Lamp Test Switch:
 - 1) Turned Right – Turns on white and green indicators on LCP.
 - 2) Turned Left – Turns on red, amber and blue indicators on LCP.
- g. Exit Inhibit Switch:
 - 1) Pressed – Applies exit block – light blue indicator on LCP.
 - 2) Pulled – Cancels exit block.

H. A Single Pole Double Throw (SPDT) toggle (On/Off/On) switch shall be provided for the following functions:

- 1. Auxiliary Switch Control (Test Key):
 - a. Up – Calls the respective power operated turnout or crossover to the normal position unless prevented by the locking circuits.
 - b. Center – Puts turnout or crossover within control of the normal routing interlocking system.
 - c. Down – Calls the respective power operated turnout or crossover to the reverse position unless prevented by the locking circuits.

I. A Single Pole Single Throw (SPST) toggle (On/Off) switch shall be provided for the following function:

- 1. Panel Lighting Control Switch:
 - a. Up – Controls the energy that is supplied to light the LCP indications. This feature may be applied as a non-vital input to the microprocessor system if driven by the same.
 - b. Down – Turns off the energy to the LCP indications.

J. An Emergency (two-position On/Off) Key Switch shall be provided.

- 1. All LCP keys shall be the same as those currently in use on the Authority's system and operate no other locks in the system.
- 2. With key inserted into lock tumbler, the Emergency Key Switch will function as follow:
 - a. Turned Clockwise – This position shall activate the Emergency bypass feature as described in Article 2.01F "Local Control Mode Switch." This

- position shall be considered it's "on" position. It shall be impossible to remove the key from this position.
- b. Turned Counter Clockwise (original position) – This position shall deactivate the local controls of the LCP and return control of the interlocking to the automatic mode. It shall be possible to remove the key from the lock tumbler while in this position.
- K. The Contractor shall submit faceplate drawings for review and approval of the Engineer.

2.02 RELAY ROOM LOCAL CONTROL PANELS

- A. The Contractor shall provide a new mosaic style LCP at Wood Street, Gateway and Allegheny Interlockings. The Contractor shall furnish and install all new indications, control switches, wiring, and hardware necessary to implement the installation. All material provided shall be compatible with existing equipment in form and function as described in Article 2.01.
- B. The Contractor shall revise the non-vital Site Specific Application Logic (SSAL) for Gateway and Wood Street Interlockings necessary to implement the LCP changes. The Contractor shall also provide the hardware, application firmware and wiring interface between the new LCP and the existing vital and non-vital microprocessors at these locations.
- C. The Contractor shall furnish new non-vital Site Specific Application Logic (SSAL) for Allegheny Interlocking necessary to implement the new local control panel. The Contractor shall also provide the hardware, application firmware and wiring interface between the new LCP and the new vital and non-vital microprocessor.

2.03 [NOT USED]

ARTICLE 3 EXECUTION

3.01 LCP MOUNTING

- A. Panels shall be mounted as specified in Section 13590, "Housing and Housing Equipment."
- B. The orientation of the LCPs shall coincide with the track layout.

ARTICLE 4 MEASUREMENT AND PAYMENT

VOLUME 2 TECHNICAL PROVISIONS NSC-009 NSC TRAIN SYSTEMS (SYSTEM WIDE) CONTINUED

- 01781 Maintenance and Protection of Authority Traffic
- 01783 Temporary Facilities
- 01784 Temporary Pedestrian Accommodations, Fence and Barricade
- 01785 Construction Surveying
- 01787 Transfer of Temporary Facilities
- 01791 Remove, Store, and Re-erect Existing Components
- 01800 Erosion and Sedimentation Control
- 01810 Off-Duty Uniformed Police Officer
- 01815 Construction Dust Control
- 01840 Spare Parts and Test Equipment
- 01850 Construction Monitoring Program
- 01900 Train Clearance Testing
- 01910 Operations, Maintenance and Repair Data
- 01911 Operations, Maintenance and Information Database
- 01920 Cutting and Patching
- 01940 Cleaning
- 02020 Handling of Unforeseen Hazardous and Contaminated Building Materials
- 02220 Demolition
- 02316 Excavation
- 02320 Backfill
- 02340 Subgrade
- 02353 Geotextile
- 02450 General Track Construction
- 02452 Direct Fixation Track Construction
- 02453 Special Track Construction
- 02454 Rail Lubrication System
- 02456 Track Appurtenances and Other Track Material
- 02462 Direct Fixation Rail Fasteners
- 02464 Special Trackwork
- 02466 Steel Rail

- (minimally):
- a. DS-1 systems shall be protected at one to seven (1:7).
 - b. Protection switching shall be <60ms.
 4. DS-1 signal outputs shall meet ANSI/EIA Standard T1.102 cross-connect specifications, and shall offer a switch selectable line code of AMI (Alternating Mark Inversion) or B8ZS (Bipolar Eight Zero Substitution).

F. Multiplexer Drop-and-Continue Capability

1. Each ADM shall be capable of performing add-drop of up to 14 DS-1s through the addition of appropriate printed circuit cards only.
2. A TSI shall be provided so that the ADM can add/drop any DS-1 (Virtual Tributary VT1.5) in the entire OC-12 payload. The TSI must be able to add/drop a single DS-1 without having to add/drop the entire VT group of 14 DS-1s. The ADM shall pass on, and not process, any traffic (DS-1s) that is not dropped at a node. This is sometimes referred to as "drop-and-continue".
3. Each ADM shall be equipped with an ML series 8-port 10/100Base-T Ethernet switch. Each ADM shall be capable of provisioning access to a 10/100Base-T Ethernet circuit by combining multiple STS-1s to support the required bandwidth and Resilient Packet Ring (RPR) operation. Ethernet capability shall be provided through the addition of dedicated hardware modules to any combination of nodes on the SONET ring. The Ethernet Ring shall provide QoS capability to support voice over IP for the telephone system. Ethernet capability at a node shall support both peer-to-peer, and client-server network environments.

G. System Timing and Synchronization

1. Each multiplexer shall be capable of at least two sources of timing:
 - a. Internal Clock – The ADM internally generated clock from an integrated Stratum 3 clock with an accuracy of 4.6 ppm or better.
 - b. External Clock - Internally synchronized to an external DS-1 signal.
2. System clocking and timing shall normally be derived from the incoming optical line signals. All remotely located multiplexers shall be timed from the timing reference, the DACS or SONET multiplexer, at the head-end node in the OCC. Each multiplexer shall have its own internal clock source take over timing in the event of a timing reference failure, and each shall be capable of acting as the timing reference for downstream units in the event of loss of primary clocking.
3. Each multiplexer shall feature synchronization status messaging.

H. Multiplexer Alarms

1. Each multiplexer shall be equipped with a front panel display for indicating the operational status of the multiplexer. The alarms displayed shall indicate overall system status and any specific failure. In lieu of a full function display on the unit, a Craft Interface Device (CID), such as a hand held RS-232 terminal, may be substituted in quantities as determined by the Engineer.
2. Individual modules shall have face plate LEDs to indicate alarm or failure condition.
3. Alarms minimally indicated by the multiplexer on the display (without the CID) shall be:
 - a. Major Alarm - Service or non-service affecting, such as one or more circuits

Table 1-1 Station Telephone Requirements

Gateway Station	31 Analog Telephones 1 Autodial Modem 1 Local Phone Line
North Side Station	49 Analog Telephones 1 Autodial Modem 1 Local Phone Line
Allegheny Station	31 Analog Telephones 1 Autodial Modem 1 Local Phone Line

- D. The telephone system shall support service to all Equipment Room Telephones installed at the following room locations within or near each NSC station:
1. Communications Equipment Rooms (CER).
 2. Equipment rooms associated with the tunnel ventilation system.
 3. Relay/Signal Equipment Rooms.
 4. Traction Power Substations, Circuit Breaker Rooms and Tie-Breaker Rooms.
 5. Signal Rooms
 6. Police Room
 7. Maintenance Support Rooms.
- E. All Equipment Room Telephones shall be on individual circuits connected to the Remote PBX Module and shall be standard manual-dialing telephones. Each circuit shall be routed to the new PBX at the OCC via the NSC Carrier Transmission System (CTS), as specified elsewhere under this contract.
- F. All Patron Telephones shall be automatic ring-down telephones on individual circuits connected to the Remote PBX Module. Each circuit shall be routed to the OCC PBX and automatically rerouted to the Pitt Tower Transit Police Console.
- G. All Blue Light Emergency Telephones shall be automatic ring-down telephones on individual circuits and shall be connected to the Remote PBX Module. Each circuit shall be routed to the PBX at the OCC and automatically rerouted to an OCC operations console.
- H. The Fire Control Panel Telephone at each NSC station shall be automatic ring-down telephone connect to the Remote PBX Module. Each circuit shall be routed to the PBX at the OCC and automatically rerouted to an OCC operations console.
- I. Existing digital phones are AVAYA 6400 series with a range of programmable features keys that must be supported by the system proposed or replaced in total with equivalent features.

- d) Slot layout plans on multi-module system racks,
 - e) Rack layout plans on multi-rack system frames,
 - f) Port/connector layout plans on cross-patch termination assemblies.
- 8) I/O –point listing, including all software and hardware points, complete with configuration details for each point, segregated by enclosures.
 - 9) Schedules and related drawings documenting usage/assignments of each of the following assemblies:
 - a) Multi-conductor cable bundle: unique conductor number, related termination points at both ends.
 - b) Multi-strand FO (Fiber Optic) cable bundle: unique strand number, related termination points at both ends.
 - c) Cross-patch panel bulkheads: unique bulkhead number, tag information and/or description of related FO strand at both ends.
 - d) Multi-equipment system rack: unique rack position number (s), model number of installed system, and application information of installed system.
 - e) Multi-card (multi/module) system cage: unique card slot number, model number of related card/module, information on applicable hardware/software address (addresses) related to the connection(s) at the card/module.
 - f) Multi-channel module: unique port/connector number, tag information and/or description of connected signal (FO, coaxial or Ethernet) medium, tag information and/or description of the port/connector/unit connected to the other end of the related signal medium.
- 10) Cable lists specifying cable, wire pair and connector and pin assignments for all signal, power and ground leads.
 - 11) All operating parameters of individual devices including, where applicable:
 - a) Dip switch settings
 - b) Jumper connections
 - c) Software configurations
 - 12) Tabulation of node addresses on data transmission system of all devices (and other network addressing where applicable), and where fixed communication is configured among nodes in pairs/groups, the tabulation of node addresses of all member of each pair/group.
 - 13) For all cameras provided:
 - a) Submit documents listing the camera PTZ viewing presets for each camera, and the preset titles as configured on the digital video recorder, related video management software, or other video system controllers such as video matrix switch.
 - b) Submit documents listing applicable tour settings, including order of presets, and related dwell duration.
 - c. Submit hard copy of software programs and configuration settings with documentation 4 weeks prior to shop testing, including the following:

- 3) Procedures for system initialization, start-up and shutdown.
 - 4) Alarm reports.
 - 5) Reports generation.
 - 6) Data base format and data entry requirements.
 - 7) Directory of all disk files.
 - 8) Description of all communication protocols, including data formats, command characters, and a sample of each type of data transfer.
- i. Maintenance Manual: Provide the Maintenance Manuals for the whole system, 30 days before the date scheduled for the training course. The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
 - j. Where applicable, full documentation on the procedural and access-protection measures instituted to keep the SYSTEM database tamper resistant.

B. [NOT USED]

- C. Submit the "As-Built" record documentation on paper media and one set of the "As-Built" record documentation on CD 30 days before the date scheduled for the training course. Drawings shall be stored in Microstation CAD format of 2007 or newer version, text files shall be stored in Microsoft Word format of 2007 or newer version. Each Record Document shall reflect the final and actual status of the installed systems, and shall be marked "Record Document". The "As-Built" record documentation shall include the following as minimum:
1. For all cameras provided:
 - a. Submit documents listing the camera PTZ viewing presets for each camera, and the preset titles as configured on the digital video recorder, related video management software, or other video system controllers such as video matrix switch.
 - b. Submit documents listing applicable tour settings, including order of presets, and related dwell duration.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall ensure that equipment has not been damaged during shipping or storage. Equipment shall be shipped separately from the equipment racks in which they are to be installed. Equipment shall remain in the original packaging until the time of installation. All equipment shall be stored in a protected area until installed.

1.06 QUALIFICATIONS

- A. Contractor shall have a minimum of five years of experience in supplying and installing video security equipment comparable to that specified herein.

1.07 DESCRIPTION OF WORK

- A. This Section presents an outline of the communications work to be performed under this Contract. It does not supersede requirements detailed elsewhere. Contractor is responsible for complying with the Contract Documents in their entirety.
- B. Contractor shall furnish all labor, material, equipment, supervision, transportation, and miscellaneous services, whether or not explicitly identified herein, to provide a completely tested and fully functional Digital Video system.
- C. [NOT USED]
- D. The work of this Section includes furnishing and installing dome mounted IP Video CCTV cameras equipped with PTZ drives in the Gateway Station, North Side Station and Allegheny Station as indicated on Reference Drawings: Gateway Station Finishes Construction Contract NSC-010, North Side Station Finishes Construction Contract NSC-011 and Allegheny Station Finishes Construction Contract NSC-012.
- E. The work of this Section also includes furnishing and installing dome mounted IP Video CCTV cameras equipped with PTZ drives at the portal entrances to the bored tunnel at the Gateway and North Side Stations as shown on the Contract Drawings.
- F. The work of this Section also includes furnishing and installing fiber optic modems, fiber optic cables, and other equipment as shown on Contract Drawings: Gateway Station Finishes Construction Contract NSC-010, North Side Station Finishes Construction Contract NSC-011 and Allegheny Station Finishes Construction Contract NSC-012 and as specified herein, to form an integral part of the Communications System.
- G. The work of this Section also includes furnishing and installing additional monitors, Digital Video Recorders, Video Management Consoles, video interface equipment and miscellaneous hardware in the Pitt Tower operations center control room to monitor and support the new digital video cameras installed at the NSC stations as part of the Project.
- H. The work of this Section also includes upgrading the Pelco CM9760 Matrix Switcher to accommodate additional analog video inputs by installing a CM9760-VCC input card.
- I. The work of this Section also includes furnishing and installing the Portal Surveillance Detection system, which includes installing IR detectors at the portal entrances of the

bored tunnel and all power and CAT5 wiring to hub processors in the Gateway and North Shore communication rooms.

- J. The work of this Section also includes furnishing and installing all miscellaneous hardware required to build a functional, reliable and maintainable CCTV system.

1.08 EXISTING CONDITIONS

- A. The existing CCTV System at Pitt Tower is based on an analog video system design, which will be difficult to expand and maintain due to equipment obsolescence.
- B. The existing equipment at Pitt Tower is used to monitor and control the cameras at the existing stations and transmit selected video images to the OCC.
- C. The existing CCTV System will remain in place and operate in parallel with the new Digital Video System.

1.08 SYSTEM REQUIREMENTS

- A. Contractor shall install Gigabit Switches at Pitt Tower and the NSC stations to create a self-healing Gigabit Ethernet Ring to support the exchange of video data between these locations. The Gigabit Ring shall use two fibers on the existing Fiber Plant and two fibers in the new 96 fiber cables to be installed between the NSC stations.
 - 1. Contractor shall install a Digital Video System at Pitt Tower using a video management client/server configuration to manage and display IP video data. The Digital Video System shall incorporate Network Video Recorders to save the video from all NSC station cameras in MPEG-4 format for 30 days and permit playback at the rate of eight-frames/second. Video output at the Pitt Tower Control Room shall be operator selectable in various multi-image formats and displayed digitally on LCD flat panel displays and on analog monitors.
 - 2. All CCTV cameras at the NSC stations shall be IP video dome cameras, configured for PTZ at the locations indicated on the architect drawings for these stations. All CCTV cameras for portal surveillance detection shall be IP video PTZ dome cameras.
 - 3. The Contractor shall provide the capability for an OCC operator to select digital IP video cameras for display at the OCC via the existing analog CCTV system interface.
 - 4. The alarm generated by the Portal Surveillance Detection system shall be polled and processed by the Video Management System software at Pitt Tower and annunciated at the client workstations. The response time between detection and annunciation shall not exceed one second.
- B. Contractor shall provide all video management software, database initialization, and maintenance software for all components (servers, workstations, network recorders, etc.) of the Digital Video System to insure a fully functional and operational system.
- C. In addition to the cameras and digital video system equipment, Contractor shall

provide all equipment racks and cabinets, mounting hardware, and all necessary cables, and connectors at Pitt Tower and the NSC stations.

- D. All equipment supplied under this Section shall comply with FCC limits for Class A radio frequency emission ratings as defined in Code of Federal Regulations, Title 47, Part 15.

1.09 TRAINING

- A. Contractor shall provide System Administrator training for four of the Port Authority's employees. As a minimum the training shall provide:
1. Training shall be conducted in a class room environment at the vendor's facility with hands-on instruction by the manufacturer's certified instructor.
 2. One working administrative console for each Port Authority trainee shall be provided.
 3. The training shall cover all administrative and maintenance reports provided for the system.
 4. Training shall cover system traces available for all installed equipment.
 5. Training shall cover moves, adds, and changes for all installed equipment
 6. Training shall cover all user, installer, and system programming available on all installed equipment.
 7. The Contractor shall provide one copy of each manual used in the training for each trainee, plus one set of manuals for the OCC.
 8. The Contractor shall provide the Port Authority with additional copies of the any administrative manuals for the duration of the warranty period and any subsequent maintenance contract periods at no additional charge.
 9. The Contractor shall cover any and all training costs associated with travel, meals, and lodging for Port Authority employees if training is done outside of the local area. Local being defined as any area within thirty miles of the Manchester Office location.
- B. Administration Manual Updates
1. The Contractor shall provide, at no cost to the Port Authority, any revisions to administration or maintenance manuals required due to system upgrades and/or changes in software for the duration of the warranty period and any subsequent period covered by maintenance contracts.

ARTICLE 2 PRODUCTS

2.01 [NOT USED]

SHEET 12 NOT USED

2.02 PTZ DOME IP CAMERA

A. PTZ Dome IP Camera

1. The Contractor shall provide PTZ dome IP cameras at the three NSC stations as indicated on the architectural contract drawings.
2. Each camera dome assembly shall include a day/night camera and shall support an optical zoom of 35X and a digital zoom of 12X.
3. Each camera dome assembly shall include a heater & blower suitable for outdoor use.
4. Each camera shall support simultaneous Motion JPEG and MPEG-4 video at resolutions of up to 640x480 pixels.
5. Each dome camera assembly shall support high-speed pan-tilt (0.05-450degrees/sec) and shall provide for 100 preset positions.
6. Minimum illumination: 0.5 lux in color mode, 0.008 lux in black/white mode.
7. Each camera shall be able to deliver high-quality video in at least 5 different resolutions up to 640x480 pixels over IP networks.
8. Each camera shall provide at least 11 different compression levels and be capable of providing bit rates between 1Kbps and 12 Mbps per video stream.
9. The camera shall contain a built-in-web server making video and configuration available in a standard browser environment using HTTP, without the need for additional software.
10. When accessed from a browser, the built-in-web server shall provide users with online, context-sensitive help.
10. The camera shall not require any additional software to operate, and shall support full functionality when operating in the following environment: Windows2000 or Windows XP and with MS Explorer 6.x and higher.
11. Each camera shall support simultaneous viewing by up to 20 clients from the web server.
12. The cameras web server shall provide support for defining usernames and passwords, for a minimum of three different types of users.
13. The camera shall provide the ability to control network traffic by limiting the maximum bandwidth to a selected value and limit the frame rate per viewer to a selected value, as well as the duration of each viewing session.
14. The camera shall provide embedded on-screen text in the video, with support for time & date and camera name.

- a. Coordinate with the Authority for the IP address assignments.
 - b. Assign static IP address for each IP Video camera assembly, Video Management Server, Video Management client workstation, Network Video Recorder, Digital Video Decoder, Ethernet DI/DO Processor, KVM Switch, and Ethernet LAN Switch.
8. UPS System
 - a. Install new UPS System in the Video Equipment Room per the Contract Drawings.
 - b. Upon successful startup and stand alone testing of the new UPS system, disconnect the existing UPS from the analog CCTV System and reconnect to the new UPS System.
 - c. Upon the successful cutover of the analog CCTV System to the new UPS System, connect and power up the Digital Video System.

B. NSC STATIONS

1. IP Video Cameras
 - a. [NOT USED]
 - b. Configure the cameras and related transmission system to transmit 4CIF video images in both MPEG4 part 2 and Motion JPEG format. Make allowance to adjust video frame rate as per instruction of the Authority during commissioning period.
 - c. Configure subtitles for each camera PTZ preset position. The subtitle shall be displayed with the related video image. The subtitle shall include the camera number, and a brief description for the covered area. Make allowance to configure up to 8 presets per camera during commissioning period.
2. Fiber Optic Cable
 - a. Ensure that all fiber cables as delivered to the project site are without splices.
 - b. All fiber cable runs between IP cameras and the station communications room shall be installed in conduit and equipped with SC fiber connectors with ten (10) feet of slack at the communications room end.
3. IR Barrier Transceivers
 - a. Install IR barrier transceivers on opposite sides of side walls of tunnels, one pair (2 beams) will be installed below the walkway, the second pair (4 beams) just above the walkway, and the third pair (2 beams) approximately ten feet above ground level. See contract drawings for location details.
 - b. Wire IR barriers for the left and right portals into separate junction boxes for each portal as indicated on the contract drawings. CAT 5 cable will be used for all wiring between IR barriers and the Hub Processor in the communications room.

- commands to the audio matrix switch. In addition, Contractor shall demonstrate the successful audio/visual message and schedule downloading to each VMS/PA station controller. Contractor shall demonstrate that each VMS/PA station controller receives and stores the message and schedule files assigned to it according to the database kept at the VMS/PA head-end server in the OCC.
3. Contractor shall demonstrate that any live audio announcement made by VMS/PA operators at Pitt Tower has priority over any initiated from the OCC. Contractor shall demonstrate that all live audio announcements made from Pitt Tower or the OCC automatically mute any pre-recorded messages playing at a station.
 4. Contractor shall demonstrate that the background music originating at Pitt Tower can be heard at the new NSC stations.

3.14 SCADA INSPECTIONS AND TESTS

- A. Integration testing of the complete SCADA system shall follow completion of all work regarding the SCADA system, including system testing at all NSC stations and at the OCC. Integration testing shall consist of exercising the overall SCADA system from the OCC and locally to verify its operation.
- B. Field Inspection and Tests
 1. Testing shall include but not be limited to the following:
 - a. Communications equipment room (CER) equipment, environmental and intrusion alarms.
 - b. Contractor shall coordinate with the OCC for testing the portion of the SCADA System associated with the Substation Control and Alarm System (SACS).
 - c. Contractor shall coordinate with the OCC for testing the SCADA System as it relates to the tunnel ventilation system known as the Remote Indication and Control System (RICS).
 - d. RTUs system testing shall confirm proper operation of all control, indication, and analog data points, in accordance with the approved test plan.

3.15 DIGITAL VIDEO SYSTEM INSPECTIONS AND TESTS

- A. System Level Factory Test
 1. A System Level Factory Test of the Digital Video System shall be performed by the Contractor. A sufficient number of components shall be included in the test to demonstrate that the IP video cameras can be viewed and recorded on the Video Management System equipment to be installed in the Pitt Tower control center.
 2. The System Level Factory Test shall include the following components as a minimum:
 - a. Four IP Video PTZ Dome Cameras
 - b. [NOT USED]
 - c. Two Gigabit Ethernet Switches & fiber cable to form a ring
 - d. One Video Management System Server
 - e. One Video Management System Client Workstation & Monitor

G. VCS to NSC CTS Interface

1. Interfaces supporting PA circuits
 - a. The Contractor shall design and install 2 or 4-wire audio circuits between the existing Penta PCx Voice Matrix Switch and NSC CTS in support of the new PA circuits for "live" announcements to the NSC stations. Refer to Drawing CM044 for the number of new audio circuits required to be terminated on the VCS to transmit "live" PA announcements.
2. Interfaces supporting Radio circuits
 - a. Receive audio from the new base stations located at Allegheny Station will be voted at the existing radio system voter/comparator equipment, which is part of the radio system and specified in Section 16722. The existing Receive audio circuit between the Penta switch and the existing Voters, with the addition of Voter Channel Cards, will be used to receive audio for each of the radio channels (e.g., LRT1 (Data), LRT2 (Operations), etc.).
 - b. The existing Transmit audio circuit between the Penta switch and the existing Simulcast Controller, with the addition of a new Simulcast Delay Card, will be used to transmit audio for each of the radio channels (e.g., LRT1 (Data), LRT2 (Operations), etc.). The existing simulcast controller is part of the radio system and specified in Section 16722.
 - c. The Contractor shall design and install a new 4-wire audio circuit between the existing Penta PCx Voice Matrix Switch and the NSC CTS to support the transmit/receive talk-around circuit as well as the new 4-wire circuits between the Simulcast Controller (Transmit Pairs)/Voters (Receive Pairs) to the NSC CTS. Refer to Drawing CM051 and Section 16722 for the required interface electronics (e.g., voter cards, simulcast delay controller cards, and Penta PCx Line cards) to support the NSC Radio System.

H. VCS to New PABX Interface

1. The existing interface supports fifteen (15) analog trunk circuits interconnecting the VCS to the existing PABX, where 6 of the 15 analog trunk circuits are allocated solely for emergency telephone calls and the remaining 9 analog trunk circuits are hunt group. The existing PABX at the OCC will be replaced (see Section 16721) with a new redundant head-end PABX. The Contractor shall terminate the existing fifteen (15) analog trunk circuits on the new PABX.
2. The determination of whether the existing fifteen (15) analog trunk circuits between the Penta PCx Voice Matrix Switch and the new PABX is capable of supporting the additional telephone circuits supported along the NSC shall be the responsibility of the Contractor. If the Contractor determines that additional trunk capacity is required, then the Contractor shall design and install the new analog trunk circuits between the Penta PCx Voice Matrix Switch and the new PABX.

I. VCS to OCC System Interface

1. The existing OCC System supports the following external interfaces to support data and audio exchange between the OCC System and the Penta VCS.
 - a. Penta PCx Interface Task
 - b. Caller ID Task
 - c. Console to VCS Interface
2. Penta PCx Interface Task
 - a. The existing Penta PCx Interface Task extends the OCC System logon/logoff implementation to the Penta PCx VCS by translating internal OCC System

- F. If the Contractor installs new Terminal Servers, then the Contractor shall provision the IP address on the Ethernet Port of the Lantronix EDS43PR 32 port Terminal Server. The IP address shall follow the current IP address scheme used within the OCCS.
- G. The Contractor shall verify proper installation during Site Acceptance Testing to ensure that the equipment has been properly installed and connected. Equipment will also be checked to ensure that it is of the appropriate model, and tagged and labeled correctly.
- H. The Contractor will verify the installation of new and relocated equipment and cables to ensure adherence to the manufacturer's specifications, contract documents, engineering drawings, and local codes.
- I. Testing will not interfere with the Authority's revenue operations and shall be coordinated with the Engineer prior to start.

3.03 INTERCONNECTION OF VCS WITH NSC CTS AND PABX

- A. The number of new audio circuits required to be terminated on the Penta PCx is as follows:
 - 1. Refer to Drawing CM044 for the number of new audio circuits required to be terminated on the Penta PCx, interconnecting the Penta PCx to the NSC CTS, to support the NSC PA system.
 - 2. Refer to Drawing CM051 for the number of new audio circuits required to be terminated on the Penta PCx, interconnecting the Penta PCx to the NSC CTS, to support the NSC Radio system.
- B. The number of new analog trunk circuits required to be terminated on the Penta PCx, interconnecting the Penta PCx to the new PABX, to support the NSC telephone system must be determined by the Contractor.
- C. Refer to Drawings CC330 thru CC333, and CC360 thru CC367 in the Hardware Detailed Design Drawings for the Stage II Light Rail Transit System as part of Contract LRS-98-05-R that are included in the "also" plans for the NSC-009 for the detailed wiring of existing voice circuits terminated on the Penta PCx Voice Matrix Switch. The Contractor shall update these drawings and provide any additional drawings as necessary to document the detailed wiring and termination of new voice circuits on the Penta PCx Voice Matrix Switch to support the NSC.
- D. The Contractor shall utilize spare equipment and ports to terminate new voice circuits associated with the NSC in support of telephone, public address, and radio systems on the Penta PCx Voice Matrix Switch.
 - 1. The Contractor shall perform a survey of the OCC to determine the spare capacity on the Penta PCx Voice Matrix Switch available to be used for the NSC after award of contract and at the time of installation. If the spare capacity is not adequate to support the NSC, then the Contractor shall be responsible for specifying, procuring, installing, and testing all new equipment required to support the NSC. For example, the Contractor shall determine whether the existing Penta PCx supports enough spare ports on existing line cards, whether new line cards must be added, and/or whether the system must be expanded to support the termination of new audio and trunk circuits in support of the NSC.

- E. The Contractor shall perform all necessary work to terminate the required number of audio and trunk circuits to support the NSC on the Penta PCx.
 - F. The Contractor shall install the wire/cable to interconnect the Penta PCx with the NSC CTS and the new PABX based upon the interconnection design illustrated in Contract Drawings CM044 and the approved connectivity and wiring diagrams/schedules submitted by the Contractor.
 - G. All wiring shall be installed as per the wire/cable installation requirements in Section 16700 “Communications”.
 - H. The Contractor shall verify proper installation during Site Acceptance Testing to ensure that the equipment has been properly installed and connected. Equipment will also be checked to ensure that it is of the appropriate model, and tagged and labeled correctly.
 - I. The Contractor will verify the installation of new and relocated equipment and cables to ensure adherence to the manufacturer's specifications, contract documents, engineering drawings, and local codes.
 - J. Testing will not interfere with the Authority's revenue operations and shall be coordinated with the Engineer prior to start.
 - K. The existing Penta PCx is currently being updated to support the required signaling functions for interfacing with the existing radio system. These functions include the ability to select/disable the channel guard function, transmit function, repeat function, and a lockout function required to disable the Talk-Around base station when a LRT base station is transmitting on the same channel and vice-versa. This work is being performed by the existing Stage II LRT-006 Contractor. These functions are also required for interfacing with the new radio base stations at the Allegheny Station. The Contractor shall ensure that once the Penta PCx has been successfully updated by the LRT-006 Contractor that the interface between the Penta PCx and the new base stations at the Allegheny Station supports the same functions as the existing interfaces.
 - L. The Contractor shall perform updates to the Penta PCx from the System Administration console.
 1. The following maintenance functions can be performed from the System Administration console:
 - a. Add, delete, and update the master electronic phone directory.
 - b. Define radio and telephone circuits.
 - c. Define call-in priorities.
 - d. Perform system diagnostics.
 - e. Distribute configuration changes.

**POR T AUTHORITY OF ALLEGHENY COUNTY
NORTH SHORE CONNECTOR PROJECT**

CONTRACT NO. NSC-009

The following Questions and Answers Summary shall not be construed to modify or change the Bid Documents. The Bidder shall submit its Bid based upon the Bid Documents. The Bid Documents may only be changed through the use of explicitly identified changes to the Bid Document, and any necessary change to the Bid Documents will be explicitly identified as such in an Addendum that would be issued by Port Authority.

Question 28: Table 15888-1 silencer insertion losses are not defined. Does this mean the contractor must have a sound consultant to test final sound levels once installed?

Response 28: Yes

Question 38: Bid Item 16221.001 – TPSS 27 KV Interrupter Switches. Where are the five (5) switches located?

Response 38: See Addendum 3

Question 41: Explain the requirement for the surge protection devise and the connections shown on Typical Impedance Bond Layout Drawing SG184, Sht. 411.

Response 41: Surge protection device is not required. See Addendum 3.

Question 42: Trying to find a company to install the concrete plinth pads will involve some additional time. Could you please extend the bid date 30 days to allow us to find a suitable company for this project? Thanks for your consideration.

Response 42: See Addendum 2

Question 43: Section 13576, Item 2.10.A & .B - The Contractor shall provide logic for Exit Inhibits for every signal at each interlocking. Exit Inhibits shall be capable of being imposed and reset from OCC or the Local Control Panel. Are the modifications to the existing Wood and Gateway LCP's

by the Contractor to include Exit Inhibit functionality or is this function only intended for OCC at these locations?

- Response 43: Exit Inhibit functionality shall be provided on the new local Control Panels at Wood Street, Gateway and Allegheny. Spec Sections 13570 and 13581 has been modified. See Addendum 3.
- Question 44: Section 13581, Item 2.01 - Neither the Indication LED color nor the Control lever style are described for the Exit Inhibit function for the LCP? Please provide.
- Response 44: The color of the indication light for the Exit Inhibit feature is blue as described in Section 13581, Paragraph 2.01 F.15. The control lever for the Exit Inhibit function at the local control panel shall be a push/pull button described in modified section 13581. SG100 and 104 have been revised. See Addendum 3.
- Question 45: Contract drawing 360, Timing Section Overlay Circuits - Requirements similar to those found in Section 13574, Item 2.06 are not defined for Audio Frequency Track Circuits. Please provide.
- Response 45: Requirements for Audio Frequency Overlay track circuits have been added, see Addendum 3.
- Question 46: Section 13574, Item 2.03.A - the Contractor shall provide and install ATS equipment at all signal locations. In reviewing contract drawing 432, it appears that a trip stop was added at Wood signal I2S, but not at signal 8N. Should a trip stop be added at signal 8N as well? Also, contract drawing 345, should we add trip stops at Gateway signals 10N and 12S?
- Response 46: Section 13574, Paragraph 2.03.A has been revised by Addendum 3. A train stop shall not be added at Signal 12S at Wood Street Interlocking, or at Signals 10N and 12S at Gateway Interlocking.
- Question 47: Contract drawing 432 - this drawing shows new cables being installed to (as an example) signal 6N. However, referring to contract drawing 449, unlike signal 10S, signal 6N cable replacement is not shown. More importantly, refer to contract drawing 337 and note that signal 6N has been completely reconfigured to include GT aspect. Is the Contractor required to provide the necessary signal units to achieve this reconfiguration, or provide a completely new signal assembly?

This issue pertains to all existing signal locations from Wood through existing Gateway both inbound and/or outbound.

- Response 47: See Contract Drawing 1022-2, sheet 432, new signal cables shall be installed from the Wood Street Interlocking Relay Room to Signal 6N. Contract Drawing 1022-16, Sheet 449 has been revised accordingly per Addendum 3. Contract Drawing SG005, Sheet 337 indicates that Signal 6N at Wood Street, and Signal 2N, 4N and 8N at Gateway Interlocking shall be re-configured by the Contractor to include the GT (Lunar) aspect. The contractor shall provide all necessary equipment and design to achieve the reconfiguration.
- Question 48: Sheet 432 shows "TWC-WS6N@MT" in a dotted circle on the left side of the drawing. Is this new TWC loop originating from Mid-Town (Steel Plaza), supposed to function as the far coil for the TWC-6N at Wood Street? If so, what is the cable length from the point of origin?
- Response 48: TWC loop TWC-WS6N@MT shown on sheet 432 is existing TWC loop 48 at Midtown. See "Also Drawing" Sheet 668-2, 668-W3 and 668-76 added per Addendum 3 for detail. Contractor shall utilize spares in existing 37 Cond. Cable between Midtown and Wood Street to transmit routing information to Wood Street.
- Question 49: Section 13581, Item 2.01.A. *A new LCP shall be provided by the Contractor in the new Relay Room at Allegheny Interlocking.* If no panel is required for the North Shore Relay Room, where are indications of the signals / track circuits within the North Shore Relay Room Limits to be shown?
- a) Only at the OCC panel?
 - b) Does the foremost left light at Sheet 377 of the contract drawings show the closest track circuit indication or the indication of all track circuits between Allegheny and Gateway?
- Response 49: The Contractor shall divide the territory between Gateway Interlocking and Allegheny Interlocking in half and indicate all track circuits within the Allegheny segment of the territory on the 2NAKE and 4NAKE lamps at Allegheny. Likewise, the Gateway segment track indicators shall be indicated on the Gateway Interlocking LCP. All track circuits shall be sent to OCC and individual indication for each track shall be provided.

- Question 50: What is the purpose of the 2-conductor twisted cable between the locations shown on Sheet 349 of the Contract drawings?
- Response 50: The 2 conductor #16 AWG,twisted pair cable shown on Contract Drawings SG019 through SG024, sheets 345 to 349 are for the maintenance telephone system. Typical circuits for this system are shown on Contract Drawing SG132, Sheet 392.
- Question 51: The “Typical **Interlocking** System Block Diagram” shown on sheet 354 of the Contract Drawing is only for the interlocking. Where can we find the system block diagram for the North Shore location?
- Response 51: See new drawing SG052A added per Addendum 3.
- Question 52: Section 13570 1.08 A. 13, has PAAC verified that the equipment specified (AFO equipment, etc.) has no impact on the ATS equipment?
- Response 52: The Contractor shall perform a Frequency and Electro Magnetic Interface analysis of all track circuits provided to prove that track circuit does not interfere with ATS equipment. Spec. Section 13576 has been modified per Addendum 3.
- Question 53: Can equivalent relay circuits be supplied to satisfy the requirements for an SRS for the wayside application logic?
- Response 53: No. Equivalent relay circuits alone will not satisfy the specified requirements for a Software Requirements Specification as defined within 13577.1.04 C.
- Question 54: 13585 3.16. H. discussed final painting requirements and includes train stops. Since the train stop is normally not painted can you clarify?
- Response 54: Train stop layouts shall be painted. The train stop itself shall not be painted if it is galvanized as specified in 13585 3.16 B.
- Question 55: Our company is in the process of estimating the electrical requirements for the above listed project. We have received several notices that various electrical equipment suppliers / manufacturers are unable to meet our requested quotation date for their bids due to key personnel being out on vacation.

We would like to request a thirty (30) day extension of the bid due date, to insure that we receive the most competitive costing for your project

Response 55: See Addendum 2

Question 56: Dwg SG021 (347) Double Line Track & Signal Plan shows a 2C #14 cable to 6035SV. Is that actually device 6034SV?

Response 56: Yes. Drawing SG021 has been changed accordingly per Addendum 3.

Question 57: Dwg SG023/SG024 (349/350) — Allegheny. -Depicts Signal 4N having aspect configuration Y-R/R. It appears from other drawings that it should be Y-R/R-LW.

Response 57: This is correct. Drawings SG023 and SG024 have been changed accordingly per Addendum 3.

Question 58: Dwg 1022-2 (432) Revised Wood Interlocking Cable Plan shows removal of track circuit, signal, stop and switch cabling and respective junction boxes. It also indicates that TWC Loops, a single new stop and switches are to be added along with respective cabling and junction boxes along with new signal, stop and track cables and junction boxes. Are we to assume that the existing equipment in the control room will not need replaced and signals will not need any aspect configuration changes?

Response 58: Wood Street Interlocking changes to apply the new scissors crossover arrangement are shown on Contract Drawings 1022-1 through 1022-W32, sheets 431 through 521 inclusive. Additional aspect changes for Signal 6N at Wood Street Interlocking are indicated on Contract Drawing SG-005 Sheet 337. The Contractor shall be required to add the Lunar aspect and all associated controls, wiring and cables to Signal 6N as Signal 6N does not display this aspect today. The Contractor shall provide a complete design for this work as specified in Section 13750, Paragraph 1.01C.

Question 59: Does PAAC have any spare LCP tiles and./or devices that can be used. It is our understanding that these tiles are no longer available. If so, what cost for these tiles should be carried in the quote?

Response 59: Requirements to modify panels at Wood Street and Gateway changed to provide new panels for Gateway and Wood Street. See response to Question 43.

Question 60: Typical circuits shown on Drawing SG086 SH. 371 depicts the train stop being controlled directly from the vital processor. Current application requires an interface relay to be used. Has space for additional relays been considered in sizing the new control rooms? Also, what possibilities of expansion exist in the event more space is needed?

Response 60: Spares have been considered. The Contractor is responsible for the final design. If interface relays are required per the equipment being supplied by the Contractor they should be provided. The Contractor shall provide a layout drawing for its equipment at each location. Room sizes are shown on Contract Drawings. No room expansion provisions have been considered.

Question 61: The time allotted for completion of the Wood St turnback operation appears to be short based on the lead-time for material procurement and implementation. To avoid paying a premium for this work, would PAAC consider an extension of this Milestone?

- Lead-time for the Ansaldo Train Stop equipment appears to be a 10 month minimum.
- Would PAAC consider an extension on this Milestone (and LD)?

Response 61: The train stop removed from Signal 2N at Wood Street should be reused for signal 12S. Revised sheet number 432 per Addendum 3. Authority will not extend the milestone duration.

Question 62: Specification Section 13595 3.14 A. 1. discussed the LRV Brake Rate Adjustment for the safe braking test. Will PAAC be adjusting the brake rate on the test vehicles on a daily basis or will a vehicle with permanently de-rated braking be made available to the test team?

Response 62: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 63: Specification Section 13595 3.14 A.2 references the "LRV Speed Recorder." Is there any information available on this PAAC device?

- Response 63: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.
- Question 64: Specification Section 13595 3.14 references that brake "Activation point." Could this be described in more detail; i.e. does PAAC anticipate utilizing the trip function on the train as the "activation" for the brake test?
- Response 64: Yes. Authority will utilize the trip function on the train for the safe braking test.
- Question 65: Section 13570, item 1.08.A.4: The Contractor shall verify the 'as-in-service' condition of all existing circuitry and equipment prior to making any circuit revisions and wiring changes. If the Contractor determines the condition of existing circuitry and/or equipment is unsuitable for use, who is responsible to repair and/or replace existing wiring or equipment?
- Response 65: Section 00700 – General Conditions, Article 11, entitled "Differing Site Conditions" provides provisions for this condition.
- Question 66: Section 13579, Item 3.03.B.3b and Item 3.04.B.1c: These items request submittal of Control Line drawings (Route and Aspect charts) with the PDR and FDR. According to section 13570, item 1.07.A the "block Layout" and "Control Line Drawings" are 'definitive' and 'final' as presented. Therefore, what is the Contractor providing per these requirements?
- Response 66: 13579 3.03B.3b and 3.04B.1c Submission of Control Lines/Route and Aspect Charts are not required. See Addendum 3.
- Question 67: Section 13595, Item 3.14.B: Discrepancies encountered while performing the Safe Braking test. According to section 13570, item 1.07.A the "Block Layout" and "Control Line Drawings" are 'definitive' and 'final' as presented. Therefore, plans of corrective action and any associated retesting is extra work. Please advise as to the mechanism for compensation for said extra work?
- Response 67: Merited extra work will be addressed in accordance with Section 00900, Article 1.
- Question 68: Section 13570 Item 1.01 .B.10g and Item 1.01 .B. 11f: The Contractor shall redraw and convert all existing drawings 'as is required' to conform to these specifications. Is the Contractor only to redraw those

existing drawings in which circuitry is modified (as is required), or the entire Book of Plans?

Response 68: See Addendum 3.

Question 69: There is a discrepancy between Section 13579, Item 2.01.O.2 and Section 13585, Item 3.05.B, which is correct?

Response 69: Direction given in Section 13585, Paragraph 3.05B regarding 10 inch height of equipment from floor is correct. Section 13579 has been revised per Addendum 3.

Question 70: On Contract Drawing 349, there appear to be overlay (AFO) track circuits applied within the interlocking limits which has single-rail PF track circuits. Since propulsion return current from both ends of each vehicle axle will be attempting to reach the one propulsion return rail, it will naturally pass through the AFO equipment connected to the rails and most likely cause permanent damage to it. Therefore, in place of these particular AFO circuits, would the use of additional single-rail PF track circuits within the interlocking be considered to achieve the same system result?

Response 70: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 71: Contract Drawing 432 depicts a TWC at the Midtown location. Where will the trackside coil's interrogator control unit be located? Will cable be required to interface this TWC interrogator to Wood St. Interlocking?

Response 71: See response to Question 48.

Question 72: NSC-009 sheet 429 depicts a TTW coil located within the 1025ST track circuit. It is our understanding that all TTW coils have been removed in this area. Please confirm that this coil was not intended to provide functionality.

Response 72: This TTW coil is to remain and its functionality shall remain as is.

Question 73: Dwg. SG019 Sheet 345 shows 3 existing TWC coils at Gateway. It is our understanding that there is only 1 coil (outbound track) installed. Please confirm whether it will be necessary to add 2 additional coils at this location.

- Response 73: No new coils are required.
- Question 74: 16703-2.01-F-3: The Specification states "Each ADM shall be equipped with a 8-port 10/100 Base-T Ethernet switch", and that "Each ADM shall be capable of provisioning access to a 10/100 Base-T Ethernet circuit by combining a series of 1 to 7 VT1.5s" a.k.a. Low Order Virtual Concatenation (LO-VCAT). This implies the use of a Layer 1, CE-100T-8 Ethernet card in the 15310 ADM which is a Point to Point device, and not a switch. Cisco also has an ML series 8 port Ethernet card that is a Layer 2 switch, but it can only be provisioned at the STS level, not at the VT level. Would you please provide clarification on this issue?
- Response 74: Section 16703-2.01.F.3 has been modified. See Addendum 3.
- Question 75: CMO11, 012, 013 & CM037: Drawing CM037 depicts an Ethernet ring connecting all of the Remote PBX Modules and the Head-End PBX Servers. Note 1 states that the Ethernet ring is on the NSC SONET ring. This implies a Resilient Packet Ring (RPR) ring. Section 16703-2.01-F-3 calls for each Ethernet circuit to be provisioned with 1 to 7 VTI.5s" a.k.a. Low Order Virtual Concatenation (LO-VCAT). This implies the use of a Layer 1, CE-100T-8 Ethernet cards in the 15310 ADM which is a Point to Point device, does not provide RPR capability, only provides 10.5Mb/s speed. Would you please clarify?
- Response 75: See Response to Question 74
- Question 76: 16703-2.01-F-3: The Specification states "Each ADM shall be equipped with a 8-port 10/100Base-T Ethernet switch", and that "Each ADM shall be capable of provisioning access to a 10/100Base-T Ethernet circuit by combining a series of 1 to 7 VT1.5s" a.k.a. Low Order Virtual Concatenation (LO-VCAT). This implies the use of a Layer 1, CE-100T-8 Ethernet card in the 15310 ADM which is a Point to Point device, and not a switch. Cisco also has an ML series 8 port Ethernet card that is a Layer 2 switch, but it can only be provisioned at the STS level, not at the VT level. Would you please provide clarification on this issue?
- Response 76: See Response to Question 74
- Question 77: CM028: The Specification references the "ALSO Drawings" in various places. Example CM028, Note 1. We have been unsuccessful in locating these drawings in the Contract #9 Specification Package. Would you please provide these drawings?

Response 77: The "Also Drawings" are Volume 2 of the Contract Drawings. If you purchased either a hard copy or CD and you should have this document. If you are still unable to locate Volume 2 Contract Drawings, please contact Toni Matessa of Authority at (412) 566-5148.

Question 78: 16950-2.07-A & 16721-2.03-A: Specification Section 16950-2.07-A states that the PBX shall be powered by the UPS for the OCC specified in Section 16705. Specification Section 16721-2.03-A states that the PBX shall have its "own dedicated UPS" Which one is correct?

Response 78: Sections 16950-2.07.A & 16705-1.01.B.5 & 3.01.C all indicate that the PBX head-end at the OCC will have its own dedicated UPS.

Question 79: 16703 - There are several references to a Digital Access and Cross-Connect System (DACS) although there are no requirements for port density, expansion, recommended manufacturer etc. Would you please provide the requirements for this piece of equipment?

Response 79: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 80: 16950 Section 1.08 Item G.2.b and Drawing CM44 refer to new transmit audio circuits for Allegheny station. It is believed that only one new card is required in the Penta for the Talk Around circuit. The current system does not support separate Transmit LIC's for each base station.

Response 80: Only one new voice circuit must be terminated on the Penta switch, which will support the Talk Around circuit to Allegheny Station. The existing Transmit audio circuit between the Penta switch and the existing Simulcast Controller will be used to transmit audio for the other radio channels (e.g., LRT1 (Data), LRT2 (Operations), etc.), with a new Simulcast Delay card required for the Allegheny station. The existing Receive audio circuits between the Penta switch and the existing Voters will be used to receive audio for the other radio channels (e.g., LRT1 (Data), LRT2 (Operations), etc.), with a new Voter Channel card required per channel for the Allegheny station. The Simulcast Delay card and the Voter Channel cards are specified in Section 16722. Drawing CM051 correctly indicates the new interface electronics required to support the NSC Radio System, and Note 5 indicates that a new Line Interface Card is required for the Talk-Around TX/RX. Spec Section 16950 Section 1.08 Item G.2 and Section 3.03 Items A and F have been updated to reflect the above architecture. See Addendum 3.

- Question 81: CM75,CM76,CM77: There seems to be missing information on these sheets. Why are the CCTV cameras on sheet CM75 not numbered in sequence? The CER RTU#3 is missing on all sheets. And the telephone circuits do not match Table 1-1 in section 16721. Please advise.
- Response 81: CCTV cameras 8, 10, and 11 were deleted. Drawings CM075 to CM077 has been revised to show the CER RTU. The Total quantities at each station shown on Table 1-1 in Section 16721 has been revised and sheets CM075 to CM077 have been updated to match the telephone quantities in Section 16721-Table1-1. See Addendum 3.
- Question 82: Specification 02450, 1.08, A the fourth line describes that "Authority will load Authority Supplied Strap Guard rail on Contractor's truck" which is in conflict with the same paragraph last second sentence" Contractor shall inspect, load and assume". Please clarify.
- Response 82: Contractor will load strap guard. See Addendum 3.
- Question 83: Quantify for Type III DF Track (Bid Item 02452,003) is 1,095 LF as shown in unit price schedule Form B. Our take-off based on drawing TK146, sheet 123 is 995 LF which is 100 feet short. Please advice,
- Response 83: Sheet TK146 is correct; 995 LF of Type III track. See Addendum 3.
- Question 84: How is the guard angle connected, jointed or welded? Please provide the detail. Also please provide the detail of the vertical shims, insert and anchor bolts of Guard Angle as shown in drawing TK13 I, sheet 113.
- Response 84: Ends of Guard Angles to be bolted. Details of joint bar, hardware, and shim included on Drawing TK128. See Addendum 3.
- Question 85: What is the design radius, which require rail, strap guard rail and emergency guard rail be bended? Can they be field bended or must be shop bended? Can PAAC provide a price to pre-bend the strap guard rail and rail?
- Response 85: All running rail and strap guard rail with a radius of less than 300' shall be shop bent. All emergency guard angle installed on curves shall be

- shop bent to be concentric with the running rail. Authority will not bend strap guard rail and rail for Contractor.
- Question 86: Specification 02452, 2.11, B requires that the HDPE shim be furnished by the direct fixation fastener manufacturer. Is that correct? Can other supplies other than DF fastener manufacture to be utilized in this item?
- Response 86: Yes, HDPE shims to be provided by direct fixation fastener manufacturer only.
- Question 87: Specification 02452, 3.02, C, 2 requires at least one polyethylene shim is to be used under each direct fixation rail fastener, but not more than two shims total under each fastener. By using top down method of installing rail, achieving the desired elevation of the track without a shim is possible. Can this requirement be deleted from the specification?
- Response 87: No, requirement cannot be deleted; a minimum of (1) shim is be used under all DF fasteners.
- Question 88: Drawing TK 112, sheet 102 bill of material includes 16 each standard joint and 14 insulated joint. Are the remaining joints welded? Please clarify.
- Response 88: All special trackwork, except anchor bolt hardware and anchor bolt inserts, shown on sheet TK112 has been previously procured and will be provided to the Contractor, per Note 1 on sheet TK112. Joints will be as provided. Ends of all stock rails will be bolted to existing track.
- Question 89: Drawing TK 113, sheet 103 shows insulated joints and non-insulated joint. Are the remaining joints welded? Please clarify.
- Response 89: Bolted and Insulated joints are to be provided where shown. If additional joints are required to facilitate manufacturing, shipping, and on-site installation, they shall be bolted.
- Question 90: The Specification are calling for L.B. Foster type Direct Fixation Fasteners (Ridge clips). Can we use an alternate of Lord DF fasteners that have been used in the past. Lord's DF fasteners use Pandrol shoulders and clips. The fasteners also have been qualified by PAACO

- Response 90: Alternate fastener assemblies may be considered, per Section 02462, Article 2.01, as long as the assembly meets all requirements of Section 02462.
- Question 91: Drawing TK 132, Bill of Material, item #8 calls for the rebar to be #5 Hoop Bars. All other information given says that the Hoop Bars will be #4 rebar. Please clarify.
- Response 91: All hoop bars to be #4 rebar. See Addendum 3.
- Question 92: Is there somewhere in the specification that mentions pre curving the running rail per a particular radius?
- Response 92: See response to Question 85.
- Question 93: The drawings mention applying a bonding agent on the concrete deck prior to installing the plinth pads. Is there a specification for the bonding agent to be used?
- Response 93: Standard PennDOT 408 Section 706 concrete bonding agent shall be used.
- Question 94: Is rail grinding the running rail at the completion of the project required?
- Response 94: Rail grinding is not required for this Contract, Section 02453,1.01,B4 has been modified in Addendum 3.
- Question 95: Reference Section 02453, Special Track Construction. 1.01, B.4 Rail Grinding. Please clarify what this rail grinding means.
- Response 95: See response to Question 94.