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: October 2 2008

Please find enclosed the following:

- Addendum No. #9 dated October 2, 2008
- Question and Answers 172, 188, 191, 214-219, 222, 224-226, 228-257
- NSC-009 Site Visit – Stage I Tunnel (Gateway Fan Rooms) Attendance Sheet
- Form B (Unit Price Schedule), Sheets B-2 through B-10 Excel file (A9-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

PORT AUTHORITY OF ALLEGHENY COUNTY

TRANSMITTAL MEMORANDUM

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Attention: Ms. Toni Matessa

Port Authority of Allegheny County

North Shore Connector

NSC Train Systems (System Wide)

Contract No. NSC-009

ADDENDUM NO. 9

October 2, 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. Section 00200, Instructions to Bidders, Page 00200-20. Delete and replace with page 00200-20.

2. Section 00400, Bid/Award Forms, Form B, Page B-2. Delete and replace with page B-2.

3. Section 00400, Bid/Award Forms, Form B, Pages B-5 through B-7. Delete and replace with pages B-5 through B-7.

4. Section 01700, Execution Requirements, Page 01700-2. Delete and replace with page 01700-2.

5. 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, Page C-1. Delete and replace with page C-1.

CHANGES TO TECHNICAL PROVISIONS (VOLUME 3)

1. Section 01781, Maintenance and Protection of Authority Traffic, Pages 01781-1 through 01781-2. Delete and replace with pages 01781-1 through 01781-2.

2. Section 01781, Maintenance and Protection of Authority Traffic, Page 01781-4. Delete and replace with page 01781-4.

CHANGES TO TECHNICAL PROVISIONS (VOLUME 3)

1. Section 15400, Tunnel Services Scope of Work, Pages 15400-36 through 15400-37. Delete and replace with pages 15400-36 through 15400-37.

2. Section 15887, Tunnel Ventilation and Balancing Dampers, Pages 15887-3 through 15887-4. Delete and replace with pages 15887-3 through 15887-4.

3. Section 15887, Tunnel Ventilation and Balancing Dampers, Pages 15887-8 through 15887-9. Delete and replace with pages 15887-8 through 15887-9.

4. Section 15887, Tunnel Ventilation and Balancing Dampers, Page 15887-17. Delete and replace with page 15887-17.

5. Section 15887, Tunnel Ventilation and Balancing Dampers, Page 15887-19. Delete and replace with page 15887-19.

6. Section 15888, Tunnel Ventilation Noise Attenuators, Pages 15888-10 through 15888-11. Delete and replace with pages 15888-10 through 15888-11.

7. Section 15889, Tunnel Ventilation Fans, Page 15889-13. Delete and replace with page 15889-13.

8. Section 15889, Tunnel Ventilation Fans, Page 15889-15. Delete and replace with page 15889-15.

9. Section 15890, Tunnel Ventilation Jet Fans, Page 15890-12. Delete and replace with page 15890-12.

10. Section 15890, Tunnel Ventilation Jet Fans, Page 15890-14. Delete and replace with page 15890-14.

11. Section 16295, Traction Power Substation Wire and Cable, Page 16295-10. Delete and replace with page 16295-10.

12. Section 16701, Fiber Optic Outside Plant, Pages 16701-12 through 16701-13. Delete and replace with pages 16701-12 through 16701-13.

13. Section 16894, Tunnel Emergency Rail Lighting and Lighting Receptacles, Page 16894-1. Delete and replace with page 16894-1.

14. Section 16894, Tunnel Emergency Rail Lighting and Lighting Receptacles, Pages 16894-3 through 16894-4. Delete and replace with pages 16894-3 through 16894-5.

CHANGES TO NSC-009 CONTRACT DRAWINGS (VOLUME 1)
(Modified or Added Drawings are attached here to)

1. Drawing No.TP005, Sheet No 271. Drawing Modified.
2. Drawing No.TP016, Sheet No 281. Drawing Modified.
3. Drawing No.TP114, Sheet No 304. Drawing Modified.
4. Drawing No.TP217, Sheet No 319. Drawing Modified.
5. Drawing No.CR104, Sheet No 567. Drawing Modified.
6. Drawing No.CR401, Sheet No 587. Drawing Modified.
7. Drawing No.CR405, Sheet No 591. Drawing Modified.
8. Drawing No.CR406, Sheet No 592. Drawing Modified.
9. Drawing No.CR409, Sheet No 595. Drawing Modified.
10. Drawing No.CR410, Sheet No 596. Drawing Modified.
11. Drawing No.FP107, Sheet No 615. Drawing Modified.
12. Drawing No.MC100, Sheet No 617. Drawing Modified.
13. Drawing No.EL002, Sheet No 649. Drawing Modified.
14. Drawing No.EL140, Sheet No 674. Drawing Modified.
15. Drawing No.EL141, Sheet No 675. Drawing Modified.
16. Drawing No.EL240, Sheet No 704. Drawing Modified.
17. Drawing No.EL241, Sheet No 705. Drawing Modified.
18. Drawing No.EL242, Sheet No 706. Drawing Modified.
19. Drawing No.EL250, Sheet No 707. Drawing Modified.

C. Drawings and specifications for related Authority contracts, if any, are identified in the Contract Documents and are available for inspection in the office of Authority. Drawings and specifications pertaining to such related work may be inspected by Bidders upon request to Authority. The Bidder must familiarize itself with these documents and must determine and take into account matters which may affect the Work.

D. The reference materials listed in Section 00200, Article 2.6.E are not included with the purchase of the Bid Documents, but are available for review or purchase by potential Bidders. The purchase price of each document has been established and is available through the contact provided below. Should the potential Bidder request special delivery such as UPS or FedEx, the potential Bidder will be required to provide a billing account number for special mailings. Reproduction and mailing will not begin until receipt of payment in full. The Bidder must allow five (5) working days for reproduction of these materials after providing a written request and payment. Potential Bidders that desire to review and/or purchase the following material must contact Jonna Balco (412) 497-6250 to schedule each review. This material will be available for review, by appointment only, between the hours of 8:00am and 3:30 pm, Monday through Friday, during the bid period, at Tri-Gold, Three Gateway Center, 15th Floor, East Wing, Pittsburgh, PA 15222.

E. The following reference materials are provided for information purposes only.

1. FTA Project and Construction Management Guidelines. *(May be purchased from the National Technology Technical Information Service, Springfield, VA 22161.) (Purchase Price $10.00)*

2. FTA Quality Assurance and Quality Control Guidelines (FTA-IT-90-5001-02.1) *(May be purchased from the National Technology Technical Information Service, Springfield, VA 22161.) (Purchase Price $9.00)*

3. PAAC – CAD and Drawing Standards Manual *(Purchase Price $10.00)*

4 through 39 [NOT USED]

40. PAAC Stage I Light Rail Transit System, Liberty Avenue Subway and Gateway Center Shell, Construction Contract No. CA-450, Dated 2-7-83 *(Purchase Price $36.00)*

41. PAAC – CAF LRV Vehicle Acquisition Project, Rehab LRV, Electromagnetic Interference Qualification Test Report, Revision 1.0, Dated April 26, 2005, *(Purchase Price $5.00)*

42. Port Authority of Allegheny County North Shore Connector Project Safety and Security Certification Plan, Dated June 30, 2004. *(Not Available for Purchase)*

43. Port Authority of Allegheny County North Shore Connector Project System Safety Program Plan, Dated July 9, 2004. *(Not Available for Purchase)*

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
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		
01781.001	WOOD STREET STATION TEMPORARY PATRON SIGNAGE	PDA	1	$15,000.00	$15,000.00
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 FACILITES	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		
02451.001	REPLACEMENT OF EXISTING DIRECT FIXATION TRACK	LF	960		
02451.002	AS DIRECTED REPLACEMENT OF EXISTING DIRECT FIXATION TRACK	PDA	1	$200,000.00	$200,000.00
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	3,290		
02453.001	NO.4 SPECIAL CONSTRUCTION CROSSOVER AT ALLEGHENY	LS	1		

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		
15400.001	SPARE TUNNEL VENTILATION EQUIPMENT	PDA	1	$250,000.00	$250,000.00
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		
15888.001	NOISE ATTENUATORS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15889.001	TUNNEL VENTILATION FANS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15889.002	EVASES AND ALL ASSOCIATED EQUIPMENT	LS	1		

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
15889.004	HIGH TEMPERATURE TESTING OF TUNNEL VENTILATION FANS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15890.001	TUNNEL VENTILATION JET FANS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15890.003	HIGH TEMPERATURE TESTING OF TUNNEL VENTILATION JET FANS AND ALL ASSOCIATED EQUIPMENT	LS	1		
15891.001	MECHANICAL TESTING AND COMMISSIONING FOR TUNNEL SERVICES	LS	1		
16060.001	GROUNDING AND BONDING	LS	1		
16111.001	1" DIRECT BURIAL CONDUIT	LF	375		
16111.003	2" DIRECT BURIAL CONDUIT	LF	375		
16111.004	3" DIRECT BURIAL CONDUIT	LF	375		
16120.001	LOW VOLTAGE CABLES AND ALL ASSOCIATED EQUIPMENT FOR FIRE/LIFE SAFETY SYSTEMS	LS	1		
16120.003	AWG NO 10 DIRECT BURIAL COPPER CABLE, 1 CONDUCTOR	LF	1,170		
16123.001	MV TRANSFORMER	EA	4		
16124.001	25 kV CABLE FROM HANDHOLE TO STATION TRANSFORMER AT GATEWAY STATION	LF	2,000		
16124.002	25 kV CABLE FROM NORTH SIDE SUBSTATION TO TRANSFORMER AT NORTH SIDE STATION	LF	1,400		
16125.001	BUS DUCT	LF	160		
16135.001	INTRUSION DETECTOR	LS	1		
16205.001	GATEWAY TIE-BREAKER STATION	LS	1		

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

ARTICLE 1 – CONTRACT DOCUMENTS

1.1 After award and execution of the Contract, Authority will furnish the Contractor, for its use, the following:

A. One original copy of the executed Contract Forms; and

B. Three (3) sets of Bid Documents.

C. One copy of the following additional Documents:

1. Port Authority of Allegheny County North Shore Connector Project Safety and Security Certification Plan.
2. Port Authority of Allegheny County North Shore Connector Project System Safety Program Plan.
3. Port Authority of Allegheny County North Shore Connector Project System Safety Management Plan.
4. Port Authority of Allegheny County System Safety Program Plan
5. FTA – Transit Noise and Vibration Impact Assessment
6. PAAC – North Shore Connector Manual of Design Criteria
7. All Permit Documents listed in Section 00700, Article 21.4, Permits acquired by Authority.
8. As-built signal circuit drawings in electronic image files (.tiff) format for Gateway Interlocking
9. As-built circuit drawings in electronic image files (.tiff) format for Wood Street Interlocking
10. As-built circuit drawings in electronic image files (.tiff) format for Midtown Interlocking
11. PAAC, Hanning & Kahl Operating Instructions, Hanning Communication System (HCS-R), Routing Equipment Edition 24.01.2002, Revision E.
12. PAAC ADU Operation Training – TWC Equipment Operation, Instruction Guide, Dated August 2006.
13. Approved Train Clearance Waiver Requests
14. Authority's CCTV IP Addressing Scheme for North Shore Connector.
15. PAAC – CAF LRV Vehicle Acquisition Project, Rehab LRV, Electromagnetic Interference Qualification Test Report, Revision 1.0, Dated April 26, 2005

1.2 The Contractor shall maintain one set of the Contract Documents at the Worksite during the performance of the Work.

ARTICLE 2 – PROJECT RECORD DOCUMENTS

2.1 The Contractor shall maintain, and update on a weekly basis, the Project Record Documents throughout the course of the Work. The Contractor shall timely make updates on the appropriate document(s) to show:

A. Changes made during the performance of the Work, including updates to the as-built drawings as the Work progresses;

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 October 2, 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**
N/A	**Temporary Facilities To Be left In Place By NSC 003/006 Contractor**	**NSC-003/006**
N/A	**NS Temporary Power Assumption Calculations for NSC-003/006 Temporary Facility Turnover**	**NSC-003/006**

Ventilation -

Given: Two 50 HP jet fans, One per Tunnel

Electrical Supply 480 Volts 3Φ

Assumptions:

Efficiency Rating 90%
PF = Power Factor 80%

$$I = \frac{HP \times 746}{E \times \%\,EFF \times PF \times 1.73}$$

$$I = \frac{50 \times 746}{480 \times 0.90 \times 0.80 \times 1.73}$$

$I =$ 62 AMPS ✓

$$KW = \frac{E \times I \times PF \times 1.73}{1000}$$

$$KW = \frac{480 \times 62 \times 0.90 \times 1.73}{1000}$$

$KW =$ 41 KW ✓

EACH FAN Requires 41kW of power to run

Both Fans 82 KW ✓

DMJM HARRIS | AECOM

Lighting System

Given:

(L) - Length of bored tunnel ≅ 2250 Ft.

Fixtures at 50' centers throughout (L) of tunnel

Each fixture 300 watts

Electrical Supply 480 volts 3 Ø

Number of Fixtures per tunnel:

$2{,}250/50 = 45$ fixtures/tunnel

TOTAL Power per tunnel:

45 fixtures * 300 watts/fixture = 13,500 watts ✓

13,500 watts = 480 volts * $I_{(amps)}$

$I_{(amps)} = 28$ Amps ✓

$$KW = \frac{480 \times 28 \times 0.90 \times 1.73}{1000}$$

KW = 21 ✓ KW for each light string

BOTH light strings 42 KW ✓

Pumping System

Given: 7.5 HP Tsurumi Pump

Electrical Supply 480V 3ϕ

Assumptions:

Efficiency Rating: 90%
PF = Power Factor 80%

$$I = \frac{HP \times 746}{E \times \%\,Eff \times PF \times 1.73}$$

$$I = \frac{7.5 \times 746}{480 \times 0.90 \times 0.80 \times 1.73}$$

$I = 9.4$ Amps ✓

$$KW = \frac{E \times I \times PF \times 1.73}{1000}$$

$$KW = \frac{480 \times 9.4 \times 0.80 \times 1.73}{1000}$$

KW = 6.2 KW ✓

Total KW usage (Bored Tunnel) = 82 KW ✓ + 42 KW ✓ + 6.2 KW ✓ = 130.2 KW

Ventilation

Given: One 50 HP jet fan

Electrical Supply 480 volts 3ϕ

From calculation page 1.

KW = 41 KW

Lighting System

From calculation on page 2

Assume two(2) light strings

KW = 42 kw

Pumping System

From calculation on page 3

KW = 6.2 KW

TOTAL KW usage Cut/Cover = 41 KW + 42 KW + 6.2 KW = 89.2 KW

DMJM HARRIS | AECOM

Combined Power Useage = Bored Tunnel + Cut/Cover

130.2kW + 89.2kW = 219.4 kW ✓

SECTION 01781

MAINTENANCE AND PROTECTION OF AUTHORITY TRAFFIC

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 maintenance and protection of Authority traffic, in accordance with the Contract Documents.

B. The work of this Section includes, but is not limited to, the following activities:
   1. Coordination of transit impacts and related items.
   2. Track Access Training.
   3. Completion of Authority facility access procedures and permitting.
   4. Installation, maintenance, and removal of trench plates, temporary traffic barriers and signing used for the protective, warning, and detouring of Authority traffic through the Worksite.
   5. Temporary ADA patron signage at Wood Street Station

1.02 RELATED SECTIONS

A. [NOT USED]

B. [NOT USED]

C. [NOT USED]

D. [NOT USED]

E. Section 02220, "Demolition."

1.03 REFERENCE STANDARDS

A. [NOT USED]

B. [NOT USED]

C. [NOT USED]

D. [NOT USED]

E. [NOT USED]

F. [NOT USED]

G. [NOT USED]

H. AASHTO.

I. MUTCD.

J. ADA

K. Authority "Track Entry Training Program" Manual.

L. PAAC Signage and Information Design Standards Manual

1.04 SUBMITTALS

A. Contractor shall submit proposed detailed construction sequencing plan to the Engineer for approval prior to installation. The construction sequencing plan shall conform to the requirements of this Section and as shown on the Contract Drawings.

ARTICLE 2 PRODUCTS

2.01 MATERIALS

A. [NOT USED]

B. [NOT USED]

C. [NOT USED]

D. Contractor shall provide all necessary standard safety equipment as prescribed in Authority's "Track Entry Training Program" manual.

E. Authority Movement Director, Route Foremen, and Flagpersons shall be provided by Authority, but paid for by the Contractor. Authority will charge a flat-rate of $33.00 per hour for each person. Contractor shall request personnel at least 14 days in advance of the work. Costs will be deducted from Contractor's progress payment.

F. Wood Street temporary patron signage conforming to ADA and PAAC Signage and Information Design Standards Manual requirements. Signs type, size, and locations shall be coordinated with the Engineer and Authority Operations staff.

ARTICLE 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Contractor shall execute the work of this Section per the Contractor's detailed construction sequencing plan, which shall be approved by the Engineer prior to the start of the work.

B. Contractor shall conduct its Work so as not to obstruct or prevent operations and maintenance of Authority facilities except as specifically permitted in the Contract Documents. Authority has the right to enter the Worksite to perform maintenance and operate within Authority facilities. Contractor shall provide Authority access during the execution of the Work if so required.

C. Contractor shall obtain, and/or complete all necessary approvals, permits, training, and attend all required meetings in accordance with Authority procedures described in the

G. Lifting of any material or equipment adjacent to or over bus and rail running lanes require use of an Authority Route Foreman. If traffic needs to be stopped, such delay shall not exceed two (2) vehicles in any direction nor five (5) minutes in duration. All stoppages must be approved prior to stoppage by the Engineer, and supervised by Authority Route Foreman.

3.04 WOOD STREET STATION TEMPORARY PATRON SIGNAGE

A. Contractor shall coordinate the type, size, location and number of temporary signs to be installed at Wood Street Station for the duration of the Wood Street turnback operations. Contractor shall remove any temporary signage at the conclusion of the Wood Street turnback operations and restore any disturbed station facilities.

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement shall be made for the work of this Section, except Item 01781.001.

B. Item 01781.001 – Wood Street Station Temporary Patron Signage shall be measured as directed by the Engineer.

4.02 PAYMENT

A. No separate payment will be made for the work of this Section, excluding Item 01781.001. Payment for the work of this Section shall be included in the payment for related portions of the Work.

B. Item 01781.001 – Wood Street StationTemporary Patron Signage will be paid for as part of a Predetermined Amount (PDA), as such work is directed to be performed by the Engineer. The value to be paid for the directed work of this Contract Item will be established, at the discretion of Authority, by one or more of the following methods
   1. By use of unit prices for items of work that have an established unit price for other Contract Items under the Contract,
   2. By a negotiated amount, subsequent to receipt of the Contractor's submission of a proposal, following the procedures for establishing a price for a negotiated Change Order in Section 00900, Article 1.7,
   3. By force account, following the procedures for establishing the value of force account work as set forth in Section 01200, Article 4, and/or by Authority on the basis of the Engineer's estimate of an equitable value for the work to be performed. This would be a unilateral value as determined by Authority.

END OF SECTION

3.20 FINAL INSPECTION

A. With notice to the Engineer that the work is ready for final inspection, the Contractor shall:
   1. Submit all testing and commissioning reports as required by the Related Sections and complete requirements as noted.
   2. Submit letter from control manufacturer certifying that controls have been checked for proper operation and calibration and that system is operating as intended.

B. The Contractor shall furnish necessary mechanics to operate system, make necessary adjustments and assist with final inspection.

3.21 SPARE TUNNEL VENTILATION EQUIPMENT

A. A Predetermined Amount (Item 15400.001) has been included in the Unit Price Schedule of the Form of Proposal to provide Authority the opportunity to acquire spare tunnel ventilation equipment including, but not limited to, tunnel ventilation fans, jet fans, attenuators, dampers, and associated equipment. The Contractor shall coordinate with the Engineer and Authority during the Work to determine which, if any, spare tunnel ventilation equipment shall be provided by the Contractor prior to Project Completion.

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

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement shall be made for the work of this Section, except for Item 15400.001.

B. Item 15400.001 – Spare Tunnel Ventilation Equipment shall be measured as directed by the Engineer.

4.02 PAYMENT

A. No separate payment will be made for the work of this Section, except for Item 15400.001. Payment for the work shall be included in the payment for related portions of the Work.

B. Item 15400.001 – Spare Tunnel Ventilation Equipment will be paid for as part of a Predetermined Amount (PDA), as such work is directed to be performed by the Engineer. The value to be paid for the directed work of this Contract Item will be established, at the discretion of Authority, by one or more of the following methods

1. By use of actual paid invoices for the purchase price of equipment from the Supplier, as approved by the Engineer. No Contractor markup, overhead or profit will be paid for the purchase of equipment.
   a. Contractor shall submit Supplier's invoices with detailed breakdown of material and cost; and
   b. Certified proof of payment to Supplier by Contractor.
2. By a negotiated amount, subsequent to receipt of the Contractor's submission of a proposal, following the procedures for establishing a price for a negotiated Change Order in Section 00900, Article 1.7,
3. By force account, following the procedures for establishing the value of force account work as set forth in Section 01200, Article 4, and/or by Authority on the basis of the Engineer's estimate of an equitable value for the work to be performed. This would be a unilateral value as determined by Authority.

END OF SECTION

E. As Built Drawings
   1. Submit As Built Drawings for tunnel ventilation and balancing dampers showing layout, location, size of system components, installation conditions, mounting details, actuator details and any other relevant information. These shall be submitted to the Engineer for approval upon Substantial Completion of the tunnel ventilation and balancing dampers portion of the Work.

F. The Contractor shall submit the following manufacturing certificates and details within 60 days of Notice to Proceed.
   1. Certified performance curves and data for leakage and pressure drop for similar application damper modules at the specified conditions (UL555S).
   2. Recent 482°F temperature and thermal shock tests on modules as proposed for the complete dampers.
   3. Evidence that materials selected and the assembled product has a service life expectancy of not less than 20 years with reasonable maintenance. This shall include details of corrosion protection.
   4. Certified differential pressure and cycle tests for modules as proposed.
   5. Schedule of at least 3 locations where comparable multiple module dampers have been in satisfactory operation for a minimum period of 5 years.
   6. Certified fire tests for a multiple module damper of similar construction and arrangement, indicating compliance with tests ISO 834 (BS 476 Part 20) or the UL555S equivalent.
   7. Estimated mean time between failure (MTBF).
   8. Mean time between service failure (MTBSF).
   9. Mean time to repair (MTTR).
   10. Manufacturer recommendations for handling and long term storage of any spare equipment.
   11. Estimated equipment loads and footing reactions for supporting structure.
   12. Details of proposed actuators.
   13. Dimensioned general arrangement and interface Shop Drawing of dampers for two representative arrangements.
   14. Details of quality test procedures and accreditation.
   15. Details of the instrumentation, including environmental specifications and standards to which they have been tested.
   16. Details of equipment surface corrosion protection.
   17. Completed equipment schedule as per Table 15887-1 and Table 15887-2.

G. The Contractor shall submit the manufacturing certificates and details below prior to delivery of the dampers 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. Certified performance curves and data for leakage and pressure drop at the specified conditions (UL555S).
   2. Recent 482°F temperature and thermal shock tests on modules as will be supplied for the complete dampers.

3. Evidence that materials selected and the assembled product has a service life expectancy of not less than 20 years with reasonable maintenance. This shall include details of corrosion protection.
4. Certified differential pressure and cycle tests for modules as will be supplied.
5. Certified fire tests for multiple module damper arrangements, indicating compliance with ISO 834 tests (BS 476 Part 20) or the UL555S equivalent.
6. Estimated mean time between failure (MTBF).
7. Mean time between service failure (MTBSF).
8. Mean time to repair (MTTR).
9. Manufacturer recommendations for handling and long term storage of any spare equipment.
10. Confirmation that each damper operates correctly prior to shipment.
11. Equipment loads and footing reactions for supporting steelwork.
12. Details of actuators for each damper.
13. Dimensioned general arrangement and interface Shop Drawing of all dampers.
14. Details of the instrumentation including environmental specifications and standards to which they have been tested.
15. 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.
16. Details of equipment surface corrosion protection.
17. Completed equipment schedule as per Table 15887-1 and Table 15887-2.

H. High Temperature Testing
   1. If manufacturing certificates are not available to certify the high temperature performance of dampers, the Contractor shall ensure that high temperature testing and all associated work is undertaken at no additional expense to Authority.
   2. A high temperature testing plan and procedure shall be submitted to the Engineer for approval prior to undertaking the work.
   3. A high temperature test report shall be submitted to the Engineer for approval prior to procuring the dampers and associated equipment. This report shall detail the tests completed, test results and all other relevant information to the satisfaction of the Engineer.

I. Equipment requirements are scheduled in Table 15887-1 and Table 15887-2 of this Section and are shown on the Contract Drawings. The items in Tables of this Section listed as "By Contractor" shall be completed by the Contractor as required by the Submittals of this Section. Equipment information and/or data sheets shall be submitted with the completed Table 15887-1 and Table 15887-2.

J. The damper width and depth in Table 15887-1 and Table 15887-2 are the overall internal dimensions when installed (i.e. dimension for air flow). The Contractor shall coordinate the required sizes with other Authority Contractors.

Width (in) (nominal)	150	95	112
Length (in) (nominal)	115	72	72
Flange	By Contractor	By Contractor	By Contractor
Air Volume (kcfm)	159	40	40
Face Area (sft)	By Contractor	By Contractor	By Contractor
Pressure Loss Factor (K)	0.5 max	0.5 max	0.5 max
Actuation Type	Electric	Electric	Electric
Elevated Temperature Operations	482°F for 1 hour	482°F for 1 hour	482°F for 1 hour
Modulating	No	No	No
Power Failure Position	Open	Open	Open

Equipment Number	NS-TVD-207	NS-TVD-208	NS-TVD-209
Make	By Contractor	By Contractor	By Contractor
Description	Tunnel damper	Tunnel damper	Platform duct damper
Model	By Contractor	By Contractor	By Contractor
Type	Aerofoil Multi-blade Parallel Blade	Aerofoil Multi-blade Parallel Blade	Aerofoil Multi-blade Opposed Blade
Depth (in) (nominal)	<12	<12	<12
Width (in) (nominal)	129	146	144
Length (in) (nominal)	72	72	52
Flange	By Contractor	By Contractor	By Contractor
Air Volume (kcfm)	40	40	127
Face Area (sft)	By Contractor	By Contractor	By Contractor
Pressure Loss Factor (K)	0.5 max	0.5 max	0.5 max
Actuation Type	Electric	Electric	Electric
Elevated Temperature Operations	482°F for 1 hour	482°F for 1 hour	482°F for 1 hour
Modulating	No	No	Yes
Power Failure Position	Open	Open	Open

Equipment Number	NS-TVD-210	NS-TVD-211	NS-TVD-212
Description	Platform duct damper	Mezzanine damper	Tunnel damper
Make	By Contractor	By Contractor	By Contractor
Model	By Contractor	By Contractor	By Contractor
Type	Aerofoil Multi-blade Opposed Blade	Aerofoil Multi-blade Opposed Blade	Aerofoil Multi-blade Parallel Blade
Depth (in) (nominal)	<12	<12	<12
Width (in) (nominal)	144	100	190
Length (in) (nominal)	52	96	100
Flange	By Contractor	By Contractor	By Contractor
Air Volume (kcfm)	127	64	159

Face Area (sft)	By Contractor	By Contractor	By Contractor
Pressure Loss Factor (K)	0.5 max	0.5 max	0.5 max
Actuation Type	Electric	Electric	Electric
Elevated Temperature Operations	482°F for 1 hour	482°F for 1 hour	482°F for 1 hour
Modulating	Yes	Yes	No
Power Failure Position	Open	Open	Closed

Equipment Number	NS-TVD-213	Typical Platform Exhaust Inlet
Description	Tunnel damper	Balancing Damper (16 off)
Make	By Contractor	By Contractor
Model	By Contractor	By Contractor
Type	Aerofoil Multi-blade Opposed Blade	Adjustable slide plate or opposed blade damper
Depth (in) (nominal)	<12	<12
Width (in) (nominal)	190	96
Length (in) (nominal)	100	40.5
Flange	By Contractor	By Contractor
Air Volume (kcfm)	159	20
Face Area (sft)	By Contractor	By Contractor
Pressure Loss Factor (K)	0.5 max	0.5 max
Actuation Type	Electric	Electric
Elevated Temperature Operations	482°F for 1 hour	482°F for 1 hour
Modulating	No	Not Applicable
Power Failure Position	Closed	Not Applicable

ARTICLE 2 PRODUCTS

2.01 GENERAL

A. Materials
   1. The Contractor shall provide all manufactured items, materials, labor, cartage, tools, plant, appliances and fixings necessary for the proper execution of the work, together with all minor and incidental works.
   2. Should the Contractor propose any deviations from the specified requirements, such variations shall be submitted in writing to the Engineer for approval.
   3. This Section shall be read in conjunction with the relevant Contract Drawings.

B. Design Life
   1. Dampers and damper actuators shall be designed for an operating life of 20 years unless noted otherwise.

C. Serviceability of Dampers

3. The Contractor shall ensure that any screens provided by other Authority Contracts do not adversely affect the flow or impact upon the fan pressures.
4. The Contractor shall ensure that any screens provided by other Authority Contracts do not impair the ability to adjust the balancing dampers at system commissioning.
5. The Contractor shall immediately inform the Engineer in writing of any concerns with the placement of screens over the balancing dampers by other Authority Contracts.

2.05 SPARES

A. A Pre-Determined Amount (Item 15400.001) has been included in the Unit Price Schedule of the Form of Proposal to provide Authority the opportunity to acquire spare tunnel ventilation equipment. The Contractor shall coordinate with the Engineer and Authority during the Work to determine which, if any, spare damper modules, actuators, and limit switches shall be provided by the Contractor prior to Project Completion. The Contractor shall provide spare damper modules, actuators, and limit switches assembly and associated equipment as directed by the Engineer.

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

2.06 INSTRUMENTATION AND CABLING

1. All instrumentation and leads within the air stream shall continue to operate in the same high temperature conditions required of the tunnel ventilation dampers.
2. General Electrical Requirements. Additional electrical requirements are given in Section 16890, "Tunnel Services Electrical Requirements for Mechanical Equipment".

ARTICLE 3 EXECUTION

3.01 SHOP TESTING

A. Testing procedures shall be submitted to the Engineer for review and approval.

B. Shop testing shall include, but not be limited to, the following;
   1. Tests shall be conducted to UL555S and ISO 834 (BS 476) on the largest module size of each type of damper installed. These shall include tests for;
      a. Pressure loss when open (as a function of air flowrate, up to a uniform face velocity of 2000fpm);
      b. Air tightness when closed;
      c. Pressure resistance when closed;
      d. High temperature resistance when closed (operable after 1 hour at 482°F) and resistance to thermal shock; and
      e. Fatigue resistance of blades and actuators.

C. [NOT USED]

4.02 PAYMENT

A. Item 15887.001 – Tunnel Ventilation Dampers 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.

B. Item 15887.002 – Balancing Dampers 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.

C. [NOT USED]

END OF SECTION

a. Unless specified, appropriate anti-corrosion provisions shall be made by the Contractor for all attenuator components based on installation conditions. The Contractor shall provide information regarding material selection, galvanizing schemes and painting schemes.

2.03 SPARES

A. A Pre-Determined Amount (Item 15400.001) has been included in the Unit Price Schedule of the Form of Proposal to provide Authority the opportunity to acquire spare tunnel ventilation equipment. The Contractor shall coordinate with the Engineer and Authority during the Work to determine which, if any, spare noise attenuators shall be provided by the Contractor prior to Project Completion. The Contractor shall provide spare noise attenuators assembly and associated equipment as directed by the Engineer.

B. The Contractor shall supply enough spare splitters and associated mountings to furnish one complete attenuator unit of each type selected by the Engineer.

C. The spares shall be suitably packed for handling and for long term storage in accordance with manufacturer recommendations that have been approved by the Engineer and coordinated with Authority. Clear identification of the equipment shall be provided on the packaging. 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. Shop testing shall include, but not be limited to, the following:
   1. Insertion loss tests shall be carried out on one of each type and size of attenuator in accordance with ISO 7235.
   2. Pressure loss tests shall be carried out on one of each type and size of attenuator in accordance with ISO 7235.

C. All attenuator testing shall be shown as a witness point in the manufacturing schedule. At least 2 weeks notice of testing shall be given and the Contractor shall facilitate the attendance at the tests of the Engineer. Shop testing carried out without sufficient notice will be deemed to have not been done and those attenuators will be re-tested when the Engineer can be in attendance.

3.02 SITE TESTING AND COMMISSIONING

A. Site testing and commissioning shall be in accordance with Section 15891, "Tunnel Services Mechanical Testing and Commissioning".

B. Measurement of noise levels under operation of equipment to confirm conformance with required performance requirements. Tests shall be carried out in accordance with ISO 11201.

C. 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.

3.03 SYSTEM COMMISSIONING

A. The tunnel ventilation attenuators are part of the overall ventilation system and shall be included in the ventilation system commissioning.

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 15888.001 – Noise Attenuators and all Associated Equipment shall be measured as a lump sum unit, complete in place.

B. [NOT USED]

4.02 PAYMENT

A. Item 15888.001 – Noise Attenuators 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.

B. [NOT USED]

END OF SECTION

available to the control system if the vibration exceeds a preset limit (defined by the fan manufacturer).

C. Each fan motor shall be fitted with motor bearing RTDs and motor winding RTDs connected to separate terminal boxes on the fan casing. These sensors shall generate an alarm condition (not shut the fan off) available to the control system via an approved motor protection relay, when bearing or winding over-temperature is detected.

D. Each set of ventilation fans shall be fitted with an air flow temperature sensor and transmitter. These transmitters shall provide a 4-20 mA output signal which shall be connected into the PLC.

E. All instrumentation and leads within the air stream shall continue to operate in the same high temperature conditions required of the fans.

F. The manufacturer shall supply appropriate anemometer equipment (e.g. pitot-static probe) required for the fans to allow airflow measurements to be undertaken. A written procedure for testing the fans in the field with these instruments shall be included as part of the operation and maintenance instructions. The procedure shall be based on ISO 5802 (or BS 848 Part 3).

G. General Electrical Requirements
   1. Additional electrical requirements are given in Section 16890, "Tunnel Services Electrical Requirements for Mechanical Equipment"

2.07 SPARES

A. A Pre-Determined Amount (Item 15400.001) has been included in the Unit Price Schedule of the Form of Proposal to provide Authority the opportunity to acquire spare tunnel ventilation equipment. The Contractor shall coordinate with the Engineer and Authority during the Work to determine which, if any, spare tunnel ventilation fans shall be provided by the Contractor prior to Project Completion. The Contractor shall provide spare tunnel ventilation fans and associated equipment as directed by the Engineer.

B. The spares shall be suitably packed for handling and for long term storage in accordance with manufacturer recommendations that have been approved by the Engineer and coordinated with Authority. Clear identification of the equipment shall be provided on the packaging. 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. The fan manufacturer shall undertake shop performance tests as follows on one tunnel ventilation fan of each duty specified.
   1. ISO 5801 (or BS 848 Part 1 type C) performance tests giving fan pressures as a function of air flowrate with efficiency contours. Tests shall be carried out for a

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Item 15889.001 – Tunnel Ventilation Fans and all Associated Equipment shall be measured as a lump sum unit, complete in place.

B. Item 15889.002 – Evases and all Associated Equipment shall be measured as a lump sum unit, complete in place.

C. [NOT USED]

D. Item 15889.004 – High Temperature Testing of Tunnel Ventilation Fans and all Associated Equipment shall be measured as a lump sum unit, complete in place.

4.02 PAYMENT

A. Item 15889.001 – Tunnel Ventilation Fans 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.

B. Item 15889.002 – Evases 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.

C. [NOT USED]

D. Item 15889.004 – High Temperature Testing of Tunnel Ventilation Fans 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

2.04 INSTRUMENTATION AND CABLING

A. Passive type dry contact flow switches shall be provided with each fan to provide positive indication of airflow (in each direction for reversible fans).

B. Each fan shall be supplied complete with permanent equipment to measure and report out of balance vibration from the impeller, motor and bearings. This equipment shall monitor the fan continuously while it is running, and shall generate an alarm signal available to the control system if the vibration exceeds a preset limit (defined by the fan manufacturer).

C. Each set of jet fans shall be fitted with an air flow temperature sensor and transmitter. These transmitters shall provide a 4-20mA output signal which shall be connected into the PLC.

D. Each fan motor shall be fitted with motor bearing RTDs and motor winding RTDs connected to separate terminal boxes on the fan casing. These sensors shall generate an alarm condition (not shut down fans) available to the control system via an approved motor protection relay, when bearing or winding over-temperature is detected.

E. All instrumentation and leads within the air stream shall continue to operate in the same high temperature conditions required of the jet fans.

F. General Electrical Requirements
   1. Additional electrical requirements are given in Section 16890, "Electrical Requirements for Mechanical Equipment for Fire Life Safety Systems".

2.05 SPARES

A. A Pre-Determined Amount (Item 15400.001) has been included in the Unit Price Schedule of the Form of Proposal to provide Authority the opportunity to acquire spare tunnel ventilation equipment. The Contractor shall coordinate with the Engineer and Authority during the Work to determine which, if any, spare jet fans shall be provided by the Contractor prior to Project Completion. The Contractor shall provide spare jet fan assembly and associated equipment for jet fans as directed by the Engineer.

B. The spares shall be suitably packed for handling and for long term storage in accordance with manufacturer recommendations that have been approved by the Engineer and coordinated with Authority. Clear identification of the equipment shall be provided on the packaging. 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. The fan manufacturer shall undertake shop performance tests as follows on one jet fan of each type.

3.03 SYSTEM COMMISSIONING

A. The tunnel ventilation jet fans are part of the overall ventilation system and shall be included in the ventilation system commissioning.

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 15890.001 – Tunnel Ventilation Jet Fans and all Associated Equipment shall be measured as a lump sum unit, complete in place.

B. [NOT USED]

C. Item 15890.003 – High Temperature Testing of Tunnel Ventilation Jet Fans and all Associated Equipment shall be measured as a lump sum unit, complete in place.

4.02 PAYMENT

A. Item 15890.001 – Tunnel Ventilation Jet Fans 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.

B. [NOT USED]

C. Item 15890.003 – High Temperature Testing of Tunnel Ventilation Jet Fans 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

2. Lengths of flexible cables shall allow for drip loop, distance to rail connection point. Cables between conduit risers shall be supported on 2 kV insulators to avoid coming into contact with any surface, supports or rails.

3.03 PRODUCT REPLACEMENT

A. If products fail tests, remove failed products and install new products, at no additional cost to Authority.

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Item 16295.001 – Traction Power Substation Wire and Cable shall be measured as a lump sum unit, complete in place.

4.02 PAYMENT

A. Item 16295.001 – Traction Power Substation Wire and Cable will be paid at the lump sum price and shall include the cost of all work specified in this Section.

END OF SECTION

1. There shall be no mid-span splices of the fiber optic cable. All fiber optic cables must originate and end at an optical node, fusion spliced to a fiber distribution panel or to another cable run.
2. A factory fabricated fusion splice kit containing materials necessary for quality fusion splicing shall be provided for each fiber splice.
3. Splices made with the factory fabricated single mode fusion splice kits shall lose no more than 0.05 dB at 1310 nm.
4. An emergency restoration kit shall be provided to perform temporary splices. This kit shall include all necessary tools and materials to perform mechanical splices. Each mechanical splice kit shall lose no more than 0.1 dB at any wavelength.
5. Contractor shall keep a log of all splices and splice testing.

2.06 FIBER SLACK ENCLOSURES (FSE)

A. FSEs shall be provided and installed as part of this Contract, in every communications equipment room as shown on the Contract Drawings.

B. FSEs shall house and protect fiber optic cable slack, in a manner that allows maintenance personnel access to the cable slack so they may implement moves and changes to the fiber optic cable plant without disruption to its integrity.

C. FSEs shall be NEMA (National Electrical Manufacturers Association) type 3R; wall mounted or pole mounted and suitable for indoor and outdoor application. They shall provide for weatherproof entry and exit of cable from the bottom sides of the FSE.

D. FSEs shall be equipped with an Engineer-approved padlock provided by Contractor.

E. FSEs shall be sized to house a minimum of 328 ft of cable slack within the enclosure and be no less than 35 in high, 20 in wide, and 8 in deep.

F. FSEs shall have provisions for entrance of the fiber optic innerduct, including compression fittings, seals, and other incidentals required for proper installation of the innerduct. The FSE shall be designed such that the cable can be released and uncoiled from the enclosure via the front of the enclosure.

G. The method used for storage of fiber slack within the FSE shall not allow the minimum operational bending radius of the cable to be exceeded at any time.

2.07 [NOT USED]

ARTICLE 3 EXECUTION

3.01 FIBER OPTIC CABLE INSTALLATION REQUIREMENTS

A. Contractor shall perform a pre-installation survey of the entire fiber optic cable route as part of the Site Inspection. Site Inspection shall include inspection of relevant ducts, ductbanks, conduits, cable trays, and cable troughs as well as entrances to the communications equipment rooms and signal rooms.

B. The route of the 96 strand communications fiber optic cables shall be as physically diverse as possible; there shall be the widest separation of distance between portions of the cable forming the loop as shown in Contract Drawing CM004. Therefore, Contractor shall, to the greatest extent possible, assure that the 96 fiber cables installed between Gateway and Allegheny stations are located on opposite sides of the tunnels and aerial structures.

C. Contractor shall coordinate the installation of the fiber optic cable with Authority.

D. The installation plan shall indicate areas where conduit is to be installed directly to the walls of tunnels. The proposed method of attaching the conduit to the wall of the tunnel shall be detailed in the plan.

E. Contractor shall perform the cable installation in accordance with the approved plan. Any deviations from the approved plan must be submitted in writing to the Engineer for approval.

F. Contractor shall pull a pull cord whenever installing cable in ducts. A minimum of 2 feet of pull cord shall be left at each end of conduit run, with ends of the pull cord secured.

G. Contractor shall verify raceway conduit is free of obstructions by pulling a suitable wire brush, swab, and mandrel through raceway conduit to remove extraneous matter.

H. Contractor shall ensure raceway conduit is dry before installation of cable and use lubricant approved by cable manufacturer to facilitate pulling cable.

I. Maximum cable lengths and pulling tensions shall be determined to avoid excessive pulling tensions or more bends than manufacturer's recommendations.

SECTION 16894

TUNNEL EMERGENCY RAIL LIGHTING AND LIGHTING RECEPTACLES

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 rail tunnel lighting, emergency egress stairway lighting and signage, and lighting receptacles, in accordance with the Contract Documents.

B. The work of this Section includes, but is not limited to, the following activities:
   1. Design, manufacture, furnish, install, and testing of the new rail tunnel emergency lighting and other equipment associated with the system.

C. The Contract Documents provide the performance parameters and Design Criteria to complete the tunnel emergency rail lighting, emergency egress stairway lighting and signage, and lighting receptacles portion of the Work. The Contractor shall be responsible to provide a completed design for this portion of the Work.

1.02 RELATED SECTIONS

A. Section 15400, "Tunnel Services Scope of Work"

B. Section 16111, "Conduit"

C. Section 16120, "Low Voltage Power Cables"

D. Section 16702, "Copper Outside Plant"

E. Section 16889, "Tunnel Services Electrical Testing and Commissioning"

F. Section 16890, "Tunnel Services Electrical Requirements of Mechanical Equipment"

G. Section 16891, "Tunnel Services Low Voltage Switchboard and Motor Control Center"

H. Section 16892, "Tunnel Services Uninterruptible Power Supply"

1.03 REFERENCE STANDARDS

A. ANSI

B. IEC

C. NEMA

B. The enclosure shall have a minimum degree of protection of NEMA 4X unless otherwise specified in Article 2.01 of this Section. Gaskets shall be temperature resistant synthetic rubber and resistant to the atmosphere in the rail tunnel.

C. All tunnel luminare components shall be of low smoke and halogen free manufacture.

D. All lighting power circuit cables shall be fire resistant and of low smoke and halogen free manufacture and be installed in steel conduit.

E. All enclosures and assemblies shall be vermin proof.

F. Duplex Receptacle
   1. Duplex Receptacle shall be weather proof with heavy duty surface mount cast device box with cover.

G. Die cast aluminum LED "Exit" sign with universal mounting and red letters in the emergency egress stairway.

2.04 LIGHTING TECHNICAL REQUIREMENTS

A. General
   1. Luminare mounting and positioning including maximum and minimum height requirements shall comply with the relevant Contract Drawings.

B. UPS Emergency Lighting
   1. Emergency lights shall be supplied from a dedicated UPS unit. UPS units shall automatically switch to battery backup in the event of a power outage.
   2. In the event of a power outage emergency lighting shall be maintained for a minimum period of 90 minutes.
   3. Minimum emergency lighting levels on egress walkways shall be 2.7 lux minimum in accordance with NFPA 130.
   4. Emergency Lighting UPS shall be UL924 listed.

C. Duplex Receptacle
   1. Duplex receptacle shall be 120VAC, 20A, 2 pole 3 wires, NEMA WD 6 5-20R with integral ground fault circuit interrupter.

2.05 SPARES

A. The Contractor shall provide a spare Emergency Lighting UPS for the type installed.

B. The spares shall be suitably packed for handling and for long term storage in accordance with manufacturer recommendations that have been approved by the Engineer and coordinated with Authority. Clear identification of the equipment shall be provided on the packaging. 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 LUMINAIRES

A. Contractor shall furnish and install all equipment necessary for the tunnel emergency lighting to function properly, including but not limited to luminaries, mountings brackets, light sources and fixings in accordance with the Contract Drawings. The rail tunnel emergency lighting shall be terminated at the end of the tunnel boat section at track chainage Sta. 6051+60. The tunnel boat section will require 26 light fixtures for both the left and right tracks.

3.02 DUPLEX RECEPTACLES

A. Contractor shall furnish and install all equipment necessary for the tunnel receptacles to function properly, including but not limited to duplex receptacles, weather proof heavy duty surface mount device box in accordance with the Contract Drawings.

3.03 TESTING

A. Tests to relevant standards shall be carried out on the complete lighting system, fully assembled in its final configuration:
   1. Insulation resistance tests;
   2. Ground continuity tests;
   3. Check of protective circuits;
   4. Operational test of all luminaries;
   5. Emergency lighting levels;
   6. Check of wiring and terminations; and
   7. Battery operated emergency system discharge test to establish the capacity of the batteries.

B. Tests to relevant standards shall be carried out on the complete duplex receptacles, fully assembled in its final configuration:
   1. Insulation resistance tests;
   2. Ground continuity tests;
   3. Check of GFCI protective circuits;
   4. Check of wiring and terminations.

3.04 PACKAGING AND SHIPMENT TO WORKSITE

A. The equipment, as far as practicable, shall be fully tested and assembled ready for shipment.

B. The equipment shall be adequately packaged for transporting to the Worksite.

3.05 EMERGENCY EGRESS STRAIRWAY LIGHTING

A. Contractor shall furnish and install all equipment necessary for the emergency egress stairway lighting to function properly, including but not limited to luminaries, exit lighting, mounting brackets, light sources and fixtures in accordance with requirements of this Section. Provide a total of four 277 V/ 42 W wall mounted vandal resistant fluorescent fixtures with polycarbonate lens and mount at each stairway landing.

B. Install "Exit" signs at both doorways so that individuals within the tunnel can see each sign from the tunnel proper.

ARTICLE 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Item 16894.001 – Rail Tunnel Lighting System shall be measured as a lump sum unit, complete in place.

B. Item 16894.002 – Rail Tunnel Lighting Receptacles shall be measured as a lump sum unit, complete in place.

C. Item 16894.003 – Spare Emergency Lighting UPS and all Associated Equipment shall be measured as a lump sum unit, complete in place.

4.02 PAYMENT

A. Item 16894.001 – Rail Tunnel Lighting System will be paid at the lump sum price and shall include the cost of all related work specified in this Section.

B. Item 16894.002 – Rail Tunnel Lighting Receptacles will be paid at the lump sum price and shall include the cost of all related work specified in this Section.

C. Item 16894.003 – Spare Emergency Lighting UPS 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

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 172: Reference Section 15887 Tunnel Ventilation and Balancing Dampers. For dampers listed as NS-TVD-210 has a width and length been determined?

Response 172: Dampers NS-TVD-209 and NS-TVD-210 are 12'-0" high by 4'-4" wide. See Addendum 9.

Question 188: Regarding Question 24 (Addenda #1), Contractors are still awaiting response. Please clarify. Ref Section 0500, Article 2.1.O — Please clarify the intent of this section. Is it the Authority's intent to charge the contractor $56.00/hr for escort services for all track occupancy? Is the escort required for the full duration of track occupancy or only to gain occupancy? Is this requirement for only revenue track? Would the Authority consider creating a PDA Bid Line Item for this?

Response188: The Authority will charge the Contractor for escorts when they are entering active track areas and when equipment is operated over switches which are also in revenue service as well as when the contractor's work activities may interfere or interact with revenue service. The escort is not needed during the entire duration of track occupancy when the contractor is in their work zone which is not in revenue service.

Question 191: Section 01787 Item 3.01. E indicates that the follow-on contractor is to be responsible for the temporary electric utility usage charges. Not knowing the calculated loads for the equipment utilizing the temporary power makes is impossible to estimate the utility usage cost. It is suggested that the Authority assume the billing or establish a PDA bid

item for these cost. Otherwise the contractor will be forced to quote inflated cost within his bid and create a competitive disadvantage.

Response191: Port Authority has estimated the electrical loads for the NSC-003/006 temporary facilities to be transferred. The information is included in Appendix C in Addendum 9.

Question 214: In reference to note no. 3 on drawing sheet no. 270, it should be "conduit supports", not "cable supports". Please revise.

Response 214: The supports are for cable in conduit.

Question 215: In reference to notes 6 and 18 on drawing sheet no. 271, it is not clear what type of conduit traction cables should be installed in. On drawing sheet no, 270, is the traction power and motor operated switch cables installed in fiberglass or galvanized rigid steel conduit? Please advise.

Response 215: Cable shall be in GRS conduit unless otherwise noted. See Addendum 9.

Question 216: On drawing sheet no. 270, please provide details of how the traction power feeder cables (as an example at stationing 6044+90) leave the conduit and attach to the feeder jumper jc-400. If a box is required, then what size and type should be used. Please advise.

Response 216: No JB required after cable leave conduit, attach to wall and ceiling using details on sheet no. 212.

Question 217: In reference to conduit id nos. tpp-3 and tpp-4 in the conduit and cable schedule on drawing sheet no. 281, do these spare type conduits stop at the manhole outside the traction power substation or do they continue into the tunnel/subway and stop at their respective stationing numbers 6044+77.5 and 6044+76? Please advise.

Response 217: Spare conduits stop at manholes.

Question 218: Detail "A" on drawing sheet no. 304 shows a porcelain cable clamp and also a conduit clamp which is a discrepancy. How is the traction power cable installed, in conduit, or exposed and supported by a

porcelain cable clamp? Please advise.

Response 218: Cables shall be exposed in porcelain clamps. See Addendum 9.

Question 219: For Gateway Traction Power Tie Breaker Station, where is the ac primary feed coming from? What types and quantities of cable and conduit are required? The contract drawings do not provide this information. Please advise.

Response 219: See drawing no.TP-320, sheet 327.

Question 222: There is a discrepancy regarding the positive feeder locations at Allegheny location. Drawing sheet no. 176 shows the tie-in locations to the OCS at 6084+50 and 6084+90. However, drawing sheet no. 319 shows the tie-in locations to the OCS at 6088+85 and 6088+86. Which is correct? Please advise.

Response 222: Drawing Number OC110, Sheet no. 176 is correct. See Addendum 9.

Question 224: Please provide a scaled drawing of contract drawing sheet nos. 587, 591, 592, 595, and 596 so that cable and conduit footages can be estimated.

Response 224: See Addendum 9.

Question 225: In reference to paragraph "X" on spec page 00500-16, does the overhead catenary system (OCS) drawings account for the OCS requirements mentioned in that paragraph. If not, then please reissue those applicable OCS layout drawings that show those requirements along with the OCS assemblies and supports.

Response 225: Yes, Drawing OC110, sheet 176 indicates Temporary Insulators IS-101 installed by Contractor between Wood Street and Gateway Stations (Sta. 1016+65). These in-span insulators sectionalize the catenary to form the terminus of the Authority operations. For the Gateway Construction the existing catenary is terminated to make one side of the overlaps at Gateway (OC309), and the existing catenary around the loop is removed.

Question 226: As an example and in reference to drawing sheet nos. 345 and 569, those drawing sheets both show the identical gateway interlocking and both are supposed to show the cable plans as well. However, in some cases, cable for a specific wayside signal assembly is shown on one drawing, but is missed on the other drawing. An example would be signal location 2s where a 2/c #6 is shown on drawing sheet no, 569, but is missed on drawing sheet no. 345. Please review these two sets of drawings and revise for consistency so that the same cables are shown on both sets. It is much better to make these revisions now, then rather incur additional costs after the contract is awarded.

Response 226: These two drawings both show 2-2c #6 and 1-10c # 14 going to signal 2S.

Comment 228: Per Addendum #6, Spec section 13593 Article 2 -Products, 2.01 Power Supplies, Paragraph C.1:

"The Contractor shall furnish ultra-low-maintenance Nickel-Cadmium Alkaline Storage Batteries and accessories for 12 volt supply, as required. Batteries shall be Saft Ultra Low Maintenance NICAD or approved equal, as specified here-in," And with reference to Specification Drawing SG125 - Sh 388, the batteries are defined to be 120 and 240 Ah for the B12 and 812-AFO supplies. Current Information indicate that both the SLM and SPL are low maintenance NICAD, but spec calls far SLM (ultra low maintenance), The SLM type does not have 120Ah (only 119Ah) or 240Ah (only 238Ah) cells. The SPL does meet the Ah range requirement, but are not listed as 'ultra low maintenance'.

Please advise if the SLM type will be acceptable for this Project, or will the SPL type be acceptable, even though they are only lined as 'low maintenance'.

Response 228: SLM type is acceptable.

Comment 229: 13570-213570-2 Signal System Requirements states, "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 the tiff Images to Autocad and shall mark the CADD files, (X=out, O=in) to portray the changes required to the circuitry as described here in. 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. All final As-built drawings shall be provided to the Authority in CADD format as specified. The Contractor shall redraw and convert all existing drawings as is required to conform to these specifications."

Is the contractor only required to redraw and convert those drawings that change as a result of modifications for purposes of this contract? Or is the contractor responsible to redraw and convert ALL drawings whether they have changes made to them or not?

Response 229: The Contractor is to redraw and convert those drawings that change as a result of modifications for purposes of this Contract.

Comment 230: 13576- Circuit Requirements states,
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.
4. Engineering data on signal strength, shunting sensitivity at various operating and ballast conditions.

K. EMI-Related Design Requirements
1. The system shall be designed to operate in the electromagnetic environment of the LRT system and not cause interference to other systems.
2. Equipment shall be designed, selected, and installed with consideration given to the electromagnetic environment, which includes but is not limited to traction
power supply, AC power distribution systems, vehicle propulsion systems,
communications systems, adjacent railroads, and electric utility lines.

L. Compatibility with Existing System
1. Signal equipment which Interfaces with the existing equipment shall be interconnected and compatible with the existing to form a complete, functional, and seamless signal system.

Is a baseline test available from the Port Authority or will accept the equipment based upon material spec sheets? If not, is baseline testing the responsibility of the contractor?

Response 230: The LRV Electromagnetic Interference Qualification Test Report has been added to the list of Reference Documents and will be given to the Contractor after NTP. Any additional baseline testing is the responsibility of the contractor. See Addendum 9.

Question 231: Question on item:
15887-01 - Tunnel Ventilation Dampers Unit Price Total Price
15887-02 - Tunnel Balancing Dampers Unit Price Total Price

Which unit equipment numbers are for ventilation and which equipment numbers are for balancing? Bid form asks for unit pricing.

Response 231: The Tunnel Ventilation Dampers Item 15887.001 and Balancing Dampers Item 15887.002 are paid as Lump Sum units, not unit price. See Section 15887, Article 4.

Question 232: There are (29) different damper equipment numbers which equipment number is to be used for unit pricing? Bid form has (1) space.

Response 232: See response to Comment 231.

Question 233: Equipment number NS-TVD-209 - Are width and length dimension defined yet?

Response 233: See response to Question 172 and Addendum 9.

Question 234: Equipment number NS-TVD-210 - Are width and length dimension defined yet?

Response 234: See response to Question 172 and Addendum 9.

Question 235: Equipment number – 'Typical Platform Exhaust Inlet Balancing Damper' says 16 off - Does that mean 16 of?

Response 235: It means 16 units of dampers.

Question 236: Equipment number - 'Typical Platform Exhaust Inlet Balancing Damper' - Are width and length dimensions defined yet?

Response 236: Balancing Dampers are 40.5" height x 96" width. See Addendum 9.

Question 237: 15887-003 Unit Pricing Bid form - Which ventilation dampers, balancing dampers are to be used for unit pricing? Are spares required for each equipment number or only select units?

Response 237: Item 15887.003 has been eliminated. Item 15400.001 Tunnel Ventilation Spare Equipment has been provided as a Pre-Determined Amount. See Addendum 9.

Question 238: 15888-001 There are (12) different attenuator equipment numbers. Which equipment number is to be used on the bid form for unit pricing?

Response 238: The Noise Attenuators Item 15888.001 are paid as a Lump Sum unit, not unit price. See Section 15888, Article 4.

Question 239: 15888-002 which spare attenuator equipment number is to be used for unit pricing schedule. Spec says (1) ea. type. All types are defined as splitter but sizes vary.

Response 239: Item 15888.002 has been eliminated. Item 15400.001 Tunnel Ventilation Spare Equipment has been provided as a Pre-Determined Amount. See Addendum 9.

Question 240: 15889-01 Tunnel Ventilation Fans - Which equipment number fan is to be used for unit pricing? Units vary in horsepower, size and pressure duty point.

Response 240: The Tunnel Ventilation Fans Item 15889.001 are paid as a Lump Sum unit, not unit price. See Section 15889, Article 4.

Question 241: 15889-003 - Which equipment number fan is to be supplied as spare? Spec says 1 - each type. All types are reversible axial direct drive, but horse powers and pressures vary.

Response 241: Item 15889.003 has been eliminated. Item 15400.001 Tunnel Ventilation Spare Equipment has been provided as a Pre-Determined Amount. See Addendum 9.

Question 242: 15890-001 - Which Jet fan equipment number is to be used for unit pricing - on unit price schedule?

Response 242: The Tunnel Ventilation Jet Fans Item 15890.001 are paid as a Lump Sum unit, not unit price. See Section 15890, Article 4.

Question 243: 15890-002 - which Tunnel Ventilation jet fan equipment number is to be provided as a spare? (2) types are reversible.

Response 243: Item 15890.002 has been eliminated. Item 15400.001 Tunnel Ventilation Spare Equipment has been provided as a Pre-Determined Amount. See Addendum 9.

Question 244: Raw Material Escalation Cost:
The quotes on fans, dampers and attenuators are based on current material costs. Due to the volatility in metals cost, (steel, copper) - are there any provisions for cost increases in the project? Can these costs be passed along to the Port Authority?

Response 244: There are no provisions for material cost increases. These costs can not be passed on to Authority.

Question 245: When would the fans, attenuators and dampers be expected on the job site?

Response 245: Contractor is responsible for scheduling the Work. The Contract has various work area availability dates as provided in Section 00500, Article 2.1,Table 00500-1.

Question 246: When would the spare equipment be expected to be delivered?

Response 246: Before Project Completion.

Question 247: Section 00700 Article 7 states that the "Authority may, in its sole discretion, and at any time prior to or during the performance of any portion of the Work, elect not to enroll or cease the enrollment of the Contractor or any Subcontractor", Please confirm that if Contractor's enrollment into the OCIP program is discontinued at any time prior to or during the performance of the Work, the Authority shall provide the Contractor with reasonable notice and will - compensate the Contractor

for any increased insurance premiums associated with the OCIP cancellation in accordance with Terms and Conditions Section 00900.

Response 247: Authority will provide reasonable notice to a Contractor in the event that Authority elects not to enroll or cease the enrollment of the Contractor or any Subcontractor. Compensation to the contractor for any increased insurance premiums associated with the OCIP cancellation would be addressed under Section 00900 - Contract Modifications.

Question 248: The Contract Documents have many references to completion of design by the Contractor. Please confirm that the Project has been 100% designed by the Authority and that the Authority's Engineer is the Engineer of Record. It is our understanding that the Signal System requires design completion by the Contractor as identified under Specification Section 13579. Therefore, for all other specifications, the Contractor is responsible to perform the work in accordance with the details shown on the plans and in accordance with the requirements of those various specifications. Please review and confirm the matrix below outlining our understanding of the Contractor's responsibility (if any) as it pertains to the design and performance of the following systems:

Specification Section	Item of Work	Designed by the Authority	Contractor Required to Complete Design for Authority's Approval
01738	Lock out/Tag Out	X	
01739	Quality and Configuration Management	X	
01755	Mobilization	X	
01775	Testing laboratory Services	X	
01777	Construction Certification Program	X	
01780	Maintenance and Protection of Traffic	X	
01781	Maintenance and Protection of Authority Traffic	X	
01783	Temporary Facilities	X	
01784	Temporary Pedestrian Accommodations, Fence and Barricade	X	
01785	Construction Survey	X	
01787	Transfer of Temporary Facilities	X	
01791	Remove, Store, and Re-erect Existing	X	

	Components		
01800	Erosion and Sedimentation Control	X	
01810	Off-Duty Uniformed Police Officers	X	
01815	Construction Dust Control	X	
01840	Spare Parts and Test Equipment	X	
01850	Construction Monitoring Program	X	
01900	Train Clearance Testing	X	
01910	Operations, Maintenance and Repair Data	X	
01911	Operations, Maintenance and Information database	X	
01920	Cutting and Patching	X	
01940	Cleaning	X	
02020	Handling of Unforeseen Hazardous and Contaminated Building Materials	X	
02220	Demolition	X	
02316	Excavation	X	
02320	Backfill	X	
02340	Subgrade	X	
02353	Geotextile	X	
02450	General Track Construction	X	
02451	Replacement of Existing Direct Fixation Track	X	
02452	Direct Fixation Track Construction	X	
02453	Special Track Construction	X	
02454	Rail Lubrication System	X	
02456	Track Appurtenances and other Track Material	X	
02462	Direct Fixation Rail Fasteners	X	
02464	Special Trackwork	X	
02466	Steel Rail	X	
02468	Rail Welding	X	
02471	Track-to-Earth Resistance Testing	X	
02581	Duquesne Light company Switch Pads	X	
02627	Pipe Underdrain, Pavement Base Drain and Subsurface Drain Outlets	X	
02721	Subbase	X	
02740	Bituminous Pavement and Sidewalk	X	
02741	Bituminous Tack Coat	X	
02751	Driveways	X	
02761	Painting Traffic Lines and Markings	X	
02781	Concrete Curb	X	
02785	Concrete Sidewalk and Stairs	X	
02825	Security Fence	X	
02840	Guide Rail	X	
02843	Bollards	X	
02891	Traffic Signing	X	
03211	Reinforcement Bars and Dowels	X	

03305	Cast-in-Place Concrete and Cement Concrete Structures	X	
03630	Plinth Anchoring System	X	
04200	Unit Masonry	X	
05120	Structural Steel	X	
05505	Metal OCS Poles	X	
05510	Warning Signs	X	
05520	Miscellaneous Metalwork	X	
07842	Fire Stop and Barrier System	X	
08110	Steel Doors and Frames	X	
08710	Finish Hardware	X	
09900	Protective Coating for Concrete Surfaces	X	
09902	Painting	X	
09910	Painting OCS Poles	X	
13570	Signal System Requirements		X
13574	Wayside Signal Equipment		X
13576	Circuit Requirements		X
13577	Solid-State Equipment		X
13579	Design Requirements		X
13580	Train to Wayside Communications (TWC)		X
13581	Local Control Panels		X
13582	Safety and Systems Assurance		X
13585	Installation Requirements		X
13587	Wire and Cable	X	
13588	Relays and Plugboards	X	
13589	Electrical and Electronic Components	X	
13590	Housing and Housing Equipment	X	
13591	Tags, Locks and Keys	X	
13593	Signal Power Distribution		X
13595	Signal System Test and Inspection		X
15400	Tunnel Services Scope of Work	X	
15445	Tunnel Mechanical Drainage Systems	X	
15546	TPSS Sump Pump	X	
15884	Tunnel Fire Extinguishers and Cabinets	X	
15885	Tunnel Dry Standpipe Systems	X	
15886	Tunnel Ventilation Jet Fan Active Control	X	
15887	Tunnel Ventilating and Balancing Dampers	X	
15888	Tunnel Ventilation Noise Attenuators	X	
15889	Tunnel Ventilation Fans	X	
15890	Tunnel Jet Fans	X	
15891	Tunnel Services Mechanical Testing & Commissioning	X	
16050	Basic Electrical Requirements	X	
16060	Grounding and Bonding	X	

16075	Electrical Identification	X	
16081	Electrical Testing AC Systems	X	
16111	Conduit	X	
16120	Low Voltage Power Cables	X	
16123	MV Transformer, Liquid Filled	X	
16124	Medium Voltage Cables, 25kV	X	
16125	Low Voltage Bus Duct	X	
16130	Raceways and Boxes	X	
16135	Intrusion Detector	X	
16200	Traction Power Substation General Requirements	X	
16205	Circuit Breaker Room & Tie-Breaker Station General Requirements	X	
16210	Traction Power Substation Basic Electrical Materials and Methods	X	
16220	Traction Power Substation 27kV AC Switchgear	X	
16221	Traction power Substation 27kV Fusible Load	X	
16230	Traction Power Substation Transformer-Rectifier Unit	X	
16235	Traction Power Substation Auxiliary Power System	X	
16240	Traction Power Substation Metal Enclosed DC Switchgear	X	
16250	Traction Power Substation Drainage and Negative Return Switchboard	X	
16270	Traction Power substation 125 VDC Battery System	X	
16280	Traction Power Substation Enclosed	X	
16295	Traction Power Substation Wire and Cable	X	
16300	Traction Power Substation Busways	X	
16310	Traction Power Substation Local Annunciator panel	X	
16340	Medium Voltage Metal-Enclosed Load Interrupter Switchgear	X	
16360	Traction power Substation Testing	X	
16430	Low Voltage Metal-Enclosed Circuit Breaker Switchgear	X	
16602	General Requirement overhead Contract System	X	
16619	Surge Arrestors	X	
16620	Uninsulated Conductors and Cables	X	
16622	Insulators	X	
16625	Section Insulators	X	

16626	Galvanized Steel Wire and Wire Rope	X	
16627	Stainless Steel Wire Rope, Strand, Rod and Strip	X	
16629	Balance Weight Anchor Assembly	X	
16640	OCS Fittings and Hardware	X	
16650	OCS Basic Electrical Materials and Methods	X	
16700	Communications	X	
16701	Fiber Optic Outside Plant	X	
16702	Copper Outside Plant	X	
16703	Carrier Transmission System (CTS)	X	
16705	Communications System Power Supply	X	
16706	Disconnect Switches	X	
16712	Contact Wire Heater System	X	
16721	Telephone System	X	
16722	Radio System Expansion	X	
16741	Variable Message Sign/PA System	X	
16742	SCADA System	X	
16750	Digital Video System	X	
16751	OCS Supporting Devices	X	
16800	Overhead Contact System Installation	X	
16805	Interface Requirements for OCS	X	
16810	Stagger and Height Gauge	X	
16820	OCS Special Tools	X	
16830	Overhead Contact System Test and Inspection	X	
16889	Tunnel Services Electrical Testing and Commissioning	X	
16890	Tunnel Services Electrical Requirements of Mechanical Equipment	X	
16891	Tunnel Services Low Voltage Switchboard and Motor Control Center	X	
16892	Tunnel Services Uninterruptible Power Supply	X	
16893	Tunnel Services Power Factor Correction	X	
16894	Tunnel Emergency Rail Lighting and Lighting Receptacles	X	
16895	Tunnel Services Low Voltage AC Variable Speed Drive	X	
16901	Communications System Inspection and Test	X	
16950	Operation Control Center (OCC) System Upgrade	X	

Response 248: The chart is not correct. There are elements of Contractor design prescribed throughout the Contract Documents. Example: Section 03305 Cast-in-Place Concrete and Cement Concrete Structures where

the Contractor needs to provide concrete mix designs. Please refer to the Contract Documents for elements of Contractor design.

Question 249: For the Wood Street cross over construction, the existing track centers are 12'-5 ½ "and the new double crossover will be 12'-6" track centers. The installation work will require realignment of existing track. Will this re-alignment require removal and replacement of the plinth concrete under the existing tangent track beyond the limits of the crossover, or should we assume the existing rail attachment hardware can accommodate this re-alignment?

Response 249: The existing rail attachment hardware can accommodate the realignment on the existing plinths outside of the crossover replacement limits. Note that all plinths that are under all new rails shall be replaced.

Question 250: Please provide a typical detail for the reinforcement of continuous plinths for the #4 crossover, the #6 crossover, and the #8 double crossover.

Response 250: The special trackwork utilizes the same typical plinth details and reinforcing that are shown in the Contract Documents. Specific plinth lengths and groupings are not shown on the plans, as these DF plates and the corresponding plinth sizes that the plates rest on will depend on the DF fastener system chosen by the Contractor and the specific special trackwork layout that is built by the trackwork manufacturer.

Question 251: Specification 16124 Section 2.02 calls for three (3) conductor 4/0 to be used for feeding the MV transformers at Gateway and North Side. The conduit schedule for these locations calls for single conductor 4/0 cables. Please clarify the type of cable to be used for feeding the MV transformers.

Response 251: Cable shall be 1-3c-4/0. Drawing TP-016 and Section 16124 have been revised in Addendum 9.

Question 252: Specification 16701 Section 1.08 and Section 2.07 appear to conflict. Section 1.08 states that Fiber Optic cable shall be installed in conduit and Section 2.07 states the Fiber Optic cable shall be installed in innerduct. Please clarify for the 96-stand and 12-strand Fiber Optic which is to be installed in the tunnel; 1) Rigid Steel Conduit or 2) low smoke, zero halogen, low toxic, fire retardant innerduct.

Response 252: Rigid steel conduit shall be installed. Section 16701 has been revised in Addendum 9.

Question 253: Is it the Authority's intent to have the contractor survey every fiber of the existing fiber optic plant (as shown on drawings CM005 and CM006) or only those fibers needed to support the expansion of the CTS System under this contract?

Response 253: Contractor shall survey only the fiber required to support the new CTS system.

Question 254: Can the survey of the existing fiber optic plant be performed during regular work hours or only during non-revenue periods (nights/weekends)?

Response 254: Authority will allow the Contractor to perform the existing fiber optic plant surveys during revenue service as approved by Authority procedures included in Section 01781 and Section 00700, Article 13.14. The Contractor will be escorted by Authority personnel at no additional cost.

Question 255: Bid Item 16124.001 "25 kV Cable from Handhole to Station Transformer at Gateway Station" has a quantity of 2,000 LF as shown in the unit price schedule Form B. Under the measurement and payment section of the specifications, this item shall be measured and paid "per linear foot, complete in place". Please clarify what the linear foot measurement is referring to (i.e. cable footage or distance from handhole to station transformer).

Response 255: Cable footage

Question 256: Bid Item 16124.002 "25 kV Cable from North Side Substation to Transformer at North Side Station" has a quantity of 1,400 LF as shown in the unit price schedule Form B. Under the measurement and payment section of the specifications, this item shall be measured and paid "per linear foot, complete in place". Please clarify what the linear foot measurement is referring to (i.e. cable footage or distance from substation to transformer).

Response 256: Cable footage

Question 257: Bid Item 16295.001 "Traction Power Substation Wire and Cable" has a quantity of 2,100 LF as shown in the unit price schedule Form B. Under the measurement and payment section of the specifications, this item shall be measured and paid "per linear foot, complete in place". Please clarify what wire and cable the linear foot measurement is referring to.

Response 257: Item 16295.001 has been changed to a Lump Sum payment. See Addendum 9.

PORT AUTHORITY OF ALLEGHENY COUNTY

SITE VISIT – GATEWAY LOOP

SUBJECT: **NORTH SHORE CONNECTOR – NSC TRAIN SYSTEMS (SYSTEM WIDE)**

CONTRACT NO. **NSC-009**

DATE: **THURSDAY, OCTOBER 2, 2008 - 1:30 AM TO 4:30 AM TOUR (night time/early morning)**

ATTENDANCE SHEET

Representative	Company	Mailing Address	Phone / Fax	
Norm Hamilton	PAAC	345 6th Ave Pitts. PA	412-287 6367	412-566-5356 ~~5345~~
Michael Blubaker	McKamish	50 - 55th St.	412 781 1262	412 781-3205
Dave Haines	DMJM Harris	4 Gateway Center		412 395 8888

GENERAL NOTES:

1. WORK AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE, AS AMENDED BY COMMONWEALTH OF PENNSYLVANIA. INTERCONNECTION TO THE 23KV SERVICE SHALL COMPLY WITH THE APPLICABLE REQUIREMENTS OF THE DUQUESNE LIGHT & POWER COMPANY (DLC).
2. CONDUIT RUNS SHOWN ARE DIAGRAMMATIC AND NOT INTENDED TO SHOW ALL DETAILS OF INSTALLATION, CONSTRUCTION OR MOUNTING.
3. CONTRACTOR SHALL COORDINATE WORK WITH OTHER TRADES.
4. ELECTRICAL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTALLATION INSTRUCTIONS AND WITH THE REQUIREMENTS OF THE CONTRACT.
5. CONDUIT FITTINGS AND ACCESSORIES SHALL BE OF COMPATIBLE MATERIALS, UNLESS OTHERWISE NOTED. CONDUITS SHALL BE CLEARLY LABELED IN BOLD TO IDENTIFY SERVICE VOLTAGE AND FUNCTION. SUBMIT LABELING METHOD TO THE ENGINEER FOR APPROVAL.
6. UNLESS OTHERWISE INDICATED, DC POWER CONDUITS SHALL BE GALVANIZED RIGID STEEL. MINIMUM SIZE SHALL BE ¾" FOR EXPOSED CONDUITS AND 1" FOR EMBEDDED CONDUITS. AC TRACTION POWER CONDUITS SHALL BE NON-METALLIC (PVC/FIBERGLASS), AS SHOWN ON DRAWINGS. ◊
7. CONDUIT ENDS SHALL BE CLOSED WITH CAPS OR PLUGS DURING CONSTRUCTION TO PREVENT CONCRETE OR OTHER MATERIALS FROM OBSTRUCTING THE CONDUIT.
8. CONDUIT CUT IN FIELD SHALL BE REAMED AND FREE OF BURRS BEFORE INSTALLATION. THREADS SHALL BE PAINTED WITH ZINC RICH PAINT BEFORE FITTINGS ARE ATTACHED.
9. WHEN A METALLIC CONDUIT CROSSES AN EXPANSON JOINT, A CONDUIT EXPANSION COUPLING WITH FLEXIBLE GROUNDING JUMPER SHALL BE UTILIZED.
10. CONDUITS SHALL BE INSTALLED SO THAT SHARP BENDS OR KINKS IN CONDUIT ARE PREVENTED. BENDS SHALL BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE REQUIREMENTS, INCLUDING COMMONWEALTH OF PENNSYLVANIA REGULATIONS.
11. THREADLESS OR SET SCREW COUPLINGS SHALL NOT BE UTILIZED IN ANY CONDUIT RUN NOR SHALL CONDUIT OR FITTINGS BE WELDED.
12. A ⅛", OR LARGER DIAMETER, POLY FISH LINE SHALL BE INSTALLED IN CONDUITS. THE FISH LINE WILL BE USED TO GUIDE PULLING ROPE THROUGH CONDUIT, SUCH THAT THE PULLING ROPE IS ATTACHED TO THE CABLE BY MEANS OF A WOVEN CABLE GRIP OR BY MEANS OF A CLEVIS OR EYE.
13. AC POWER FEEDERS AND BRANCH CIRCUITS SHALL INCLUDE AN INSULATED GROUND CONDUCTOR, SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, INCLUDING COMMONWEALTH OF PENNSYLVANIA AMENDMENTS, WHETHER OR NOT SHOWN ON PLANS.
14. SECURELY ANCHOR FREE-STANDING EQUIPMENT TO FLOOR SLABS, OR HOUSEKEEPING PADS.
15. EXACT NUMBER AND MAKEUP OF WIRE BUNDLES, INCLUDING 10% SPARE CONDUCTORS FOR CONTROL CIRCUITS, IS THE RESPONSIBILITY OF THE INSTALLER AND SHALL BE SUBMITTED FOR APPROVAL.
16. WALL AND FLOOR OPENINGS FOR CABLE TRAYS, CONDUITS, ETC. SHALL BE FITTED WITH AN APPROVED FIRE STOP MATERIAL TO PREVENT PROPAGATION OF FIRES.
17. THE CONTRACTOR SHALL PERFORM SYSTEM PHASING VERIFICATION FOR CONNECTIONS.
18. ◊
19. FOR TYPICAL ANNUNCIATOR WIRING SCHEMATIC, SEE GATEWAY TIEBREAKER STATION DESIGN PACKAGE.

PB AMERICAS, INC.

Two Gateway Center, 18th Fl.,
Newark, N.J. 07102

NO.	DATE	DESCRIPTION
◊	10/1/08	ADDENDUM #9 - DRAWING MODIFIED

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.

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — LACHMAN D. KUKREJA — ENGINEER

SIGNATURE

DMJM HARRIS | AECOM

FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED — DATE 10/1/08

DESIGNED	LDK
DRAWN	SB
CHECKED	JSJ
IN CHARGE	DPH
DATE APRIL 28, 2008	
SCALE	NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
TRACTION POWER
GENERAL NOTES

Port Authority

CONTRACT NO. NSC-009
DWG. NO. TP005
SHT. 271

NORTH SHORE TPSS

CONDUIT ID	DWG NO.	FROM	TO	FUNCTION	CONDUIT SIZE	CONDUIT TYPE	CONDUIT LENGTH	CABLE	REMARKS
PSF-101		DLC-23 KV INCOMING LINE #22037	NORTH SHORE SUB 27 KV SWITCHGEAR	23 KV INCOMING FEEDER #1	5"	PVC		3-1/C #500 KCMIL, 25 KV, 1-#4/0G, 600 V	
PSF-102		DLC-23 KV INCOMING LINE #22037	NORTH SHORE SUB 27 KV SWITCHGEAR	23 KV INCOMING FEEDER #1	5"	PVC		SPARE	
PSF-103		DLC-23 KV INCOMING LINE #22046	NORTH SHORE SUB 27 KV SWITCHGEAR	23 KV INCOMING FEEDER #2	5"	PVC		3-1/C #500 KCMIL, 25 KV, 1-#4/0G, 600 V	
PSF-104		DLC-23 KV INCOMING LINE #22046	NORTH SHORE SUB 27 KV SWITCHGEAR	23 KV INCOMING FEEDER #2	5"	PVC		SPARE	
PSF-105		27 KV SWITCHGEAR FEEDER RT1	RECTIFIER TRANSFORMER #1	AC SUPPLY FOR RECTIFIER #1	5"	PVC		3-1/C #2/0 KCMIL, 25 KV, 1-#4G, 600 V	
PSF-106		27 KV SWITCHGEAR FEEDER RT1	RECTIFIER TRANSFORMER #1	AC SUPPLY FOR RECTIFIER #1	5"	PVC		SPARE	
PSF-107		27 KV SWITCHGEAR FEEDER RT2	RECTIFIER TRANSFORMER #2	AC SUPPLY FOR RECTIFIER #2	5"	PVC		3-1/C #2/0 KCMIL, 25 KV, 1-#4G, 600 V	
PSF-108		27 KV SWITCHGEAR FEEDER RT2	RECTIFIER TRANSFORMER #2	AC SUPPLY FOR RECTIFIER #2	5"	PVC		SPARE	
PSF-109		27 KV SWITCHGEAR AUX XFMR FEEDER #1	AUX TRANSFORMER #1	AUX SERVICE FOR TPS SUBSTATION	4"	PVC		3-1/C #1 KCMIL, 25 KV, 1-#2G, 600 V	
PSF-110		27 KV SWITCHGEAR AUX XFMR FEEDER #1	AUX TRANSFORMER #1	AUX SERVICE FOR TPS SUBSTATION	4"	PVC		SPARE	
PSF-111		27 KV SWITCHGEAR AUX XFMR FEEDER #2	AUX TRANSFORMER #2	AUX SERVICE FOR TPS SUBSTATION	4"	PVC		3-1/C #1 KCMIL, 25 KV, 1-#2G, 600 V	
PSF-112		27 KV SWITCHGEAR AUX XFMR FEEDER #2	AUX TRANSFORMER #2	AUX SERVICE FOR TPS SUBSTATION	4"	PVC		SPARE	
PSF-113		23 KV PASSENGER STATION FEEDER #1	NORTH SIDE PASS. STA. SERVICE #1	NORTH SIDE PASS. STA. SERVICE #1	5"	PVC		1-3/C #4/0 KCMIL, 25 KV, 1-#4G, 600 V	
PSF-114		23 KV PASSENGER STATION FEEDER #1	NORTH SIDE PASS. STA. SERVICE #1	NORTH SIDE PASS. STA. SERVICE #1	5"	PVC		SPARE	
PSF-115		23 KV PASSENGER STATION FEEDER #2	NORTH SIDE PASS. STA. SERVICE #2	NORTH SIDE PASS. STA. SERVICE #2	5"	PVC		1-3/C #4/0 KCMIL, 25 KV, 1-#4G, 600 V	
PSF-116		23 KV PASSENGER STATION FEEDER #2	NORTH SIDE PASS. STA. SERVICE #2	NORTH SIDE PASS. STA. SERVICE #2	5"	PVC		SPARE	
TPP-1		OBT 6044+80.5	NORTH SHORE TPSS	POSITIVE FDR 11F04	3"	PVC		1000 KCMIL 2 KV	
TPP-2		OBT 6044+79	NORTH SHORE TPSS	POSITIVE FDR 11F04	3"	PVC		1000 KCMIL 2 KV	
TPP-3		OBT 6044+77.5	NORTH SHORE TPSS	POSITIVE FDR 11F04	3"	PVC		SPARE	
TPP-4		OBT 6044+76	NORTH SHORE TPSS	POSITIVE FDR 11F04	3"	PVC		SPARE	
TPP-5		IBT 6044+80.5	NORTH SHORE TPSS	POSITIVE FDR 11F03	3"	PVC		1000 KCMIL 2 KV	
TPP-6		IBT 6044+79	NORTH SHORE TPSS	POSITIVE FDR 11F03	3"	PVC		1000 KCMIL 2 KV	
TPP-7		IBT 6044+77.5	NORTH SHORE TPSS	POSITIVE FDR 11F03	3"	PVC		SPARE	
TPP-8		IBT 6044+76	NORTH SHORE TPSS	POSITIVE FDR 11F03	3"	PVC		SPARE	
TPP-9		OBT 6044+00.5	NORTH SHORE TPSS	POSITIVE FDR 11F02	3"	PVC		1000 KCMIL 2 KV	
TPP-10		OBT 6043+99	NORTH SHORE TPSS	POSITIVE FDR 11F02	3"	PVC		1000 KCMIL 2 KV	
TPP-11		OBT 6043+97.5	NORTH SHORE TPSS	POSITIVE FDR 11F02	3"	PVC		SPARE	
TPP-12		OBT 6043+96	NORTH SHORE TPSS	POSITIVE FDR 11F02	3"	PVC		SPARE	
TPP-13		IBT 6044+00.5	NORTH SHORE TPSS	POSITIVE FDR 11F01	3"	PVC		1000 KCMIL 2 KV	
TPP-14		IBT 6043+99	NORTH SHORE TPSS	POSITIVE FDR 11F01	3"	PVC		1000 KCMIL 2 KV	
TPP-15		IBT 6043+97.5	NORTH SHORE TPSS	POSITIVE FDR 11F01	3"	PVC		SPARE	
TPP-16		IBT 6043+96	NORTH SHORE TPSS	POSITIVE FDR 11F01	3"	PVC		SPARE	
TPN-17		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-1	3"	PVC		1000 KCMIL 2 KV	
TPN-18		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-1	3"	PVC		1000 KCMIL 2 KV	
TPN-19		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-1	3"	PVC		SPARE	
TPN-20		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-1	3"	PVC		SPARE	
TPN-21		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-2	3"	PVC		1000 KCMIL 2 KV	
TPN-22		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-2	3"	PVC		1000 KCMIL 2 KV	
TPN-23		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-2	3"	PVC		SPARE	
TPN-24		OUTBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-2	3"	PVC		SPARE	
TPN-25		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-3	3"	PVC		1000 KCMIL 2 KV	
TPN-26		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-3	3"	PVC		1000 KCMIL 2 KV	
TPN-27		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-3	3"	PVC		SPARE	
TPN-28		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-3	3"	PVC		SPARE	
TPN-29		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-4	3"	PVC		1000 KCMIL 2 KV	
TPN-30		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-4	3"	PVC		1000 KCMIL 2 KV	
TPN-31		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-4	3"	PVC		SPARE	
TPN-32		INBOUND RUNNING RAILS	NEGATIVE SWITCHBOARD	NEGATIVE RETURN DN-4	3"	PVC		SPARE	

NOTES:

1. CONTRACTOR TO INSERT SHOP DRAWING SHEET NUMBERS INTO TABLE FOR "DWG NO." CONDUIT LENGTH TO ALSO BE FILLED-IN BY CONTRACTOR.

PB AMERICAS, INC.
Two Gateway Center, 18th Fl.,
Newark, N.J. 07102

NO.	DATE	DESCRIPTION
2	10/1/08	ADDENDUM #9 - DRAWING MODIFIED
1	9/12/08	ADDENDUM #7 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER LACHMAN D. KUKREJA PE-045066-E

SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED

10/1/08
DATE

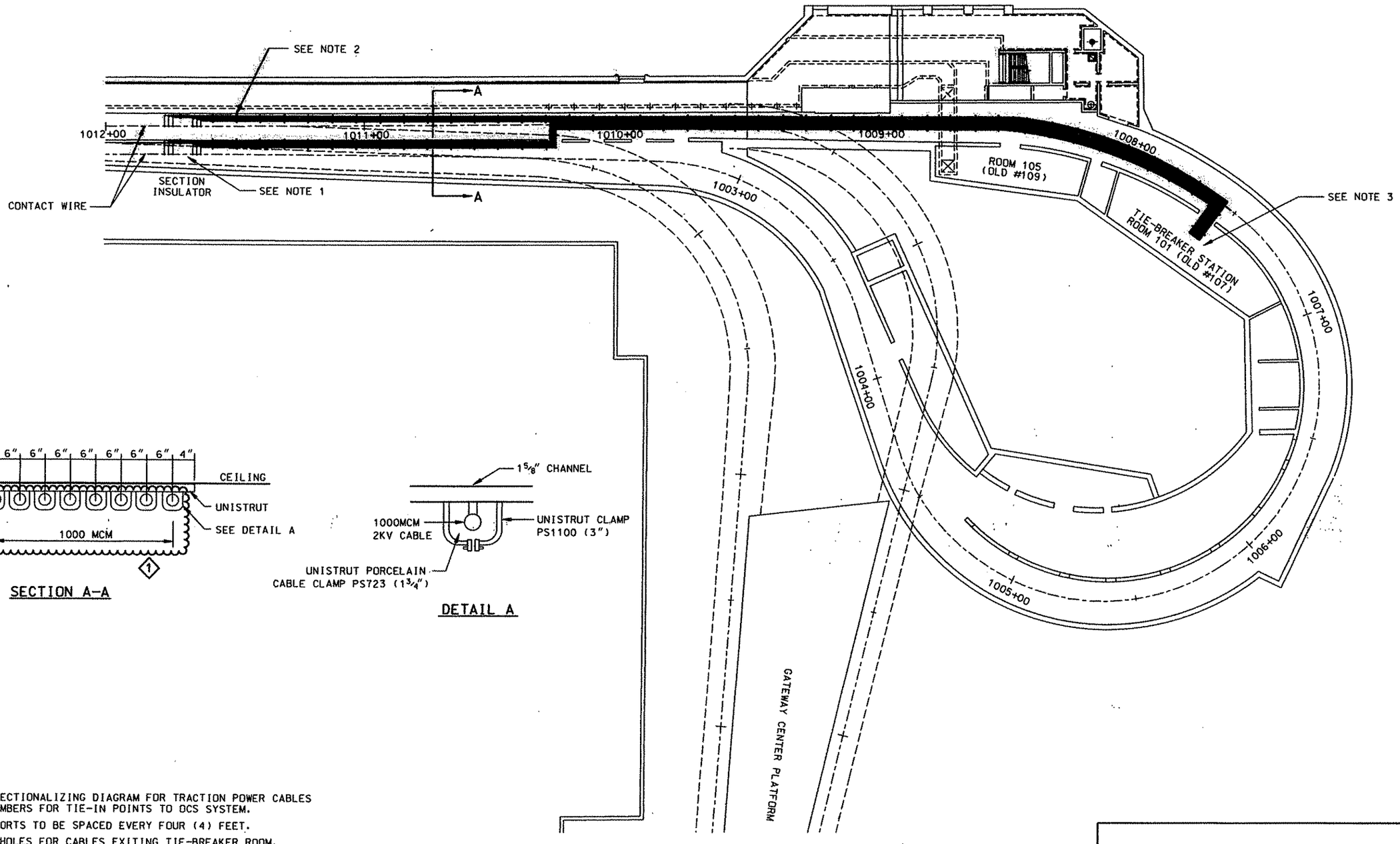
DESIGNED	LDK
DRAWN	SB
CHECKED	JSJ
IN CHARGE	DPH
DATE	APRIL 28, 2008
SCALE	NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
NS SUBSTATION
CONDUIT & CABLE SCHEDULE - SHEET 1

Port Authority

CONTRACT NO.	NSC-009
DWG. NO.	TP018
SHT.	281



SECTION A-A

DETAIL A

NOTES:

1. REFER TO SECTIONALIZING DIAGRAM FOR TRACTION POWER CABLES STATION NUMBERS FOR TIE-IN POINTS TO OCS SYSTEM.
2. CABLE SUPPORTS TO BE SPACED EVERY FOUR (4) FEET.
3. CORE BORE HOLES FOR CABLES EXITING TIE-BREAKER ROOM.

Gannett Fleming
Transit & Rail Systems

NO.	DATE	DESCRIPTION
1	10/01/08	ADDENDUM 9 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA — MICHAEL T. MCNAMARA — ENGINEER

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED — 10/1/08 DATE

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
NSC TRAIN SYSTEM: (SYSTEM WIDE)
SITE PLAN (GATEWAY)
TPSS CABLE CONDUIT AND DUCTBANK PLAN

Port Authority

CONTRACT NO. NSC-009.
DWG. NO. TP114 SHT. 304

CABLE						CIRCUIT		ROUTING				CONDUIT	
NO.	CONSTRUCTION		SIZE AWG	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	AC DC	FROM	VIA	TO	FUNCTION	NO.	SIZE & MATERIAL
DP1	1	1/C	1000	2KV	EPR	650	DC	BREAKER 5TB01	CONDUIT	DCS 6084+50	TIE BREAKER	1	3"C-PVC
DP2	1	1/C	1000	2KV	EPR	650	DC	BREAKER 5TB01	CONDUIT	DCS 6084+50	TIE BREAKER	1	3"C-PVC
DP3	1	1/C	1000	2KV	EPR	650	DC	BREAKER 5TB01	CONDUIT	DCS 6084+90	TIE BREAKER	1	3"C-PVC
DP4	1	1/C	1000	2KV	EPR	650	DC	BREAKER 5TB01	CONDUIT	DCS 6084+90	TIE BREAKER	1	3"C-PVC
DP5	-	-	-	-	-	-	-	-	-	-	SPARE	1	3"C-PVC
DN1	2	1/C	#6	2KV	EPR	650	DC	NEGATIVE REF. CABINET	CONDUIT	RAIL	NEGATIVE RETURN REF.	1	3"C-PVC
DN2	1	1/C	#6	2KV	EPR	650	DC	NEGATIVE REF. CABINET	CONDUIT	BREAKER 5TB01	VOLT TRANSDUCER	1	1"C-PVC
AC1	4/1	1/C	#6/10	600	90°C	208	AC	ELECTRICAL ROOM	CONDUIT	PANEL PNP	SERVICE POWER	1	1"C-RGS
AC2	2/1	1/C	#6/10	600	90°C	208	AC	PANEL PNP	CONDUIT	BATTERY CHARGER	DC POWER	1	1"C-RGS
AC3	2	1/C	#10	600	90°C	120	AC	PANEL PNP	CONDUIT	BREAKER 5TB01	CONTROL POWER	1	3/4"C-RGS
AC4	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	RTU CABINET	CONTROL POWER	1	3/4"C-RGS
AC5	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	INTRUSION ALARM	CONTROL POWER	1	3/4"C-RGS
DC1	2	1/C	#6	600	90°C	125	DC	BATT. CHARGER	CONDUIT	DC PB	DC POWER	1	1"C-RGS
DC2	2	1/C	#2	600	90°C	125	DC	DC PB	CONDUIT	DC-DS1	DC POWER	1	1"C-RGS
DC3	2	1/C	#2	600	90°C	125	DC	DC-DS1	CONDUIT	BATTERY	DC POWER	1	1"C-RGS
DC4	2	1/C	#12	600	90°C	125	DC	DC PB	CONDUIT	RTU CABINET	DC POWER	1	3/4"C-RGS
DC5	2	1/C	#12	600	90°C	125	DC	DC PB	CONDUIT	ANNUNICATOR	DC POWER	1	3/4"C-RGS
DC6	2	1/C	#8	600	90°C	125	DC	DC PB	CONDUIT	BREAKER TEST CABINET	DC POWER	1	1"C-RGS
DC7	2	1/C	#12	600	90°C	125	DC	DC PB	CONDUIT	ETR	DC POWER	1	3/4"C-RGS
DC8	2	1/C	#10	600	90°C	125	DC	DC PB	CONDUIT	BREAKER 7F05	DC POWER	1	1"C-PVC

CABLE						CIRCUIT		ROUTING				CONDUIT	
NO.	CONSTRUCTION		SIZE AWG	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	AC DC	FROM	VIA	TO	FUNCTION	NO.	SIZE & MATERIAL
SC1	6	1/C	12	600	90°C	120	AC	BATT. CHARGER	CONDUIT	RTU CABINET	INDICATION	1	3/4"C-RGS
SC2	2	1/C	12	600	90°C	120	AC	INTRUSION ALARM	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
SC3	2	1/C	12	600	90°C	120	AC	ETR	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
SC4	2	1/C	12	600	90°C	120	AC	FIRE ALARM	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
SC5	4	1/C	12	600	90°C	120	AC	ANNUNICATOR	CONDUIT	RTU CABINET	INDICATION ANALOG	1	3/4"C-RGS
SC6	30	1/C	12	600	90°C	120	AC	DC SWGR	CONDUIT	RTU CABINET	INDICATION	1	2"C-PVC
AN1	2	1/C	12	600	90°C	120	AC	ETR	CONDUIT	ANNUNICATOR	ALARM	1	3/4"C-RGS
AN2	2	1/C	12	600	90°C	120	AC	FIRE ALARM	CONDUIT	ANNUNICATOR	ALARM	1	3/4"C-RGS
AN3	4	1/C	12	600	90°C	120	AC	BATT. CHARGER	CONDUIT	ANNUNICATOR	ALARM	1	3/4"C-RGS
AN4	2	1/C	12	600	90°C	120	AC	BATTERY ROOM VENT.	CONDUIT	ANNUNICATOR	ALARM	1	3/4"C-RGS
AN5	2	1/C	12	600	90°C	120	AC	PNP	CONDUIT	ANNUNICATOR	LOSS OF POWER	1	3/4"C-RGS
AN6	12	1/C	12	600	90°C	120	AC	7F05	CONDUIT	ANNUNICATOR	ALARM	1	1"C-PVC
CM1	18	PR.	22	300	90°C	48	DC	RTU CABINET	CONDUIT	COMM. ROOM	SCADA	1	1"C-RGS

SEE NOTE 5

H-A.C. PRIMARY VOLTAGE CABLE
DP-D.C. POSITIVE POWER CABLE
DN-D.C. NEGATIVE POWER CABLE
AN- ANNUNCIATOR CABLE
SC- SCADA CONTROL CABLE
CN- CONTROL CABLE
MA- MISCELLANEOUS CIRCUITS
AC-A.C. LOW VOLTAGE POWER CIRCUITS
DC-D.C. CONTROL POWER CIRCUITS
CI- CATENARY INDICATION
CM- COMMUNICATION CABLE

NOTES:

1. CONDUIT AND CABLE SCHEDULE IS TYPICAL AND PROVIDED FOR INFORMATION AND GUIDANCE ONLY. THE CONTRACTOR SHALL VERIFY THE SCHEDULE AND MAKE CHANGES/ADDITIONS AS REQUIRED FOR COMPLETE WORKING SYSTEM AT NO ADDITIONAL COST TO PORT AUTHORITY.
2. CONTRACTOR TO UTILIZE CABLE TRAY WHENEVER POSSIBLE TO MINIMIZE USE OF CONDUITS INSIDE SUBSTATION.
3. CONTRACTOR IS TO ENSURE THAT DC SWITCHGEAR /RECTIFIER IS ISOLATED FROM CONDUITS, CABLE TRAY AND ALL EQUIPMENT THAT COULD PROVIDE STRAY GROUNDS.
4. CONDUITS ARE ALLOCATED ON CIVIL DRAWINGS.
5. SEE SPEC. 16742.

Gannett Fleming
Transit & Rail Systems

NO.	DATE	DESCRIPTION
2	10/01/08	ADDENDUM 9 - DRAWING MODIFIED
1	09/08/08	ADDENDUM 6 - DRAWING MODIFIED

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.

COMMONWEALTH OF PENNSYLVANIA
MICHAEL T. MOUMARAH
SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED 8/1/08 DATE

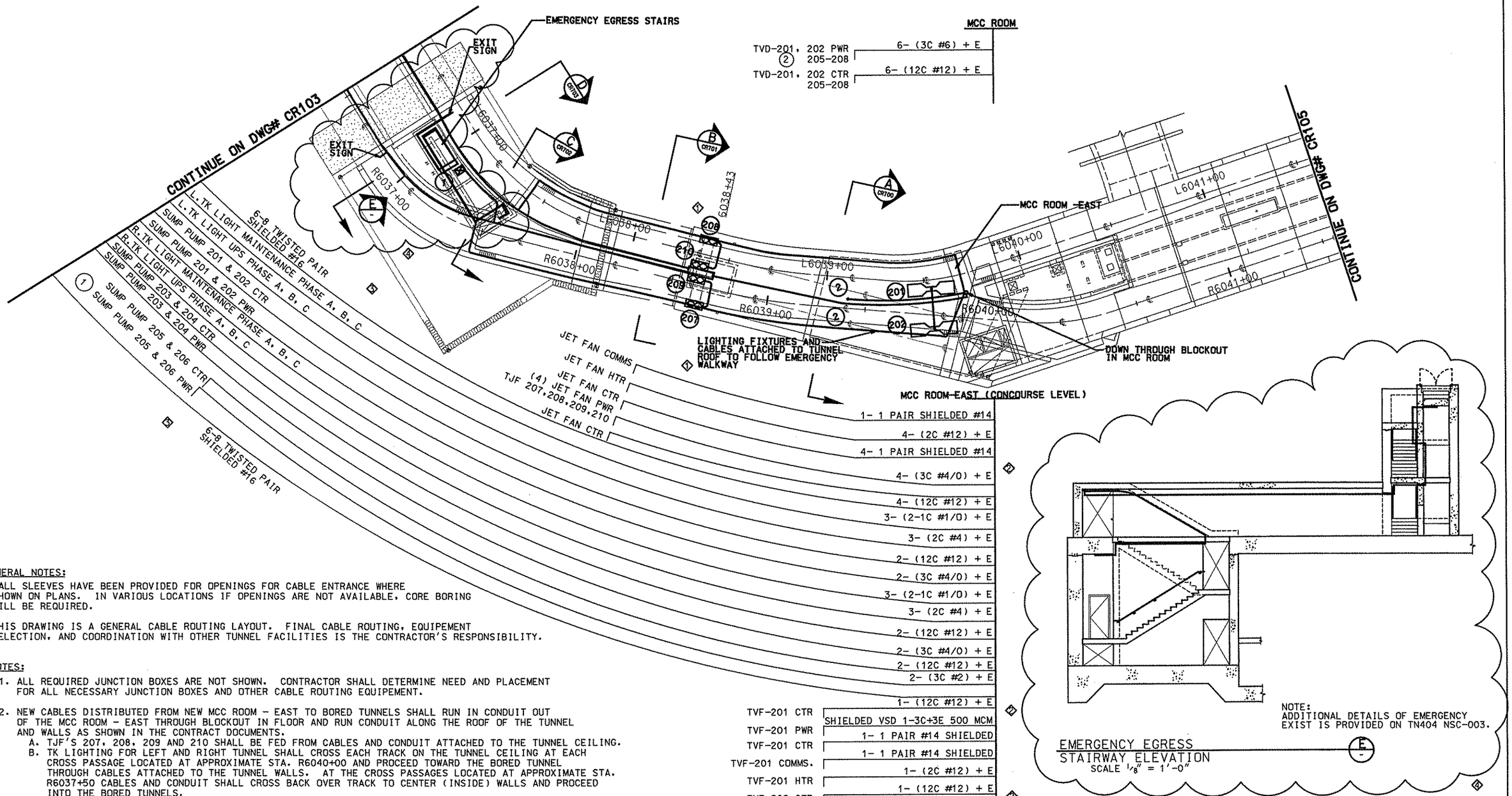
DESIGNED	H SOROKIN
DRAWN	HT TRAN
CHECKED	M INSOGNA
IN CHARGE	CO JONES
DATE	APR. 28, 2008
SCALE	NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
ALLEGHENY CIRCUIT BREAKER ROOM
CONDUIT AND CABLE SCHEDULE

Port Authority

CONTRACT NO.	NSC-009
DWG. NO.	TP217
SHT.	319



NOTE:
ADDITIONAL DETAILS OF EMERGENCY EXIST IS PROVIDED ON TN404 NSC-003.

EMERGENCY EGRESS STAIRWAY ELEVATION
SCALE 1/8" = 1'-0"

GENERAL NOTES:

WALL SLEEVES HAVE BEEN PROVIDED FOR OPENINGS FOR CABLE ENTRANCE WHERE SHOWN ON PLANS. IN VARIOUS LOCATIONS IF OPENINGS ARE NOT AVAILABLE, CORE BORING WILL BE REQUIRED.

THIS DRAWING IS A GENERAL CABLE ROUTING LAYOUT. FINAL CABLE ROUTING, EQUIPEMENT SELECTION, AND COORDINATION WITH OTHER TUNNEL FACILITIES IS THE CONTRACTOR'S RESPONSIBILITY.

NOTES:

1. ALL REQUIRED JUNCTION BOXES ARE NOT SHOWN. CONTRACTOR SHALL DETERMINE NEED AND PLACEMENT FOR ALL NECESSARY JUNCTION BOXES AND OTHER CABLE ROUTING EQUIPEMENT.
2. NEW CABLES DISTRIBUTED FROM NEW MCC ROOM - EAST TO BORED TUNNELS SHALL RUN IN CONDUIT OUT OF THE MCC ROOM - EAST THROUGH BLOCKOUT IN FLOOR AND RUN CONDUIT ALONG THE ROOF OF THE TUNNEL AND WALLS AS SHOWN IN THE CONTRACT DOCUMENTS.
   A. TJF'S 207, 208, 209 AND 210 SHALL BE FED FROM CABLES AND CONDUIT ATTACHED TO THE TUNNEL CEILING.
   B. TK LIGHTING FOR LEFT AND RIGHT TUNNEL SHALL CROSS EACH TRACK ON THE TUNNEL CEILING AT EACH CROSS PASSAGE LOCATED AT APPROXIMATE STA. R6040+00 AND PROCEED TOWARD THE BORED TUNNEL THROUGH CABLES ATTACHED TO THE TUNNEL WALLS. AT THE CROSS PASSAGES LOCATED AT APPROXIMATE STA. R6037+50 CABLES AND CONDUIT SHALL CROSS BACK OVER TRACK TO CENTER (INSIDE) WALLS AND PROCEED INTO THE BORED TUNNELS.
   C. SUMP PUMPS 201, 202, 203, 204, 205 AND 206 SHALL BE FED FROM CABLES AND CONDUIT ATTACHED TO THE TUNNEL CEILING, PROCEEDING PAST TJF 207-210 TO THE CENTER TUNNEL WALL. SUMP PUMPS 203, 204, 205 AND 206 SHALL PROCEED DOWN THE RIGHT TRACK CENTER WALL AND INTO THE BORED TUNNEL AND EGRESS SUMP ROOM. SUMP PUMP 201 AND 202 SHALL PROCEED DOWN THE LEFT TRACK CENTER WALL AND INTO THE BORED TUNNEL.
   D. TVF 201 AND 202 AND TVD 201, 202, 205 - 208 SHALL BE FED FROM THE MCC ROOM - EAST TO THE FAN ROOM THROUGH BLOCKOUT IN MCC CEILING.

LEGENDS:

- CONDUIT
- JET FAN
- TV FAN
- SUMP PUMPS

NO.	DATE	DESCRIPTION
4	10/2/08	ADDENDUM 9 - DRAWING MODIFIED
3	9/23/08	ADDENDUM 8 - DRAWING MODIFIED
2	8/5/08	ADDENDUM 2 - DRAWING MODIFIED
1	7/31/08	ADDENDUM 1 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID P. HAINES 051578-E

SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED 10/2/08 DATE

DESIGNED	MAUNSELL
DRAWN	GFTR
CHECKED	DPH
IN CHARGE	DPH
DATE	APR. 28, 2008
SCALE	NTS

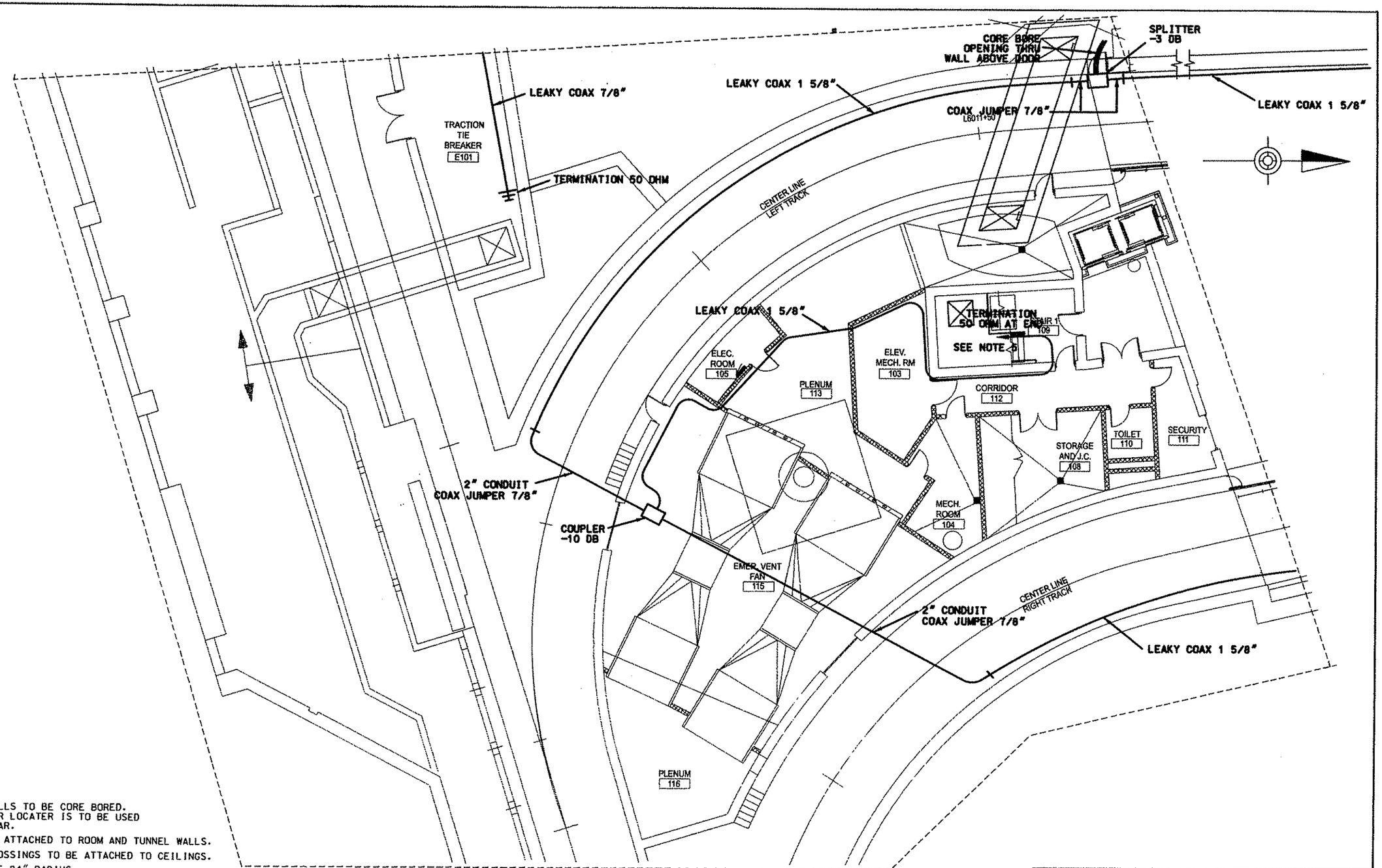
PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
ELECTRICAL CABLE ROUTING PLAN
NORTH SIDE STATION

Port Authority

CONTRACT NO. NSC-009
DWG. NO. CR104 SHT. 567

10/2/2008 T: 24:36 PM N:\NSF\Final\GR\009 Addendum 8\009CR104-A8.dgn



DETAIL A CR400

NOTES:

1. OPENINGS THRU ALL WALLS TO BE CORE BORED. BEFORE BORING A REBAR LOCATER IS TO BE USED TO AVOID CUTTING REBAR.
2. COAXIAL CABLES TO BE ATTACHED TO ROOM AND TUNNEL WALLS.
3. CONDUITS AT TRACK CROSSINGS TO BE ATTACHED TO CEILINGS.
4. ALL CONDUIT BENDS ARE 24" RADIUS.
5. RUN TO TOP OF EMERGENCY EGRESS STAIRS.

NO.	DATE	DESCRIPTION
1	10/01/08	ADDENDUM 9 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA PROFESSIONAL MICHAEL T. MCNAMARA No. 37384-E

SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED 10/1/08 DATE

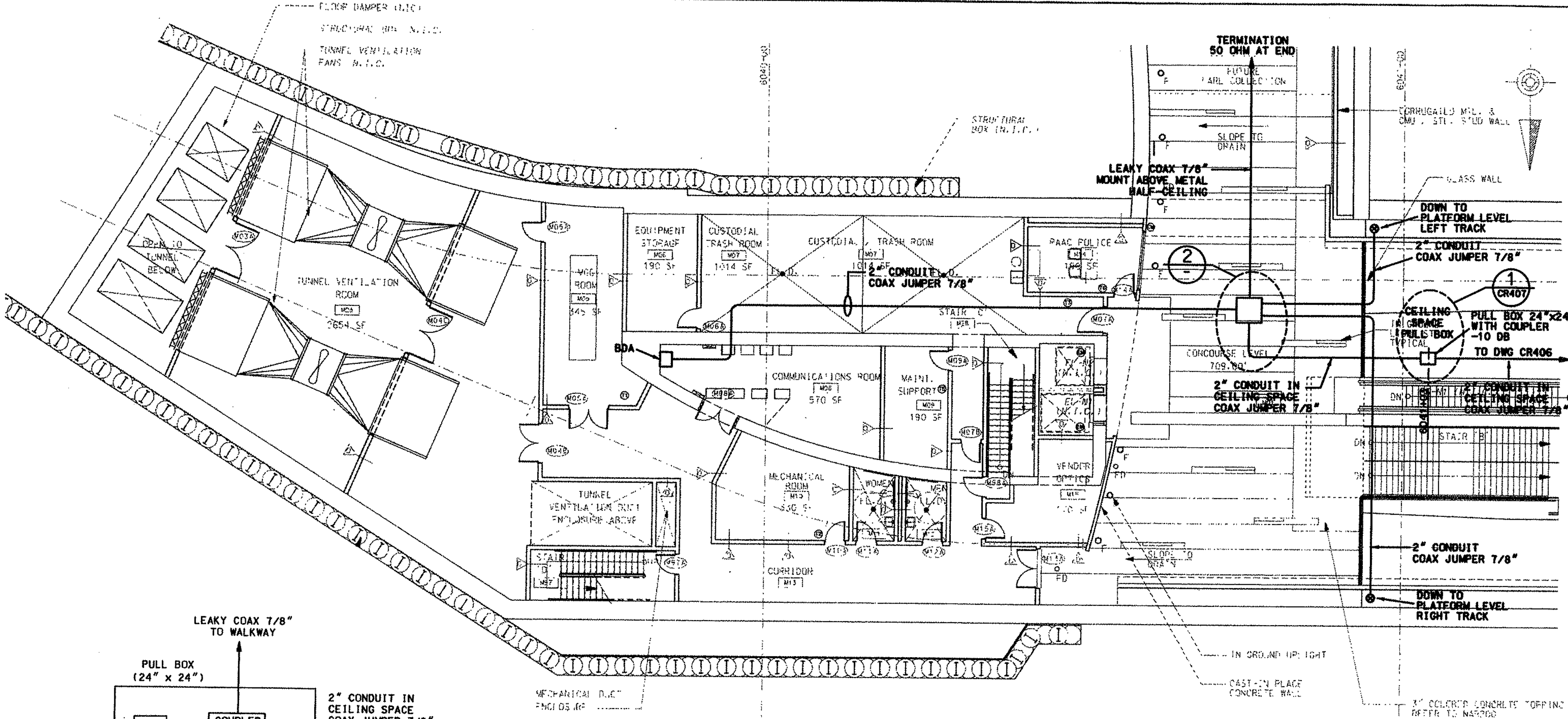
DESIGNED	R SCHMIDT
DRAWN	HT TRAN
CHECKED	K HOFFMAN
IN CHARGE	CO JONES
DATE	APR. 28, 2008
SCALE	1" = 8'-0"

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

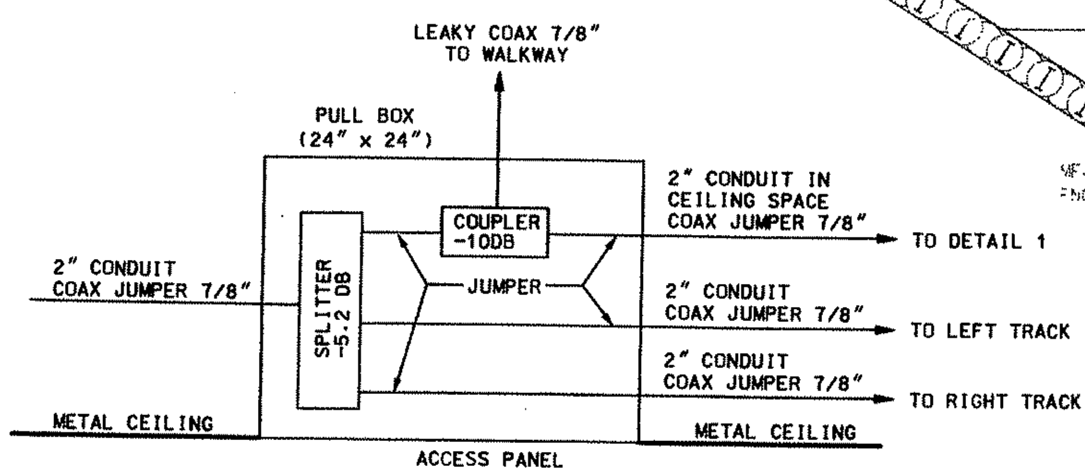
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
LEAKY CO-AXIAL CABLE ROUTING PLAN
GATEWAY STATION ROOM LAYOUT

Port Authority

CONTRACT NO.	NSC-009
DWG. NO.	CR401
SHT.	587



CONCOURSE LEVEL EAST END - DETAIL (A / CR404)



PULL BOX - DETAIL (2 / -)

NOTES:

1. OPENINGS THRU ALL WALLS TO BE CORE BORED. BEFORE BORING A REBAR LOCATER IS TO BE USED TO AVOID CUTTING REBAR.
2. COAXIAL CABLES TO BE ATTACHED TO ROOM AND TUNNEL WALLS.
3. CONDUITS AT TRACK CROSSINGS TO BE ATTACHED TO CEILINGS.
4. ALL CONDUIT BENDS ARE 24" RADIUS.

NO.	DATE	DESCRIPTION
1	10/01/08	ADDENDUM 9 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA — PROFESSIONAL ENGINEER — MICHAEL T. MCNAMARA

SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED — DATE 10/1/08

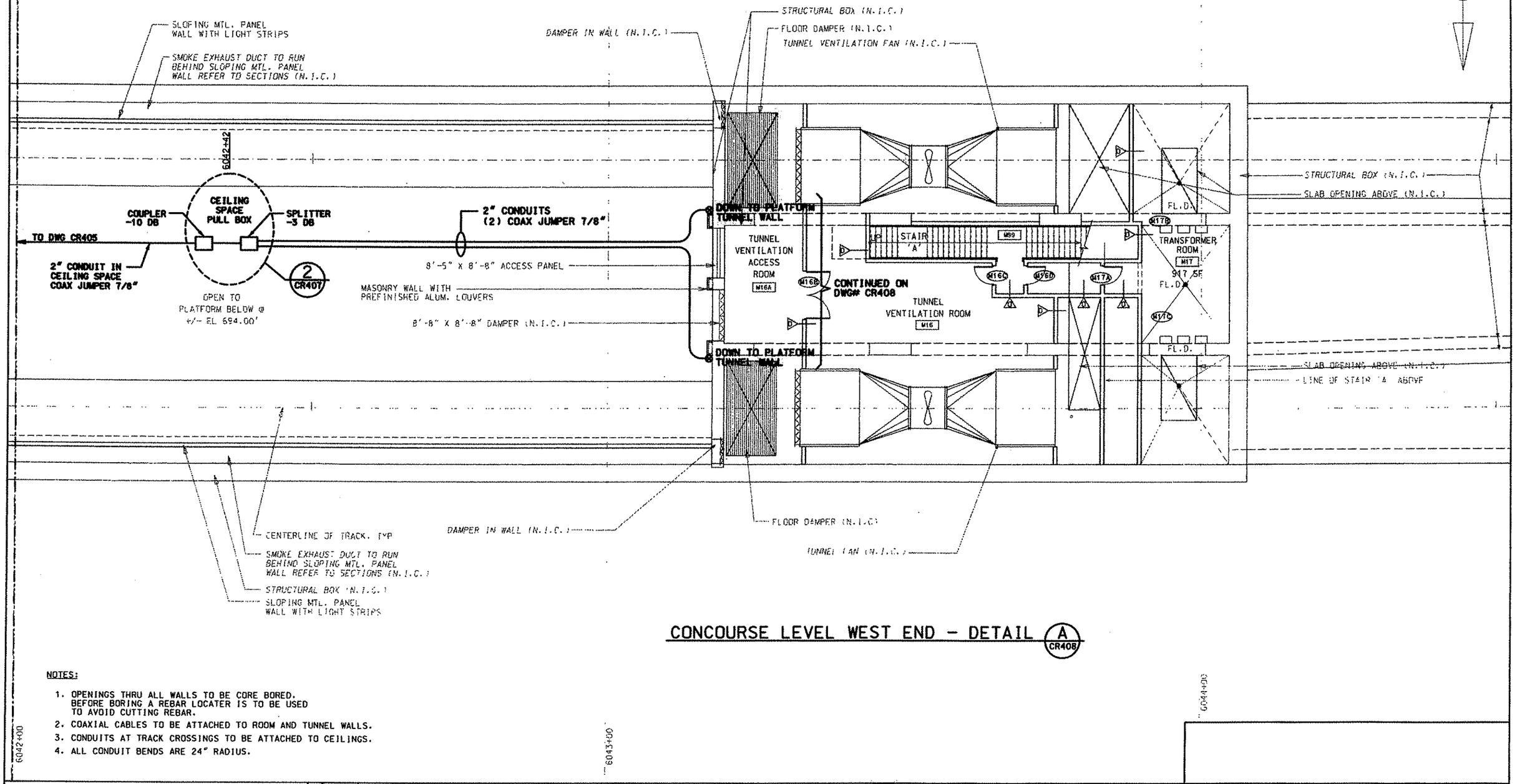
DESIGNED	R SCHMIDT
DRAWN	HT TRAN
CHECKED	K HOFFMAN
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	1"= 8'-0"

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
LEAKY CO-AXIAL CABLE ROUTING PLAN
NORTH SIDE STATION - CONCOURSE LEVEL - EAST END

Port Authority

CONTRACT NO. NSC-009
DWG. NO. CR405 SHT. 591



CONCOURSE LEVEL WEST END - DETAIL A (CR408)

NOTES:

1. OPENINGS THRU ALL WALLS TO BE CORE BORED. BEFORE BORING A REBAR LOCATER IS TO BE USED TO AVOID CUTTING REBAR.
2. COAXIAL CABLES TO BE ATTACHED TO ROOM AND TUNNEL WALLS.
3. CONDUITS AT TRACK CROSSINGS TO BE ATTACHED TO CEILINGS.
4. ALL CONDUIT BENDS ARE 24" RADIUS.

NO.	DATE	DESCRIPTION
1	10/01/08	ADDENDUM 9 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA — MICHAEL T. MCNAMARA — SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED — DATE 10/1/08

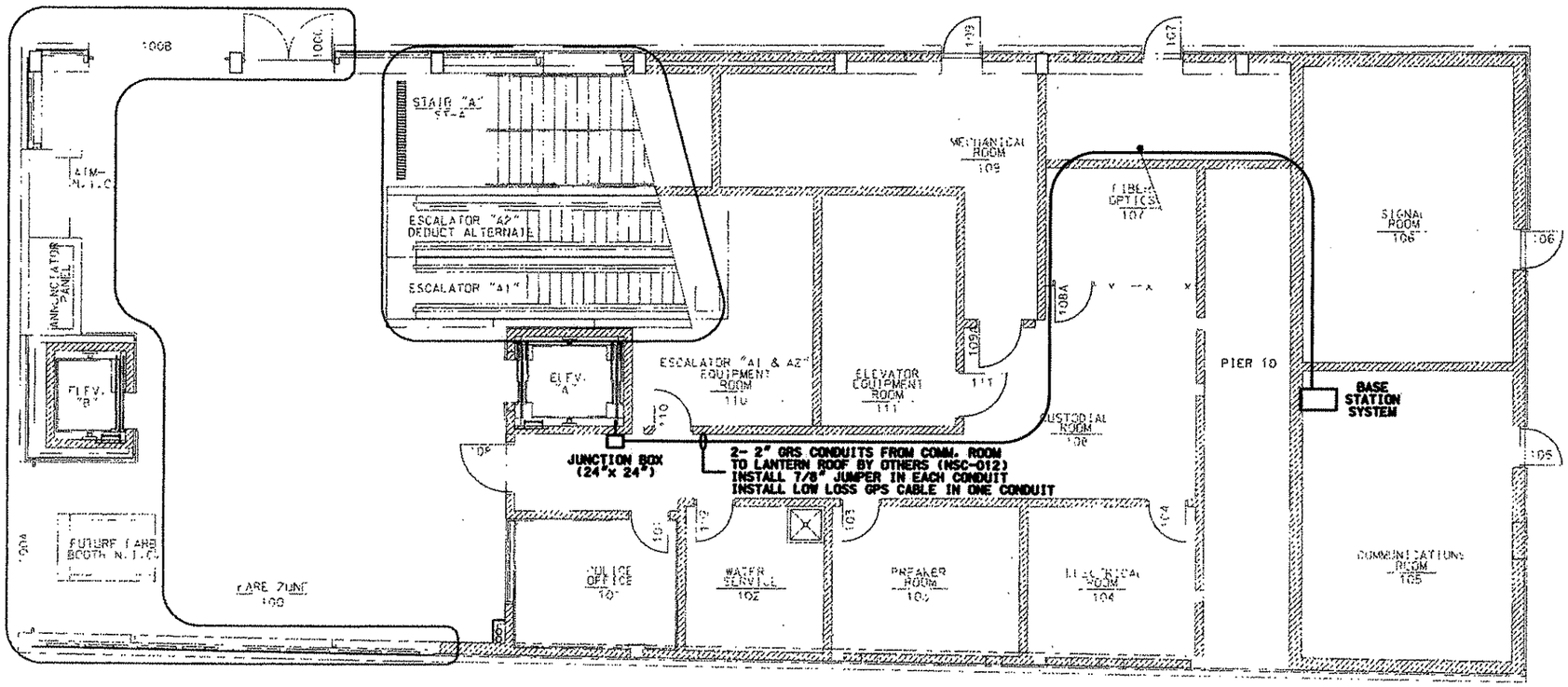
DESIGNED	R SCHMIDT
DRAWN	HT TRAN
CHECKED	K HOFFMAN
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	1" = 8'-0"

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
LEAKY CO-AXIAL CABLE ROUTING PLAN
NORTH SIDE STATION - CONCOURSE LEVEL - WEST END

Port Authority

CONTRACT NO.	NSC-009
DWG. NO.	CR406
SHT.	562



ALLEGHENY STATION

NOTES:

1. COAXIAL CABLES TO BE ATTACHED TO THE ROOM WALLS.
2. ALL CONDUIT BENDS ARE 24" RADIUS.
3. LOCATION (A) HAVE 1- 1" SLEEVE PROVIDED BY OTHERS FOR CONDUITS & CABLES.
4. CONTRACTOR SHALL VERIFY SUITABILITY OF GPS LOW LOSS JUMPER.

NO.	DATE	DESCRIPTION
1	10/01/08	ADDENDUM 9 - DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — MICHAEL T. MCNAMARA

SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED 6/1/08 DATE

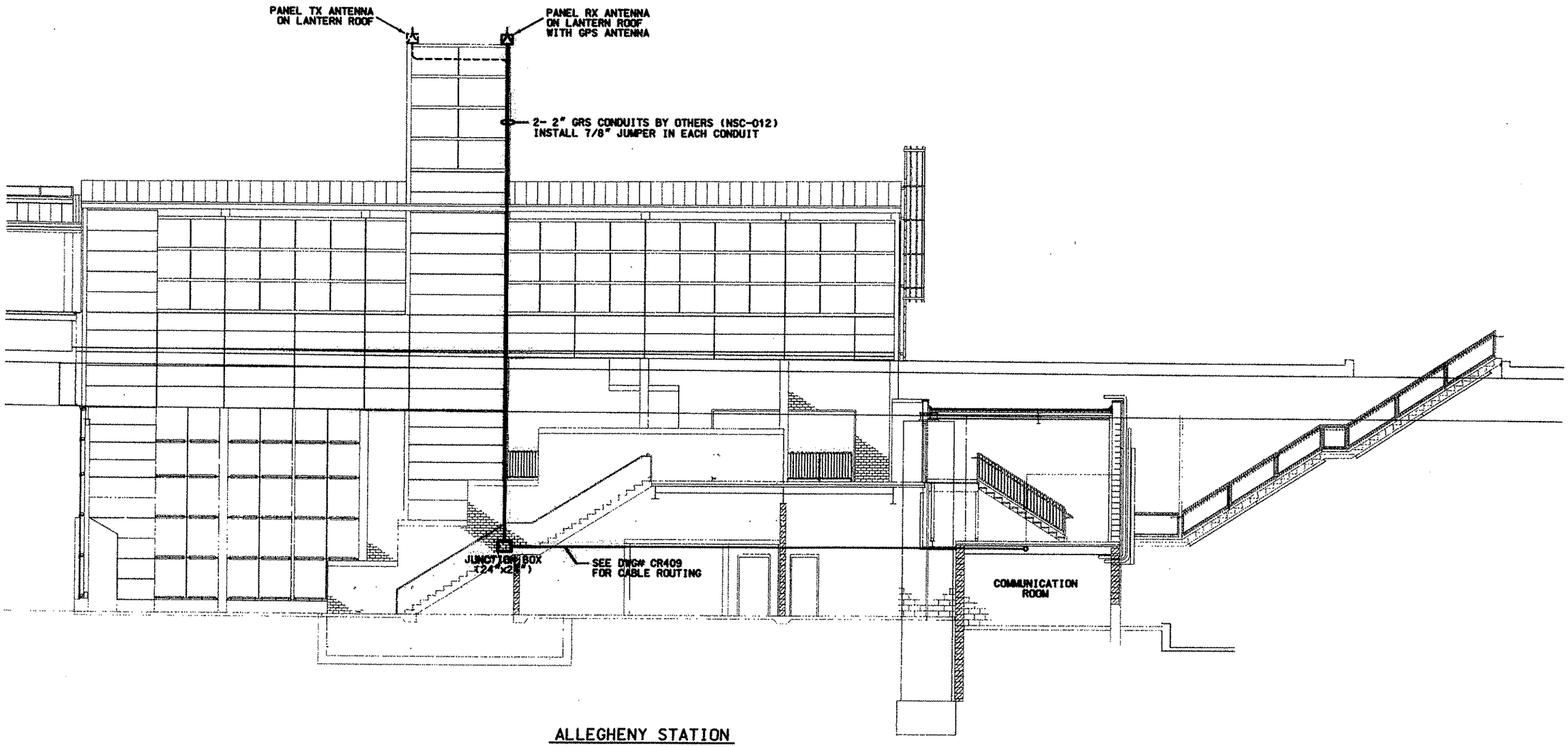
DESIGNED	R SCHMIDT
DRAWN	HT TRAN
CHECKED	K HOFFMAN
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	1"= 6'-0"

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
LEAKY CO-AXIAL CABLE ROUTING PLAN
ALLEGHENY STATION

Port Authority

CONTRACT NO. NSC-009
DWG. NO. CR409 SHT. 595



ALLEGHENY STATION

NOTES:

1. COAXIAL CABLES TO BE ATTACHED TO THE ROOM WALLS.
2. ALL CONDUIT BENDS ARE 24" RADIUS.
3. CONTRACTOR SHALL VERIFY SUITABILITY OF GPS LOW LOSS JUMPER.
4. MOUNT PANEL RX ANTENNA 10' HIGHER THAN PANEL TX ANTENNA.
5. MOUNT GPS ANTENNA WITH PANEL RX ANTENNA.

NO.	DATE	DESCRIPTION
7	10/01/08	ADDENDUM 9 – DRAWING MODIFIED

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL MICHAEL T. MCNAMARA

SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED 10/1/08 DATE

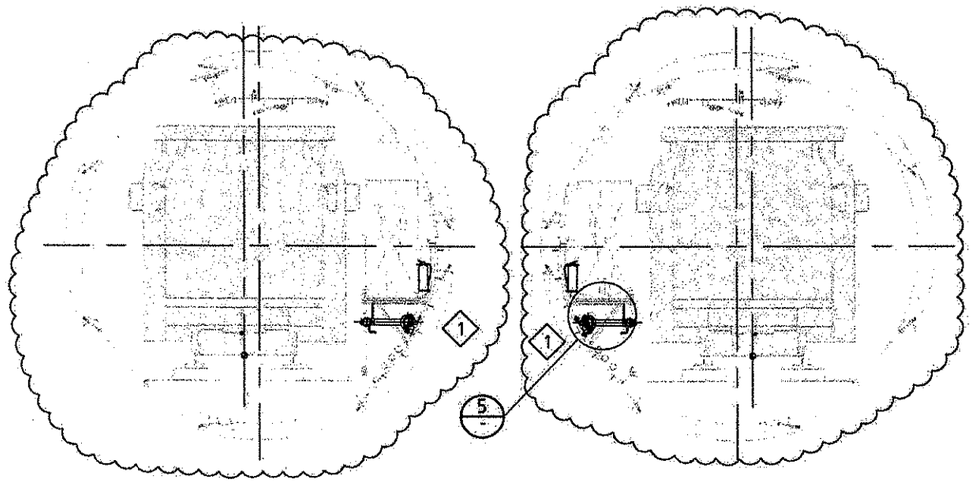
DESIGNED	R SCHMIDT
DRAWN	HT TRAN
CHECKED	K HOFFMAN
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	7 1"=6'-0"

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

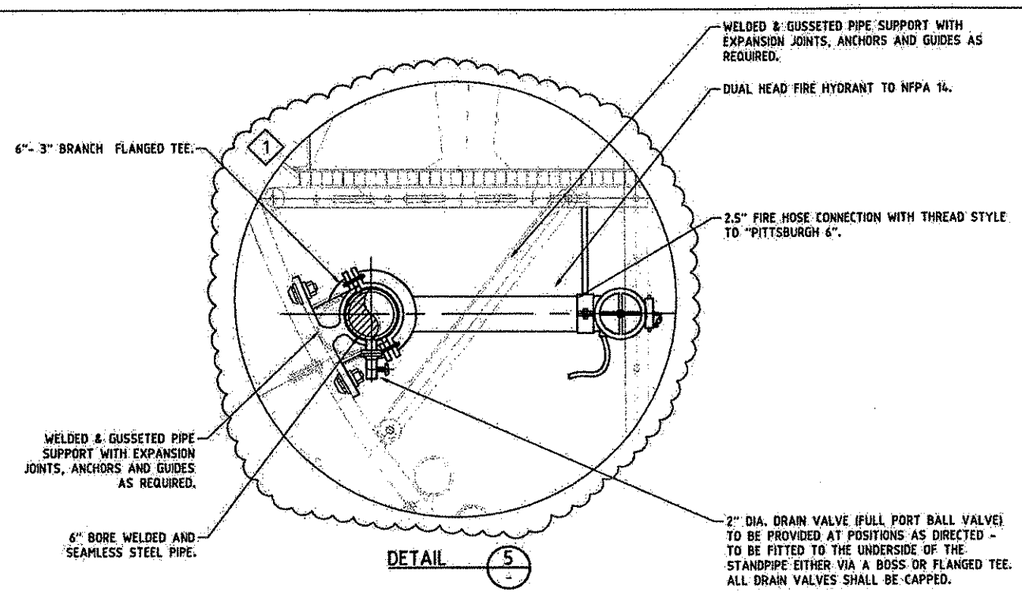
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
LEAKY CO-AXIAL CABLE ROUTING PLAN
ALLEGHENY STATION

Port Authority

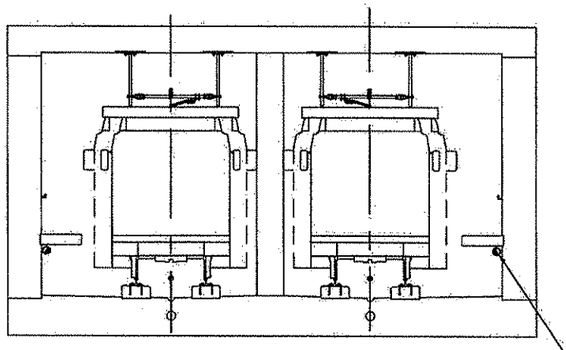
CONTRACT NO. NSC-009
DWG. NO. CR410 SHT. 596



TYPICAL BORED TUNNEL SECTION
(ZERO CANT SHOWN ONLY)

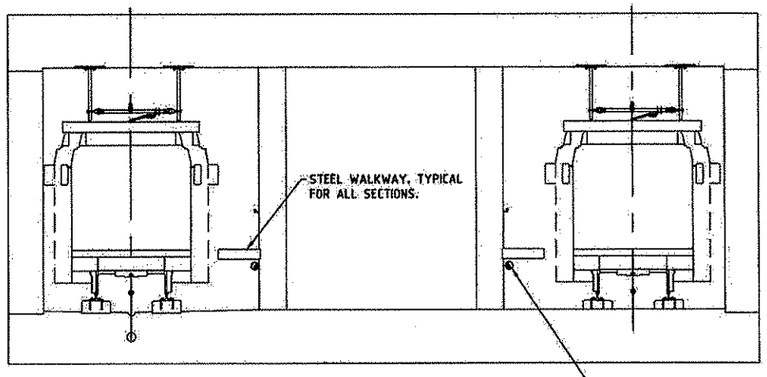


DETAIL 5



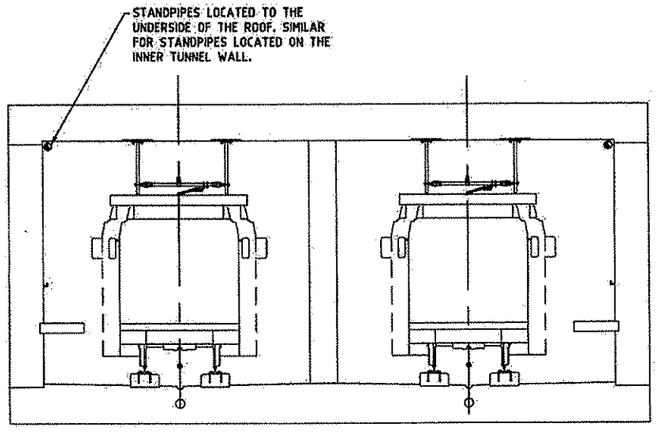
TYPICAL SECTION A
(ZERO CANT SHOWN ONLY)

STANDPIPES LOCATED UNDERNEATH THE WALKWAY ON THE OUTER TUNNEL WALL.



TYPICAL SECTION B
(ZERO CANT SHOWN ONLY)

STANDPIPES LOCATED UNDERNEATH THE WALKWAY ON THE INNER TUNNEL WALL.



TYPICAL SECTION C
(ZERO CANT SHOWN ONLY)

NOTES:

1. THE CONTRACTOR SHALL REFER TO SECTION 15885 "TUNNEL DRY STANDPIPE SYSTEM" AND 15884 "TUNNEL FIRE EXTINGUISHERS AND CABINETS" OF THE CONTRACT DOCUMENTS FOR FURTHER DETAILS.
2. STANDPIPES SHALL CONFORM TO NFPA 14 CLASS 1 DRY SYSTEM. MINIMUM FLOW RATE OF 500gpm AT 100psi AT THE HYDRAULICALLY MOST REMOTE HYDRANT LOCATION.
3. EXTINGUISHERS SHALL CONFORM TO NFPA 10 CLASS C.
4. SECTIONS ARE INDICATIVE ONLY AND VARY ACCORDING TO CHAINAGE.
5. STANDPIPE SYSTEM, FIRE EXTINGUISHERS AND CABINETS SHALL BE PROVIDED BY CONTRACT NSC-009 IN THE TUNNELS PROPER. OTHERS WILL PROVIDE THE SAME AT STATIONS.
6. WALL FIXTURES SHALL BE COORDINATED WITH OTHER AUTHORITY CONTRACTS (NSC-003, NSC-006) AS REQUIRED.
7. THE CONTRACTOR SHALL ENSURE THAT THE STANDPIPE SYSTEM AND ANY ASSOCIATED EQUIPMENT DOES NOT ENCROACH INTO THE CLEARANCE ENVELOPE.
8. THE CONTRACTOR SHALL PROVIDE 2.5" FIRE HOSE CONNECTION WITH THREAD STYLE TO "PITTSBURGH 6".

MAUNSELL | AECOM

Maunsell Australia Pty Ltd A.B.N. 20,093 846 925

APPROVED October 2, 2008 DATE

NO.	DATE	DESCRIPTION
1	10/02/08	ADDENDUM 9 - DRAWING MODIFIED

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
RPEQ 5128
SIGNATURE
DATE 10/2/08

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED 10/2/08 DATE

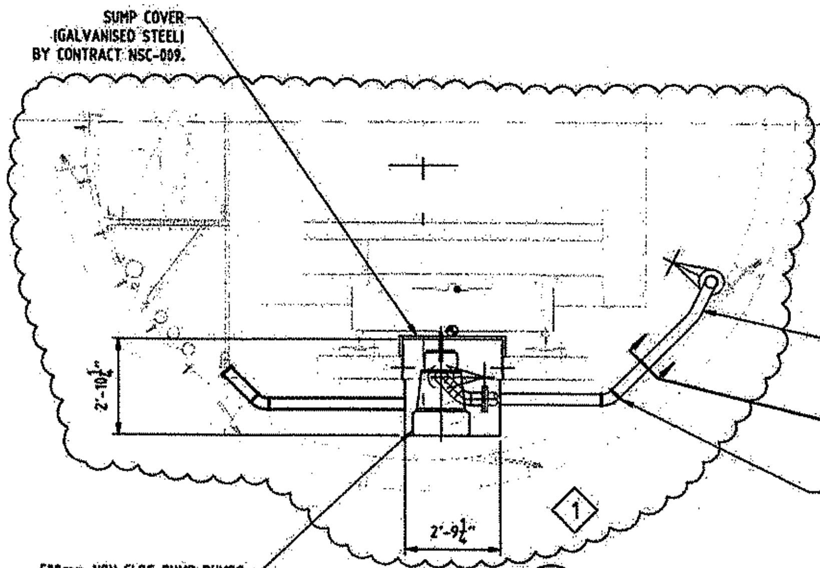
DESIGNED	AP
DRAWN	BK
CHECKED	PB
IN CHARGE	CS
DATE	06/27/08
SCALE	NTS

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

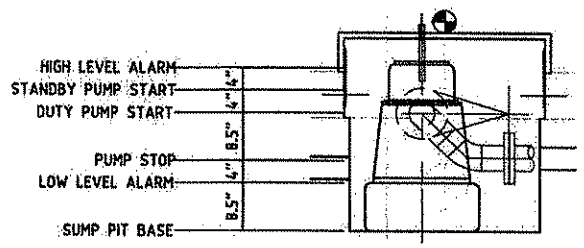
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
GATEWAY LINE
TUNNEL FIRE HYDRANT TYPICAL DETAILS, SHEET 2 OF 2

Port Authority

CONTRACT NO. NSC-009
DWG. NO. FP-107 SHT. 616

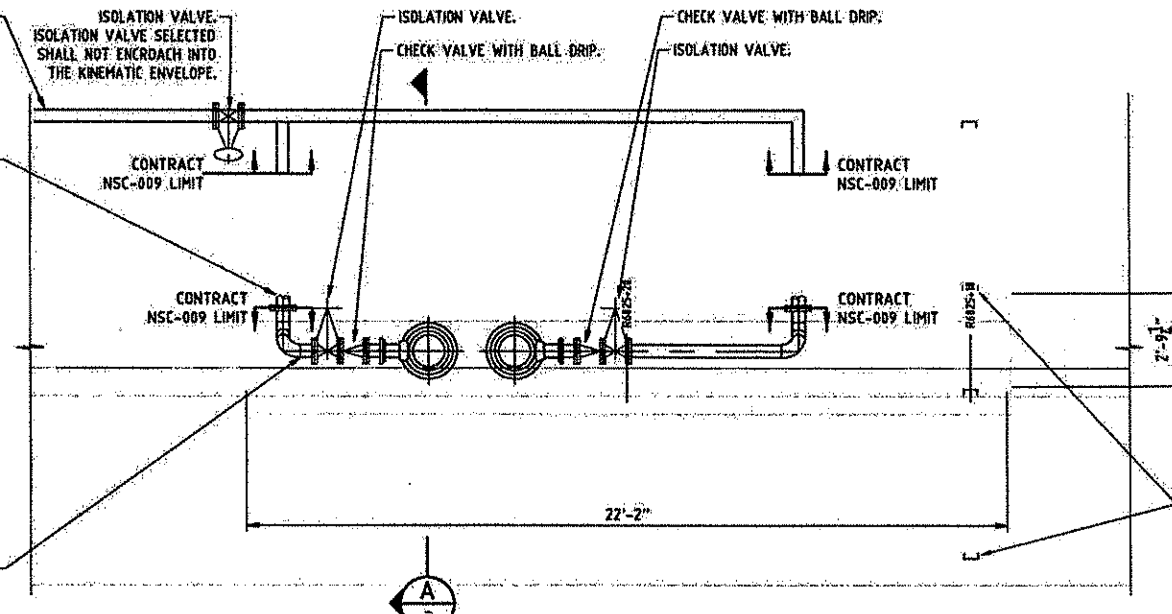


SECTION A
SCALE 3/8"-1'

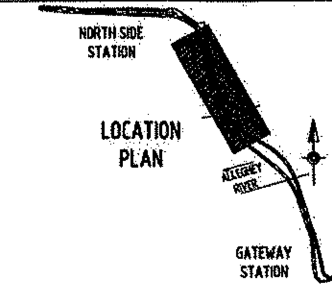


NOTE:
SUMP LEVEL DIMENSIONS ARE NOMINAL ONLY AND MAY CHANGE DEPENDANT ON PUMP SELECTION AND FINAL PIT DIMENSIONS. CONTRACTOR SHALL CONFIRM THE SUMP LEVEL DIMENSIONS.

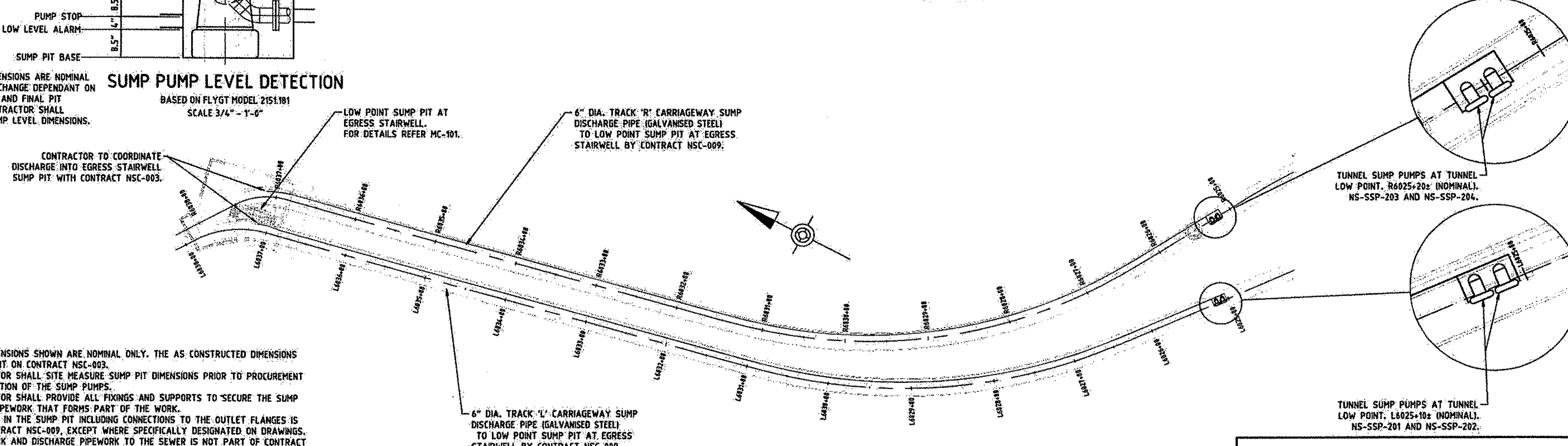
SUMP PUMP LEVEL DETECTION
BASED ON FLYGT MODEL 2151.181
SCALE 3/4" - 1'-0"



TYPICAL PLAN OF LOW POINT SUMP PIT
SCALE 3/8" - 1'-0"



LOCATION PLAN



LOCATION PLAN
SCALE 1/64" - 1'-0"

NOTES:

1. SUMP PIT DIMENSIONS SHOWN ARE NOMINAL ONLY. THE AS CONSTRUCTED DIMENSIONS ARE DEPENDANT ON CONTRACT NSC-003.
2. THE CONTRACTOR SHALL SITE MEASURE SUMP PIT DIMENSIONS PRIOR TO PROCUREMENT AND INSTALLATION OF THE SUMP PUMPS.
3. THE CONTRACTOR SHALL PROVIDE ALL FIXINGS AND SUPPORTS TO SECURE THE SUMP PUMPS AND PIPEWORK THAT FORMS PART OF THE WORK.
4. ALL PIPEWORK IN THE SUMP PIT INCLUDING CONNECTIONS TO THE OUTLET FLANGES IS PART OF CONTRACT NSC-009, EXCEPT WHERE SPECIFICALLY DESIGNATED ON DRAWINGS.
5. INLET PIPEWORK AND DISCHARGE PIPEWORK TO THE SEWER IS NOT PART OF CONTRACT NSC-009, EXCEPT WHERE SPECIFICALLY DESIGNATED ON DRAWINGS.
6. FOR STRUCTURAL DETAILS REFER TO DRAWINGS 03TN317, 03TN318, 03TN338, 03TN339 AND 03TN378.
7. THE CONTRACTOR SHALL REFER TO SECTION 15445 "TUNNEL MECHANICAL DRAINAGE SYSTEMS" OF THE CONTRACT DOCUMENTS FOR FURTHER DETAILS.

MAUNSELL | AECOM
Maunsell Australia Pty Ltd A.B.N. 20 093 846 925
APPROVED — DATE October 2, 2008

NO.	DATE	DESCRIPTION
1	10/02/08	ADDENDUM 9 - DRAWING MODIFIED

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.

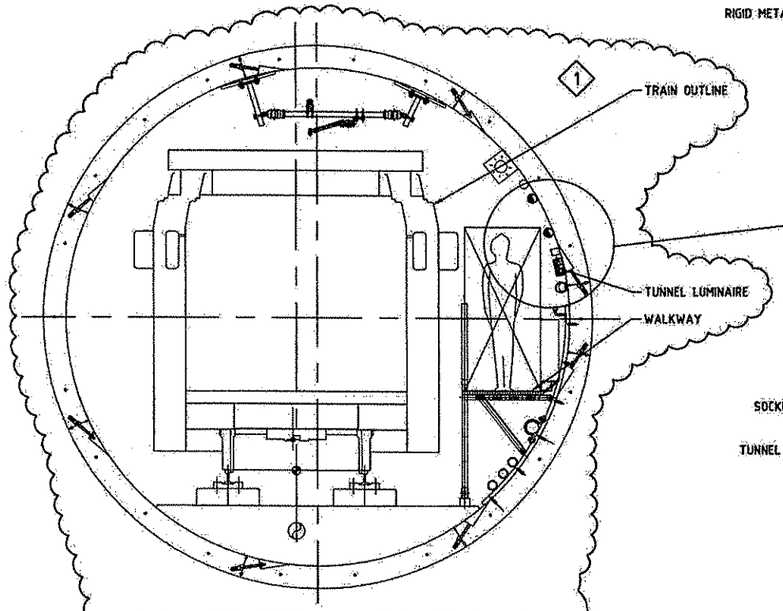
REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
SIGNATURE
RPEQ #002194

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED — DATE 10/2/08

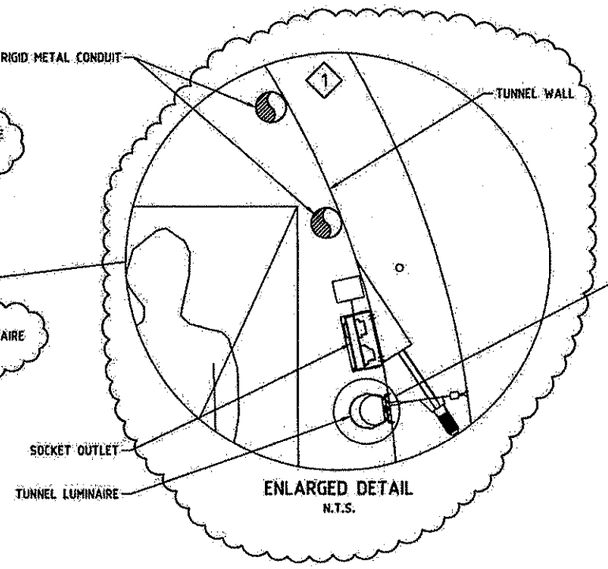
DESIGNED	AP
DRAWN	IK
CHECKED	PG
IN CHARGE	CS
DATE	06/27/08
SCALE	

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
GATEWAY LINE
BORED TUNNEL SUMP PUMP PLAN

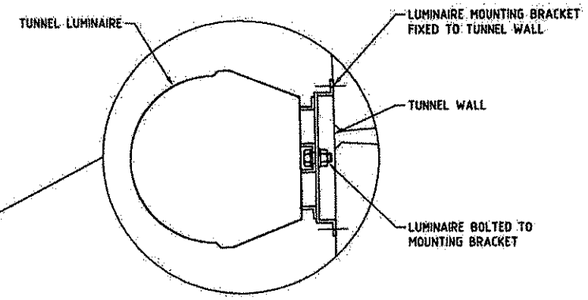
Port Authority
CONTRACT NO. NSC-009
DWG. NO. MC-100 SHT. 617



BORED TUNNEL TYPICAL LUMINAIRE INSTALLATION
GATEWAY STATION TO STA L6036+73.96
(LEFT TRACK SHOWN)

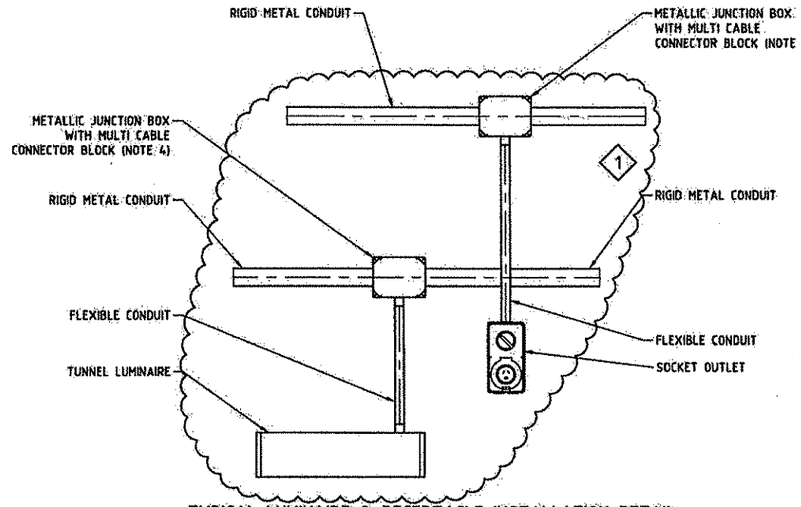


ENLARGED DETAIL
N.T.S.



ENLARGED DETAIL
N.T.S.

LIGHT FITTING SCHEDULE			
1 LIGHT FITTING No.	TRACK CHAINAGE	LIGHT FITTING SPACING CENTRE TO CENTRE	MOUNTING HEIGHT ABOVE GANGWAY
GW01-L TO GW49-L	L6014+50 TO L6026+43	25'	4'-6"
NS61E-L TO NS21E-L	L6026+68 TO L6036+25	25'	4'-6"
NS20E-L TO NS17E-L	L6036+19 TO L6037+45	19'	6'
NS16E-L TO NS05E-L	L6037+57 TO L6039+77	18'	7'
NS04E-L TO NS01E-L	L6039+90 TO L6040+44	19'	6'
NS01W-L TO NS22W-L	L6043+19 TO L6047+17	19'	6'
NS23W-L TO NS31W-L	1 L6047+30 TO L6048+81	19'	6'
GW01-R TO GW48-R	R6014+47 TO R6026+24	25'	4'-6"
NS65E-R TO NS24E-R	R6026+49 TO R6036+65	25'	4'-6"
NS23E-R TO NS20E-R	R6036+84 TO R6037+49	19'	6'
NS19E-R TO NS06E-R	R6037+55 TO R6040+00	18'	7'
NS05E-R TO NS01E-R	R6040+14 TO R6040+91	19'	6'
NS01W-R TO NS22W-R	R6043+19 TO R6047+17	19'	6'
NS23W-R TO NS31W-R	R6047+30 TO R6048+81	19'	6'



TYPICAL LUMINAIRE & RECEPTACLE INSTALLATION DETAIL
N.T.S.

NOTE
1. LUMINAIRE TO BE SCHREADER MY2-PL42 c/w 42W FLOURESCENT LAMP AND SURFACE MOUNTING BRACKET.
2. LUMINAIRE TO INCLUDE SPECIAL ANTI CORROSION TREATMENT.
3. ONLY EVERY SECOND LUMINAIRE HAVE A CORRESPONDING RECEPTACLE INSTALLED, REFER TO EL-106 & EL-107 FOR RECEPTACLE CHAINAGES.
4. INSTALL MULTI CABLE CONNECTOR BLOCK SUITABLE FOR CONNECTING 1/0 AWG TO #14 AWG WIRE.

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Maunsell Australia Pty Ltd A.B.N. 20 093 846 925

APPROVED October 2, 2008 DATE

NO.	DATE	DESCRIPTION
1	10/02/08	ADDENDUM 9 - DRAWING MODIFIED

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
RPEQ 5128
SIGNATURE
PATP #002191

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED 10/2/08 DATE

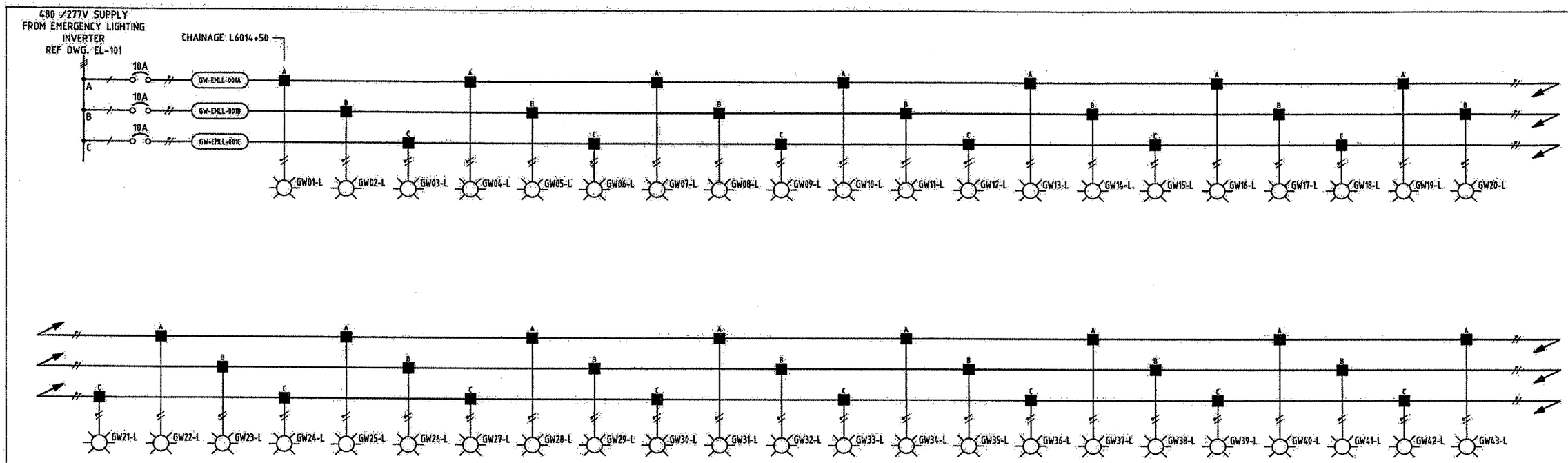
DESIGNED	TS
DRAWN	BH
CHECKED	MMS
IN CHARGE	CS
DATE	06/27/08
SCALE	

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
TUNNEL LIGHTING
TYPICAL DETAILS

Port Authority

CONTRACT NO. NSC-009
DWG. NO. EL-002 SHT. 649



GATEWAY STATION TUNNEL LIGHTING CIRCUITS LEFT TRACK

NOTE

1. LUMINAIRE TO BE SCHREADER MY2-PL42 c/w 42W FLOURESCENT LAMP AND SURFACE MOUNTING BRACKET.
2. FOR CABLE NUMBERS REFER TO CABLE SCHEDULE DRAWINGS EL-160, 161, 162.

LEGEND

- 42W FLOURESCENT LIGHT FITTING (GW= GATEWAY) (NS= NORTH SIDE) (E= EAST) (W= WEST) (01= SEQUENTIAL EQUIPMENT No.) (R= RIGHT TRACK) (L= LEFT TRACK) — NSE01-L
- JUNCTION BOX (PHASE IDENTIFICATION) — A
- CABLE NUMBER
- CIRCUIT BREAKER
- SINGLE PHASE
- SINGLE PHASE + NEUTRAL
- 3 PHASE

MAUNSELL | AECOM

Maunsell Australia Pty Ltd A.B.N. 20 093 846 925

APPROVED October 2, 2008 DATE

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REVISIONS

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REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
CONRAD H.R. SINCLAIR
RPEQ 5128

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PATP #002194

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IN CHARGE	CS
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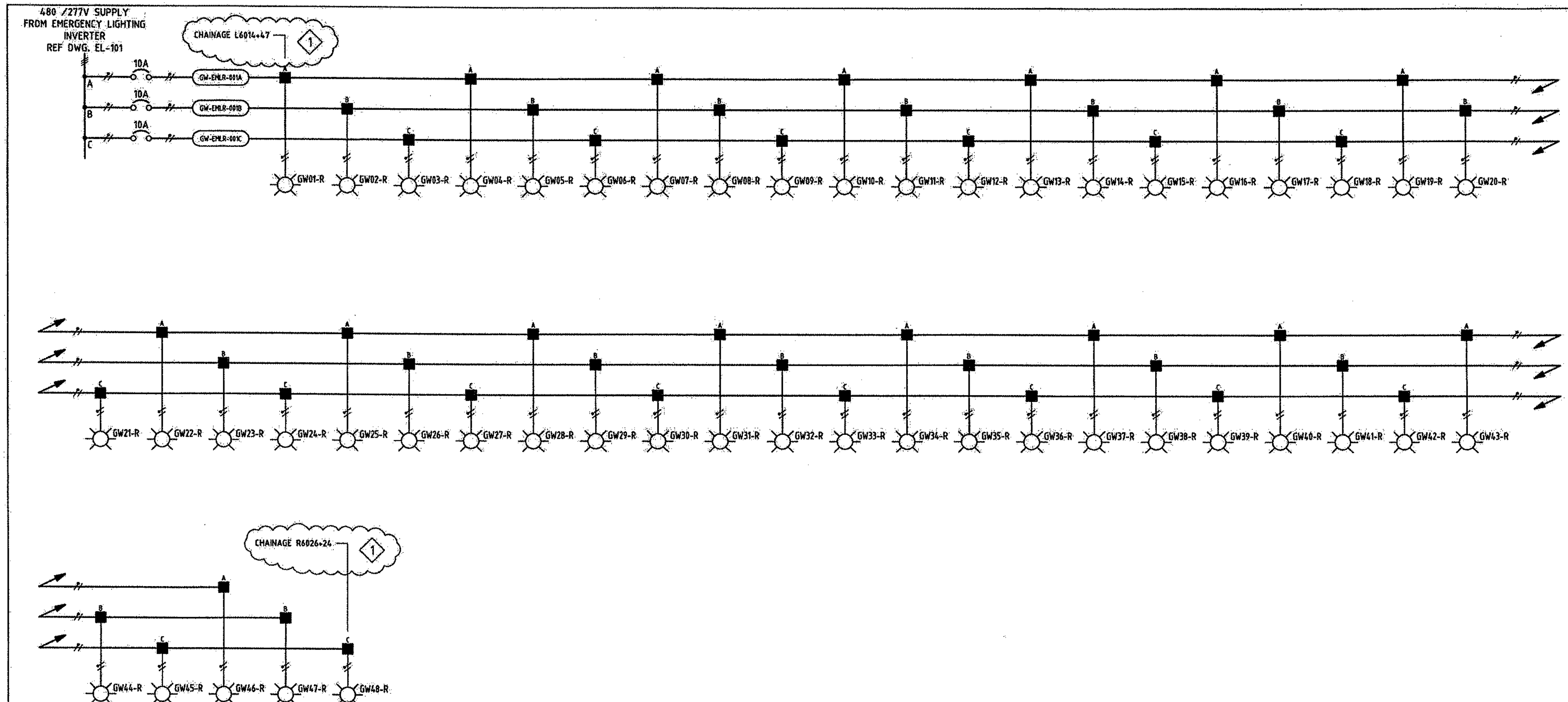
SCALE	

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
GATEWAY STATION
TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 1 OF 2

Port Authority

CONTRACT NO. NSC-009
DWG. NO. EL-140 SHT. 674



GATEWAY STATION TUNNEL LIGHTING CIRCUITS RIGHT TRACK

LEGEND (1)

42W FLOURESCENT LIGHT FITTING
(GW= GATEWAY) (NS= NORTH SIDE)
(01= SEQUENTIAL EQUIPMENT No.)
(E= EAST) (W= WEST)
(R= RIGHT TRACK) (L= LEFT TRACK)
NS01E-L

JUNCTION BOX (PHASE IDENTIFICATION)

CABLE NUMBER
CIRCUIT BREAKER
SINGLE PHASE
SINGLE PHASE + NEUTRAL
3 PHASE

NOTE

1. TUNNEL LIGHT FITTING ARE TO BE INSTALLED 25 FEET APART, FROM CENTRE TO CENTRE OT THE LIGHT FITTINGS.
2. LUMINAIRE TO BE SCHREADER MY2-PL42 c/w 42W FLOURESCENT LAMP AND SURFACE MOUNTING BRACKET.
3. FOR CABLE NUMBERS REFER TO CABLE SCHEDULE DRAWINGS EL-160, 161, 162.

MAUNSELL | AECOM

Maunsell Australia Pty Ltd A.B.N. 20 093 846 925

APPROVED: [signature] DATE: October 2, 2008

NO.	DATE	DESCRIPTION
1	10/02/08	ADDENDUM 9 - DRAWING MODIFIED

REVISIONS

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REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
CONRAD H.R. STACEY
RPEQ 5128
SIGNATURE
PATP #002194

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222

APPROVED [signature] DATE 10/2/08

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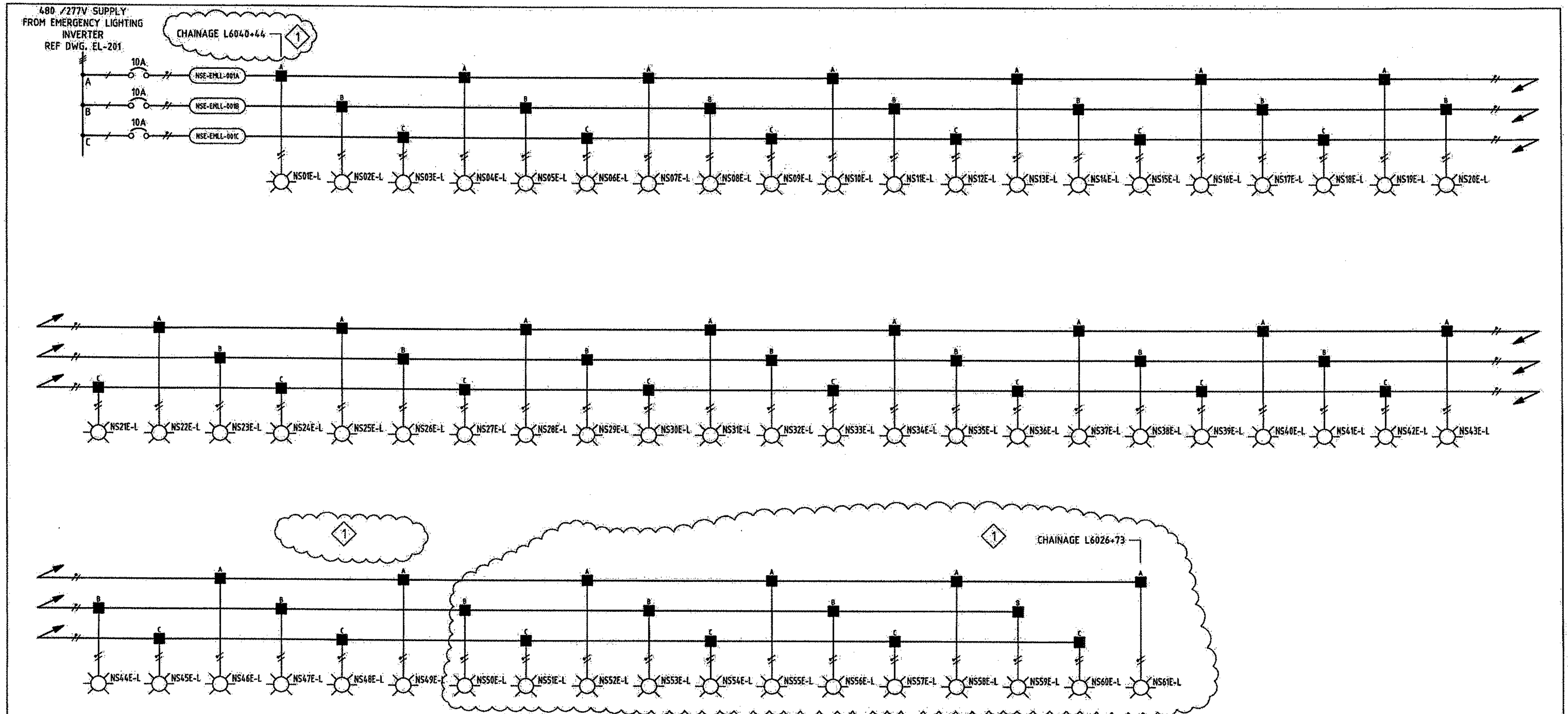
DRAWN	SH
CHECKED	MHS
IN CHARGE	CS
DATE	06/27/08
SCALE	

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
GATEWAY STATION
TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 2 OF 2

Port Authority

CONTRACT NO. NSC-009
DWG. NO. EL-141 SHT. 675



LEGEND ⟨1⟩

NS01E-L: 42W FLOURESCENT LIGHT FITTING (GW= GATEWAY) (NS= NORTH SIDE) (01= SEQUENTIAL EQUIPMENT No.) (E= EAST) (W= WEST) (R= RIGHT TRACK) (L= LEFT TRACK)	
JUNCTION BOX (PHASE IDENTIFICATION)	
CABLE NUMBER	
CIRCUIT BREAKER	
SINGLE PHASE	
SINGLE PHASE + NEUTRAL	
3 PHASE	

NOTE

1. LUMINAIRE TO BE SCHREADER MY2-PL42 c/w 42W FLOURESCENT LAMP AND SURFACE MOUNTING BRACKET.
2. FOR CABLE NUMBERS REFER TO CABLE SCHEDULE DRAWINGS EL-260, 261, 262, 263.

MAUNSELL | AECOM

Maunsell Australia Pty Ltd A.B.N. 20 093 846 925

APPROVED — DATE October 2, 2008

NO.	DATE	DESCRIPTION
1	10/02/08	ADDENDUM 9 - DRAWING MODIFIED

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REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND CONRAD H.B. [illegible] RPEQ 5328

SIGNATURE

PA #002196

DMJM HARRIS | AECOM

FOUR GATEWAY CENTER
10TH FLOOR
PITTSBURGH, PA. 15222

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IN CHARGE	CS
DATE	06/27/08
SCALE	

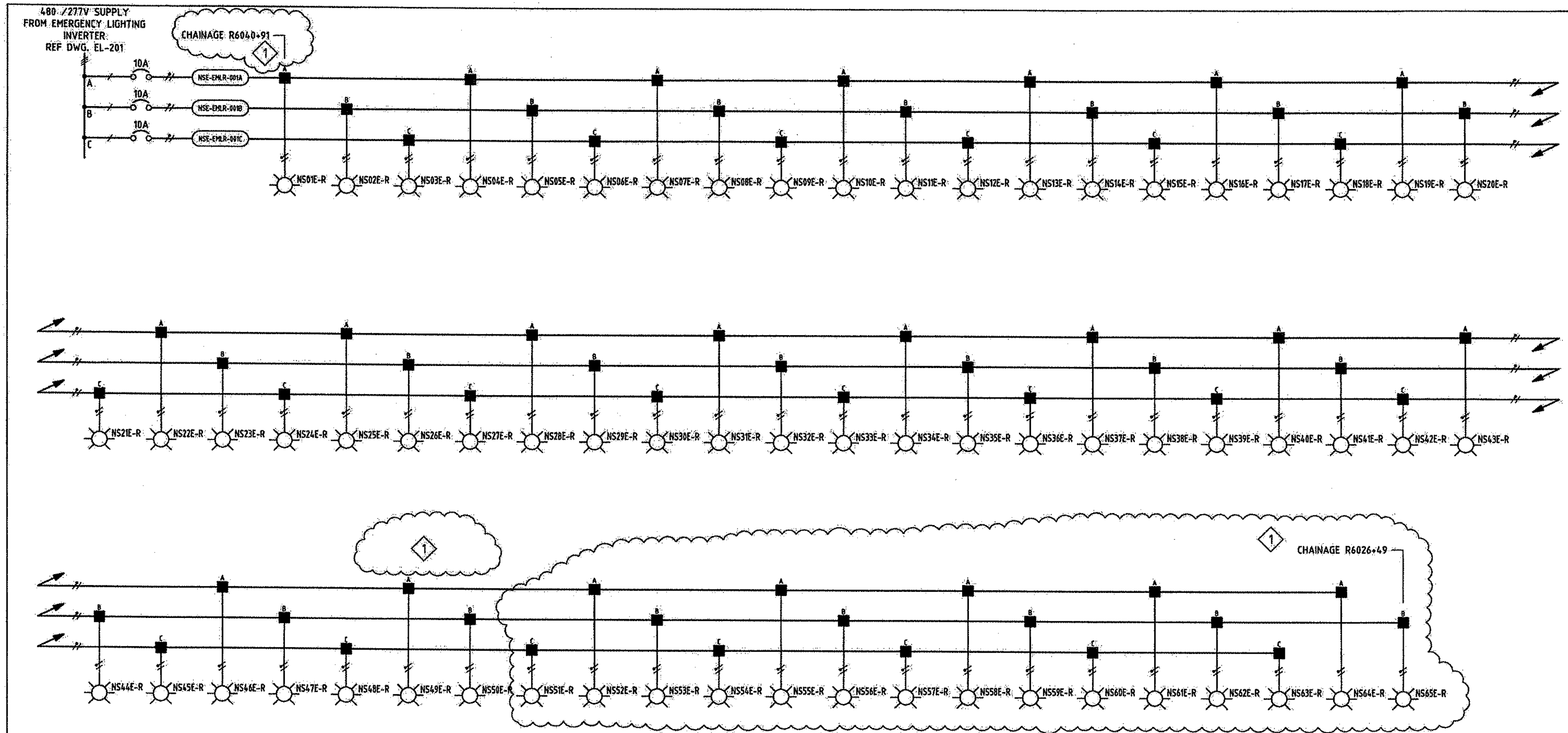
PORT AUTHORITY OF ALLEGHENY COUNTY

PITTSBURGH — PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
NORTH SIDE STATION
TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 1 OF 3

Port Authority

CONTRACT NO.	NSC-009	
DWG. NO.	EL-240	SHT. 704



LEGEND

1 — 42W FLOURESCENT LIGHT FITTING
- (GW= GATEWAY) (NS= NORTH SIDE)
- (01= SEQUENTIAL EQUIPMENT No.)
- (E= EAST) (W= WEST)
- (R= RIGHT TRACK) (L= LEFT TRACK)

NS01E-L

JUNCTION BOX (PHASE IDENTIFICATION)

Symbol	Meaning
(oval)	CABLE NUMBER
(arc)	CIRCUIT BREAKER
/	SINGLE PHASE
//	SINGLE PHASE + NEUTRAL
///	3 PHASE

NOTE

1. LUMINAIRE TO BE SCHREADER MY2-PL42 c/w 42W FLOURESCENT LAMP AND SURFACE MOUNTING BRACKET.
2. FOR CABLE NUMBERS REFER TO CABLE SCHEDULE DRAWINGS EL-260, 261, 262, 263.

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REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
CONRAD H.B. STACEY
RPEQ 5128
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PITTSBURGH, PA. 15222

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DRAWN	GH
CHECKED	MS
IN CHARGE	CS
DATE	06/27/08
SCALE	

PORT AUTHORITY OF ALLEGHENY COUNTY

PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
NORTH SIDE STATION
TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 2 OF 3

Port Authority

CONTRACT NO. NSC-009
DWG. NO. EL-241 SHT. 708

480 /277V SUPPLY
FROM EMERGENCY LIGHTING
INVERTER
REF DWG. EL-202

CHAINAGE L6043+19

10A A — NSW-EMLL-001A
10A B — NSW-EMLL-001B
10A C — NSW-EMLL-001C

NS01W-L NS02W-L NS03W-L NS04W-L NS05W-L NS06W-L NS07W-L NS08W-L NS09W-L NS10W-L NS11W-L NS12W-L NS13W-L NS14W-L NS15W-L NS16W-L NS17W-L NS18W-L NS19W-L NS20W-L

CHAINAGE L6048+81

NS21W-L NS22W-L NS23W-L NS24W-L NS25W-L NS26W-L NS27W-L NS28W-L NS29W-L NS30W-L NS31W-L

480 /277V SUPPLY
FROM EMERGENCY LIGHTING
INVERTER
REF DWG. EL-202

CHAINAGE R6043+19

10A A — NSW-EMLR-001A
10A B — NSW-EMLR-001B
10A C — NSW-EMLR-001C

NS01W-R NS02W-R NS03W-R NS04W-R NS05W-R NS06W-R NS07W-R NS08W-R NS09W-R NS10W-R NS11W-R NS12W-R NS13W-R NS14W-R NS15W-R NS16W-R NS17W-R NS18W-R NS19W-R NS20W-R

CHAINAGE R6048+81

NS21W-R NS22W-R NS23W-R NS24W-R NS25W-R NS26W-R NS27W-R NS28W-R NS29W-R NS30W-R NS31W-R

LEGEND

42W FLOURESCENT LIGHT FITTING
(GW= GATEWAY) (NS= NORTH SIDE)
(01= SEQUENTIAL EQUIPMENT No.)
(E= EAST) (W= WEST)
(R= RIGHT TRACK) (L= LEFT TRACK)

NS01E-L

JUNCTION BOX (PHASE IDENTIFICATION)

CABLE NUMBER
CIRCUIT BREAKER
SINGLE PHASE
SINGLE PHASE + NEUTRAL
3 PHASE

NOTE

1. LUMINAIRE TO BE SCHREADER MY2-PL42 c/w 42W FLOURESCENT LAMP AND SURFACE MOUNTING BRACKET.
2. FOR CABLE NUMBERS REFER TO CABLE SCHEDULE DRAWINGS EL-260, 261, 262, 263.

MAUNSELL | AECOM

Maunsell Australia Pty Ltd A.B.N. 20 093 846 925

APPROVED October 2, 2008 DATE

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REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
CONRAD H.R. STACEY
RPEQ 5128
SIGNATURE
PATP #002194

DMJM HARRIS | AECOM
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PITTSBURGH, PA. 15222

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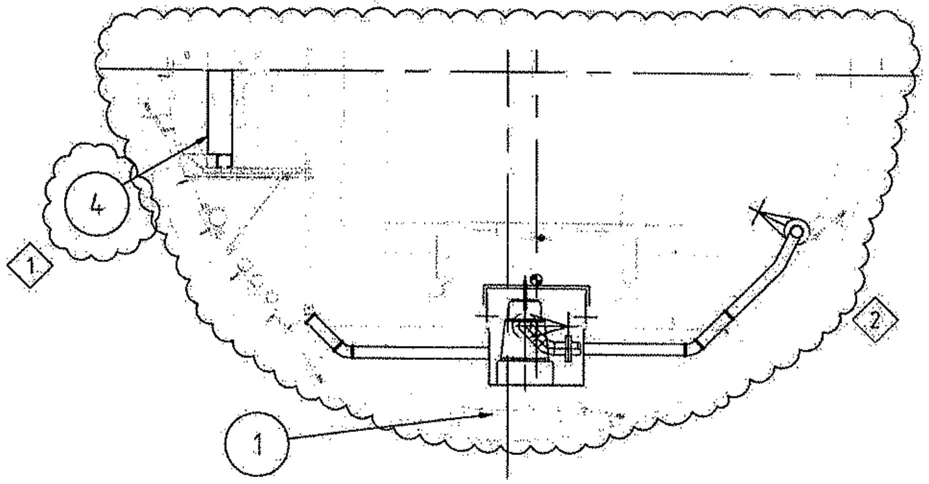
IN CHARGE	CS
DATE	06/27/08
SCALE	

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

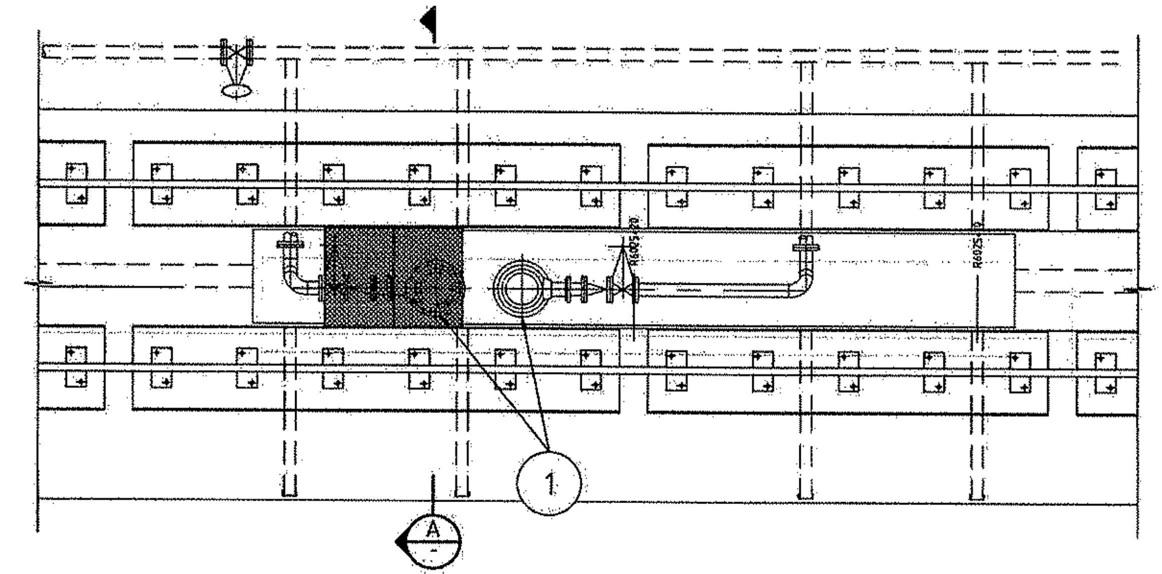
NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
NORTH SIDE STATION
TUNNEL LIGHTING ELECTRICAL SCHEMATIC SHEET 3 OF 3

Port Authority

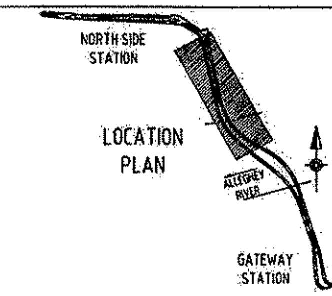
CONTRACT NO. NSC-009
DWG. NO. EL-242 SHT. 706

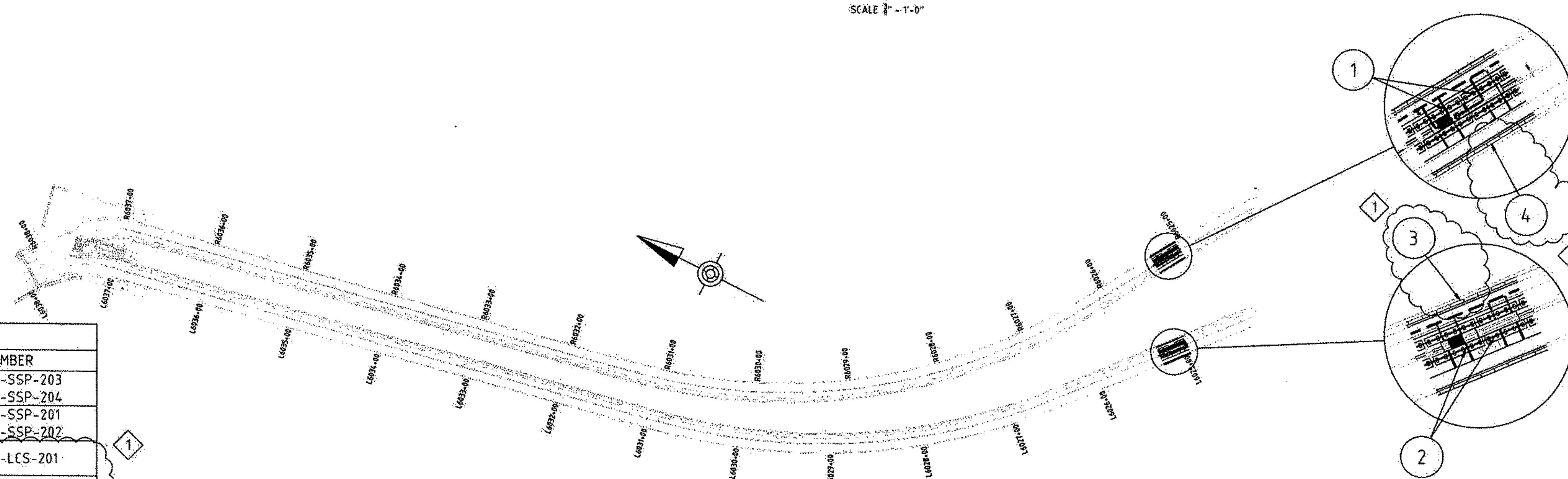


SECTION A
SCALE 3/8"=1'



TYPICAL PLAN OF LOW POINT SUMP PIT
SCALE 3/8" - 1'-0"





DEVICE LIST

ITEM NUMBER	DEVICE	NUMBER
1	TUNNEL SUMP PUMPS	NS-SSP-203 NS-SSP-204
2	TUNNEL SUMP PUMPS	NS-SSP-201 NS-SSP-202
3	LOCAL CONTROL STATION	NS-LCS-201
4	LOCAL CONTROL STATION	NS-LCS-202

LOCATION PLAN
SCALE 1/16" - 1'-0"

MAUNSELL | AECOM
Maunsell Australia Pty Ltd A.B.N. 20 093 846 925
APPROVED — DATE October 2, 2008

NO.	DATE	DESCRIPTION
2	10/02/08	ADDENDUM 9 - DRAWING MODIFIED
1	08/15/08	ADDENDUM 3 - DRAWING MODIFIED

REVISIONS

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REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND
CONRAD H.R. STACEY
RPEQ 5128
SIGNATURE

DMJM HARRIS | AECOM
FOUR GATEWAY CENTER
20TH FLOOR
PITTSBURGH, PA. 15222
APPROVED — DATE 10/2/08

DESIGNED	TS
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CHECKED	HHS
IN CHARGE	CS
DATE	06/27/08
SCALE	AS NOTED

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

NORTH SHORE CONNECTOR
NSC TRAIN SYSTEM (SYSTEM WIDE)
GATEWAY LINE
ELECTRICAL EQUIPMENT

Port Authority

CONTRACT NO. NSC-009
DWG. NO. EL-250 SHT. 707