

PORT 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: September 5, 2008

Please find enclosed the following:

- Addendum No. #5 dated September 5, 2008
- Question and Answers 63, 103, 109-124, 131, and 135-145
- Form B (Unit Price Schedule), Sheets B-2 through B-10 Excel file (A5-NSC-009 Form B.xls).

All document holder, the Excel file listed above, is provided on the CD as a separate file that is in addition to the (.pdf) files for the Addendum.

To use the Excel file, copy the file to your computer, right click on the file and go to "Properties". Under the pop-up locate "Attributes" and uncheck the "Read-only" toggle. The bidder remains responsible for the proper submission of its Bid in accordance with the Bid Documents. Any additional updates to the Unit Price Schedule will be issued in Excel format as a part of related Addenda.

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. 5

September 5, 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-4. Delete and replace with page TOC-4.
2. Section 00200, Instructions to Bidders, Page 00200-25. Delete and replace with page 00200-25.
3. Section 00400, Bid/Award Forms, Form B, Page B-5. Delete and replace with page B-5.
4. Section 01300, Administrative Requirements, Page 01300-9. Delete and replace with page 01300-9.

CHANGES TO TECHNICAL PROVISIONS (VOLUME 2)

1. Table of Contents, Page TOC-4. Delete and replace with page TOC-4.

CHANGES TO TECHNICAL PROVISIONS (VOLUME 3)

1. Table of Contents, Page TOC-4. Delete and replace with page TOC-4.
2. Volume 3 Table of Contents, Page TP Index-1. Delete and replace with page TP Index-1.

3. Section 15885, Tunnel Dry Standpipe Systems, Page 15885-8. Delete and replace with 15885-8.
4. Section 15886, Tunnel Ventilation Jet Fan Active Control, Pages 15886-1 through 15886-12. Technical Provision Added.
5. Section 16722, Radio System Expansion, Page 16722-4. Delete and replace with 16722-4.
6. Section 16895, Tunnel Services Low Voltage AC Variable Speed Drive, Page 16895-3. Delete and replace with 16895-3.

CHANGES TO NSC-009 CONTRACT DRAWINGS (VOLUME 1)

(Modified or Added Drawings are attached here to)

1. Drawing No. GN010, Sheet No. 10. Drawing Modified.
2. Drawing No. OC151, Sheet No. 182. Drawing Modified.
3. Drawing No. TP111, Sheet No. 303. Drawing Modified.
4. Drawing No. TP116, Sheet No. 306. Drawing Modified.
5. Drawing No. CM062, Sheet No. 554. Drawing Modified.
6. Drawing No. CM072, Sheet No. 557. Drawing Modified.
7. Drawing No. CM074, Sheet No. 559. Drawing Modified.
8. Drawing No. MC001A, Sheet No. 616A. Drawing Added.

CHANGES TO NSC-009 ALSO PLANS (REF DWGS) (VOLUME 2)

(Modified or Added Drawings are attached here to)

1. Drawing No. GN004A. Drawing Modified.
2. NSC-006 Drawing No. TN697-1. Drawing Added.
3. NSC-007 Drawing No. ST024. Drawing Added.

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

13574 Wayside Signal Equipment
13576 Circuit Requirements
13577 Solid-State Equipment
13579 Design Requirements
13580 Train to Wayside Communications (TWC)
13581 Local Control Panels
13582 Safety and Systems Assurance
13585 Installation Requirements
13587 Wire and Cable
13588 Relays and Plugboards
13589 Electrical and Electronic Components
13590 Housings and Housing Equipment
13591 Tags, Locks and Keys
13593 Signal Power Distribution
13595 Signal System Test and Inspection

VOLUME 3 TECHNICAL PROVISIONS NSC-009 NSC TRAIN SYSTEMS (SYSTEM WIDE)

15400 Tunnel Services Scope of Work
15445 Tunnel Mechanical Drainage Systems
15446 TPSS Sump Pumps
15884 Tunnel Fire Extinguishers and Cabinets
15885 Tunnel Dry Standpipe Systems
15886 Tunnel Ventilation Jet Fan Active Control
15887 Tunnel Ventilation and Balancing Dampers
15888 Tunnel Ventilation Noise Attenuators
15889 Tunnel Ventilation Fans
15890 Tunnel Ventilation Jet Fans
15891 Tunnel Services Mechanical Testing and Commissioning
16050 Basic Electrical Requirements
16060 Grounding and Bonding

137. PAAC Stage II Light Rail Transit System, Contract No. LRT-006, Electro-Magnetic Interface ICDD (EMI ICDD), Dated August 2, 2001, (*Purchase Price \$ 5.00*).
138. PAAC TELOC 2510 Event Recorder PTU User Manual, Charter 1 -TELOC 2510 Event Recorder, Dated May 2005, (*Purchase Price \$ 2.00*).
139. PAAC CAF Light Rail Vehicle Running Maintenance and Service Manual–Volume I Chapter 12 -Train Control, Dated March 2005, and Volume III, M930-RM-001 – Change Default Event Recorder Configuration; M930-RM-002 – Read and Deal with Event Recorder Error Messages; M930-RM-003 – Check Additional Factors with the Event Recorder Service Unit Software; M930-RM-004 – Check Event Recorder Function; M930-RM-005 – Replace Event Recorder, Dated March 2005, (*Purchase Price \$ 5.00*).
140. PAAC CAF Light Rail Vehicle Heavy Repair Maintenance Manual; M930-HR-001 – Change Event Recorder Modules; M930-HR-002 – Change the Event Recorder Power Supply Unit; M930-HR-003 – Change Event Recorder Backup Battery, Dated March 2005 (*Purchase Price \$ 5.00*).

2.7 Preparation And Submission Of Bid

- A. Bids shall be completed in ink on the Form of Bid (Form B) and must be manually signed. Evidence of the authority of the person signing the Form of Bid will be required with the Bid. If erasures or other changes appear on the Bid, each erasure or change must be initialed by the person signing the Bid. The Bidder shall submit, with the Form of Bid, the Certification of Bidder (Form C), along with the required Bid Guaranty. In addition, for a Bid totaling over \$100,000, the Bidder shall submit the Buy America Certificate (Form D), Certification Regarding Lobbying (Form E), and the Disclosure of Lobbying Activities (Form F), if required pursuant to Bidder's completion of Form E. Bidder should also complete and submit, with its Bid, the Bidder/Subcontractor Data Form (Form G-VI).
- B. Prices shall be provided for each item set forth on the Form of Bid.
- C. Written modification of a Bid already submitted will be considered if received by Authority at the specified location before the time set for receipt of Bids. The modification shall be duly executed by the Bidder or its authorized representative, shall be clearly labeled as a modification of a Bid, and if an increase, shall be accompanied by an increase in the Bid Guaranty. Modifications received after the time stipulated for receipt of Bids will not be considered. Telegraphic or faxed modifications will not be considered.
- D. Bidders must execute Bids as follows:
 1. Sole Proprietor
If the Bidder is an individual or sole proprietor, the Bid must be executed with a handwritten signature by the owner. In the event that the Bid is signed by a person other than the owner, then the Bid must contain supporting documentation, satisfactory as to form and substance to Authority, authorizing said person to bind the Bidder in contractual matters (such as a properly executed Power of Attorney).
 2. Partnership
If the Bidder is a general, limited or other partnership, the Bid must be executed with a handwritten signature by a general partner of that partnership. In the event that the Bid is signed by a person other than a general partner, then the Bid must contain supporting documentation, satisfactory as to form and substance to Authority, authorizing said person to bind the partnership in contractual matters.
 - c) Joint Venture

PORT 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
13579.001	CONCEPTUAL DESIGN REVIEW	LS	1		
13579.002	PRELIMINARY DESIGN REVIEW	LS	1		
13579.003	FINAL DESIGN REVIEW	LS	1		
13579.004	SOFTWARE DOCUMENTATION AND SUPPORT	LS	1		
13582.001	SAFETY AND SYSTEMS ASSURANCE, DESIGN PHASE	LS	1		
13582.002	SAFETY AND SYSTEMS ASSURANCE, TEST PHASE	LS	1		
13595.001	SIGNAL SYSTEM TEST AND INSPECTION	LS	1		
15445.001	TUNNEL MECHANICAL DRAINAGE SYSTEMS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15445.002	SPARE TUNNEL MECHANICAL DRAINAGE EQUIPMENT	LS	1		
15446.001	TPSS SUMP PUMPS	LS	1		
15884.001	TUNNEL FIRE EXTINGUISHERS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15884.002	TUNNEL FIRE EXTINGUISHER CABINETS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15884.003	SPARE TUNNEL FIRE EXTINGUISHER AND CABINET	LS	1		
15885.001	TUNNEL DRY STANDPIPE SYSTEM AND ALL ASSOCIATED EQUIPMENT	LS	1		
15885.002	SPARE TUNNEL DRY STANDPIPE VALVES	LS	1		
15886.001	JET FAN ACTIVE CONTROL SYSTEM AND ALL ASSOCIATED EQUIPMENT	LS	1		
15887.001	TUNNEL VENTILATION DAMPERS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15887.002	BALANCING DAMPERS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15887.003	SPARE TUNNEL VENTILATION DAMPERS, BALANCING DAMPERS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15888.001	NOISE ATTENUATORS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15888.002	SPARE NOISE ATTENUATORS	LS	1		
15889.001	TUNNEL VENTILATION FANS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15889.002	EVASES AND ALL ASSOCIATED EQUIPMENT	LS	1		

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

REFERENCED	ITEM	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
13595	Signal System Test and Inspection													
15400	Tunnel Services Scope of Work	X	X	X	X									
15445	Tunnel Mechanical Drainage System	X	X	X	X									
15446	TPSS Sump Pumps	X	X	X	X									
15884	Tunnel Fire Extinguisher and Cabinets	X	X	X	X									
15885	Tunnel Dry Stand Pipe System	X	X	X	X									
15890	Tunnel Ventilation Jet Fans	X	X	X	X									
15887	Tunnel Ventilation and Balancing Dampers	X	X	X	X									
15888	Tunnel Ventilation Noise Attenuators	X	X	X	X									
15889	Tunnel Ventilation Fans	X	X	X	X									
15886	Tunnel Ventilation Jet Fan Active Control	X	X	X	X									
15891	Tunnel Service Mechanical Testing and Commissioning													
16050	Basic Electric Requirements	X	X	X	X									
16060	Grounding and Bonding	X	X	X	X									
16081	Electrical Testing AC Systems													
16111	Conduit	X	X	X	X									
16120	Low Voltage Power Cables	X	X	X	X									
16123	MV Transformer, Liquid Filled	X	X	X	X									
16124	Medium Voltage Cables, 25kV	X	X	X	X									
16125	Low Voltage Bus Duct	X	X	X	X									
16130	Raceways and Boxes	X	X	X	X									
16135	Intrusion Detectors	X	X	X	X									
16200	Traction Power Substation General Requirements													
16205	Circuit Breaker Room and Tie Breaker Station General Requirements													
16210	Traction Power Substation Basic Electrical Materials and Methods													
16220	Traction Power Substation 27KV AC Switchgear	X	X	X	X									
16221	Traction Power Substation 27KV Fusible Load Interrupter	X	X	X	X									
16230	Traction Power Substation Transformer - Rectifier Unit	X	X	X	X									
16235	Traction Power Substation Auxiliary Power System	X	X	X	X									
16240	Traction Power Substation Metal Enclosed DC Switchgear	X	X	X	X									
16250	Traction Power Substation Drainage and Negative Return Switchboard	X	X	X	X									

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

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Port Authority Technical Provisions
NSC-009 Technical Provisions

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- 15400 Tunnel Services Scope of Work
- 15445 Tunnel Mechanical Drainage System
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- 15884 Tunnel Fire Extinguishers and Cabinets
- 15885 Tunnel Dry Standpipe Systems
- 15886 Tunnel Ventilation Jet Fan Active Control
- 15887 Tunnel Ventilation and Balancing Dampers
- 15888 Tunnel Ventilation Noise Attenuators
- 15889 Tunnel Ventilation Fans
- 15890 Tunnel Ventilation Jet Fans
- 15891 Tunnel Services Mechanical Testing and Commissioning

DIVISION 16 – ELECTRICAL

- 16050 Basic Electrical Requirements
- 16060 Grounding and Bonding
- 16075 Electrical Identification
- 16081 Electrical Testing AC Systems
- 16111 Conduit
- 16120 Low Voltage Power Cables
- 16123 MV Transformer, Liquid Filled
- 16124 Medium Voltage Cables, 25 kV
- 16125 Low Voltage Bus Duct

- L. All pipework must be so constructed that it shall be free for contraction and expansion so that it shall not damage any other work or itself.
- M. Provide for thermal expansion of piping by provision of expansion joints spaced at least every 200ft and around isolation valves. The Contractor shall consider the ambient temperature at the time of installation to ensure that the expansion joints have been installed for adequate expansion and contraction over the range of expected operating temperatures. It is estimated that temperatures will range between 32°F and 104°F with a corresponding thermal expansion of 1.85" for every 200 ft of piping.
- N. Special care shall be taken in the arrangement of piping to ensure neat and workmanlike appearance and true alignment and grade.
- O. All pipes and fittings shall be thoroughly cleaned before erection, removing all scale, burrs, fins and obstructions and the section shall be blown out to remove all scale, slag, pipe-cutting residue, etc. before final flushing.
- P. Support piping so that hangers or saddle clamps shall sustain load and properly secure piping to prevent vibration when piping is in use. Support intervals shall not exceed 10 feet. Provide at least one hanger for each pipe section. Hangers and clamps shall also be installed at each offset or change in direction and at each hose valve connection.
- Q. Grade piping where necessary so that the entire system can be drained. Provide 2 inch full port drain valves at low points in system not drained by a fire hose valve.
- R. Provide piping passing through walls and other locations as indicated with sleeves with annular space between pipe and sleeve sealed in an approved manner. Where fire isolation is required between spaces separated by walls, fire stopping shall be provided in accordance with Section 07841, "Fire Stop and Barrier Systems".
- S. Grooved Piping
 - 1. Prepare and groove piping in accordance with the coupling manufacturer's instructions. Pipe shall be free from indentations, projections, or roll marks for proper gasket seating.
 - 2. Before installation, verify that gasket supplied is as specified for service intended.
 - 3. Apply gasket lubricant supplied by coupling manufacturer so that gasket will not be pinched upon assembly. Apply a uniform coat over exterior surface of gasket on the pipe and coupling surface.
 - 4. Install gasket and coupling in accordance with the manufacturer's instructions.
- T. Protection
 - 1. Throughout the installation of all piping, special care shall be continuously exercised to protect all openings to prevent the admission of any dirt, stones or other foreign substances that would subsequently obstruct the system. Close pipe openings with caps or plugs during installation.

SECTION 15886

TUNNEL VENTILATION JET FAN ACTIVE CONTROL

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 the implementation of the jet fan active control system for the bored tunnels in accordance with the Contract Documents. This Section provides a high level description of the jet fan active control system.
- B. The work of this Section includes, but is not limited to, the following activities:
 - 1. The development, programming, simulation, tuning, testing and commissioning of the program logic and PID controls required to meet the performance specification of this Section.
 - 2. The design, manufacture, supply, delivery, off-loading, storage, install, program, testing and commissioning of the equipment required to meet the performance specification of this Section.
- C. The Contract Documents provide the performance parameters and Design Criteria to complete certain portions of the Work of this Section and Related Sections. The Contractor shall be responsible to provide a completed installation for these portions of the Work.

1.02 RELATED SECTIONS

- A. Section 01910, "Operations, Maintenance and Repair Data"
- B. Section 01911, "Operations, Maintenance and Repair Database"
- C. Section 05520, "Miscellaneous Metal Work"
- D. Section 15400, "Tunnel Services Scope of Work"
- E. Section 15890, "Tunnel Ventilation Jet Fans"
- F. Section 15891, "Tunnel Services Mechanical Testing and Commissioning"
- G. Section 16120, "Low Voltage Power Cables"
- H. Section 16742, "SCADA System"
- I. Section 16889, "Tunnel Services Electrical Testing and Commissioning"
- J. Section 16890, "Tunnel Services Electrical Requirements for Mechanical Equipment"

- K. Section 16891, "Tunnel Services Low Voltage Switchboard and Motor Control Center"
- L. Section 16985, "Tunnel Services Low Voltage AC Variable Speed Drive"

1.03 REFERENCE STANDARDS

- A. AMCA
- B. ANSI
- C. ASHRAE
- D. ASME
- E. ASTM
- F. AWS
- G. British Standards (BS)
- H. IEEE
- I. ISO
- J. NEC
- K. NEMA
- L. NFPA
- M. SSPC
- N. UL

1.04 SUBMITTALS

- A. All drawing, calculation and design submittals shall be sealed by a Professional Engineer.
- B. Certified results from the required shop testing shall be provided prior to shipment of system components to the Worksite.
- C. Detailed drawings demonstrating that installed components will not encroach into the train kinematic envelope at any part of the Project. This shall be submitted to the Engineer for approval prior to procurement and installation of any components of the system.

- D. The documentation provided shall include key manufacturing quality assurance reports, including particularly the testing procedures carried out for material quality and structural integrity and the results in terms of defects noted.
- E. Shop Drawing
1. Submit Shop Drawings for the jet fan active control system showing schematic, layout, location, dimensions of system components, installation conditions, mounting details, and any other relevant information. These shall be submitted to the Engineer for approval prior to procurement and installation of any components of the system.
- F. As Built Drawings
1. Submit As Built Drawings for the jet fan active control system showing layout, location, size of system components, installation conditions, mounting details, and any other relevant information. These shall be submitted to the Engineer for approval upon Substantial Completion of the jet fan active control system portion of the Work.
- G. The Contractor shall submit the following manufacturing certificates and details within 60 days of Notice to Proceed.
1. Catalogue cuts shall be provided of all system components.
 2. Evidence that the materials selected and the assembled product will have a service life expectancy of not less than 20 years with reasonable maintenance. This shall include details of corrosion protection.
 3. Schedule of at least 3 project locations where comparable system components have been in satisfactory service for a minimum period of 5 years.
 4. Factory quality control plan and manufacturing schedule.
 5. Estimated mean time between failure (MTBF).
 6. Estimated mean time between service failure (MTBSF).
 7. Mean time to repair (MTTR).
 8. Recommended planned maintenance schedule.
 9. Manufacturer recommendations for handling and long term storage of any spare equipment.
 10. Dimensioned general arrangement and interface Shop Drawing of the system.
- H. The Contractor shall submit manufacturing certificates and details prior to delivery to the Worksite. The documentation delivery Schedule shall be proposed by the Contractor in the Project Schedule and submitted to the Engineer for approval.
1. Evidence that the materials selected and the assembled product will have a service life expectancy of not less than 20 years with reasonable maintenance. This shall include details of corrosion protection.
 2. Factory quality control records, inspection checklists and test reports.
 3. Factory calibration procedures and certificates.
 4. Estimated mean time between failure (MTBF).
 5. Estimated mean time between service failure (MTBSF).

6. Mean time to repair (MTTR).
7. Operation and maintenance manuals – these manuals shall describe the recommended maintenance, all design parameters and the designations, part numbers and commercial sources of spare parts. Manual format and numbers shall be in accordance with Authority requirements. As a minimum three copies shall be provided.
8. Manufacturer recommendations for handling and long term storage of any spare equipment.
9. Dimensioned general arrangement interface Shop Drawing of the system.

ARTICLE 2 PRODUCTS

2.01 GENERAL

A. Design Life

1. Equipment described in this section shall be designed for an operating life of 20 years unless noted otherwise. All auxiliary equipment (e.g. brackets, mounting frames and hardware etc.) shall be designed for an operating life of at least 20 years unless noted otherwise.

B. Serviceability of Electrical and Mechanical Equipment

1. Serviceability of electrical and mechanical equipment shall be considered in the detailed design.
2. Equipment shall be accessible and serviced safely to the satisfaction of the Engineer.
3. Equipment shall be arranged with sufficient clear space to facilitate equipment or component removal, maintenance and replacement, and to allow for ease in equipment servicing.

C. Equipment Location and Mounting

1. The intended location of mechanical and electrical equipment is shown on the Contract Drawings.
2. The Contractor shall coordinate with other Authority Contracts to ensure that the anemometers can be installed in accordance with the manufacturer's recommendations.
3. If any equipment cannot be installed at locations indicated on the Contract Drawings, the Contractor shall submit details of an alternative location to the Engineer for approval.
4. All equipment shall be installed such that it does not encroach into the train kinematic envelope at any part of the Project.
5. The Contractor shall submit to the Engineer details of proposed mounting brackets and hardware for approval to proceed.
6. In the event that any of the Contractor's equipment requires special mounting details (e.g. cast in place fixtures) the Engineer shall be notified in a timely manner for incorporation into the civil or structural packages.

D. Equipment Identification

1. Equipment and control devices shall be permanently labeled after installation. All labels shall be of a uniform format. This format shall identify individual equipment items and provide information regarding equipment type, equipment function, flow direction and other such data as appropriate. Identification shall include the equipment designator given in the Contract Drawings.
2. The manufacturer's branding and model number shall be clearly recorded on the anemometer casing.

2.02 SCOPE OF WORK

- A. The Contractor is responsible for the complete implementation of the jet fan active control system in accordance to the Contract Documents, including all required coordination efforts with other Authority Contracts.
- B. Equipment and services to be provided by the Contractor shall include, but not be limited to, the following;
1. Anemometers complete with mounting brackets and associated hardware.
 2. Low voltage AC variable speed drives (VSDs) suitable for jet fans as indicated in the Contract Documents.
 3. Power and communication cabling between the anemometers, PLC(s) and VSDs at North Side station.
 4. Spare parts.
 5. Special tools and test apparatus.
 6. Installation of all system components, inclusive of all electrical and communication cabling terminations.
 7. Design, modeling/simulation, development and documentation of the program logic and PID controls.
 8. Programming of PLC(s) to process the information from the anemometers.
 9. Programming of PLC(s) to implement Proportional-Integral-Derivative (PID) control of tunnel airflow.
 10. Programming of PLC(s) to communicate with and control jet fan VSD(s).
 11. Tuning of PID parameters in the PLC(s) to enable stable and effective control of jet fan speed to achieve a pre-determined tunnel air velocity during different emergency scenarios to the satisfaction of the Engineer.
 12. Interfacing with the SCADA system.
 13. Design, supply and install all equipment mountings. It is the Contractor's responsibility to provide frames and other supports required to mount the equipment to the fixed locations.
 14. Testing and commissioning as required by the Contract Documents.

2.03 JET FAN ACTIVE CONTROL SYSTEM DESCRIPTION

- A. The following presents a high level description of the intent and functionality of the jet fan active control system. It aims to assist the Contractor in the detailed design of the

system and the logic development and PLC programming to meet the design specifications in this Section.

- B. The jet fan active control system is designed to automatically adjust the total thrust generated by jet fans NS-TJF-207, NS-TJF-208, NS-TJF-209 and NS-TJF-210 located at approximately CH6038+50, with the purpose of achieving and subsequently maintaining a pre-determined air velocity inside the tunnels. Anemometers installed in the tunnels shall provide continual feedback to the jet fan active control system.
- C. Jet fans NS-TJF-207 and NS-TJF-209 serve the right tunnel, whereas jet fans NS-TJF-208 and NS-TJF-210 serve the left tunnel.
- D. Active control of the jet fans will be initiated in Mode 27 and Mode 28 of the Tunnel Ventilation Mode Table presented in drawings MC-402, MC-403 and MC-404.
- E. Active control of the jet fans will also be initiated during testing and commissioning as well as during Maintenance Testing mode.
- F. Principles of Operation
 1. Jet fans NS-TJF-207, NS-TJF-208, NS-TJF-209 and NS-TJF-210 are unidirectional and are designed to generate airflow towards Gateway station.
 2. These four jet fans shall be driven by variable speed drives (VSD) located in the MCC rooms at North Side Station.
 3. Twelve anemometers shall be installed within the tunnels at the locations specified in the Contract Drawings (six anemometers per tunnel) and shall provide continual tunnel air velocity monitoring and feedback to the North Side Station PLC(s).
 4. The PLC(s) shall process the feedback data from the anemometers, and shall continually adjust the speed of the jet fans via the VSD(s) to achieve and maintain a pre-determined air velocity within the tunnel.
 5. The PID control parameters shall be tuned to enable stable and effective control of jet fans speed even during different emergency scenarios to the satisfaction of the Engineer.
 6. The system shall have the ability to respond rapidly to changes in tunnel air velocity due to buoyancy effects of a fire, and automatically adjust the jet fans thrust.

2.04 ANEMOMETERS

- A. Anemometers shall employ ultrasonic speed measurement technology with a minimum of bi-directional velocity reporting capability, complete in a robust and corrosion resistant housing. Housings shall be sealed to IP65. All cable and wiring entries shall have correctly sized cable glands to at least the same IP rating as the housing.

- B. Anemometers shall be capable of measuring air velocity from 0 – 50 feet per second (fps) with an accuracy of $\pm 2\%$ or less and a minimum resolution of 0.033 feet per second or less through the entire range.
- C. Anemometers shall have a start up time of less than 1 second.
- D. Anemometers shall be factory calibrated within the specified measurement range. Individual factory calibration certificates shall accompany each anemometer.
- E. Anemometers shall be capable of satisfactory and reliable operation in all expected environments within the tunnels at the Project location. Mean Time Before Failure (MTBF) shall be no less than 15 years.
- F. Anemometers shall use a suitable communication protocol, taking into account the distance between the most remote anemometer and the North Side Station PLC(s).
- G. Anemometers shall have the capability of transmitting a status code, when polled, to provide the PLC with an indication of its operation status.
- H. Anemometers shall be capable of being remotely configurable via software, to enable operator selection of output rates, units of measurements and measurement range.
- I. Other
 - 1. Site measurement
 - i. Anemometer mountings are designated in the Contract Drawings. The Contractor shall site measure all locations to be fitted with anemometer mountings and shall be responsible for correct manufacture and installation.
 - 2. Fixtures
 - i. Mounting frames shall be supplied complete with all fixtures (nuts, bolts, spacers, washers, seals, packers etc) such that mounting frames and components supplied with the anemometers can be completely assembled.
 - 3. Equipment surface corrosion protection
 - i. Unless specified, appropriate anti-corrosion provisions shall be made by the Contractor for all components based on SSPC standards suitable for installation conditions. The Contractor shall provide information regarding material selections and corrosion protection schemes.

2.05 CABLING

- A. Communication cabling to anemometers shall be suitably shielded based on the anemometer communication protocol.
- B. Power cabling to anemometers shall be suitably sized, based on anemometer power rating.

- C. Anemometer communication cabling shall be UL Listed Type XHHW-2, low smoke, zero halogen, Firewall LSZH as manufactured by Rockbestos-Surprenant or approved equal as required by NFPA 130.
- D. Anemometer power cabling shall be Type RHW, 2-hour fire-rated, low smoke, zero halogen, as manufactured by Raychem or approved equal as required by NFPA 130.
- E. Additional electrical requirements are given in Section 16120, "Low Voltage Power Cables" and Section 16890, "Tunnel Services Electrical Requirements for Mechanical Equipment".

2.06 OPERATIONAL REQUIREMENTS OF THE ACTIVE CONTROL SYSTEM

- A. The system shall be capable of continually monitoring the tunnel air velocity during normal operation, and provide air velocity information to the operator via the SCADA interface. Continual logging of air velocity data shall be via the SCADA.
- B. The system shall continually monitor the operational status of each installed anemometer in the tunnel, and provide status reporting and logging via the SCADA interface.
- C. The system shall also be capable of displaying tunnel airflow rates in cubic feet per minute (cfm) if required by the operator, via the SCADA.
- D. Faulty anemometers shall be reported to the operator via the SCADA interface, and the system shall be capable of automatically isolating and removing the faulty anemometer feedback during data processing for jet fan active control.
- E. During jet fan active control, the system shall have sufficient tolerance for error and delays in achieving the desired airflow velocity, to prevent unstable and oscillatory system responses.
- F. The system shall be fully configurable and tunable for changing operating conditions. All PID parameters shall be fully adjustable.
- G. Adjustment of individual gain (calibration) and confidence weighting of each anemometer shall be possible within the control software.
- H. The system shall incorporate a Maintenance Testing mode. When initiated, the system will automatically achieve and maintain a pre-determined air velocity in each tunnel in turn for 10 minutes each and automatically return to normal operation mode upon completion of the test. Air velocity readings from all anemometers shall be logged individually and at a sampling period of not more than 10 seconds, for the duration of the test and a comprehensive test report shall be generated upon completion.

- I. In the event of complete failure of all anemometers, communications or other items that disrupts the feedback on air speed, the system shall be capable of reverting to a fixed response mode where a default jet fan speed shall be achieved and maintained.
- J. In the event of complete failure of the jet fan active control system, the PLC(s) shall revert to a fixed response where a default jet fan speed shall be achieved and maintained.

2.07 DATA PROCESSING REQUIREMENTS OF THE ACTIVE CONTROL SYSTEM

- A. When active control of jet fans command is initiated, the system shall firstly perform a poll on all active anemometers in the tunnel of interest. Active anemometers are defined as anemometers which have previously returned a “healthy” operation status.
- B. Upon completion of the poll, the system shall decide the available number of “healthy” anemometers in the tunnel. If the number of “healthy” anemometers in the tunnel of interest is less than 2, then the system shall revert to a fix response with a default jet fan speed.
- C. If the number of “healthy” anemometers is equal to or greater than 3, the system shall perform a continual averaging of the velocity readings from only the “healthy” anemometers, while simultaneously excluding the highest and lowest anemometer velocity readings from the averaging algorithm. Time averaging periods shall be fully adjustable by the operator.
- D. The averaged air velocity readings shall be submitted to the PID control module as the actual velocity in the tunnel, V_{actual} . The desired velocity, V_{desired} shall be determined during system testing and commissioning (V_{desired} should be between to the critical velocity and the velocity which would be caused by smoke overshoot into Gateway Station, as agreed by the Engineer).
- E. The PID control module shall output the appropriate speed control signals to the VSD(s) controlling the jet fans, and continually adjust jet fan speeds to achieve and maintain $V_{\text{actual}} \approx V_{\text{desired}}$ in the tunnel for as long as the active control command is maintained.
- F. In the event of one or more anemometers becoming “faulty” during active control of the jet fans, the system shall automatically isolate and exclude the “faulty” anemometers from the averaging algorithm.
- G. In the event that the number of “healthy” anemometers drops below 3 during active control of the jet fans, the system shall automatically revert to a fixed response with a default jet fan speed.
- H. When jet fan active control is no longer required, the system shall return to normal operation mode.

- I. In addition to the averaging algorithm, an alternative algorithm shall also be programmed. This second algorithm shall look at the anemometer outputs starting from the upstream end of the tunnel (with respect to train direction). It shall look along the tunnel until it finds 3 anemometer readings that agree within 15% of each other, and then take the average of those 3 readings as V_{actual} . If such an agreement cannot be identified after 4 attempts, the algorithm shall revert to that described in point C.
- J. All relevant signals (i.e. all anemometer readings, all VSD speeds and the averaged air speed results) shall be reported individually to the SCADA system.

2.08 SPARES

- A. The Contractor shall provide four spare anemometers of the same make and model as installed.
- B. The spares shall be suitably packed for handling and long term storage in accordance to manufacturer recommendations that have been approved by the Engineer and coordinated with Authority. Clear identification of the equipment shall be provided on the packaging.
- C. The Contractor shall be responsible for the transport and off-loading of any spares to a site nominated by Authority.

ARTICLE 3 EXECUTION

3.01 SHOP TESTING

- A. Testing procedures shall be submitted to the Engineer for review and approval.
- B. Anemometers shall be fully tested and calibrated at the factory, and a current factory calibration certificate shall accompany each anemometer. This shall be submitted to the Engineer for review and approval prior to installation of the anemometers.

3.02 SITE CALIBRATION, TESTING AND COMMISSIONING

- A. Calibration and testing procedures shall be submitted to the Engineer for review and approval.
- B. Site testing and commissioning shall be in accordance with Section 15891, "Tunnel Services Mechanical Testing and Commissioning".
- C. Calibration of anemometers as installed shall be performed using a hand held rotating vane anemometer. A full traverse of the tunnel cross section shall be performed while logging the anemometer reading, and an average air velocity derived for the test cross section. Correction factors shall then be calculated and programmed for each installed anemometer. These factors shall be programmable into the PLC controller(s).

- D. The Contractor shall carry out tests on completion as scheduled in Table 15886-1. The tests shall be carried out once all elements of the tunnel structure which affect the ventilation system are adequately close to being in their final operating conditions. The performance tests shall be carried out to demonstrate to the Engineer that the jet fan active control system is operating correctly.
- E. All testing shall be shown as a witness point in the Contractor's Project Schedule. At least 2 weeks notice of testing shall be given and the Contractor shall facilitate the attendance at the tests of the Engineer. Site testing carried out without sufficient notice will be deemed to have not been done and those fans will be re-tested when the Engineer can be in attendance.
- F. All test results shall be submitted to the Engineer for approval. The test results shall record all relevant information to the satisfaction of the Engineer. Tests that are not adequately documented will be deemed not to have happened and will be repeated by the Contractor at no extra expense to Authority.

Table 15891-1 Jet Fan Active Control Testing and Commissioning

Case	Description	Incident Track	Stationing (Front of Train) or General Position of Train	Vent Zone	Vent Mode	Tunnel Air Velocity Required in feet per second (m/s)
1	Bored tunnel between Gateway and North Side Stations: Ventilation via jet fans towards Gateway Station.	Right	6034+00 (top of grade)	5	27	5.5 (1.7)
2	Bored tunnel between North Side and Gateway Stations: Ventilation via jet fans towards Gateway Station.	Left	6034+00 (top of grade)	6	28	5.0 (1.5)
3	Bored tunnel between North Side and Gateway Stations: Ventilation via jet fans towards Gateway Station.	Right	6026+00 (bottom of grade)	5	27	5.5 (1.7)
4	Bored tunnel between North Side and Gateway Stations: Ventilation via jet fans towards Gateway Station.	Left	6026+00 (bottom of grade)	6	28	5.0 (1.5)

3.03 SYSTEM COMMISSIONING

- A. The jet fan active control system form part of the overall ventilation system.

- B. System commissioning shall be completed as part of Section 15891, "Tunnel Services Mechanical Testing and Commissioning".

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Item 15886.001 – Jet Fan Active Control System and all Associated Equipment shall be measured as a lump sum unit, complete in place.

4.02 PAYMENT

- A. Item 15886.001 – Jet Fan Active Control System and all Associated Equipment will be paid at the lump sum price and shall include the cost of all related work specified in this Section.

END OF SECTION

- N. Submit Allocation and Provisioning Plan, for approval by the Engineer
- O. Submit Software and Firmware Plan, for approval by the Engineer
- P. Submit Inspection and Test Plan and Procedures in accordance with Section 16901, "Communication System Inspection and Test", for approval by the Engineer
- Q. Submit Test Reports, for approval by the Engineer
- R. Submit maintenance data, materials, products, and spare parts list
- S. Submit As-Built Drawings and As-Configured data and documentation, for approval by the Engineer
- T. Submit Operating and Maintenance Manuals

1.06 NSC RADIO SYSTEM EXISTING CONDITIONS

- A. The existing LRT Radio System provides communication throughout the entire Authority LRT System. The FCC licensed channels used in the NSC Radio System above and below ground are indicated in TABLE 16722- 1.

TABLE 16722- 1				
Radio Channels	Transmit	Receive	Above Ground	Below Ground
LRT Operations	470.6625 MHz	473.6625 MHz	X	X
LRT Support	470.7375 MHz	473.7375 MHz	X	X
LRT Data	470.6125 MHz	473.6125 MHz	X	X
LRT Right of Way (ROW)	471.8125 MHz	474.8125 MHz	X	X
Transit Police	452.7750 MHz	457.7750 MHz		X
City of Pittsburgh Police	453.1000 MHz	458.1000 MHz		X
City of Pittsburgh Police Tactical	453.4500 MHz	458.4500 MHz		X
City of Pittsburgh EMS	462.9500 MHz	467.9500 MHz		X
City of Pittsburgh Fire Dept.	453.7000 MHz	458.7000 MHz		X

1.07 NSC RADIO SYSTEM RELIABILITY PERFORMANCE

- A. The NSC Radio Communications System shall provide two-way radio voice and data communications for the system frequencies as indicated in the above TABLE 16722- 1. The NSC Radio Systems shall provide above and below ground communications for Allegheny Station, North Side Station, Gateway Station, the NSC tunnel system, and within 500' of above ground right of way. The NSC Radio System shall provide radio communications,

	Fans, Jet Fans)		
3	Supply Frequency	Hz	60
4	Operating Ambient Temperature	°F	104
5	Minimum Operating Temperature	°F	32
6	Control Voltage	VAC	120
7	Braking Resistor	Required	YES

2.02 GENERAL

- A. Should the Contractor propose any deviations from the specified requirements, such variations shall be submitted in writing to the Engineer for approval.
- B. Ratings
 1. All equipment and materials supplied by the Contractor shall be suitable for operation under the general service conditions as specified in Article 2.01 of this Section.
 2. The Variable Speed Drive (VSD) controller components shall be capable of carrying continuously its assigned full load current at the ambient temperature as specified in Article 2.01 of this Section and rated voltage without exceeding the permissible maximum temperatures of the components parts.
 3. Only service proven designs shall be offered. When a design has not been proven in service for at least five (5) years, quotations shall indicate which parts do not meet this requirement and the extent of experience with these parts.
- C. Equipment Protection
 1. All equipment shall have a minimum degree of protection of NEMA 12, unless otherwise specified in this Section.
 2. All enclosures shall be vermin proof.
- D. All electronic components, circuiting and Printed Circuit Boards (PCBs) shall be coated with fungistatic lacquer to prevent damage or failure due to moisture or fungus growth.
- E. All VSD cabinets shall be made up of a framework of folded sheet steel and/or structural sections with additional supporting members provided where necessary for heavier components. All steelwork for electrical enclosures shall be free of rust, scale, burrs and sharp edges.
- F. Eyebolts shall be provided so that no distortion or fatigue will result from lifting. It shall be possible to remove all lifting accessories without needing access to any internal section of the panel.
- G. Direct air cooling for the VSD cubicles is preferred. Cooling fans and filters shall be provided.

**PORT 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 63: Specification Section 13595 3.14 A.3.a references the "LRV Speed Recorder." Is there any information available on this PAAC device?

Response 63: The data has been included as Reference Material available for viewing at Tri-Gold's offices in accordance with Section 00200, Article 2.6. See Addendum 5

Question 103: Specification item # 2.03 A.4 'Where the VSD requires additional functions such as dynamic braking capability' these will be specified in the Article 2.01 of this section. There is no mention of dynamic braking requirement in 2.01 of this section, but dynamic braking resistor is shown on electrical drawings for all VFD's.

Is dynamic braking required, and if so, are we to quote the braking resistors to be mounted external to the VFD's by others?

Response 103: Yes, braking resistors are required. See Addendum 5.

Question 109: For GW Tie Breaker Station (ref Drawing TP114), detail indicates cable to be run exposed and fastened to uni-strut. Conduit cable plan on drawing TP116, indicates cable to be run in 3" PVC from OCS to Tie breaker. Please clarify' installation method.

Response 109: Drawing TP114 is correct. Drawing TP116 has been revised.in Addendum 5.

Question 110: Drawing TP111 indicates that conduits DP 9 and DP 10 are spares between the Tie-Breaker room and OCS. If cable is fastened to uni-

strut, are you requiring uni-strut be long enough to add two additional 1000mcm cables for future use?

Response 110: a.) Uni-strut does not need to be extended for spares

b.) 2" C = PVC has been removed from DN-1 and DN-2. Dwg TP116 has been revised in Addendum 5.

Question 111: Drawing TP116 indicates 1000mcm cable to have insulation type EPR. Please confirm this insulation is required for the 1000mcm cable in a tunnel

Response 111: See Section 16121.2.02.H

Question 112: Drawing TP114, Section A-A, calls for (4) 1C cables for negative return reference. Drawing TP116 only indicates one cable. Conduit schedule on TP116 indicates two conduits from Negative return to rail. Please clarify how many negative returns reference there are and if these are to be in conduits in the tunnel or attached directly to the uni-strut

Response 112: a.) 4 – 1C-#6 Required per drawing TP114. One to each running rail of each track as per drawing TP101.

b.) Drawing TP116 has been revised, see Addendum 5.

c.) Only one negative return reference cabinets required as shown on dwg TP111.

d.) Cables to be attached to uni-strut per drawing TP114 and installed in conduit down tunnel wall to track.

Question 113: Drawing TP116. Regarding the conduit ACI; it appears that the "from" should be from the ATS not Electrical room. Station utility is feeding power to the ATS and NSC-009 needs to get power from the ATS to the PNP panel. Please confirm.

Response 113: Conduit AC-1 has been removed. Drawing TP116 has been revised in Addendum 5. Service from electrical room will be brought to Breaker Room by NSC-010 Contractor.

Question 114: Drawing TP111. Is the panel labeled PDP A Station Service panel the same panel as the PNP panel listed in the conduit schedule on sheet TP116?

Response 114: Yes, see Drawing TP 116 in Addendum 5.

Question 115: Drawing TP116. Conduit schedule list conduits AC7, AC8, and AC9. These conduits go from panel PNP to the air conditioning, EF-1, and EF-2. Please identify the physical location of these devices so conduits and cable length can be determined. Please note that the electrical schematic on drawing TP102 does not show these device connected in the Tie breaker room AC panel.

Response 115: EF-1, EF-2 and air conditioning have been removed from Drawing TP116. Fans and air conditioning by Contract NSC-010.

Question 116: Drawing TP111, what is the physical location of the battery charger?

Response 116: Locate battery charger adjacent to battery rack. See revised drawing TP111 in Addendum 5.

Question 117: Reference Drawing TP116. Conduit CM1 is designated to go from the SCADA Panel to the Comm Room. There are two Comm Rooms, E107 and E116 shown on drawing EL010. Please indicate in which Comm Room CM1 terminates and provide additional information as to where in the Comm Room the CM1 terminates.

Response 117: Conduit CM-1 shall run to CTS Rack in room E116.

Question 118: Conduit CM1 on Drawing TP116 is listed as PVC. This is low voltage running through the existing loop in the tunnel. Typically you call for RGS in this application. Please clarify.

Response 118: All conduits to be RGS.

Question 119: Drawing TP016, conduit schedule NS, has 1000 mcm cable for conduits, PSF 113 and PSF 115. These are the Passenger station AC feeders and on drawing TP310 they are listed as 4/0. Please clarify whether these cables are 1000 mcm or 4/0.

Response 119: Cables to be 3 – 1C #4/0.

Question 120: Drawing TP036 references Drawing TN697, Note 4. Please provide this drawing as a reference

Response 120: Drawing NSC-006 TN697 has been included in Addendum 5.

Question 121: Please provide a detail on how you would like the 1000 mcm DC feeders cables connected to the 500 mcm messenger wire. The detail provided is for connecting to a 1000 mcm messenger wire.

Response 121: See revised drawing OC151.

Question 122: Please quantify' the disconnect switches that are currently in place at Wood Street Station Cross-over.

Response 122: Currently there is one disconnect switch in middle of existing crossover.

Question 123: Please confirm that since the anchor bolts for the OCS poles have been previously installed by other, all anchor bolt nuts shall be provided to the NSC-009 Contractor by others at no additional cost.

Response 123: Nuts and washers for Catenary poles to be supplied by NSC-009.

Question 124: Please reference Specification Section 13585-3.04 regarding grounding requirements. Note 7 of Drawing SG150 states "All signals to be grounded to the Signal System Ground", Additionally, Drawings CR700 to CR703 all show a ground wire attached to the tunnel ceiling.

- a) Is the ground wire shown in Drawings CR700 to CR703 the aerial/signal system ground?
- b) Is the signal system ground connected to each ground plate in each signal relay room?
- c) Is there a signal system ground to be continued from the Gateway portion of the tunnel to the new tunnel?
- d) Are the signal system and electrical conduits to be grounded every 500' as shown on Drawing OC805 (Addenda #3)?
- e) Is the signal system ground the same as the ground wire shown mounted on the ceiling in the OC# Drawings (from Addenda #3)?

Response 124: a) Yes.
b) No.
c) See drawing OC600 thru OC604 for aerial ground requirements.
d) Yes.
e) Yes.

Question 131: Terms and Conditions Section 00900-3.16 addresses "incidental or consequential. We suggest that this waiver of "incidental or consequential damages" be mutual.

Response 131: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 135: We respectfully request an extension to the current bid submission deadline.

Response 135: The construction of the NSC-009 Contract is key to the NSC Program schedule. Port Authority is currently reviewing this schedule to assess if an additional bid extension can be accommodated. Bidders will be notified of any bid extensions in a near future Addendum.

Question 136: Addendum #3, Response 46 states the trip for 12S signal at Wood Street (which was being added for this job) shall not be added, but the cable plan for Wood Street in Addendum #3 still shows the trip and new cable being required Please clarify.

Response 136: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 137: 'The circuits (sh.388) show two 12volt/240AH batteries but do not specify what type of battery, (NICad, Lead Acid etc) or charger is required. Please specify the battery types and battery charger requirements.

Response 137: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 138: Section 13574, 2.03.A.1. ATS will be compatible with existing inductive train-stop equipment now in service.

There is no mention in the spec. of Manufacturer and/or Model of train-stops in service. Can you please, provide this information

Response 138: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 139: Section 13574, 2.03.B The wayside coils will be active at all times, unless the signal governing movements over the coils displays a permissive aspect.

Existing Wood Interlocking circuits, as well as typical ATS control logic, show coils to be energized only when a signal displays a permissive aspect Please clarify.

Response 139: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 140: We intends on submitting a prime bid on the project. In order to effectively do this, we requests a three week extension to the current bid date of September 24, 2008. There are also other major transit projects across the country being bid around the same time period and we want to be sure that we can assign the proper estimating resources to this opportunity. This again is a very complex project and this extension of time will allow us, as well as our numerous and varied/disciplined Subcontractors and Vendors, some of which being disadvantage business enterprise (dbe) owned, more time to develop a more detailed and cost effective price proposal for which the Port Authority of Allegheny County will surely benefit. This time will also allow for the distribution, comprehension and clarification of the forthcoming addendum and other future addendums as well as the original contact documents.

Response 140: The construction of the NSC-009 Contract is key to the NSC Program schedule. Port Authority is currently reviewing this schedule to assess if an additional bid extension can be accommodated. Bidders will be notified of any bid extensions in a near future Addendum.

Question 141: We request clarification to Note # 2 as to how it applies to the 6 Fiber Cable and Power Cables shown. Is the NSC-009 contractor to install the cable as shown or only provide the conduit rough-in for future cable installation?

Response 141: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 142: Are the bid sheets to be conformed to the addendums and hardcopies distributed by the Authority or are bidders to extract the revised sheets from the addendums and supplement the sheets provided in the bid package? Also is it possible to receive the conformed bid sheets in an electronic format to allow us to input the numbers on the sheets electronically.

Response 142: Bidders are to conform the Form B (Bid form). The electronic file of Form B has now been included on the CD and will be distributed to all Bid Document holders.

Question 143: Reference Dwg. CR206, Sift. 575 thru Dwg. CR208, Sht. 577

Can you define the limits of the Cable raceway by NSC-007 and the cable trough by NSC-009 on the elevated structure? Will the raceway in the walkway by the NSC-007 contractor extend through the retained fill area from the elevated structure?

Response 143: Yes, See NSC-007 Drawing ST024 added in Addendum 5.

Question 144: Section 13585 Item 3.03 C. infers that on elevated structures NSC-009 furnish covers of a specific size however Dwg. SG204 indicates the covers are by others.

Response 144: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

Question 145: Section 13574 Item 2.09 A specifies rail heater to be 300 watts per foot but Dwg. SG134 load calculations chart specifies 150 watts per foot. What is the correct wattage?

Response 145: Port Authority is reviewing this question and if a change to the Bid Documents is required it will be issued as an addendum.

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No.

DRAWING
No.

DRAWING TITLE

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633	MC-202	NORTH SIDE STATION - MECHANICAL EQUIPMENT - SHEET 2 OF 2 (WEST)
634	MC-210	NORTH SIDE STATION - TV EXHAUST DUCT PLAN
635	MC-220	NORTH SIDE STATION - EASTERN END, TV FAN ROOM PLAN
636	MC-221	NORTH SIDE STATION - EASTERN END, TV FAN ROOM ELEVATIONS
637	MC-230	NORTH SIDE STATION - WESTERN END, TV FAN ROOM PLAN
638	MC-231	NORTH SIDE STATION - WESTERN END, TV FAN ROOM ELEVATIONS
639	MC-232	NORTH SIDE STATION - JET FAN SECTIONS - CUT AND COVER TUNNEL - SHEET 1 OF 2
640	MC-233	NORTH SIDE STATION - JET FAN SECTIONS - CUT AND COVER TUNNEL - SHEET 2 OF 2
641	MC-300	GATEWAY LINE - TYPICAL DAMPER MOUNTING DETAILS
642	MC-301	GATEWAY STATION - TYPICAL PLATFORM LENGTH BALANCING DAMPERS - SHEET 1 OF 2
643	MC-302	NORTH SIDE STATION - TYPICAL PLATFORM LENGTH BALANCING DAMPERS - SHEET 2 OF 2
644	MC-400	TUNNEL VENTILATION SYSTEM - VENTILATION ZONES - SHEET 1 OF 2
645	MC-401	TUNNEL VENTILATION SYSTEM - VENTILATION ZONES - SHEET 2 OF 2
646	MC-402	TUNNEL VENTILATION SYSTEM - MODE TABLE - SHEET 1 OF 3
647	MC-403	TUNNEL VENTILATION SYSTEM - MODE TABLE - SHEET 2 OF 3
648	MC-404	TUNNEL VENTILATION SYSTEM - MODE TABLE - SHEET 3 OF 3

ELECTRICAL

649	EL-002	TUNNEL LIGHTING - TYPICAL DETAILS
650	EL-003	TUNNEL LIGHTING - TYPICAL DETAILS
651	EL-020	GATEWAY STATION - CONTROL SYSTEM BLOCK DIAGRAM
652	EL-022	TUNNEL VENTILATION - TYPICAL NON-MODULATING DAMPER CONTROL SCHEMATICS SHEET 1 OF 2
653	EL-023	TUNNEL VENTILATION - TYPICAL NON-MODULATING DAMPER CONTROL SCHEMATICS SHEET 2 OF 2
654	EL-024	TUNNEL VENTILATION - TYPICAL NON-MODULATING DAMPER CONTROL CONNECTION DIAGRAM
655	EL-025	TUNNEL VENTILATION - TYPICAL MODULATING DAMPER CONTROL SCHEMATICS SHEET 1 OF 2
656	EL-026	TUNNEL VENTILATION - TYPICAL MODULATING DAMPER CONTROL SCHEMATICS SHEET 2 OF 2
657	EL-027	TUNNEL VENTILATION - TYPICAL MODULATING DAMPER CONTROL CONNECTION DIAGRAM
658	EL-101	GATEWAY STATION - OVERALL POWER SLD CONTRIBUTION
658A	EL-101A	DISTRIBUTION PANELS SLD CONTRIBUTION
659	EL-106	GATEWAY STATION - LV DISTRIBUTION CONTRIBUTION SHEET 1 OF 2
660	EL-107	GATEWAY STATION - LV DISTRIBUTION CONTRIBUTION SHEET 2 OF 2
661	EL-108	GATEWAY STATION - COMMON CONTROLS PLC FAIL OVER SHEET 1 OF 2
662	EL-109	GATEWAY STATION - COMMON CONTROLS PLC FAIL OVER SHEET 2 OF 2
663	EL-110	GATEWAY STATION - GW-TVF-101 - 104 TUNNEL JET FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 1 OF 2
664	EL-111	GATEWAY STATION - GW-TVF-101 - 104 TUNNEL JET FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 2 OF 2
665	EL-112	GATEWAY STATION - GW-TVF-101 - 104 TUNNEL JET FAN ELECTRICAL CONNECTION DIAGRAM
666	EL-113	GATEWAY STATION - GW-TVF-101/EM09 TUNNEL VENT FAN TYPICAL ELECTRICAL SCHEMATIC DIAGRAM SHEET 1 OF 2
667	EL-114	GATEWAY STATION - GW-TVF-101/EM09 TUNNEL VENT FAN TYPICAL ELECTRICAL SCHEMATIC DIAGRAM SHEET 2 OF 2

MAUNSELL | AECOM

MAUNSELL AUSTRALIA PTY LTD A.B.N. 20 093 846 925
September 2, 2008
APPROVED
DATE

NO.	DATE	DESCRIPTION
1	09/02/08	ADDENDUM 5 - DRAWING MODIFIED
2	08/15/08	ADDENDUM 3 - DRAWING MODIFIED
3		
4		
5		
6		
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THE PREPARATION OF THIS DOCUMENT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE PORT AUTHORITY OF ALLEGHENY COUNTY, PENNSYLVANIA.

REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
CONRAD H.B. STACEY
RPEQ 5128
PAT# 000297

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA 15222
APPROVED
DATE 9/10/08

DESIGNED	AP
DRAWN	IK
CHECKED	PG
IN CHARGE	CS
DATE	06/27/08
SCALE	NIS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
INDEX OF DRAWINGS (SUBWAY TUNNEL FACILITY SYSTEMS)
SHEET 9 OF 9

CONTRACT NO.	NSC-009
DWG. NO.	GN-010
SHT.	10

SHEET
No.

DRAWING
No.

DRAWING TITLE

ELECTRICAL

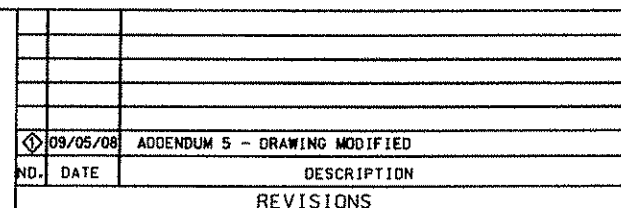
668	EL-115	GATEWAY STATION - GW-TVF-101/EM09 TUNNEL VENT FAN TYPICAL ELECTRICAL CONNECTION DIAGRAM
669	EL-116	GATEWAY STATION - GW-TVF-102/EM10 TUNNEL VENT FAN TYPICAL ELECTRICAL SCHEMATIC DIAGRAM SHEET 1 OF 2
670	EL-117	GATEWAY STATION - GW-TVF-102/EM10 TUNNEL VENT FAN TYPICAL ELECTRICAL SCHEMATIC DIAGRAM SHEET 2 OF 2
671	EL-118	GATEWAY STATION - GW-TVF-102/EM10 TUNNEL VENT FAN TYPICAL ELECTRICAL CONNECTION DIAGRAM
672	EL-119	GATEWAY STATION - GW-SSP-101 - 102 TUNNEL SUMP PUMP SCHEMATIC DIAGRAM SHEET 1 OF 2
672A	EL-119A	GATEWAY STATION - GW-SSP-101 - 102 TUNNEL SUMP PUMP SCHEMATIC DIAGRAM SHEET 2 OF 2
673	EL-120	GATEWAY STATION - GW-SSP-101 - 102 TUNNEL SUMP PUMP ELECTRICAL CONNECTION DIAGRAM
674	EL-140	GATEWAY STATION - TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 1 OF 2
675	EL-141	GATEWAY STATION - TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 2 OF 2
676	EL-150	GATEWAY STATION - ELECTRICAL EQUIPMENT
677	EL-151	GATEWAY STATION - ELECTRICAL SWITCH ROOM LAYOUT
678	EL-152	GATEWAY STATION - KEY PLAN LIGHTING (EXISTING DRAWING MARK UP) SHEET 1 OF 2
679	EL-153	GATEWAY STATION - KEY PLAN LIGHTING (EXISTING DRAWING MARK UP) SHEET 2 OF 2
679A	EL-153A	LIB. AVE. SUBWAY AND GATEWAY CTR. FINISHES - BLOCK DIAGRAM (EXISTING DRAWING MARK UP) SHEET 1 OF 2
679B	EL-153B	LIB. AVE. SUBWAY AND GATEWAY CTR. FINISHES - BLOCK DIAGRAM (EXISTING DRAWING MARK UP) SHEET 2 OF 2
679C	EL-153C	LIB. AVE. SUBWAY AND GATEWAY CTR. FINISHES - TERM. BOX NO.1-2 WIRING DIAGRAM (EXISTING DRAWING MARK UP)
679D	EL-153D	GATEWAY CENTER FINISHES - SUPERVISORY CONT. TERM. BOX WIRING DIA. (EXISTING DRAWING MARK UP)
679E	EL-153E	LIB. AVE. SUBWAY AND GATEWAY CTR. FINISHES - FAN EM-9 SCHEMATIC (EXISTING DRAWING MARK UP)
679F	EL-153F	LIB. AVE. SUBWAY AND GATEWAY CTR. FINISHES - FAN EM-10 SCHEMATIC (EXISTING DRAWING MARK UP)
679G	EL-153G	GATEWAY CENTER FINISHES - LIGHTING PLAN & SECTIONS (EXISTING DRAWING MARK UP)
680	EL-160	GATEWAY STATION - CABLE SCHEDULE SHEET 1 OF 4
681	EL-161	GATEWAY STATION - CABLE SCHEDULE SHEET 2 OF 4
682	EL-162	GATEWAY STATION - CABLE SCHEDULE SHEET 3 OF 4
683	EL-163	GATEWAY STATION - CABLE SCHEDULE SHEET 4 OF 4
684	EL-201	NORTH SIDE STATION - OVERALL POWER SLD CONTRIBUTION SHEET 1 OF 2
684A	EL-201A	NORTH SIDE STATION - DISTRIBUTION PANELS SLD CONTRIBUTION
685	EL-202	NORTH SIDE STATION - OVERALL POWER SLD CONTRIBUTION SHEET 2 OF 2
685A	EL-202A	NORTH SIDE STATION - OVERALL POWER SLD CONTRIBUTION
686	EL-206	NORTH SIDE STATION - LV DISTRIBUTION CONTRIBUTION SHEET 1 OF 3
687	EL-207	NORTH SIDE STATION - LV DISTRIBUTION CONTRIBUTION SHEET 2 OF 3
688	EL-208	NORTH SIDE STATION - LV DISTRIBUTION CONTRIBUTION SHEET 3 OF 3
689	EL-209	NORTH SIDE STATION - COMMON CONTROLS PLC FAIL OVER
690	EL-210	NORTH SIDE STATION - NS-TJF-201 - 210 TUNNEL JET FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 1 OF 2
691	EL-211	NORTH SIDE STATION - NS-TJF-201 - 210 TUNNEL JET FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 2 OF 2
692	EL-212	NORTH SIDE STATION - NS-TJF-201 - 210 TUNNEL JET FAN ELECTRICAL CONNECTION DIAGRAM
693	EL-213	NORTH SIDE STATION - NS-TVF-201 & 203 TUNNEL VENT FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 1 OF 2
694	EL-214	NORTH SIDE STATION - NS-TVF-201 & 203 TUNNEL VENT FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 2 OF 2
695	EL-215	NORTH SIDE STATION - NS-TVF-201 & 203 TUNNEL VENT FAN ELECTRICAL CONNECTION DIAGRAM
696	EL-216	NORTH SIDE STATION - NS-TVF-202 & 204 TUNNEL VENT FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 1 OF 2
697	EL-217	NORTH SIDE STATION - NS-TVF-202 & 204 TUNNEL VENT FAN ELECTRICAL SCHEMATIC DIAGRAM SHEET 2 OF 2
698	EL-218	NORTH SIDE STATION - NS-TVF-202 & 204 TUNNEL VENT FAN ELECTRICAL CONNECTION DIAGRAM
699	EL-219	NORTH SIDE STATION - NS-SSP-201 - 208 TUNNEL SUMP PUMP ELECTRICAL SCHEMATIC DIAGRAM
699A	EL-219A	NORTH SIDE STATION - NS-SSP-201 - 208 TUNNEL SUMP PUMP ELECTRICAL SCHEMATIC DIAGRAM
700	EL-220	NORTH SIDE STATION - NS-SSP-201 - 208 TUNNEL SUMP PUMP ELECTRICAL CONNECTION DIAGRAM
701	EL-221	NORTH SIDE STATION (WEST) COMMON CONTROLS PLC FAIL OVER
702	EL-230	NORTH SIDE STATION - CONTROL SYSTEM BLOCK DIAGRAM SHEET 1 OF 2
703	EL-231	NORTH SIDE STATION - CONTROL SYSTEM BLOCK DIAGRAM SHEET 2 OF 2
704	EL-240	NORTH SIDE STATION - TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 1 OF 3
705	EL-241	NORTH SIDE STATION - TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 2 OF 3
706	EL-242	NORTH SIDE STATION - TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 3 OF 3
707	EL-250	GATEWAY LINE - ELECTRICAL EQUIPMENT
708	EL-251	NORTH SIDE STATION - ELECTRICAL EQUIPMENT SHEET 1 OF 2 (EAST)
709	EL-252	NORTH SIDE STATION - ELECTRICAL EQUIPMENT SHEET 2 OF 2 (WEST)
710	EL-253	NORTH SIDE STATION - ELECTRICAL SWITCH ROOM LAYOUT (EAST)
711	EL-254	NORTH SIDE STATION - ELECTRICAL SWITCH ROOM LAYOUT (WEST)
712	EL-260	NORTH SIDE STATION - CABLE SCHEDULE SHEET 1 OF 5
713	EL-261	NORTH SIDE STATION - CABLE SCHEDULE SHEET 2 OF 5
714	EL-262	NORTH SIDE STATION - CABLE SCHEDULE SHEET 3 OF 5
715	EL-263	NORTH SIDE STATION - CABLE SCHEDULE SHEET 4 OF 5
716	EL-264	NORTH SIDE STATION - CABLE SCHEDULE SHEET 5 OF 5

1. PROVIDE WATERTIGHT SEALING BUSHING ON ALL SPOUTS
2. ARRANGEMENTS SHOW GENERAL PRINCIPALS. FURNISH DETAILED ARRANGEMENT FOR EACH FEEDER LOCATION
3. ALL FEEDER TAP ARRANGEMENTS ARE TO BE PROTECTED BY SURGE ARRESTERS
4. ALL SURGE ARRESTERS SHALL BE PROVIDED WITH A GROUNDING ARRANGEMENT AND SPECIFIED RESISTANCE IN ACCORDANCE WITH THE ARRESTER MANUFACTURER'S RECOMMENDATIONS
(SEE DRAWING DC187 FOR GROUNDING DETAILS)
5. INSULATED CROSS TRACK FEEDER CABLES MAY BE INSTALLED ON CROSS SPAN WIRES WHERE HEADSPAN CONSTRUCTION IS USED
6. FEEDER CONNECTIONS TO THE CATENARY SHALL ALLOW FOR ALONG TRACK MOVEMENT
7. REFER TO SECTIONALIZING DIAGRAMS AND OCS LAYOUT DRAWINGS FOR FEEDING REQUIREMENTS
8. MAXIMUM SURGE ARRESTER GROUNDING RESISTANCE NOT TO EXCEED 5 OHMS PER COMPLETE INSTALLATION
9. TIE WRAPS WILL NOT BE ALLOWED

* = QUANTITY AS REQUIRED.

- 6084+50 RT
- 6084+89.85 LT

- 6078+27 RT
- 6084+50 RT
- 6084+89.85 LT



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DEPARTMENT OF TRANSPORTATION, UNDER THE
URBAN MASS TRANSPORTATION ACT OF 1964.
AS AMENDED, FOR THE PORT AUTHORITY OF
ALLEGHENY COUNTY, PENNSYLVANIA.



DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
David Perini
APPROVED 9/5/08
DATE

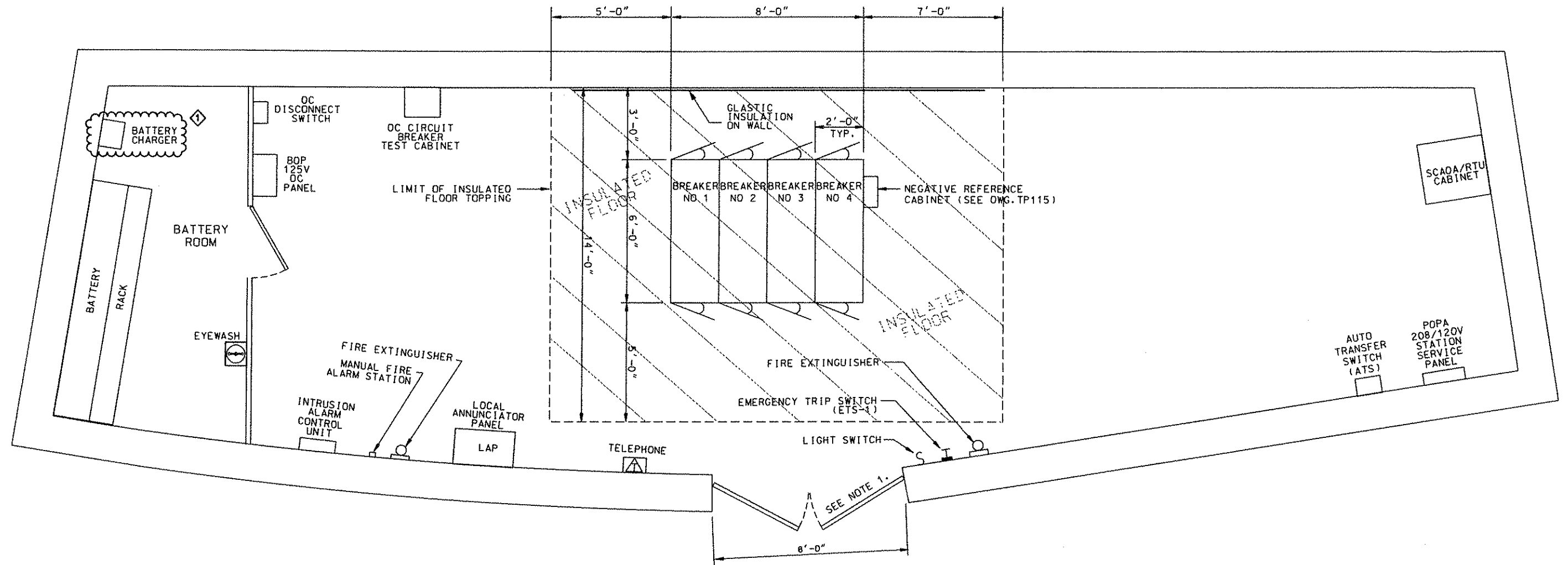
DESIGNED	SR ADKINS
DRAWN	HT TRAN
CHECKED	TA SHANTZ
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

**NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM-WIDE)
FEEDER TAP ARRANGEMENT
AND SURGE ARRESTER**

Port Authority

CONTRACT NO.		NSC-009
DWG. NO.	QC151	SHT. 1



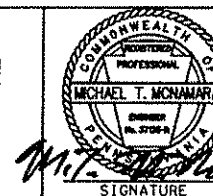
ROOM 101
OLD # 107

NOTES:

1. DOORS SHALL BE EQUIPPED WITH PANIC HARDWARE.
2. FOR HVAC, LIGHTS, RECEPTICAL, SEE NSC-010.
3. GROUND ALL ELECTRICAL EQUIPMENT TO EXISTING GROUND BUS.

NO.	DATE	DESCRIPTION
09/05/08		ADDENDUM 5 - DRAWING MODIFIED

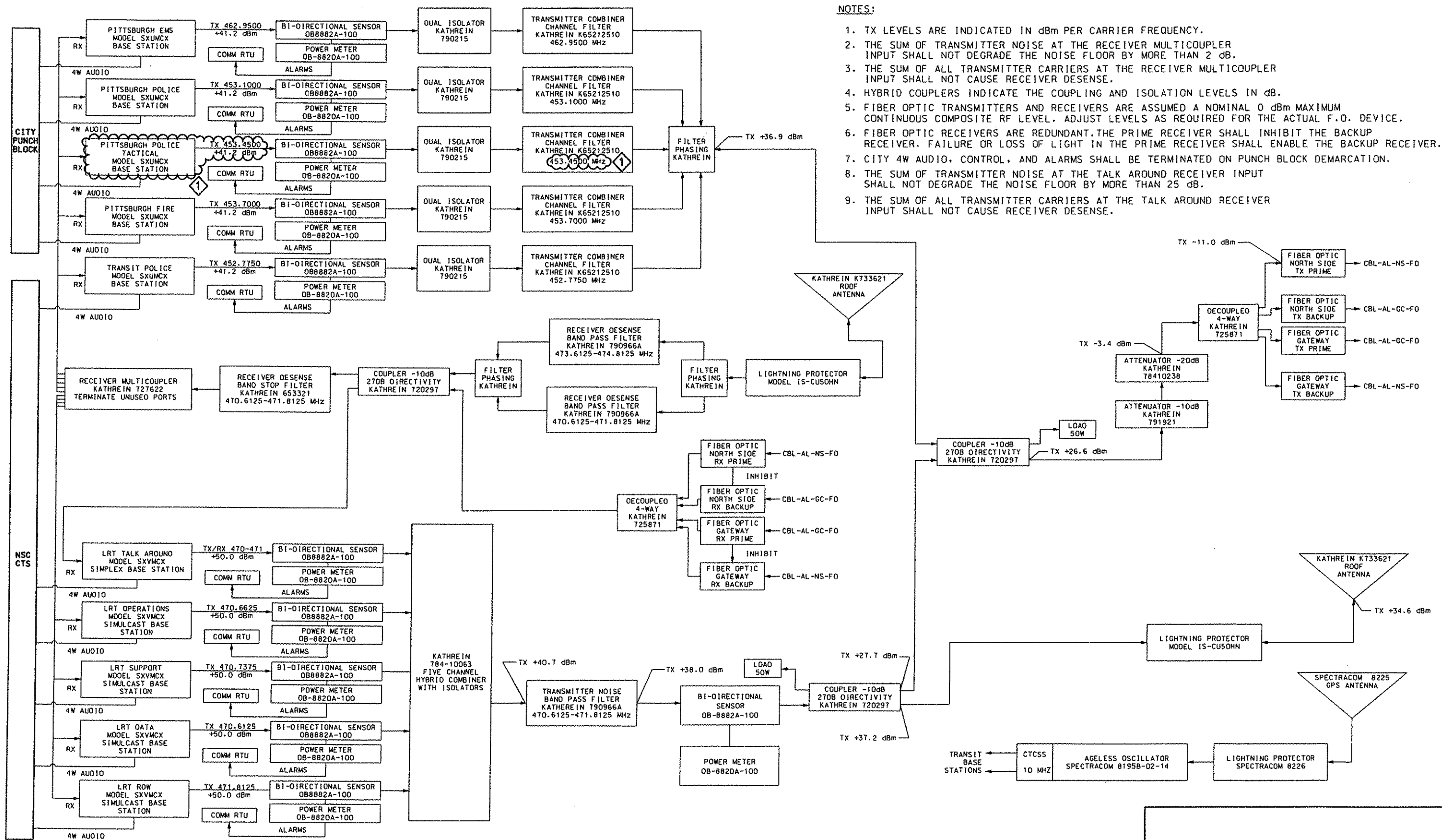
THE PREPARATION OF THIS DOCUMENT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE PORT AUTHORITY OF ALLEGHENY COUNTY, PENNSYLVANIA.



DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED
DATE 9/5/08

DESIGNED H. SOROKIN
DRAWN RG JACKSON
CHECKED M. INSOGNA
IN CHARGE CD JONES
DATE APR. 28, 2008
SCALE NTS

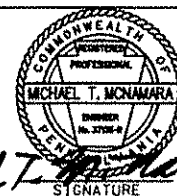
PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH, PENNSYLVANIA
NORTH SHORE CONNECTOR
SYSTEMWIDE TRACTION POWER AND OCS
GATEWAY TIE BREAKER STATION
EQUIPMENT ARRANGEMENT PLAN
CONTRACT NO. NSC-009
DWG. NO. TP111
SHT. 303



- NOTES:
1. TX LEVELS ARE INDICATED IN dBm PER CARRIER FREQUENCY.
 2. THE SUM OF TRANSMITTER NOISE AT THE RECEIVER MULTICOUPLER INPUT SHALL NOT DEGRADE THE NOISE FLOOR BY MORE THAN 2 dB.
 3. THE SUM OF ALL TRANSMITTER CARRIERS AT THE RECEIVER MULTICOUPLER INPUT SHALL NOT CAUSE RECEIVER DESENSE.
 4. HYBRID COUPLERS INDICATE THE COUPLING AND ISOLATION LEVELS IN dB.
 5. FIBER OPTIC TRANSMITTERS AND RECEIVERS ARE ASSUMED A NOMINAL 0 dBm MAXIMUM CONTINUOUS COMPOSITE RF LEVEL. ADJUST LEVELS AS REQUIRED FOR THE ACTUAL F.O. DEVICE.
 6. FIBER OPTIC RECEIVERS ARE REDUNDANT. THE PRIME RECEIVER SHALL INHIBIT THE BACKUP RECEIVER. FAILURE OR LOSS OF LIGHT IN THE PRIME RECEIVER SHALL ENABLE THE BACKUP RECEIVER.
 7. CITY 4W AUDIO, CONTROL, AND ALARMS SHALL BE TERMINATED ON PUNCH BLOCK DEMARCATION.
 8. THE SUM OF TRANSMITTER NOISE AT THE TALK AROUND RECEIVER INPUT SHALL NOT DEGRADE THE NOISE FLOOR BY MORE THAN 25 dB.
 9. THE SUM OF ALL TRANSMITTER CARRIERS AT THE TALK AROUND RECEIVER INPUT SHALL NOT CAUSE RECEIVER DESENSE.

NO.	DATE	DESCRIPTION
09/05/08		ADDENDUM 5 - DRAWING MODIFIED
REVISIONS		

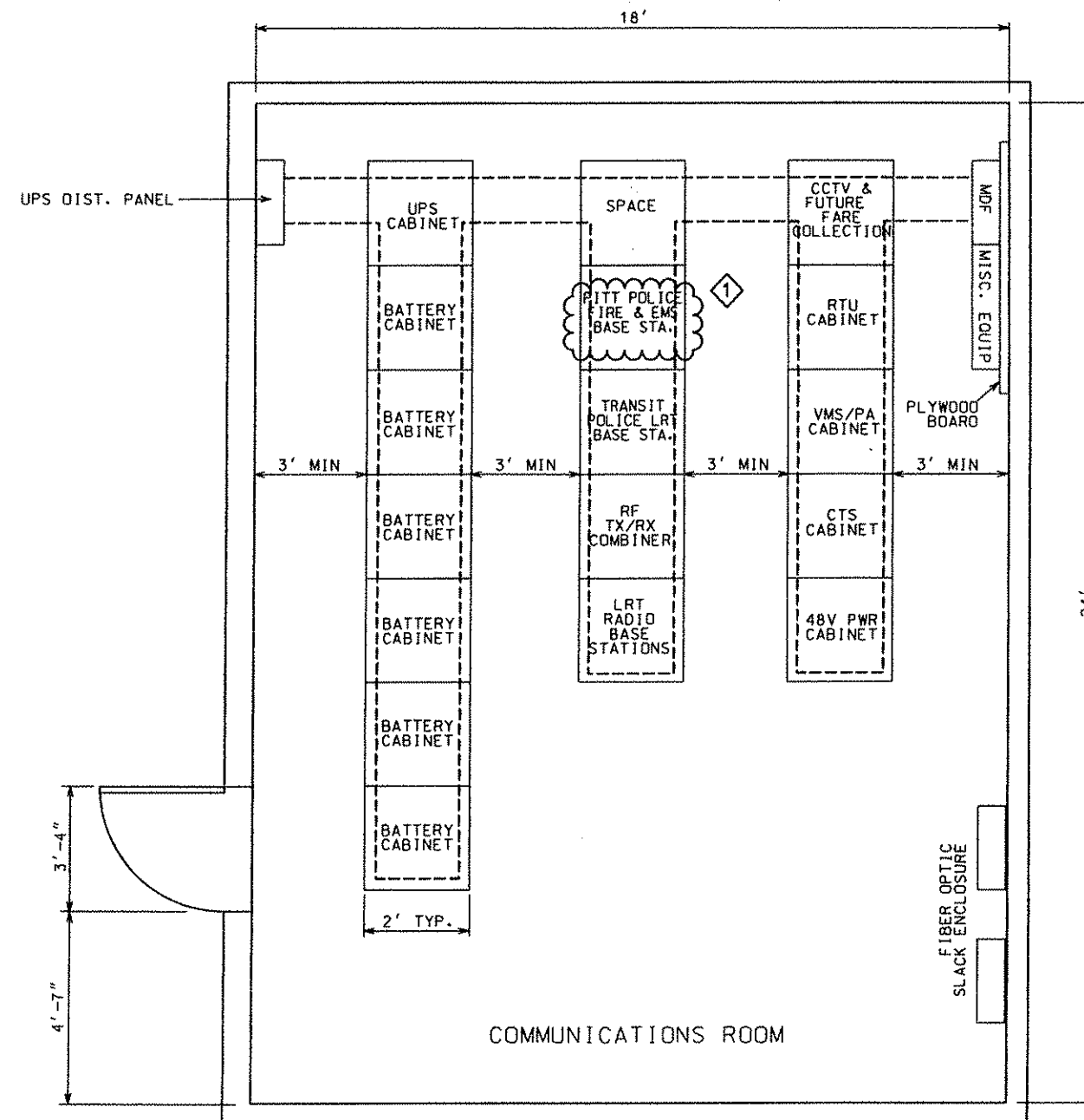
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DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED: [Signature] DATE: 9/5/08

DESIGNED: R SCHMIDT
DRAWN: HT TRAN
CHECKED: K HOFFMAN
IN CHARGE: CD JONES
DATE: APR. 28, 2008
SCALE: NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH, PENNSYLVANIA
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
SYSTEMWIDE SIGNALS & COMMUNICATION SYSTEMS
ALLEGHENY STATION - RADIO BLOCK DIAGRAM
CONTRACT NO. NSC-009
DWG. NO. CM062
SHEET 554



LEGENDS:

----- CABLE TRAY

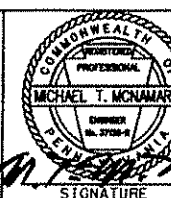
NOTES:

1. PLAN IS NOT TO SCALE, FOR APPROXIMATE LAYOUT OF EQUIPMENT ONLY. CONTRACTOR TO VERIFY ROOM DIMENSIONS AND EQUIPMENT DIMENSIONS PRIOR TO INSTALLATION.
2. CONTRACTOR TO PROVIDE CABLE TRAY AS REQUIRED FOR ALL RACK-TO-RACK CABLING.

Gannett Fleming
Transit & Rail Systems

NO.	DATE	DESCRIPTION
09/05/08	ADDENDUM 5 - DRAWING MODIFIED	
REVISIONS		

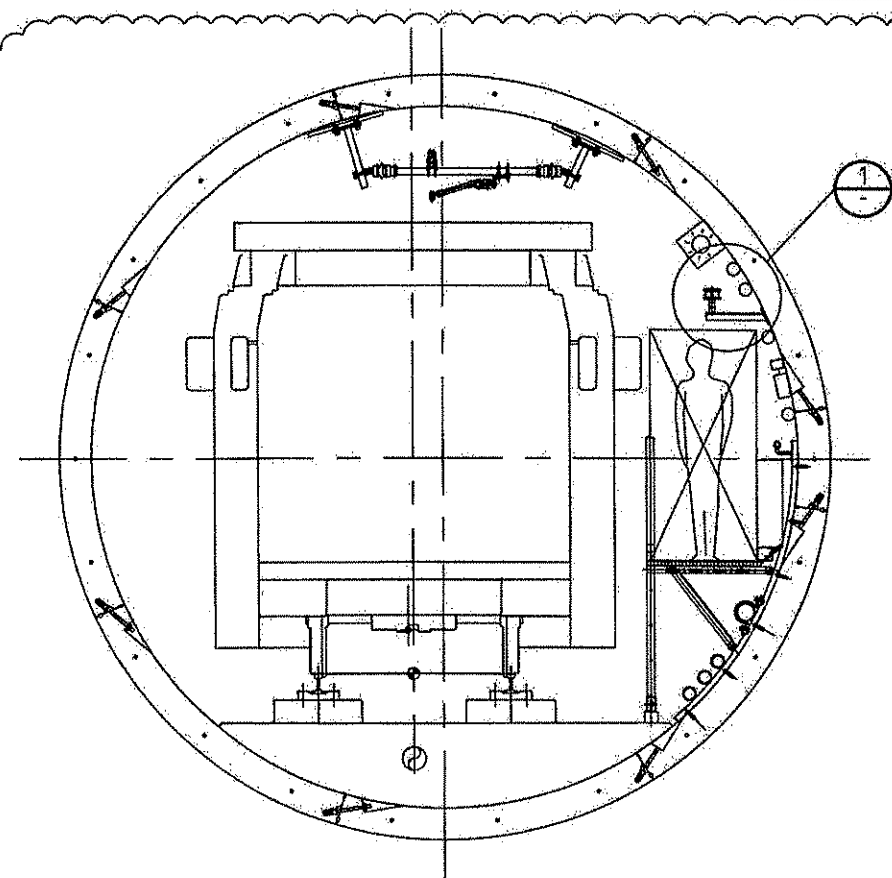
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DMJM HARRIS | **AECOM**
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED
DATE 9/5/08

DESIGNED R WEIDNER
DRAWN HT TRAN
CHECKED D ZUCK
IN CHARGE CD JONES
DATE APR. 28, 2008
SCALE 1" = 2'-0"

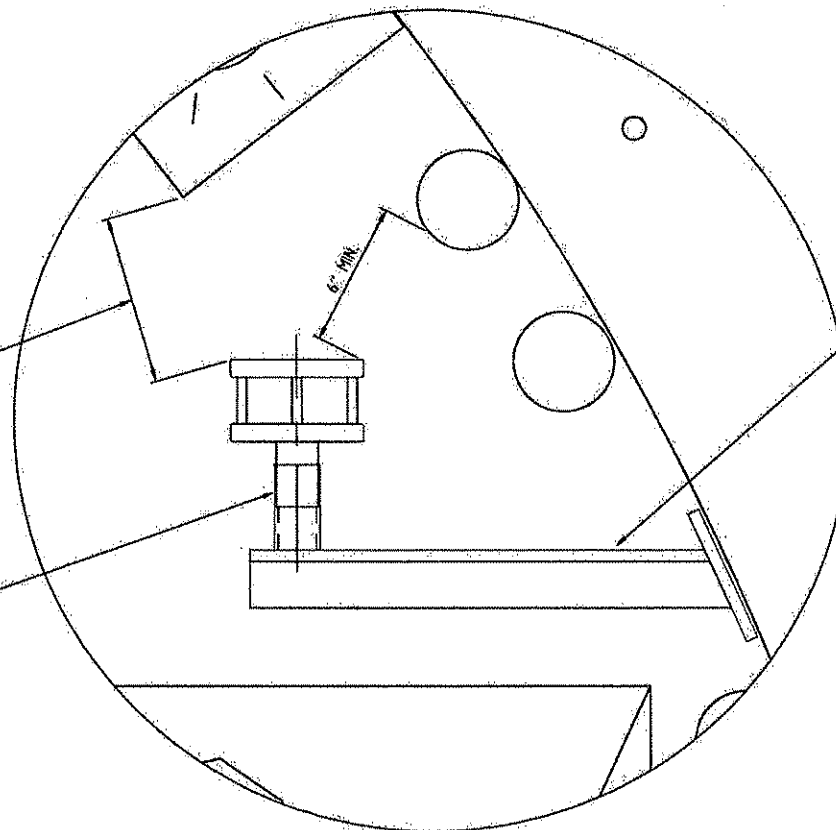
PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
SYSTEMWIDE SIGNALS & COMMUNICATION SYSTEMS
ALLEGHENY STATION /COMMUNICATIONS EQUIPMENT ROOM LAYOUT
Port Authority
CONTRACT NO. NSC-009
DWG. NO. CM072
SHEET 557



TYPICAL BORED TUNNEL SECTION
SHOWING ANEMOMETER POSITION
SCALE 3/8" = 1'-0"

ANEMOMETER TO BE NO CLOSER THAN 6" MINIMUM
TO ANY EQUIPMENT MOUNTED IN BORED TUNNEL.

ANEMOMETER MEASURING HEAD TO BE INSTALLED
ON MOUNTING BRACKET AS PER MANUFACTURER
RECOMMENDATIONS.

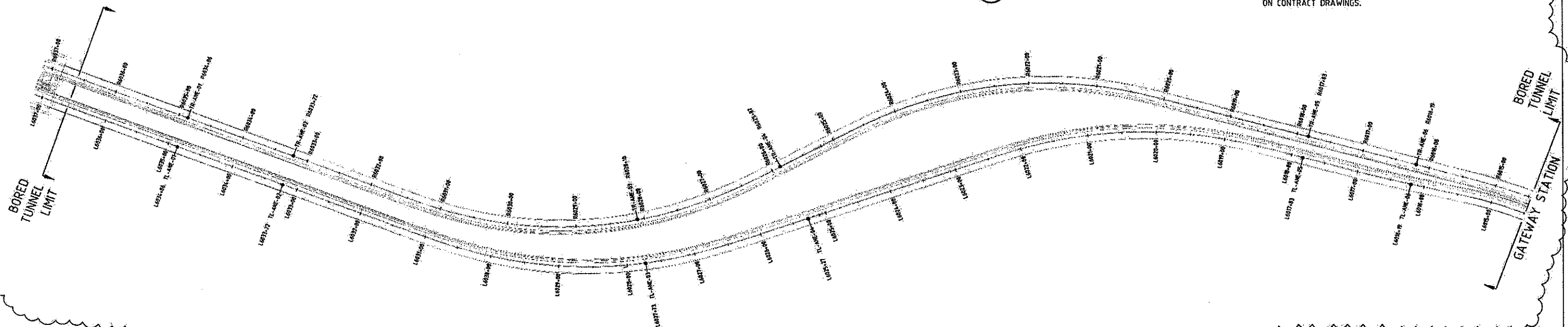


DETAIL 1
SCALE 3" = 1'

ANEMOMETER MOUNTING BRACKET TO BE PROVIDED
AT POSITIONS AS DIRECTED.
POWER AND COMMUNICATION CABLING TO BE
INSTALLED INTERNAL OF THE MOUNTING BRACKET.

NOTES:

1. THE CONTRACTOR SHALL REFER TO SECTION 15886, "TUNNEL VENTILATION JET FANS" ACTIVE CONTROL OF THE CONTRACT DOCUMENTS FOR FURTHER DETAILS.
2. SECTIONS ARE INDICATIVE ONLY AND VARY ACCORDING TO CHAINAGE AND TRACK.
3. WALL FIXTURES SHALL BE COORDINATED WITH OTHER AUTHORITY CONTRACTS (NSC-003, NSC-006 AS REQUIRED).
4. THE CONTRACTOR SHALL ENSURE THAT THE ANEMOMETER MEASURING HEAD, MOUNTING BRACKET AND ANY ASSOCIATED EQUIPMENT DOES NOT ENCRoACH INTO THE CLEARANCE ENVELOPE.
5. MOUNTING BRACKETS SHALL HAVE A MINIMUM HEIGHT OF 6'-6" ABOVE WALKWAY.
6. THE CONTRACTOR SHALL ENSURE MINIMUM CLEARANCES BETWEEN ANEMOMETER MEASURING HEAD AND NEARBY EQUIPMENT AS DESIGNATED ON CONTRACT DRAWINGS.



PLAN FOR TWIN BORED TUNNEL
SHOWING ANEMOMETER LOCATIONS

MAUNSELL | AECOM

MAUNSELL Australia Pty Ltd A.B.N. 20 093 846 925
C. Stacey
APPROVED
September 2, 2008
DATE

NO.	DATE	DESCRIPTION
09/02/08	ADDENDUM 5 - DRAWING ADDED	
REVISIONS		

THE PREPARATION OF THIS DOCUMENT HAS BEEN
FINANCED IN PART THROUGH A GRANT FROM THE
FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF
TRANSPORTATION, UNDER THE URBAN MASS
TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE
PORT AUTHORITY OF ALLEGHENY COUNTY,
PENNSYLVANIA.

REGISTERED
PROFESSIONAL
ENGINEER OF
QUEENSLAND
CONRAD H.B. STACEY
RPPG 5128
SIGNATURE
PATP #002744

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
D. Harris
APPROVED
9/5/08
DATE

DESIGNED	SS
DRAWN	IK
CHECKED	NA
IN CHARGE	CS
DATE	09/02/08
SCALE	AS NOTED

PORT AUTHORITY OF ALLEGHENY COUNTY	
PITTSBURGH	PENNSYLVANIA
NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM WIDE) BORED TUNNEL	
ANEMOMETER LAYOUT PLAN AND TYPICAL DETAILS	
Port Authority	CONTRACT NO. NSC-009
DWG. NO. MC-001A	SHT. 616A

INDEX OF ALSO DRAWINGS

CONTRACT NO.	DRAWING NO.	DRAWING TITLE
		AERIAL STRUCTURE, RETAINED FILL, DEMOLITION OF MILLER PRINTING (ALLEGHENY STRUCTURE)
NSC-007	ST001	GENERAL PLAN & ELEVATION STA 6051+50 TO STA 6074+00 LEFT TRACK
NSC-007	ST002	GENERAL PLAN & ELEVATION STA 6074+00 TO STA 6079+50 LEFT TRACK
NSC-007	ST003	GENERAL PLAN & ELEVATION STA 6079+50 TO STA 6084+00 LEFT TRACK
NSC-007	ST004	GENERAL PLAN & ELEVATION STA 6084+00 TO STA 6088+22.60 LEFT TRACK
NSC-007	ST008	TYPICAL SECTIONS SHEET 1 OF 5
NSC-007	ST009	TYPICAL SECTIONS SHEET 2 OF 5
NSC-007	ST010	TYPICAL SECTIONS SHEET 3 OF 5
NSC-007	ST011	TYPICAL SECTIONS SHEET 4 OF 5
NSC-007	ST012	TYPICAL SECTIONS SHEET 5 OF 5
NSC-007	ST024	MSE WALL DETAILS 2 (SHEET 159)
NSC-007	ST025	RETAINED FILL SECTION MSE WALL DETAILS 3
NSC-007	ST040	PIER PLAN & ELEVATION PIER 14
NSC-007	ST041	PIER PLAN & ELEVATION PIER 14 DETAILS
NSC-007	ST081	GIROER DETAILS MISC STEEL DETAILS 2
NSC-007	ST085	DECK PLAN SPAN 1
NSC-007	ST086	DECK PLAN SPAN 2
NSC-007	ST087	DECK PLAN SPAN 3
NSC-007	ST088	DECK PLAN SPAN 4
NSC-007	ST089	DECK PLAN SPAN 5
NSC-007	ST090	DECK PLAN SPAN 6
NSC-007	ST091	DECK PLAN SPAN 7
NSC-007	ST092	DECK PLAN SPAN 8
NSC-007	ST093	DECK PLAN SPAN 9
NSC-007	ST094	DECK PLAN SPAN 10
NSC-007	ST095	DECK PLAN SPAN 11
NSC-007	ST096	DECK PLAN SPAN 12
NSC-007	ST097	DECK PLAN SPAN 13
NSC-007	ST098	DECK PLAN SPAN 14
NSC-007	ST101	DECK TYPICALS SHEET 1 OF 2
NSC-007	ST102	DECK TYPICALS SHEET 2 OF 2
NSC-007	ST103	DECK DETAILS SHEET 1 OF 6
NSC-007	ST104	DECK DETAILS SHEET 2 OF 6
NSC-007	ST105	DECK DETAILS SHEET 3 OF 6
NSC-007	ST106	DECK DETAILS SHEET 4 OF 6
NSC-007	ST107	DECK DETAILS SHEET 5 OF 6
		GATEWAY STATION FINSHES
NSC-010G	AR004	EXISTING LOOP ROOM NUMBERS REF. NSC-009 CONTRACT
NSC-010G	AR101	OVERALL PLATFORM & EXISTING LOOP PLAN
NSC-010G	AR102	PARTIAL PLAN PARTIAL 1 CUT EL. +708'-0"
NSC-010G	AR103	PARTIAL PLAN PARTIAL 2 CUT EL. +708'-0"
NSC-010G	AR104	PARTIAL PLAN PARTIAL 3 CUT EL. +708'-0"
NSC-010G	AR105	PARTIAL PLAN PARTIAL 4 CUT EL. +708'-0"
NSC-010G	AR106	PARTIAL PLAN PARTIAL 5 CUT EL. +708'-0"
NSC-010G	AR107	PARTIAL PLAN PARTIAL 6 CUT EL. +708'-0"
NSC-010G	AR108	CONCOURSE PLAN CUT EL. +734'-0"
NSC-010G	AR109	ROOF PLAN
NSC-010G	AR113	ELECTRICAL BLOCKOUT LOCATION PLAN PLATFORM LEVEL
NSC-010G	AR201	OVERALL PLATFORM & EXISTING LOOP PLAN RCP CUT EL +708'-0"
NSC-010G	AR202	PLATFORM RCP PARTIAL 1 CUT EL +708'-0"
NSC-010G	AR203	PLATFORM RCP PARTIAL 2 CUT EL +708'-0"
NSC-010G	AR204	PLATFORM RCP PARTIAL 3 CUT EL +708'-0"
NSC-010G	AR205	PLATFORM RCP PARTIAL 4 CUT EL +708'-0"
NSC-010G	AR206	PLATFORM RCP PARTIAL 5 CUT EL +708'-0"
NSC-010G	AR207	PLATFORM RCP PARTIAL 6 CUT EL +708'-0"
NSC-010G	AR208	CONCOURSE RCP CUT EL +734'-0"
NSC-010G	AR301	EXTERIOR ELEVATIONS
NSC-010G	AR401	LATERAL SECTIONS X.40 & X.112

CONTRACT NO.	DRAWING NO.	DRAWING TITLE
		GATEWAY STATION FINSHES
NSC-010G	AR402	LATERAL SECTIONS X.144 & X.197.2
NSC-010G	AR403	LONGITUOINAL SECTION 1
NSC-010G	AR404	LONGITUOINAL SECTION 2
NSC-010G	AR701	INTERIOR ELEVATIONS 1 OF 2
NSC-010G	AR704	EXHAUST TOWER ELEVATIONS AND DETAILS
NSC-010G	AR706	ENTRANCE SECTIONS AND ELEVATIONS
NSC-010G	AR708	SECURITY GATE DETAILS
NSC-010G	AR709	MURAL DETAILS
NSC-010G	AR711	LIGHT PENDANT PLAN AND ELEVATIONS
NSC-010G	AR712	LIGHT PENDANT DETAILS
NSC-010G	AR741	LIGHT POST PLANS 2 OF 2
NSC-010G	AR742	LIGHT POST ELEVATIONS 1 OF 2
NSC-010G	AR743	LIGHT POST ELEVATIONS 2 OF 2
NSC-010G	AR744	CONDUIT DETAILS 1 OF 1
NSC-010G	AR745	FLOODLIGHT DETAILS 1 OF 1
NSC-010G	AR746	CAMERA DETAILS 1 OF 1
NSC-010G	AR747	SPEAKER DETAILS 1 OF 1
NSC-010G	AR749	ADA STOBE AND MICROPHONE DETAILS 1 OF 1
NSC-010G	AR750	FIRE ALARM DETAILS 1 OF 1
NSC-010G	AR751	EMBED PLATE DETAILS 1 OF 1
NSC-010G	AR752	DOWNSTAND SIGNAGE DETAILS 2 OF 2
NSC-010G	AR754	POST & RAILING SIGNAGE DETAILS 1 OF 1
NSC-010G	AR756	DEVICE MOUNTING DETAILS 1 OF 3
NSC-010G	AR757	DEVICE MOUNTING DETAILS 2 OF 3
NSC-010G	AR760	SIGN SCHEMULE
NSC-010G	AR761	PLATFORM LEVEL SIGNAGE LAYOUT 1 OF 1
NSC-010G	AR762	CONCOURSE LEVEL SIGNAGE LAYOUT 1 OF 1
NSC-010G	AR763	SIGNAGE DETAILS 1 OF 2
NSC-010E	EL001	ELECTRICAL RISER
NSC-010E	EL002	ELECTRICAL PANEL SCHEMULES
NSC-010E	EL003	ELECTRICAL PANEL SCHEMULES
NSC-010E	EL004	ELECTRICAL PANEL SCHEMULES
NSC-010E	EL005	"L" CONDUIT SCHEMULE PLATFORM LEVEL
NSC-010E	EL006	ELECTRICAL CONDUIT AND MECHANICAL SCHEMULES
NSC-010E	EL007	CONDUIT EMBEDMENTS AND PULL BOX SCHEMATIC
NSC-010E	EL010	ELECTRICAL PLAN - PLATFORM LEVEL OVERALL
NSC-010E	EL011	POWER PLAN - PLATFORM LEVEL PARTIAL 1
NSC-010E	EL012	POWER PLAN - PLATFORM LEVEL PARTIAL 2
NSC-010E	EL013	POWER PLAN - PLATFORM LEVEL PARTIAL 3
NSC-010E	EL014	POWER PLAN - PLATFORM LEVEL PARTIAL 4
NSC-010E	EL015	POWER PLAN - PLATFORM LEVEL PARTIAL 5
NSC-010E	EL016	POWER PLAN - PLATFORM LEVEL PARTIAL 6
NSC-010E	EL017	POWER PLAN - PLATFORM LEVEL PARTIAL 7
NSC-010E	EL018	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 1
NSC-010E	EL019	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 2
NSC-010E	EL020	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 3
NSC-010E	EL021	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 4
NSC-010E	EL022	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 5
NSC-010E	EL023	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 6
NSC-010E	EL024	LIGHTING PLAN - PLATFORM LEVEL PARTIAL 7
NSC-010P	FP001	FIRE PROTECTION DETAILS
NSC-010P	FP002	FIRE PROTECTION PLAN - PLATFORM LEVEL OVERALL
NSC-010P	FP003	FIRE PROTECTION PLAN - PLATFORM LEVEL PARTIAL 1
NSC-010P	FP004	FIRE PROTECTION PLAN - PLATFORM LEVEL PARTIAL 2
NSC-010P	FP005	FIRE PROTECTION PLAN - PLATFORM LEVEL PARTIAL 3
NSC-010P	FP006	FIRE PROTECTION PLAN - PLATFORM LEVEL PARTIAL 4
NSC-010P	FP007	FIRE PROTECTION PLAN - PLATFORM LEVEL PARTIAL 5
NSC-010P	FP008	FIRE PROTECTION PLAN - PLATFORM LEVEL PARTIAL 6
NSC-010P	FP010	FIRE PROTECTION PLAN - UNDER PLATFORM



09/05/08 ADDENDUM 5 - DRAWING MODIFIED

NO.	DATE	DESCRIPTION
		REVISIONS

THE PREPARATION OF THIS DOCUMENT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE PORT AUTHORITY OF ALLEGHENY COUNTY, PENNSYLVANIA.



DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED: [Signature] 9/15/08
DATE

DESIGNED	JC TRAUM
DRAWN	JC TRAUM
CHECKED	CD JONES
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM-WIDE)
INDEX OF ALSO DRAWINGS FOR NSC CONTRACT INTERFACES
SHEET 3 OF 4



CONTRACT NO.	NSC-009
DWG. NO.	GN004A
SHT.	

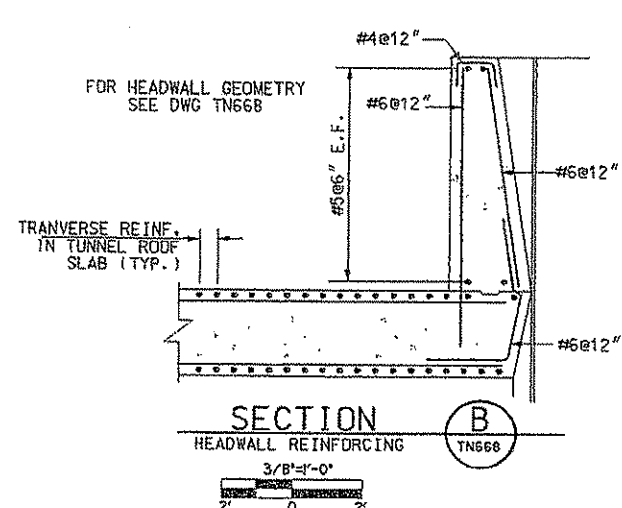
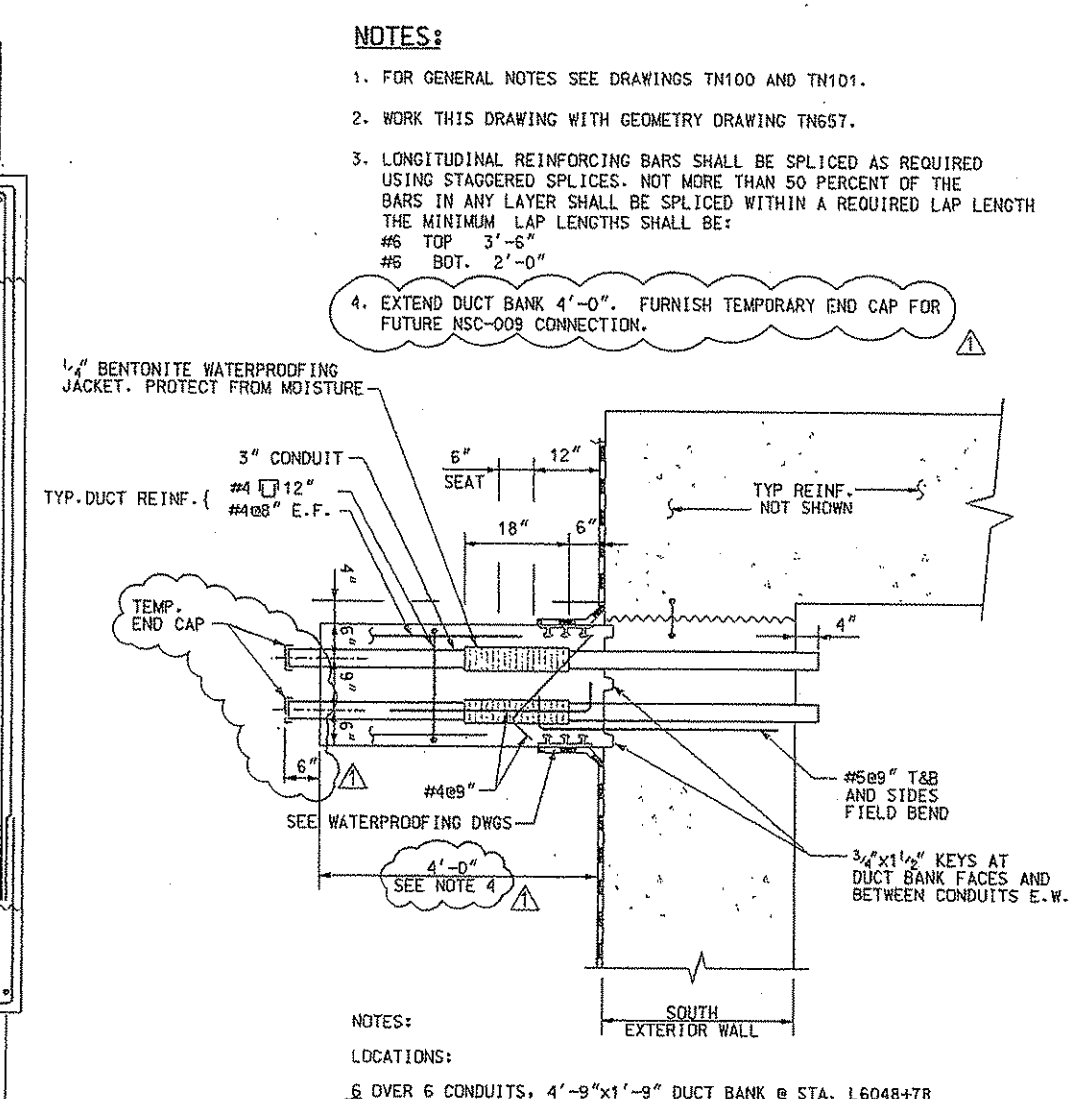
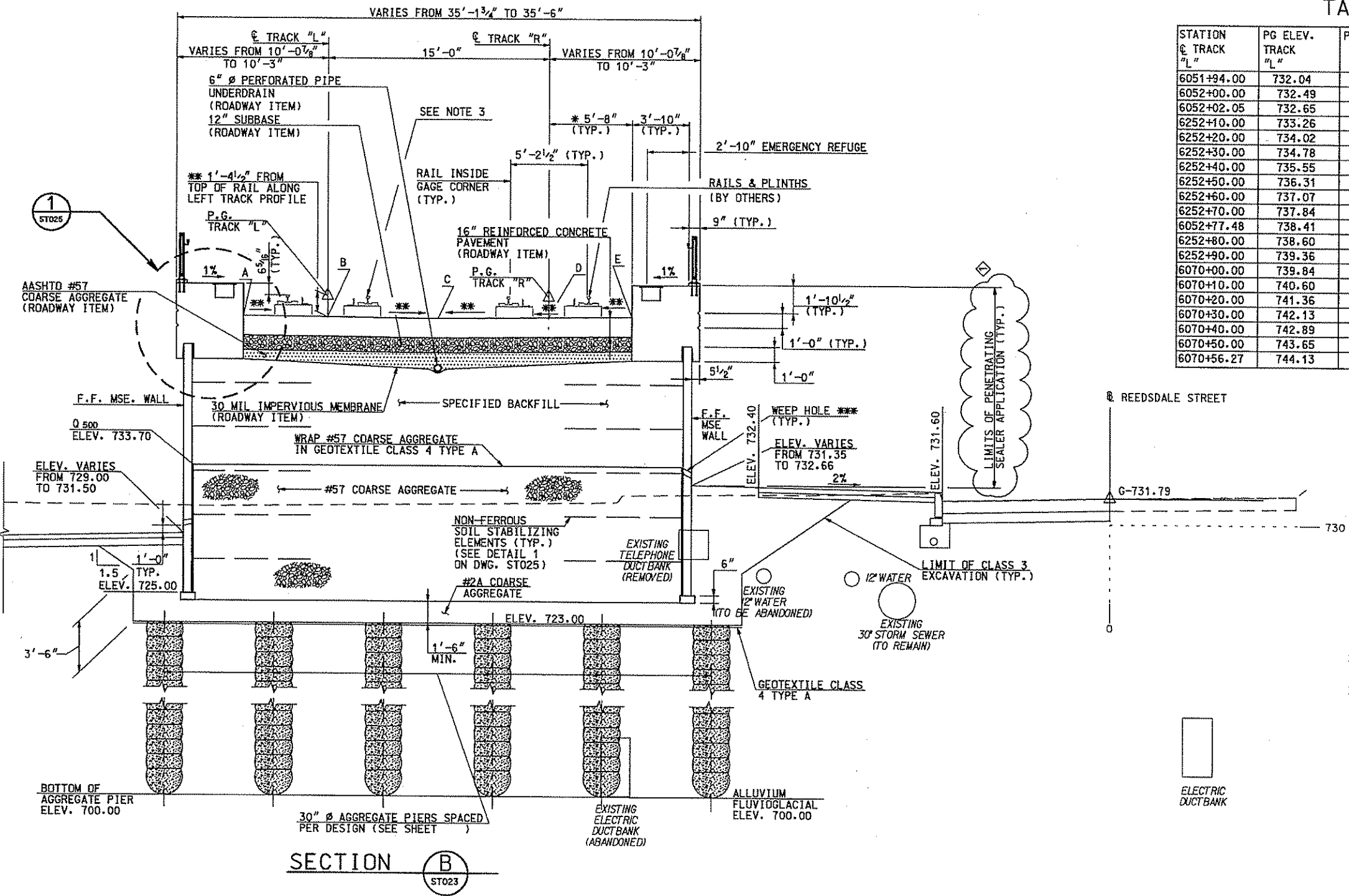
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TABLE OF ELEVATIONS

STATION C TRACK "L"	PG ELEV. TRACK "L"	POINT A	POINT B	POINT C	POINT D	POINT E
6051+94.00	732.04	730.67	730.62	730.70	730.62	730.67
6052+00.00	732.49	731.16	731.11	731.19	731.11	731.16
6052+02.05	732.65	731.33	731.28	731.35	731.28	731.33
6252+10.00	733.26	731.94	731.88	731.95	731.88	731.94
6252+20.00	734.02	732.70	732.65	732.70	732.65	732.70
6252+30.00	734.78	733.47	733.41	733.46	733.41	733.47
6252+40.00	735.55	734.23	734.17	734.21	734.17	734.23
6252+50.00	736.31	734.99	734.93	744.96	734.93	734.99
6252+60.00	737.07	735.75	735.70	735.72	735.70	735.75
6252+70.00	737.84	736.52	736.46	736.47	736.46	736.52
6052+77.48	738.41	737.09	737.03	737.03	737.03	737.09
6252+80.00	738.60	737.28	737.22	737.22	737.22	737.28
6252+90.00	739.36	738.04	737.99	737.97	737.99	738.04
6070+00.00	739.84	738.52	738.46	738.45	738.46	738.52
6070+10.00	740.60	739.28	739.23	739.20	739.23	739.28
6070+20.00	741.36	740.05	739.99	739.95	739.99	740.05
6070+30.00	742.13	740.81	740.75	740.70	740.75	740.81
6070+40.00	742.89	741.57	741.51	741.46	741.51	741.57
6070+50.00	743.65	742.33	742.28	742.21	742.28	742.33
6070+56.27	744.13	742.81	742.75	742.68	742.75	742.81



NOTES:

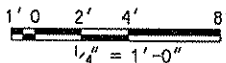
1. ALL SLAB VERTICAL CONTROL GEOMETRY IS SET OFF THE LEFT TRACK PROFILE FOR RETAINED FILL SECTION.
2. FOR MSE WALL DESIGN PARAMETERS, SEE TECHNICAL PROVISIONS.
3. PLINTHS, PLINTH ANCHORAGES, AND RAILS PROVIDED BY OTHERS.

REFERENCE:

1. SEE BC-T99M FOR ADDITIONAL MSE DETAILS.

LEGEND:

- * DYNAMIC CLEARANCE ENVELOPE PLUS RUNNING CLEARANCE AND CONSTRUCTION TOLERANCES.
- ** DENOTES CROSS SLOPE AS INDICATED ON DRAWING ST023.
- *** SPACE WEEP HOLES @ 10'-0" C/C.

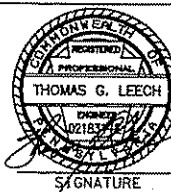


GANNETT FLEMING, INC.
601 Holiday Drive
Foster Plaza III
Suite 200
Pittsburgh, PA. 15220

4-16-08 ADDENDUM 1 - DRAWING MODIFIED

NO.	DATE	DESCRIPTION
		REVISIONS

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DMJM HARRIS AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
DATE 3/10/08
APPROVED
DATE

DESIGNED	JDM
DRAWN	JWM - EPV
CHECKED	CTV
IN CHARGE	TGL
DATE	3/10/08
SCALE	AS SHOWN

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
AERIAL STRUCTURE, RETAINED FILL, DEMOLITION OF MILLER PRINTING
RETAINED FILL SECTION
MSE WALL DETAILS 2

Port Authority
Contract No. NSC-007

DWG. NO. ST024 SHT. 159