

GENERAL NOTES:

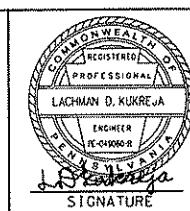
1. WORK AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE, AS AMENDED BY COMMONWEALTH OF PENNSYLVANIA. INTERCONNECTION TO THE 23KV SERVICE SHALL COMPLY WITH THE APPLICABLE REQUIREMENTS OF THE DUQUESNE LIGHT & POWER COMPANY (DLC).
2. CONDUIT RUNS SHOWN ARE DIAGRAMMATIC AND 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, CONDUITS SHALL BE GALVANIZED RIGID STEEL. MINIMUM SIZE SHALL BE  $\frac{3}{4}$ " FOR EXPOSED CONDUITS AND 1" FOR EMBEDDED CONDUITS.
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 EXPANSION 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  $\frac{1}{8}$ ", 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. TRACTION POWER CONDUITS SHALL BE NON-METALLIC (PVC/FIBERGLASS).
19. FOR TYPICAL ANNUNCIATOR WIRING SCHEMATIC, SEE GATEWAY TIEBREAKER STATION DESIGN PACKAGE.

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Newark, N.J. 07102

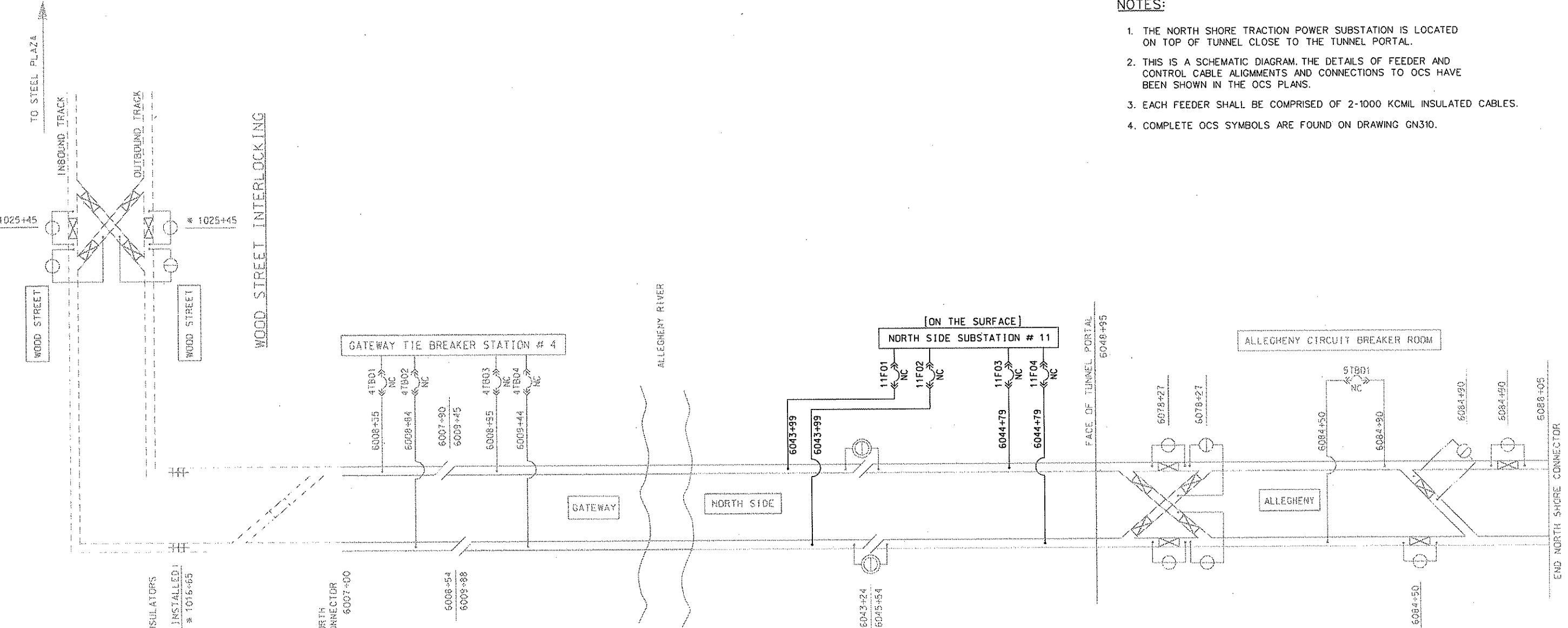
NO.	DATE	DESCRIPTION
REVISIONS		

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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Dave M. Harris*  
APPROVED DATE  
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



TEMPORARY INSULATORS  
(2) IS-100  
(CONTRACTOR INSTALLED)  
# 1018-65

#### LEGEND

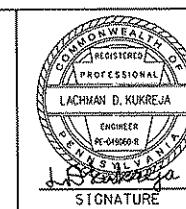
- Existing Section Insulator
- New Section Insulator
- +++ Temporary In-Span Insulator
- - - Existing OCS
- New OCS
- Uninsulated Overlap
- Insulated Overlap
- New Manual Disconnect Switch- Normally Closed (NOC)
- New Motorized Disconnect Switch- Normally Open
- Existing DC Disconnect Switch-Normally Closed

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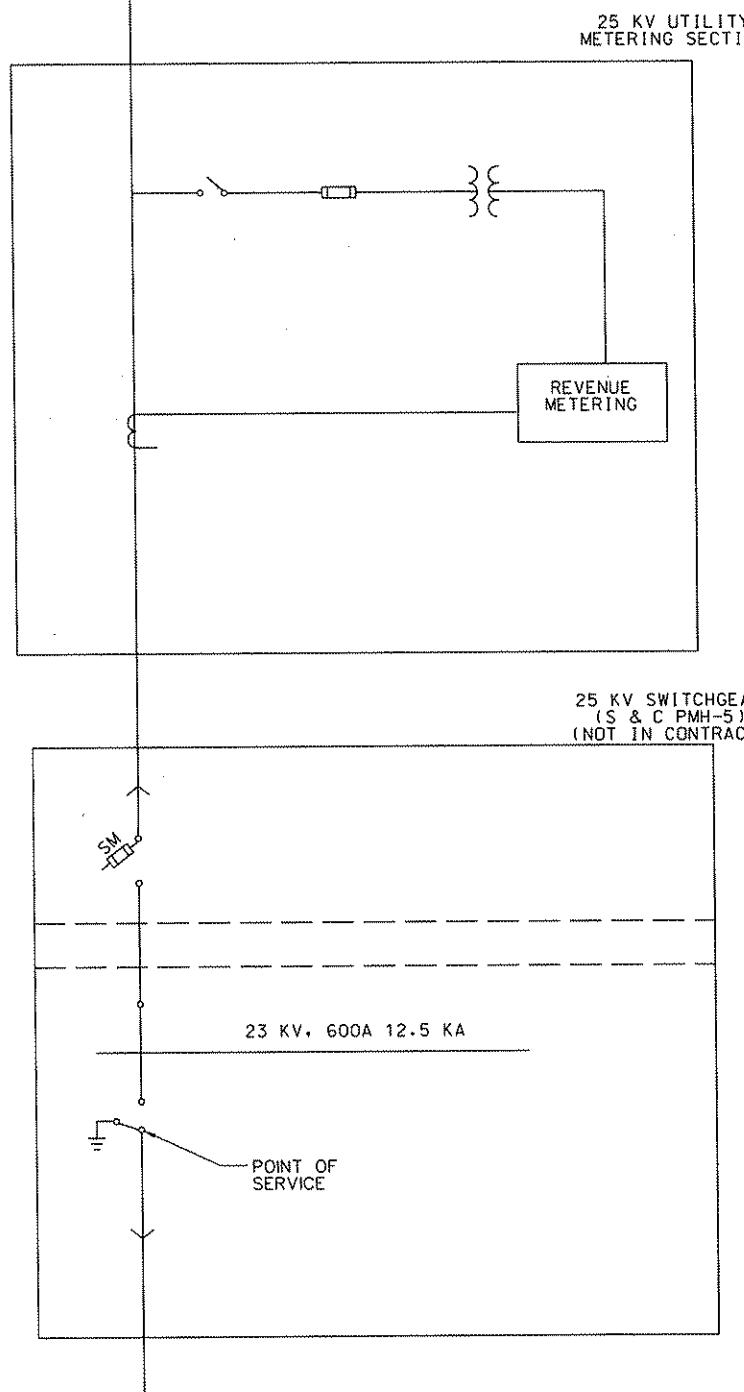


**DMJM HARRIS** | **AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel P. Harrington*  
APPROVED DATE  
SIGNATURE

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

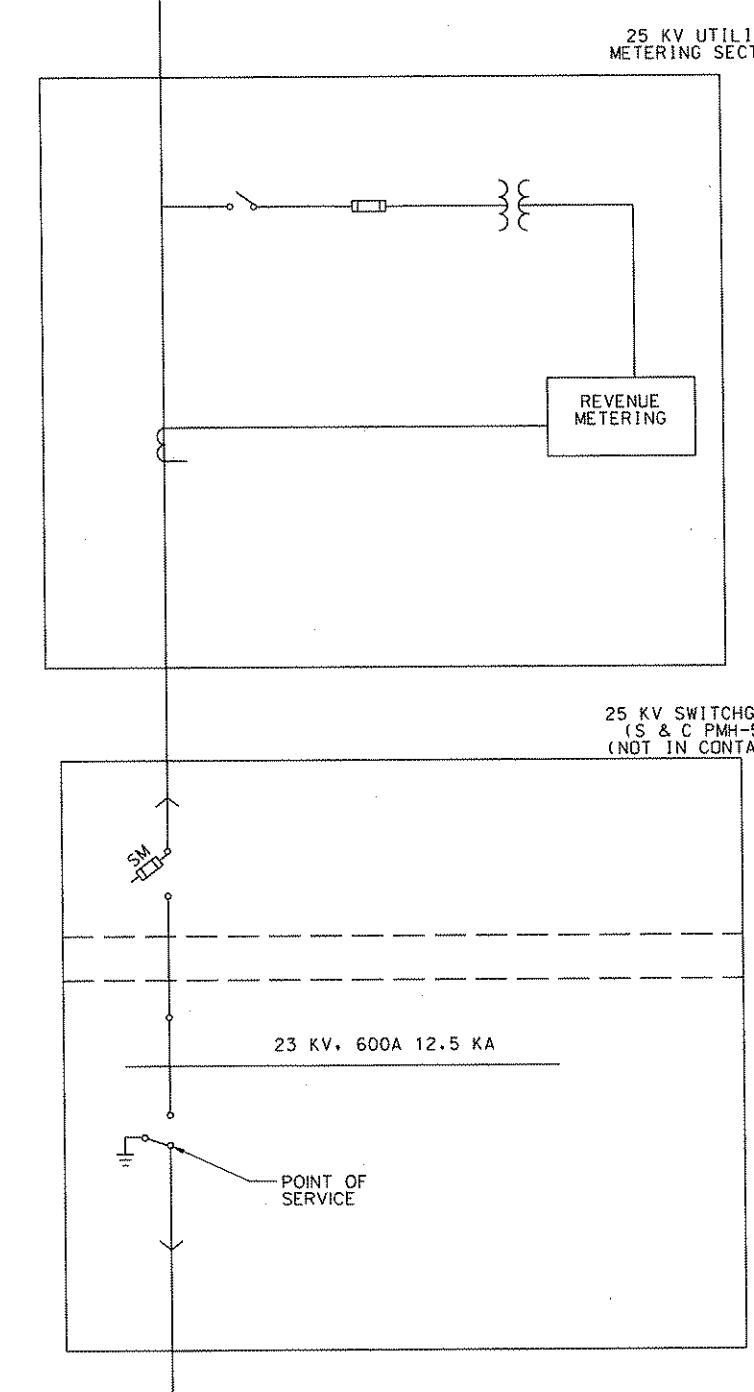
**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH, PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
SECTIONALIZING DIAGRAM  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP006 SHT. 272

CIRCUIT 22037 (BI - MANCHESTER)

 $I_{sc} = 15.5 \text{ KA}$ 

CONTINUED ON DWG. TP008

CIRCUIT 22046 (BI - IRWIN \*2)

 $I_{sc} = 15.5 \text{ KA}$ 

CONTINUED ON DWG. TP008

## NOTES:

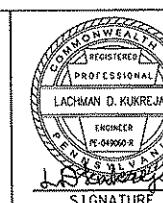
1. DLC SHALL FURNISH & INSTALL S & C PMH-5 SWITCHGEAR.
2. METERING SECTION SHALL BE PROVIDED BY PAAC CONTRACTOR.

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NO.	DATE	DESCRIPTION	REVISIONS

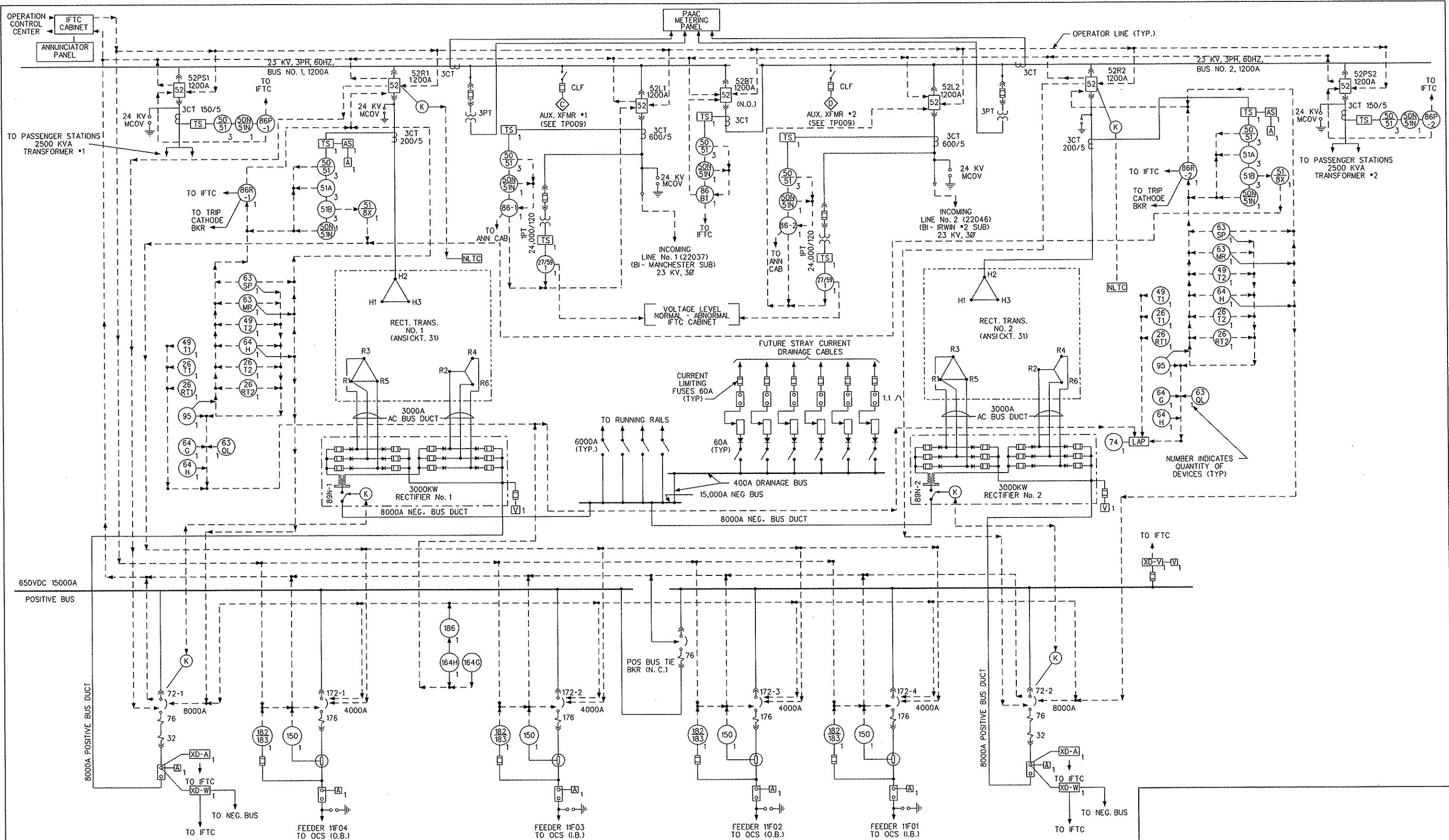
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FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*David P. Harr*  
APPROVED DATE  
SIGNATURE

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

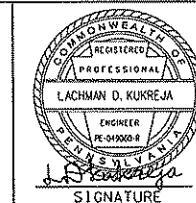
**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
23 KV DLC INCOMING SERVICE  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP007 SRT. 273



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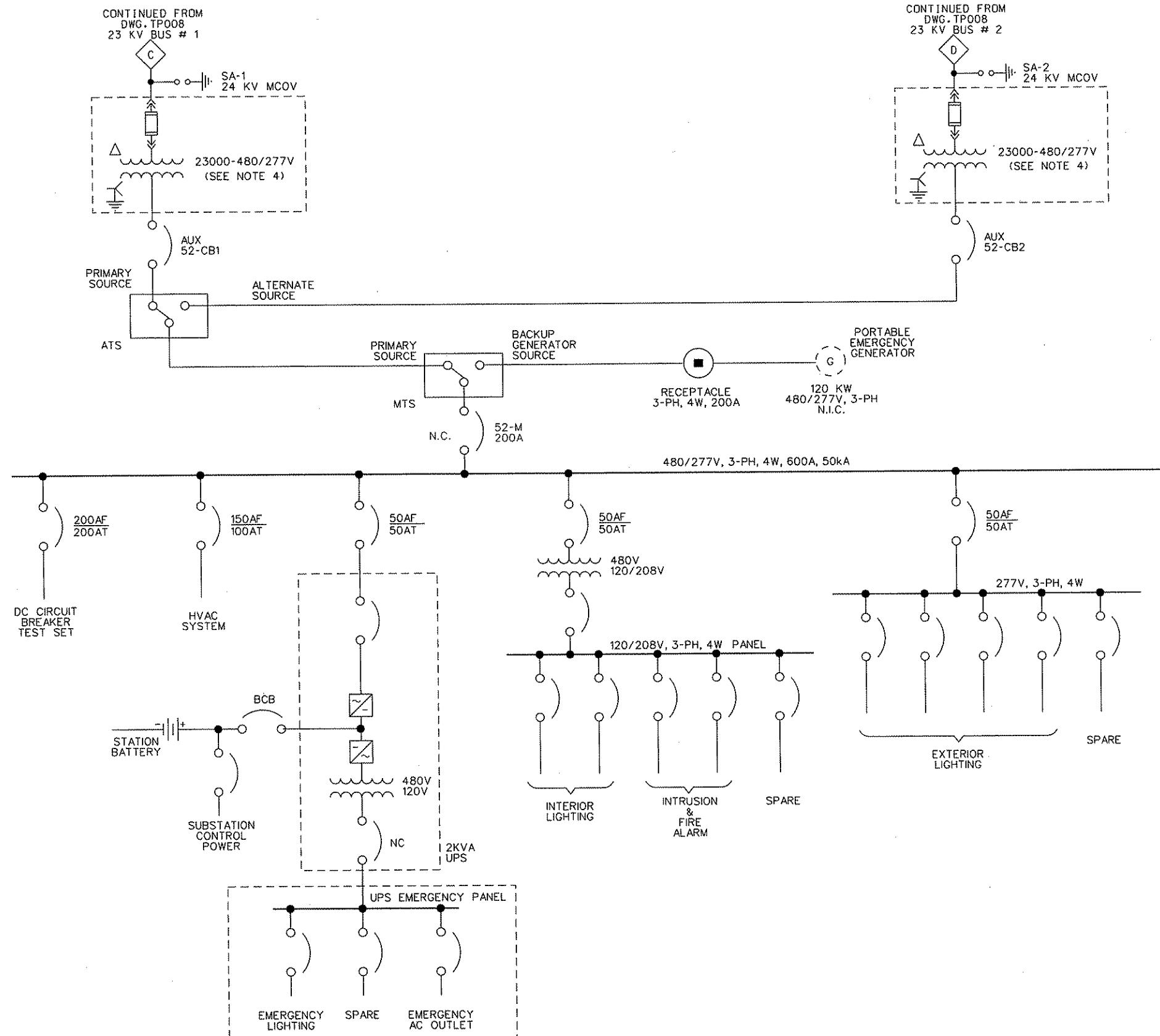


DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]*  
APPROVED DATE  
LACHMAN D. KUREJA  
ENGINEER PE-01900-R  
SIGNATURE  
APPROVED DATE  
D. Lachman  
APPROVED DATE  
J. [Signature]  
APPROVED DATE

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSTON, PENNSYLVANIA

NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
SINGLE LINE DIAGRAM

Port Authority	CONTRACT NO. NSC-609
	DWG. NO. TP008
SHT 274	



### NOTES:

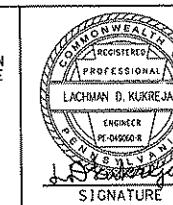
1. THE CONTRACTOR WILL PROVIDE RECEPTACLE IN SUBSTATION ENCLOSURE TO PLUG IN AN EMERGENCY GENERATOR.
2. EMERGENCY GENERATOR IS NOT IN CONTRACT (N.I.C.).
3. CONTRACTOR SHALL PROVIDE ALL BRANCH CIRCUITS, INCLUDING BREAKERS.
4. CONTRACTOR SHALL DEVELOP A DETAILED DESIGN FOR SUBMITTAL TO THE ENGINEER FOR APPROVAL, INCLUDING KVA RATINGS OF THE AUXILIARY POWER TRANSFORMERS.

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NO.	DATE	DESCRIPTION
REVISIONS		

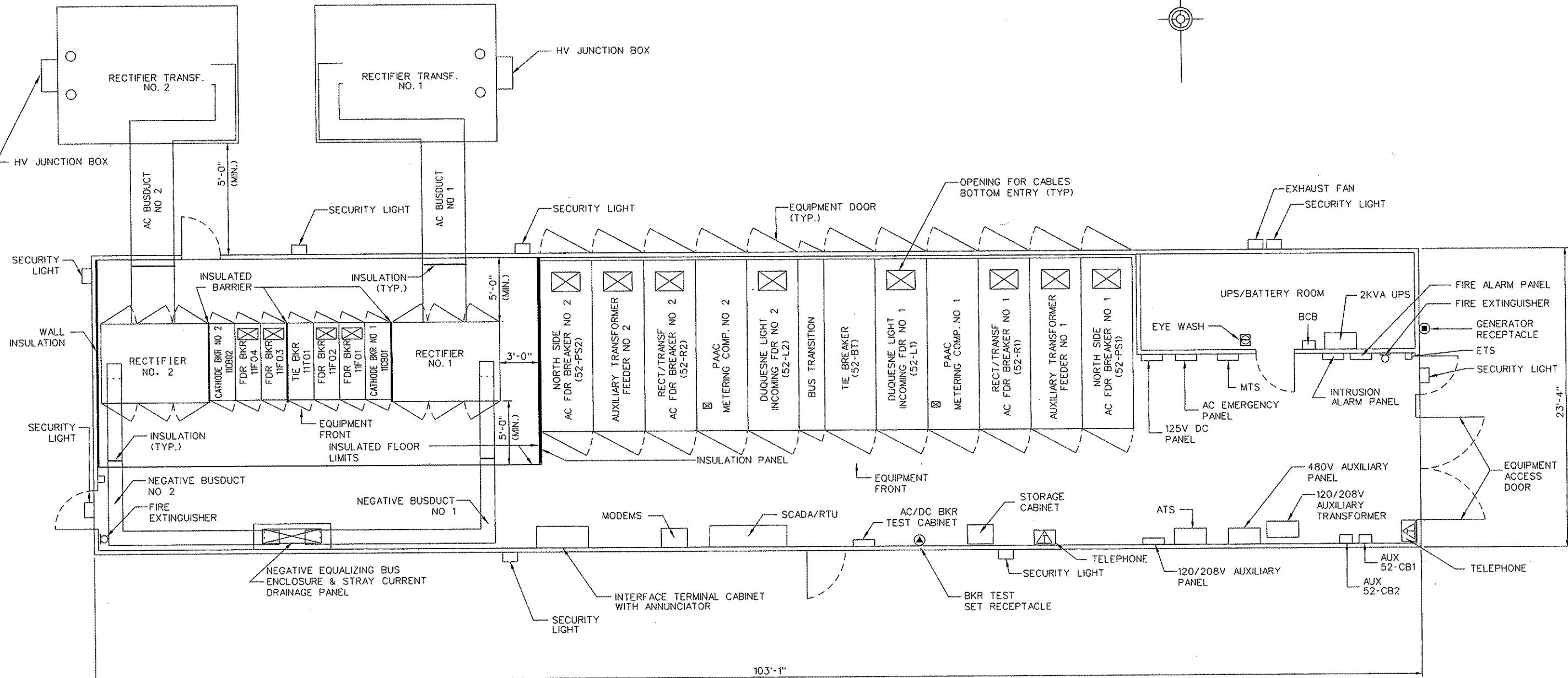
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**DMJM HARRIS | AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]*  
APPROVED DATE

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  
AUXILIARY POWER SINGLE LINE DIAGRAM  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP009 SHT. 275

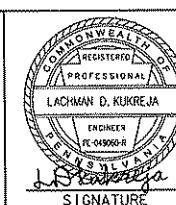


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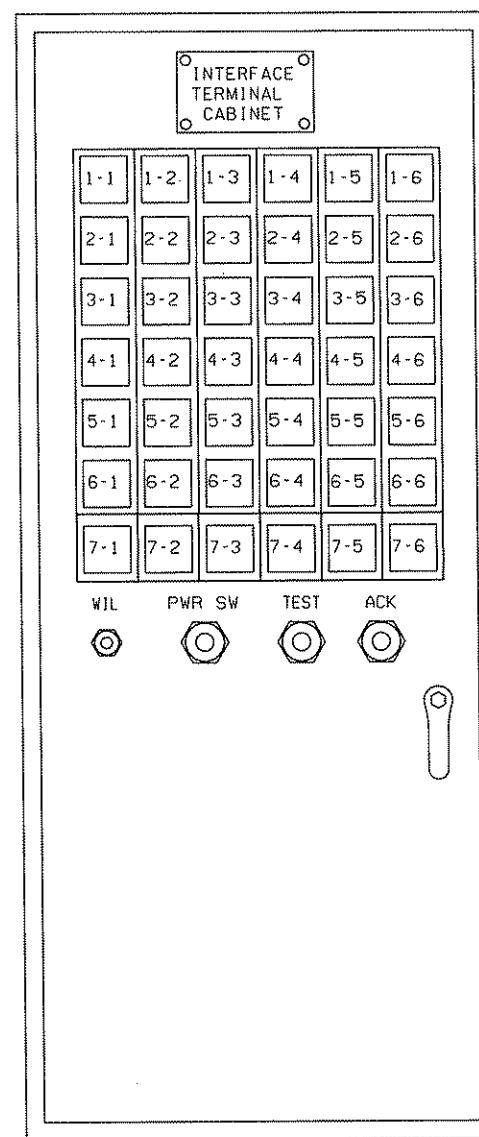


LACHMAN D. KUKREJA  
ENGINER  
PE-04906-R  
SIGNATURE

Daniel P. Hargay  
APPROVED

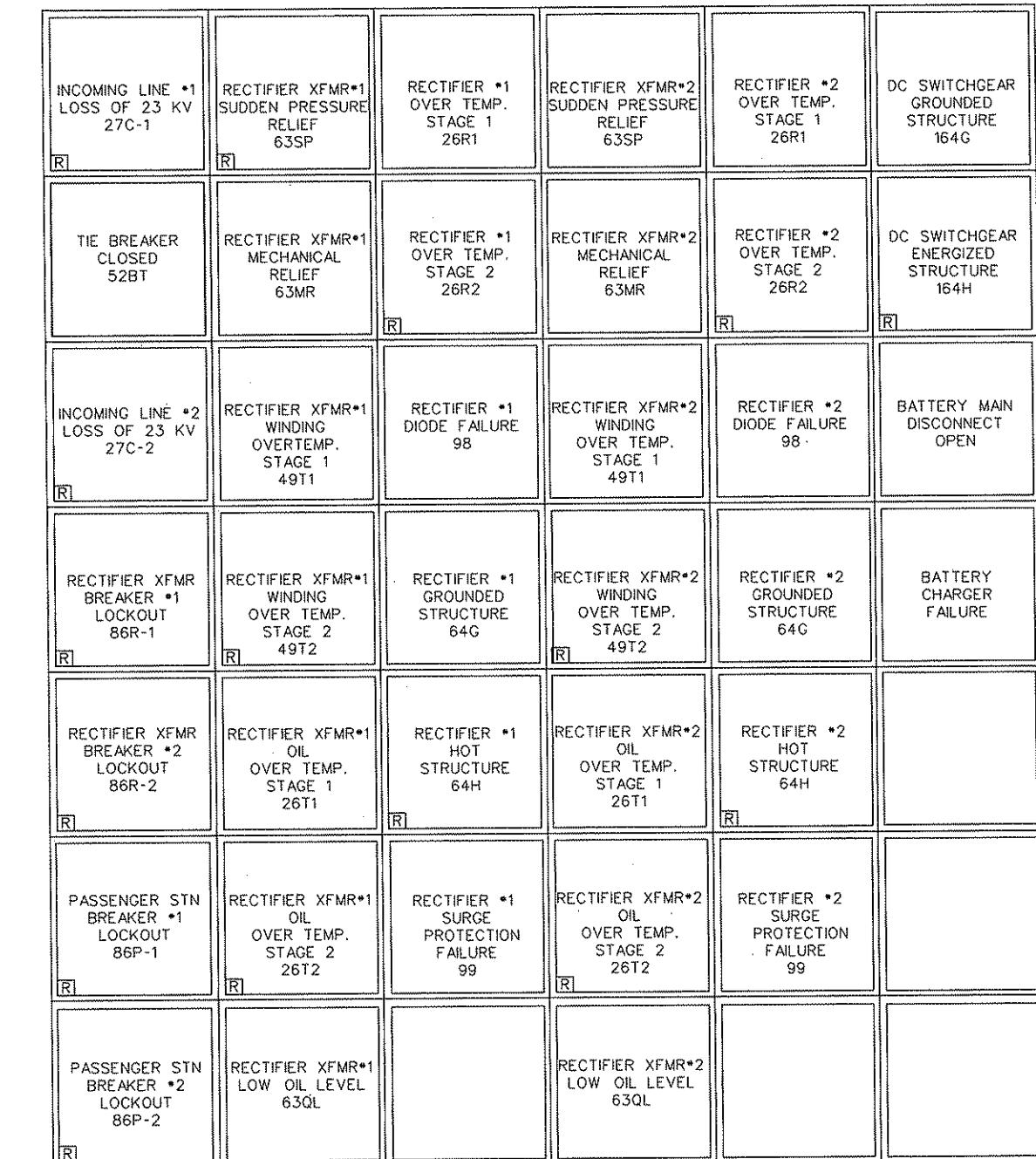
DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
DATE APRIL 28, 2008  
SCALE  $1/4'' = 1'-0''$

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH, PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
EQUIPMENT ARRANGEMENT PLAN  
**Port Authority**  
CONTRACT NO. NSC-009  
DWG. NO. TP010  
SHT. 276



INTERFACE TERMINAL CABINET  
WITH ANNUNCIATOR

FRONT VIEW



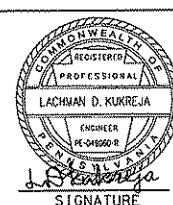
NOTES:

1. THE EQUIPMENT LAYOUT SHOWN IS SCHEMATIC, THE CONTRACTOR SHALL PROVIDE A DETAILED EQUIPMENT LAYOUT FOR APPROVAL IN ACCORDANCE WITH THE SPECIFICATIONS.
2. [R] - ALL TRIP FUNCTIONS SHALL BE PROVIDED WITH RED FILTER OR FILM LOCATED BEHIND THE WHITE NAMEPLATE TO SHOW A DISPLAY WITH RED BACKGROUND WHEN LAMP IN LIGHT BOX BEHIND NAMEPLATE ARE ILLUMINATED.

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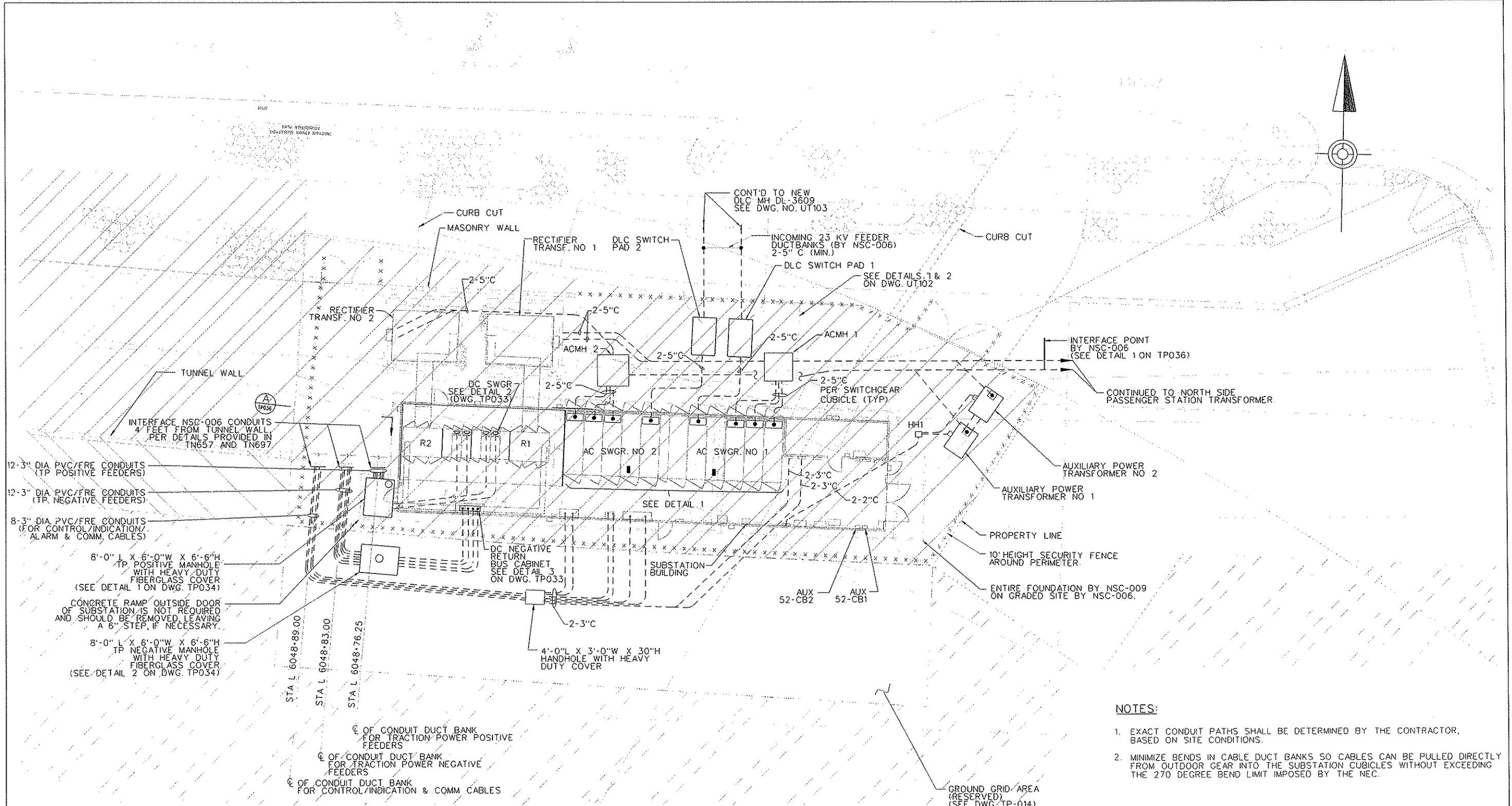
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**DMJM HARRIS | AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel P. Hawley*  
APPROVED DATE  
SIGNATURE

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
ANNUNCIATOR WINDOW ARRANGEMENT  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP012 SHT. 277



PLAN- SUBSTATION RACEWAY LAYOUT

0 10  
SCALE

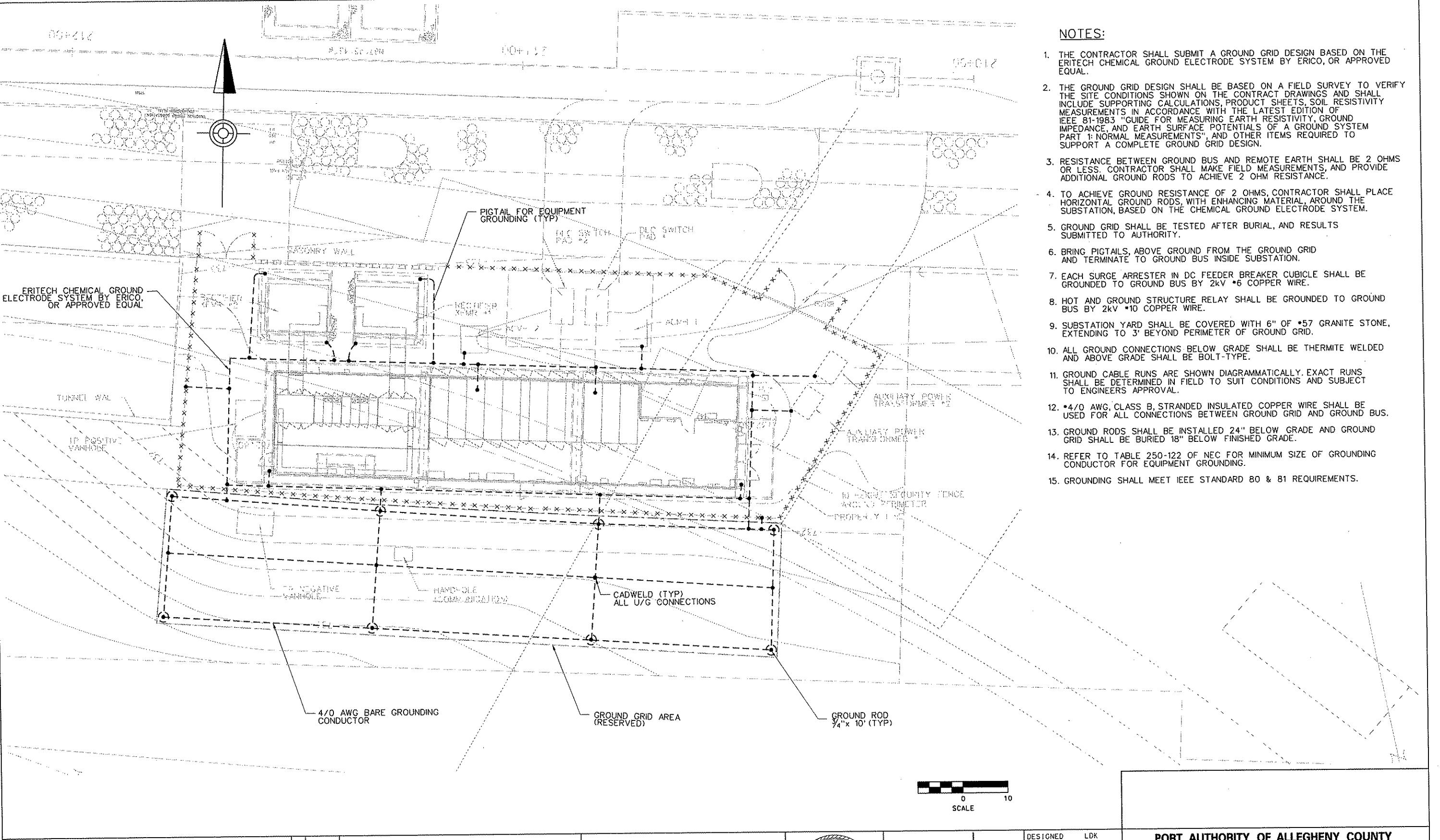
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*David J. Harris*  
APPROVED DATE  
SIGNATURE

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
SITE PLAN  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP013 SHT. 278



**NOTES:**

1. THE CONTRACTOR SHALL SUBMIT A GROUND GRID DESIGN BASED ON THE ERITECH CHEMICAL GROUND ELECTRODE SYSTEM BY ERICO, OR APPROVED EQUAL.
2. THE GROUND GRID DESIGN SHALL BE BASED ON A FIELD SURVEY TO VERIFY THE SITE CONDITIONS SHOWN ON THE CONTRACT DRAWINGS AND SHALL INCLUDE SUPPORTING CALCULATIONS, PRODUCT SHEETS, SOIL RESISTIVITY MEASUREMENTS IN ACCORDANCE WITH THE LATEST EDITION OF IEEE 81-1983 "GUIDE FOR MEASURING EARTH RESISTIVITY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM PART 1: NORMAL MEASUREMENTS", AND OTHER ITEMS REQUIRED TO SUPPORT A COMPLETE GROUND GRID DESIGN.
3. RESISTANCE BETWEEN GROUND BUS AND REMOTE EARTH SHALL BE 2 OHMS OR LESS. CONTRACTOR SHALL MAKE FIELD MEASUREMENTS, AND PROVIDE ADDITIONAL GROUND RODS TO ACHIEVE 2 OHM RESISTANCE.
4. TO ACHIEVE GROUND RESISTANCE OF 2 OHMS, CONTRACTOR SHALL PLACE HORIZONTAL GROUND RODS, WITH ENHANCING MATERIAL, AROUND THE SUBSTATION, BASED ON THE CHEMICAL GROUND ELECTRODE SYSTEM.
5. GROUND GRID SHALL BE TESTED AFTER BURIAL, AND RESULTS SUBMITTED TO AUTHORITY.
6. BRING PIGTAILS, ABOVE GROUND FROM THE GROUND GRID AND TERMINATE TO GROUND BUS INSIDE SUBSTATION.
7. EACH SURGE ARRESTER IN DC FEEDER BREAKER CUBICLE SHALL BE GROUNDED TO GROUND BUS BY 2KV \*6 COPPER WIRE.
8. HOT AND GROUND STRUCTURE RELAY SHALL BE GROUNDED TO GROUND BUS BY 2KV \*10 COPPER WIRE.
9. SUBSTATION YARD SHALL BE COVERED WITH 6" OF \*57 GRANITE STONE, EXTENDING TO 3' BEYOND PERIMETER OF GROUND GRID.
10. ALL GROUND CONNECTIONS BELOW GRADE SHALL BE THERMITE WELDED AND ABOVE GRADE SHALL BE BOLT-TYPE.
11. GROUND CABLE RUNS ARE SHOWN DIAGRAMMATICALLY. EXACT RUNS SHALL BE DETERMINED IN FIELD TO SUIT CONDITIONS AND SUBJECT TO ENGINEERS APPROVAL.
12. •4/0 AWG, CLASS B, STRANDED INSULATED COPPER WIRE SHALL BE USED FOR ALL CONNECTIONS BETWEEN GROUND GRID AND GROUND BUS.
13. GROUND RODS SHALL BE INSTALLED 24" BELOW GRADE AND GROUND GRID SHALL BE BURIED 18" BELOW FINISHED GRADE.
14. REFER TO TABLE 250-122 OF NEC FOR MINIMUM SIZE OF GROUNDING CONDUCTOR FOR EQUIPMENT GROUNDS.
15. GROUNDS SHALL MEET IEEE STANDARD 80 & 81 REQUIREMENTS.

PB AMERICAS, INC.		
Two Gateway Center, 18th Fl., Newark, N.J. 07102		
NO. DATE	DESCRIPTION	
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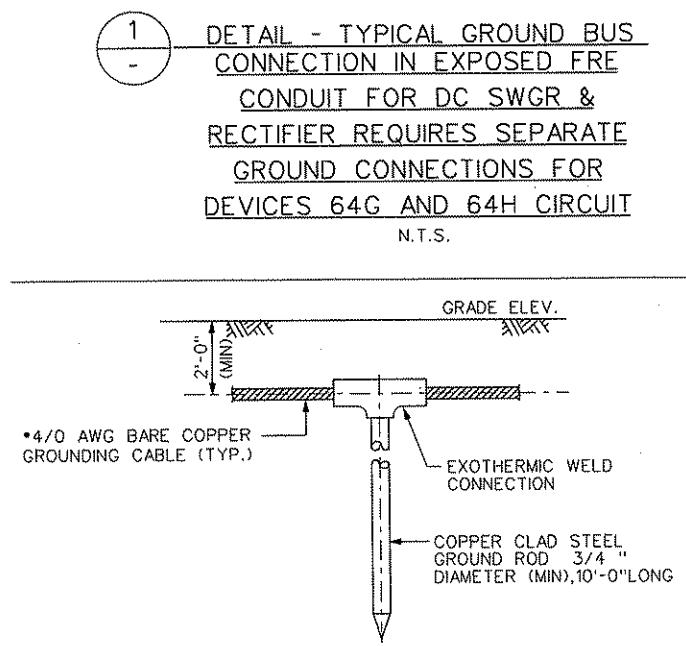
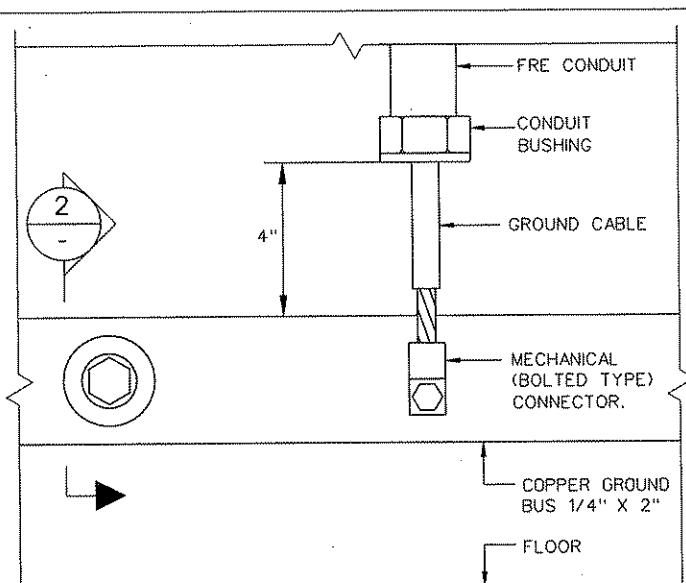
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20TH FLOOR  
PITTSBURGH, PA. 15222  
*Dave P. Hawley*  
APPROVED DATE  
LACHMAN D. KUREJA  
ENGINEER  
PE-04860-D  
SIGNATURE

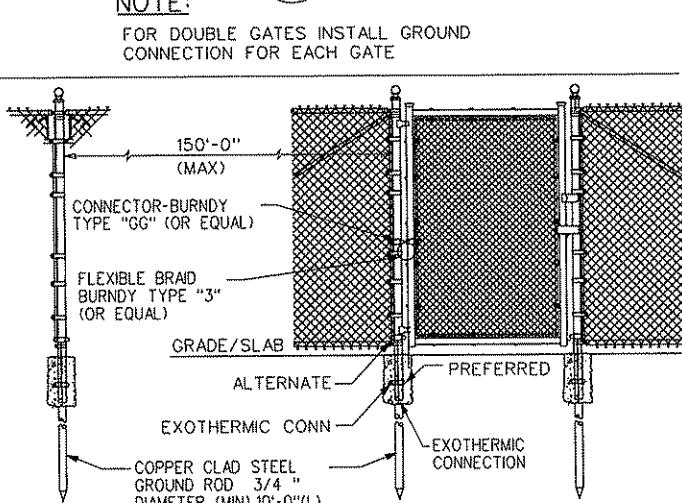
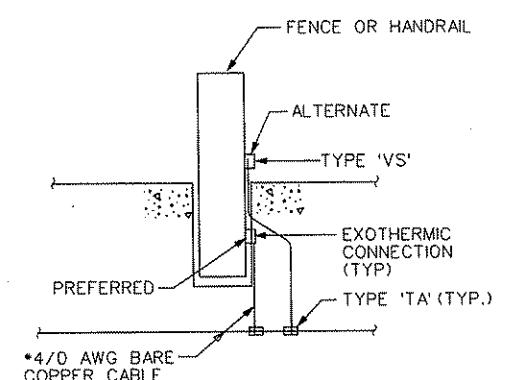
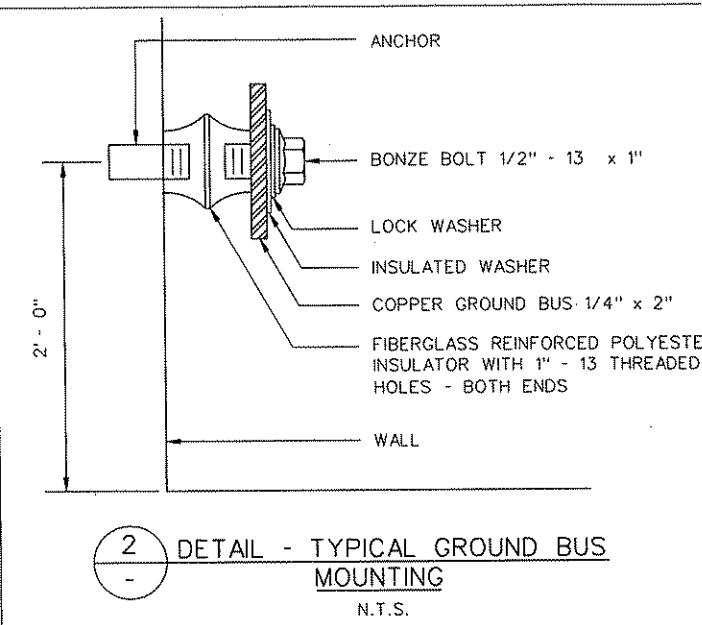
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SCALE

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
GROUNDING PLAN  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP014 SHT. 279

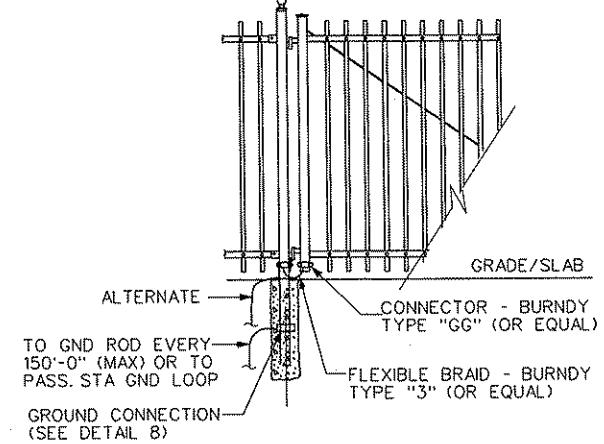


**TYPICAL CONNECTION OF GROUND COPPER CABLE TO GROUND ELECTRODE (ROD)**

**5** DETAIL  
SCALE: N.T.S.



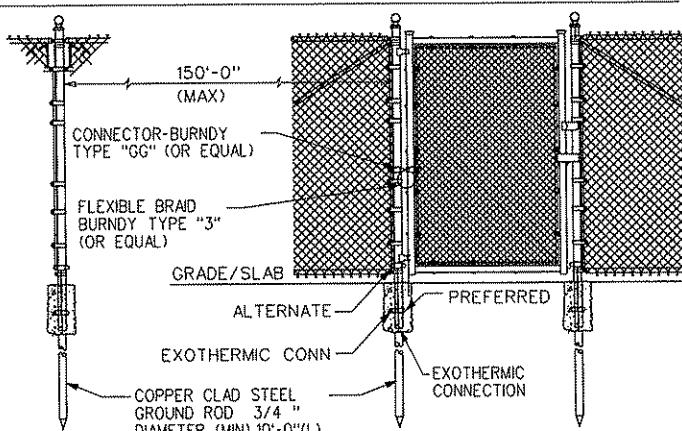
**TYPICAL FENCE AND GATE GROUNDING**



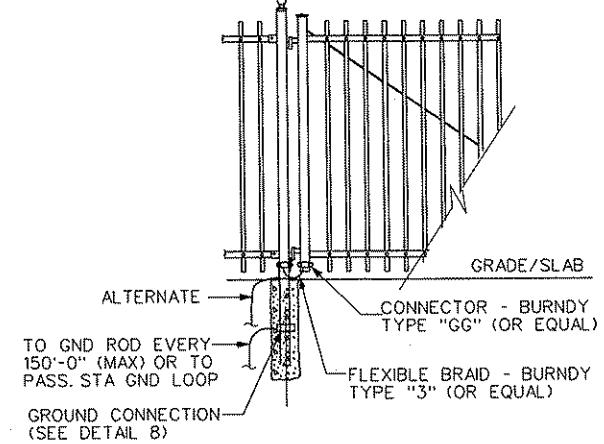
**TYPICAL FENCE GROUNDING**

**7** DETAIL  
SCALE: N.T.S.

**8** DETAIL  
SCALE: N.T.S.



**TYPICAL FENCE AND GATE GROUNDING**



**TYPICAL FENCE GROUNDING**

**9** DETAIL  
SCALE: N.T.S.

**10** DETAIL  
SCALE: N.T.S.

**11** DETAIL  
SCALE: N.T.S.

**12** DETAIL  
SCALE: N.T.S.

**13** DETAIL  
SCALE: N.T.S.

**14** DETAIL  
SCALE: N.T.S.

**15** DETAIL  
SCALE: N.T.S.

**16** DETAIL  
SCALE: N.T.S.

**17** DETAIL  
SCALE: N.T.S.

**18** DETAIL  
SCALE: N.T.S.

**19** DETAIL  
SCALE: N.T.S.

**20** DETAIL  
SCALE: N.T.S.

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**DMJM HARRIS AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]*  
APPROVED DATE  
LACHMAN D. KUREJA  
ENGINEER  
PE-09000-B  
SIGNATURE

DESIGNED LDK -  
DRAWN SB -  
CHECKED JSJ -  
IN CHARGE DPH -  
DATE APRIL 28, 2008  
SCALE NTS  
APPROVED DATE  
NITTS  
APPROVED DATE  
LACHMAN D. KUREJA  
ENGINEER  
PE-09000-B  
SIGNATURE

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
GROUNDING DETAILS  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP015 SHT. 280

**PB AMERICAS, INC.**

Two Gateway Center, 18th Fl.,  
Newark, NJ. 07102

NO.	DATE	DESCRIPTION
REVISIONS		

## NORTH SHORE TPSS

CONDUIT ID	DWG NO.	FROM	TO	FUNCTION	CONDUIT			CABLE	REMARKS
					SIZE	TYPE	LENGTH		
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 XFMER 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 XFMER FEEDER #1	AUX TRANSFORMER #1	AUX SERVICE FOR TPS SUBSTATION	4"	PVC		SPARE	
PSF-111		27 KV SWITCHGEAR AUX XFMER 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 XFMER 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		3-1/C #1/0 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		3-1/C #1/0 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	

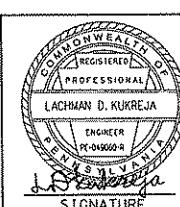
## NOTES:

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	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.



LACHMAN D. KUKREJA  
ENGINEER  
P.E. #09009-2  
*[Signature]*  
APPROVED  
DATE  
NTS

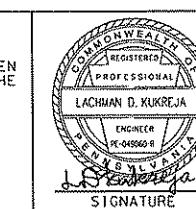
DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]*  
APPROVED  
DATE  
NTS

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. TP016 Sht. 281

NORTH SHORE TPSS

PB AMERICAS, INC.

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



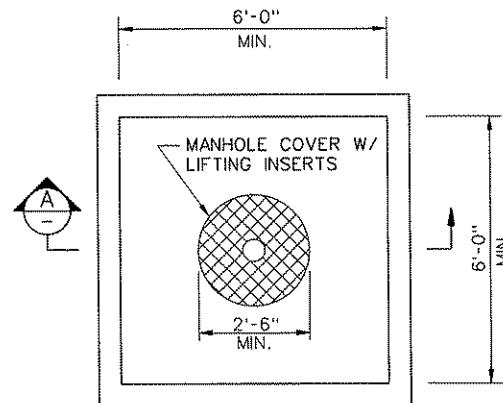
**DMJM HARRIS** | AECON  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
  
*Daniel P. Harrington*  
APPROVED \_\_\_\_\_ DATE \_\_\_\_\_

DESIGNED	
DRAWN	
CHECKED	
IN CHARGE	
DATE APRIL 28	
SCALE	

**PORT AUTHORITY OF ALLEGHENY COUNTY**

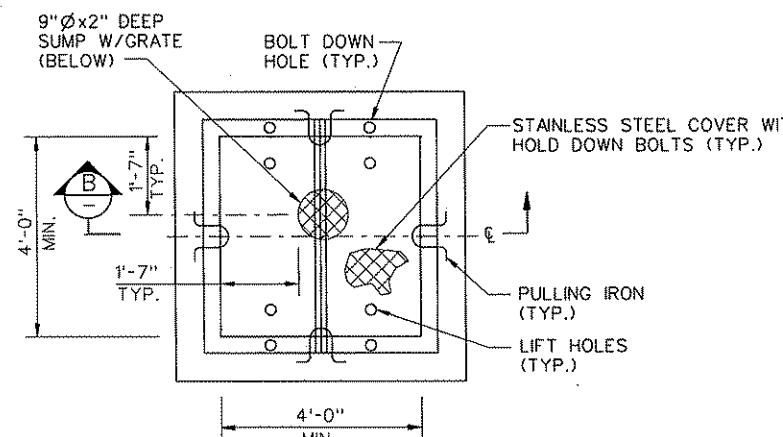
PITTSBURGH  
PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
CONDUIT & CABLE SCHEDULE - SHEET 2

**Port Authority** connecting people to life  
CONTRACT NO. NSC-009  
DWG. NO. TP017 SHT. 282



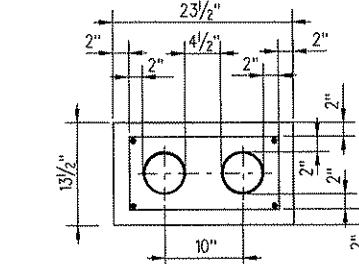
**TYPE "C" AND "C-1"**  
**PRECAST MANHOLE**

SEE NOTES 1 & 2

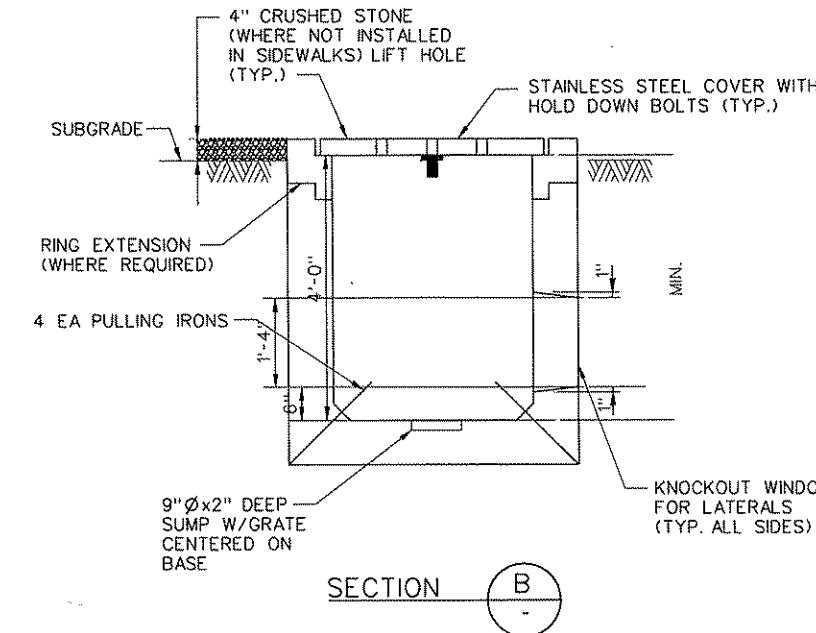
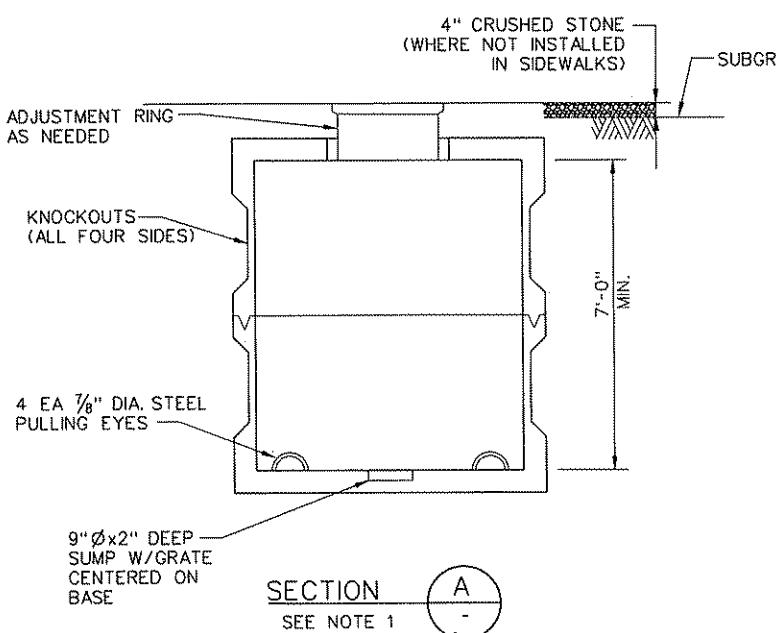


**TYPE "D" AND "D-1"**  
**PRECAST MANHOLE**

SEE NOTES 1 & 2



**TYPICAL 2-WAY DUCT BANK SECTION DETAILS**



**NOTES:**

1. TYPE "C" MANHOLE AND TYPE "D" HANDHOLE LOADING CRITERIA IS HS-20 (20,000 LBS. AXLE LOAD).
2. TYPE "C-1" MANHOLE AND TYPE "D-1" HANDHOLE LOADING CRITERIA IS E-50 (50,000 LBS. AXLE LOAD).
3. MANHOLES AND HANDHOLES INSTALLED CLOSER THAN 8'-0" TO CENTER LINE OF TRACK SHALL BE TYPE "C-1". OTHERWISE, USE TYPE "C" MANHOLES OR TYPE "D" HANDHOLES.
4. WHERE DUCTBANKS ARE INSTALLED UNDER THE TRACK, THE MINIMUM COVER SHALL BE 5'-0" FROM THE BOTTOM OF THE TIE TO THE TOP OF THE CONCRETE.
5. OTHER DUCTBANK CONFIGURATIONS NOT SHOWN SHALL BE BUILT SIMILAR TO THOSE SHOWN IN TERMS OF ALL REQUIRED CLEARANCES, SPACING AND COVER.
6. ALL CONDUITS IN ENCASED DUCTBANKS TO BE SCHEDULE 40 PVC.
7. REINFORCEMENT STEEL SHALL BE DEFORMED BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. ALL HOOKS SHALL BE STANDARD HOOKS, UNLESS OTHERWISE NOTED.
8. THE CONTRACTOR SHALL SUBMIT DETAILS FOR OTHER DUCT BANK CONFIGURATIONS, REQUIRED FOR CONSTRUCTION.

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

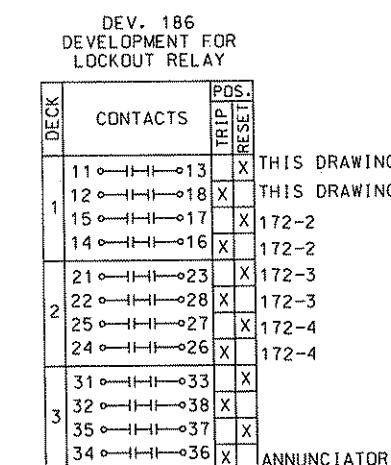
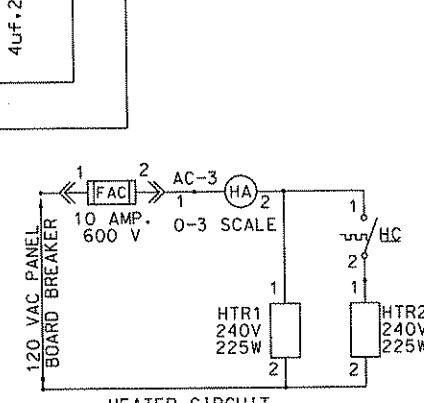
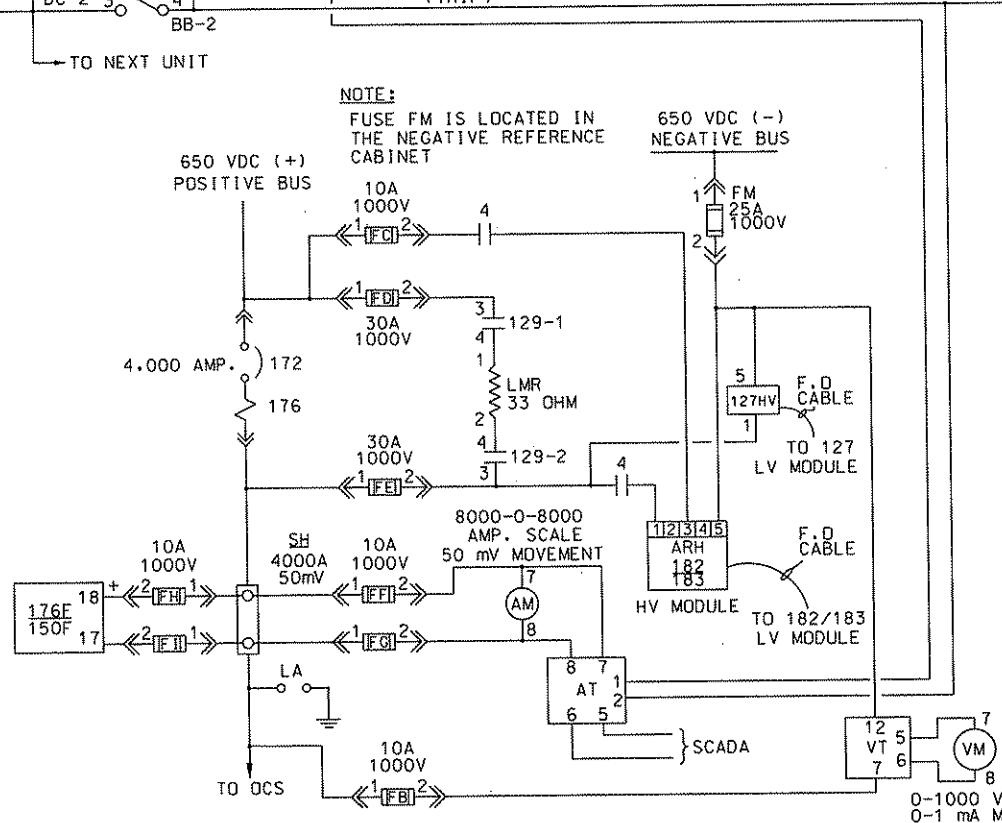
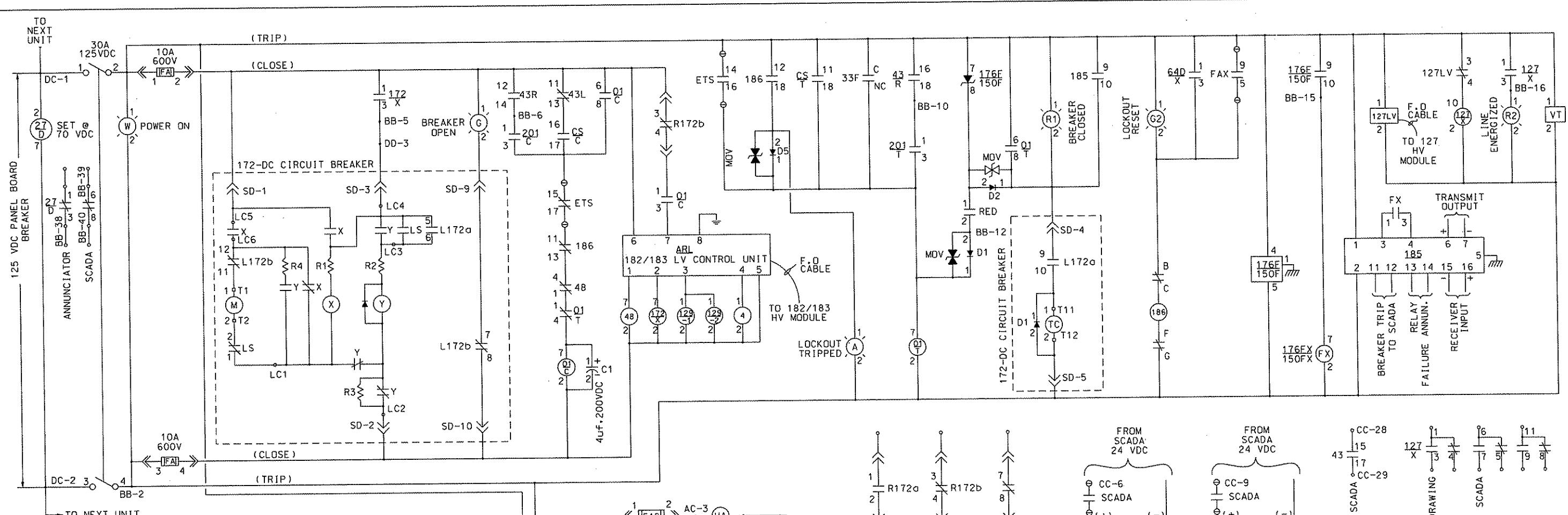
NO.	DATE	DESCRIPTION
REVISIONS		

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**DMJM HARRIS | AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel P. Hagan*  
APPROVED DATE

<b>PORT AUTHORITY OF ALLEGHENY COUNTY</b> PITTSBURGH PENNSYLVANIA	<b>NORTH SHORE CONNECTOR</b> <b>NSC TRAIN SYSTEM (SYSTEM WIDE)</b> <b>NS SUBSTATION</b> <b>DUCT BANK SECTIONS</b>
<b>Port Authority</b>	CONTRACT NO. NSC-009 DWG. NO. TP018 SHT. 283



DECK	CONTACTS	POS.
1	11 -> I-I-I -> 13 12 -> I-I-I -> 18 15 -> I-I-I -> 17 14 -> I-I-I -> 16	X X X X
2	21 -> I-I-I -> 23 22 -> I-I-I -> 28 25 -> I-I-I -> 27 24 -> I-I-I -> 26	X X X X
3	31 -> I-I-I -> 33 32 -> I-I-I -> 38 35 -> I-I-I -> 37 34 -> I-I-I -> 36	X X X X

01T - AUX. TRIP RELAY  
4 - VOLTAGE MEASURING RELAY  
48 - TIME DELAY RELAY (INCOMPLETE SEQUENCE)  
182 - DEAD LOAD PICK-UP RELAY  
183 - TRANSFER RELAY  
129 - LOAD MEASURING CONTACTOR

- NOTES:**
1. BREAKER SHOWN IN THE CONNECTED AND OPEN POSITION.
  2. 33F CONTACTS SHOWN WITH DOORS OPEN.
  3. 43 SWITCH SHOWN IN LOCAL POSITION.
  4. THIS CIRCUIT BREAKER CONTROL SCHEMATIC IS TYPICAL, AND CAN ALSO BE FOUND ELSEWHERE WITHIN DRAWING PACKAGE.

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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
LACHMAN D. KUREJA  
ENGINEER  
PE-04560-B  
*[Signature]*  
APPROVED DATE

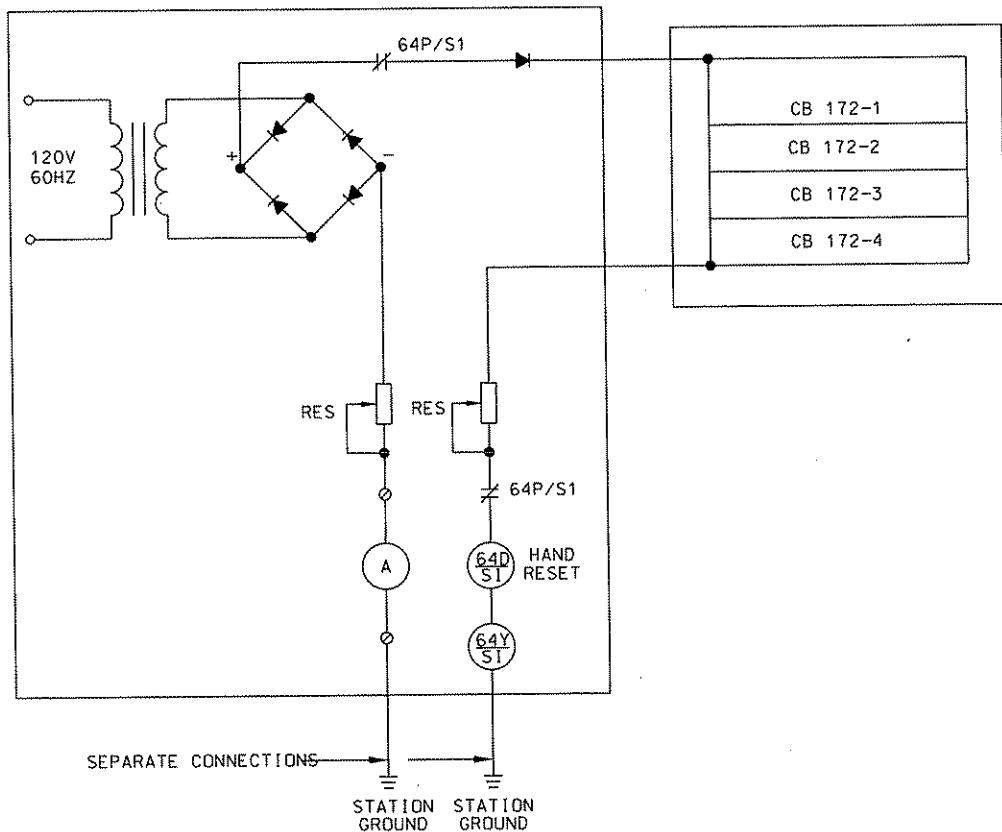
PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSTBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
TYPICAL CIRCUIT BREAKER CONTROL SCHEMATIC  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP019 SHT. 284

PB AMERICAS, INC.

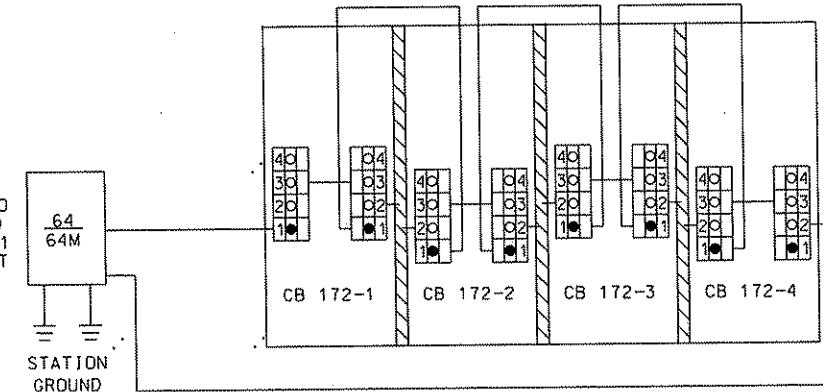
Two Gateway Center, 18th Fl., Newark, N.J. 07102

NO.	DATE	DESCRIPTION	REVISIONS

64 RELAY CAN  
BE POWERED BY  
120VAC AS SHOWN  
OR 125VDC AS SHOWN  
ON DWG# TP103



64 RELAY TO  
BE MOUNTED  
IN CB 172-1  
COMPARTMENT



### NORTH SHORE TRACTION POWER SUBSTATION

#### NOTES:

1. MANUFACTURER TO INCLUDE LEGEND FOR ALL FUNCTIONS AND DEVICES SHOWN ON THIS DRAWING ON ALL SHOP DRAWING SUBMITTALS.
2. ALL RGS CONDUITS ENTERING THE DC SWITCHGEAR SHALL HAVE FIRE NIPPLES TO ISOLATE ENCLOSURES.
3. ALL CONTROL WIRING ENTERING OR LEAVING THE DC SWITCHGEAR SHALL BE 1000V INSULATED.
4. THIS DC HOT & GROUND STRUCTURE SCHEMATIC IS TYPICAL, AND CAN ALSO BE FOUND ELSEWHERE WITHIN DRAWING PACKAGE.

**PB AMERICAS, INC.**

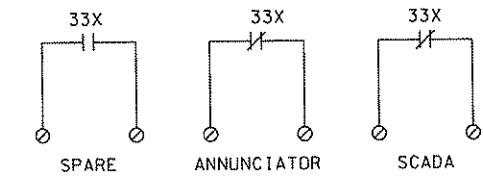
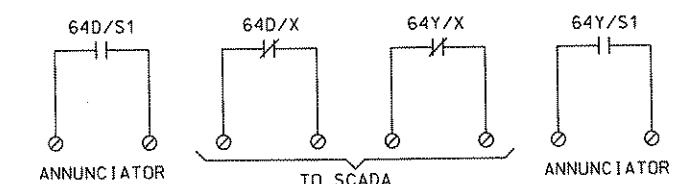
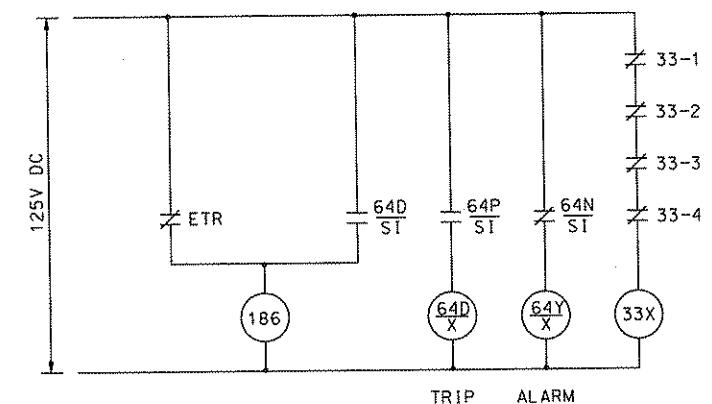
Two Gateway Center, 18th Fl.,  
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]*  
APPROVED DATE

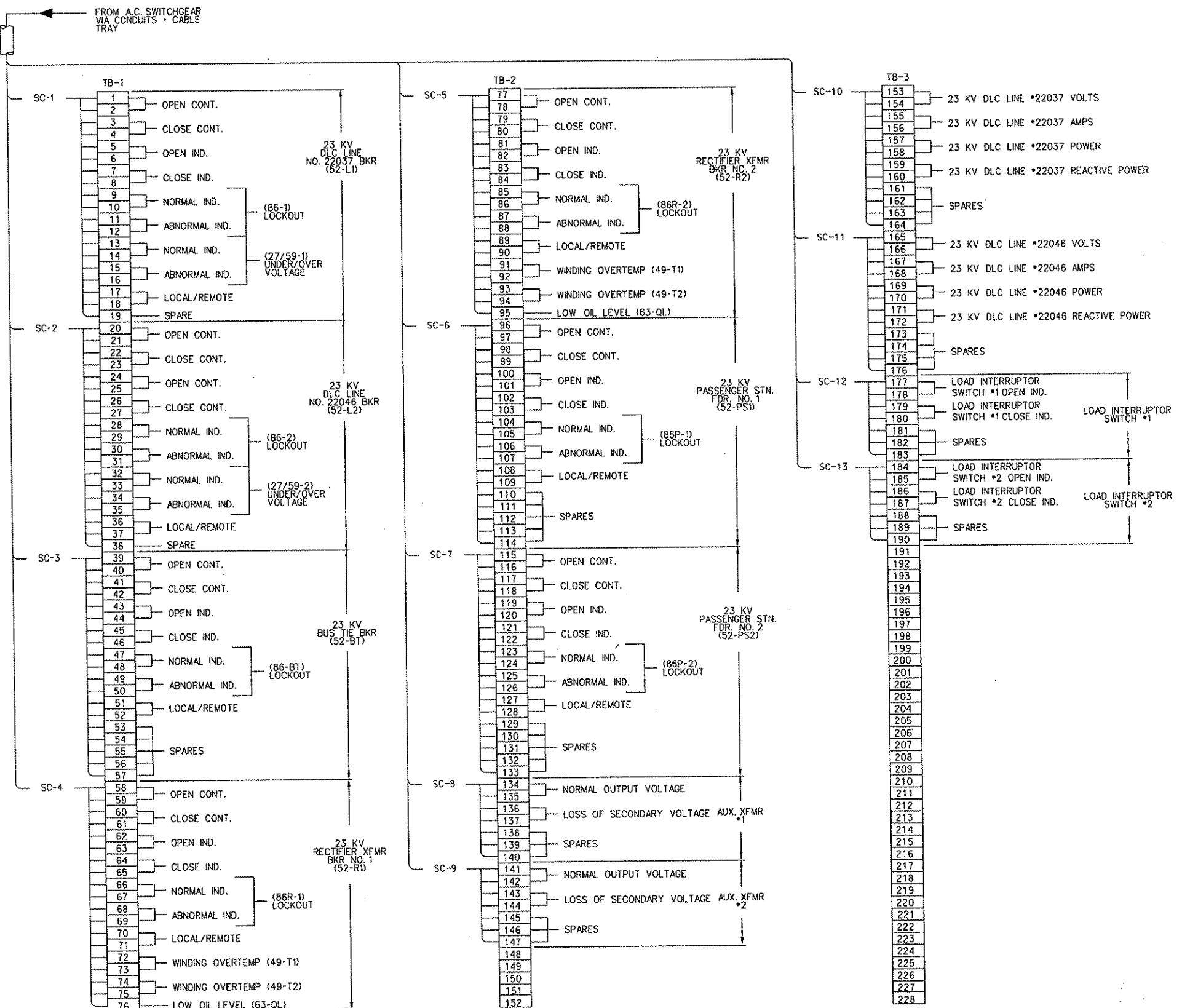


BACK DOOR INTERLOCKS

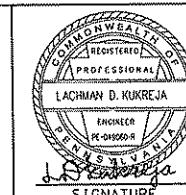
<b>PORT AUTHORITY OF ALLEGHENY COUNTY</b> PITTSBURGH	
NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM WIDE) NS SUBSTATION	
DC HOT & GROUND STRUCTURE SCHEMATIC	
<b>Port Authority</b>	CONTRACT NO. NSC-009
DWG. NO. TP020	SHT. 285

POINT DESCRIPTION			ACTUATING DEVICE	DEVICE No	SCADA					
					DISCRETE POINT			ANALOG POINT		
			CONTROL	INDICATION	ALARM	UNIT	LOW	HIGH		
		FIRE/SECURITY								
1	1	PANEL ARMED	FA/A PANEL				1			
2	2	PANEL TROUBLE	FA/A PANEL				1			
3	3	BUILDING FIRE	FA/A PANEL				1			
4	4	BUILDING INTRUSION	FA/A PANEL				1			
		VENTILATION								
5	1	HIGH TEMPERATURE	THERMOSTAT				1			
6	2	LOW TEMPERATURE	THERMOSTAT				1			
		125 VDC BATTERY SYSTEM								
7	1	BATTERY GROUND FAULT	BATTERY CHARGER				1			
8	2	BATTERY FAILURE	BATTERY CHARGER				1			
9	3	CHARGER TROUBLE	BATTERY CHARGER				1			
10	4	SUPPLY VOLTAGE LOSS	BATTERY CHARGER				1			
11	5	BATTERY VOLTAGE LOW	BATTERY CHARGER				1			
		23KV AC SWITCHGEAR								
12	1	23KV DLC MAIN BREAKER LINE •22037 - (52-L1) OPEN	52-L1		1	1				
13	2	23KV DLC MAIN BREAKER LINE •22037 - (52-L1) CLOSED	52-L1		1	1				
14	3	23KV DLC MAIN BREAKER LINE •22037 - LOCAL CONTROL	43-L1			1				
15	4	23KV DLC MAIN BREAKER LINE •22037 - LOCKOUT TRIP	86-L1			1				
16	5	23KV DLC LINE •22037 - ABNORMAL VOLTAGE	27/59-L1			1				
17	6	23KV DLC MAIN BREAKER LINE •22046 - (52-L2) OPEN	52-L2		1	1				
18	7	23KV DLC MAIN BREAKER LINE •22046 - (52-L2) CLOSED	52-L2		1	1				
19	8	23KV DLC MAIN BREAKER LINE •22046 - LOCAL CONTROL	43-L2			1				
20	9	23KV DLC MAIN BREAKER LINE •22046 - LOCKOUT TRIP	86-L2			1				
21	10	23KV DLC LINE •22046 - ABNORMAL VOLTAGE	27/59-L2			1				
22	11	23KV DLC TIE BREAKER (52-BT) OPEN	52-BT		1	1				
23	12	23KV DLC TIE BREAKER (52-BT) CLOSED	52-BT		1	1				
24	13	23KV DLC TIE BREAKER - LOCAL CONTROL	43-BT			1				
25	14	23KV DLC TIE BREAKER - LOCKOUT TRIP	86-BT			1				
26	15	23KV PASSENGER STN. FEEDER BREAKER •1 (52-PS1) OPEN	52-PS1		1	1				
27	16	23KV PASSENGER STN. FEEDER BREAKER •1 (52-PS1) CLOSED	52-PS1		1	1				
28	17	23KV PASSENGER STN. FEEDER BREAKER •1 - LOCAL CONTROL	43-PS1			1				
29	18	23KV PASSENGER STN. FEEDER BREAKER •1 - LOCKOUT TRIP	86-PS1			1				
30	19	23KV PASSENGER STN. FEEDER BREAKER •2 (52-PS2) OPEN	52-PS2		1	1				
31	20	23KV PASSENGER STN. FEEDER BREAKER •2 (52-PS2) CLOSED	52-PS2		1	1				
32	21	23KV PASSENGER STN. FEEDER BREAKER •2 - LOCAL CONTROL	43-PS2			1				
33	22	23KV PASSENGER STN. FEEDER BREAKER •2 - LOCKOUT TRIP	86-PS2			1				
34	23	23KV RECTIFIER TRANSFORMER BREAKER •1 (52-R1) OPEN	52-R1		1	1				
35	24	23KV RECTIFIER TRANSFORMER BREAKER •1 (52-R1) CLOSED	52-R1		1	1				
36	25	23KV RECTIFIER TRANSFORMER BREAKER •1 - LOCAL CONTROL	43-R1			1				
37	26	23KV RECTIFIER TRANSFORMER BREAKER •1 - LOCKOUT TRIP	86-R1			1				
38	27	23KV RECTIFIER TRANSFORMER •1 - HIGH TEMPERATURE	49-T1-R1			1				
39	28	23KV RECTIFIER TRANSFORMER •1 - OVERTEMPERATURE	48-T2-R1			1				
40	29	23KV RECTIFIER TRANSFORMER •1 - LOW OIL LEVEL	63-QL-R1			1				
41	30	23KV RECTIFIER TRANSFORMER BREAKER •2 (52-R2) OPEN	52-R2		1	1				
42	31	23KV RECTIFIER TRANSFORMER BREAKER •2 (52-R2) CLOSED	52-R2		1	1				
43	32	23KV RECTIFIER TRANSFORMER BREAKER •2 - LOCAL CONTROL	43-R2			1				
44	33	23KV RECTIFIER TRANSFORMER BREAKER •2 - LOCKOUT TRIP	86-R2			1				
45	34	23KV RECTIFIER TRANSFORMER •2 - HIGH TEMPERATURE	49-T1-R2			1				
46	35	23KV RECTIFIER TRANSFORMER •2 - OVERTEMPERATURE	49-T2-R2			1				
47	36	23KV RECTIFIER TRANSFORMER •2 - LOW OIL LEVEL	63-QL-R2			1				
48	37	23KV LOAD INTERRUPTOR SWITCH •1 OPEN	52-LIS			1				
49	38	23KV LOAD INTERRUPTOR SWITCH •1 CLOSED	52-PS1			1				
50	39	23KV LOAD INTERRUPTOR SWITCH •2 OPEN	52-LIS			1				
51	40	23KV LOAD INTERRUPTOR SWITCH •2 CLOSED	52-PS1			1				
52	41	23KV AUX. TRANSFORMER •1 - NORMAL OUTPUT VOLTAGE	AT1-NORM			1				
53	42	23KV AUX. TRANSFORMER •1 - LOSS OF VOLTAGE	AT1-LOSS			1				
54	43	23KV AUX. TRANSFORMER •2 - NORMAL OUTPUT VOLTAGE	AT2-NORM			1				
55	44	23KV AUX. TRANSFORMER •2 - LOSS OF VOLTAGE	AT2-LOSS			1				

POINT DESCRIPTION			ACTUATING DEVICE	DEVICE No	SCADA					
					DISCRETE POINT			ANALOG POINT		
			CONTROL	INDICATION	ALARM	UNIT	LOW	HIGH		
56	45	23KV DLC LINE •22037 - VOLTAGE							V-22037	
57	46	23KV DLC LINE •22037 - CURRENT							A-22037	
58	47	23KV DLC LINE •22037 - POWER							KW-22037	
59	48	23KV DLC LINE •22037 - REACTIVE POWER							KVAR-22037	
60	49	23KV DLC LINE •22046 - VOLTAGE							V-22046	
61	50	23KV DLC LINE •22046 - CURRENT							A-22046	
62	51	23KV DLC LINE •22046 - POWER							KW-22046	
63	52	23KV DLC LINE •22046 - REACTIVE POWER							KVAR-22046	
		DC POSITIVE SWITCHGEAR								
64	1	DC STRUCTURE GROUNDED							164-G	
65	2	DC STRUCTURE ENERGIZED							164-H	
66	3	DC STRUCTURE LOCKOUT TRIP							186	
67	4	DC SWITCHGEAR CATHODE BREAKER •1 (72-1) OPEN							72-1	1
68	5	DC SWITCHGEAR CATHODE BREAKER •1 (72-1) CLOSED							72-1	1
69	6	DC SWITCHGEAR CATHODE BREAKER •1 - LOCAL CONTROL							43-1	1
70	7	DC SWITCHGEAR CATHODE BREAKER •2 (72-2) OPEN							72-2	1
71	8	DC SWITCHGEAR CATHODE BREAKER •2 (72-2) CLOSED							72-2	1
72	9	DC SWITCHGEAR CATHODE BREAKER •2 - LOCAL CONTROL							43-2	1
73	10	DC SWITCHGEAR FEEDER BREAKER •1 (172-1) OPEN							172-1	1
74	11	DC SWITCHGEAR FEEDER BREAKER •1 (172-1) CLOSED							172-1	1
75	12	DC SWITCHGEAR FEEDER BREAKER •1 - LOCAL CONTROL							143-1	1
76	13	DC SWITCHGEAR FEEDER BREAKER •2 (172-2) OPEN							172-2	1
77	14	DC SWITCHGEAR FEEDER BREAKER •2 (172-2) CLOSED							172-2	1
78	15	DC SWITCHGEAR FEEDER BREAKER •2 - LOCAL CONTROL							143-2	1
79	16	DC SWITCHGEAR FEEDER BREAKER •3 (172-3) OPEN							172-3	1
80	17	DC SWITCHGEAR FEEDER BREAKER •3 (172-3) CLOSED								



**PB AMERICAS, INC.**



**DMJM HARRIS | AECOM**

Dave P. Henry  
APPROVED DATE

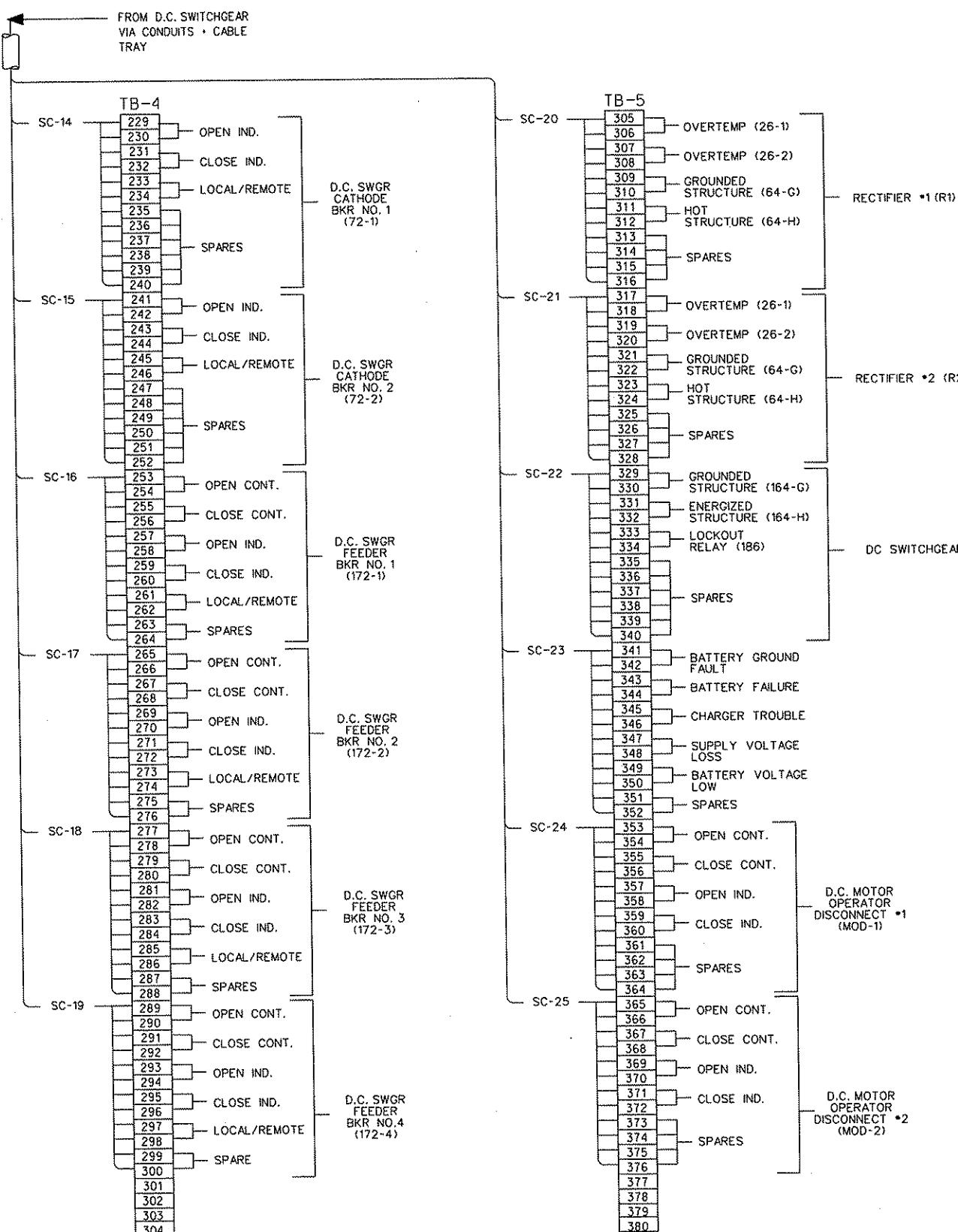
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DATE APRIL 28, 200  
SCALE NTS

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH, PENNSYLVANIA

**NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
SCADA INTERFACE CABINET WIRING DIAGRAM - SHE**

**Port** | **CONTRACT NO.** **NSC-0**

**Authority** connecting people to life DWG. NO. TP022 SHT. **287**

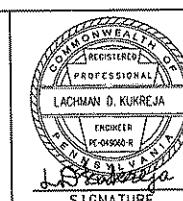


**NOTES:**

1. CONTRACTOR SHALL HARD-WIRE ALL POINTS TO INTERFACE CABINET IN SUBSTATION.
2. SUPERVISORY CONTROL (SC) SHALL BE #14 AWG.
3. NUMBER OF CONDUCTORS SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR.

NO.	DATE	DESCRIPTION	REVISIONS

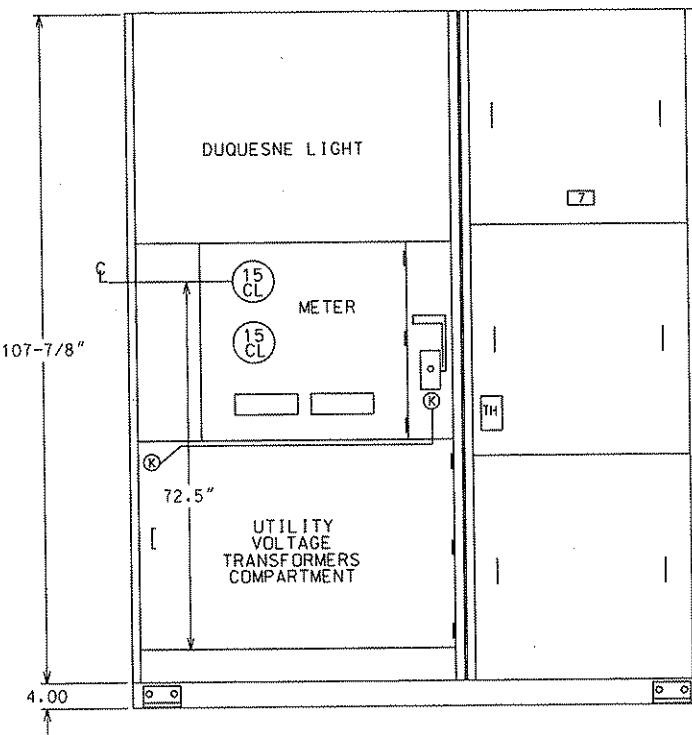
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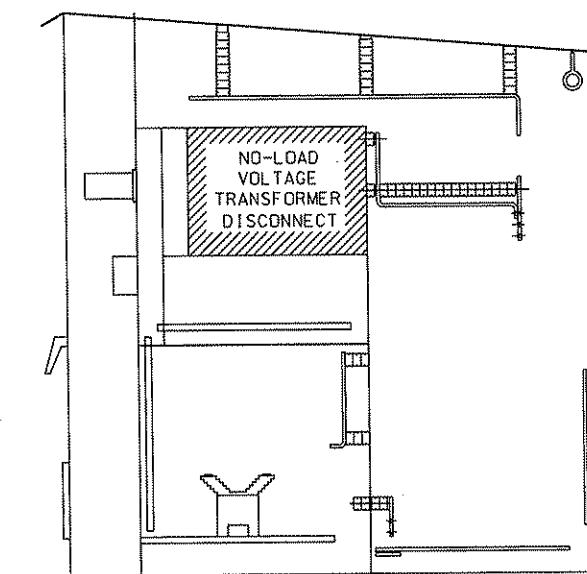
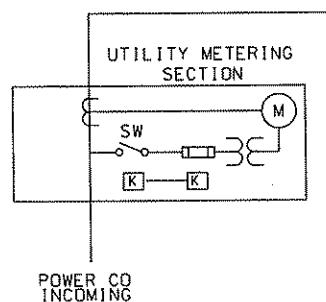
**DMJM HARRIS | AECOM**  
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20TH FLOOR  
PITTSBURGH, PA. 15222  
*D. P. Haney*  
APPROVED DATE  
SIGNATURE

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
SCADA INTERFACE CABINET WIRING DIAGRAM - SHEET 2  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP023 SHT. 288

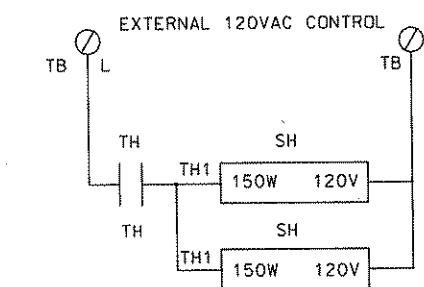
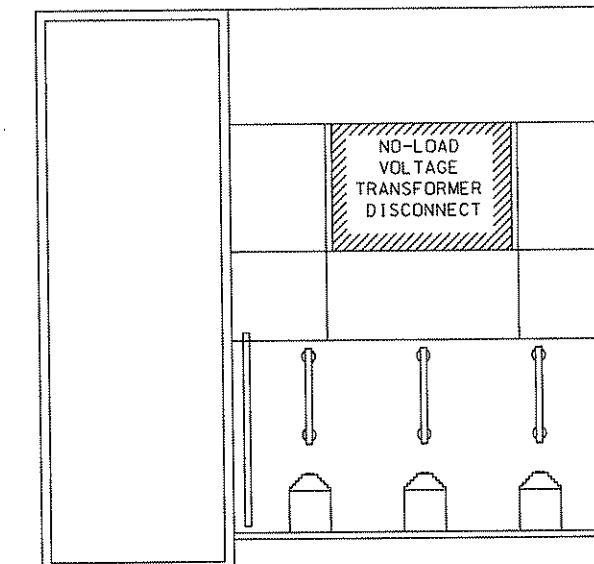
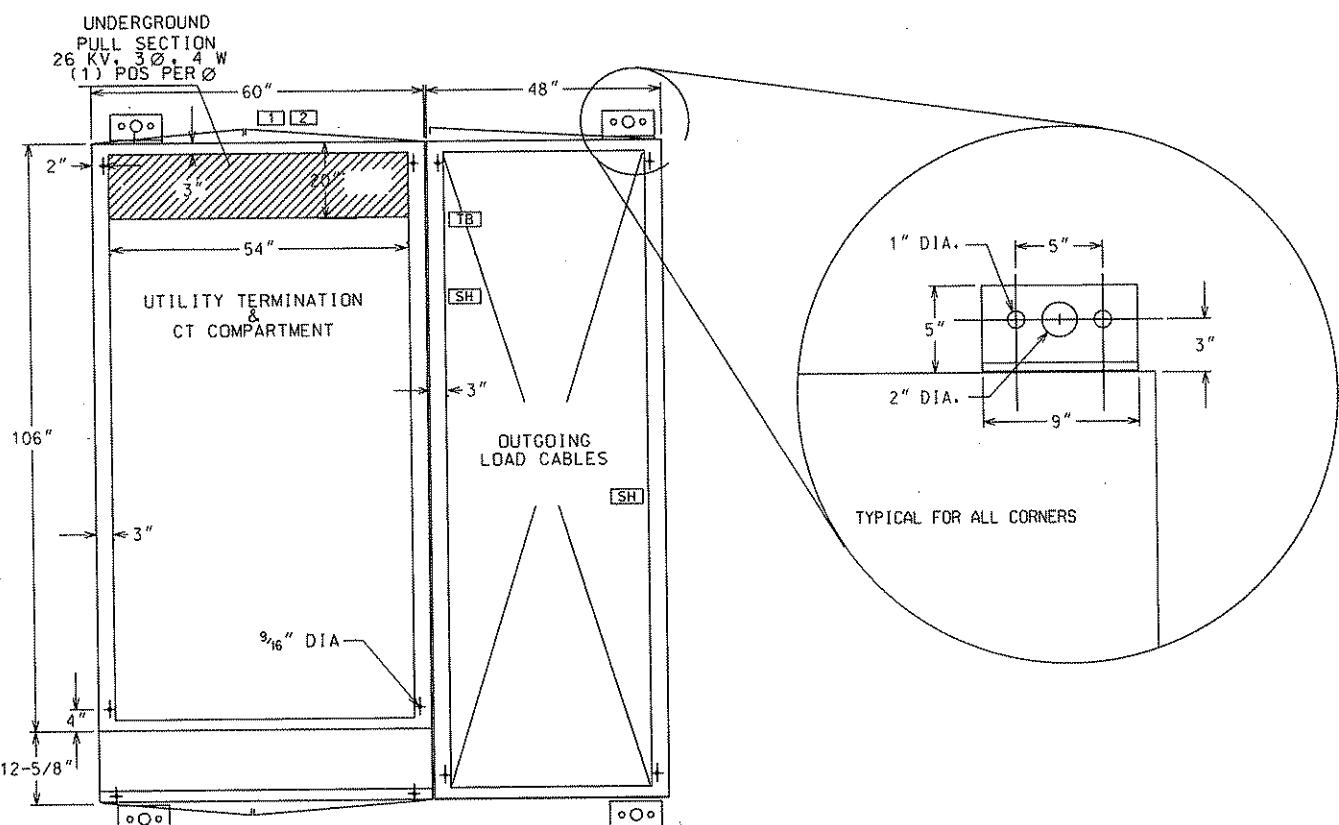


23KV, 3PH, 4W, 1200A, 40KASC



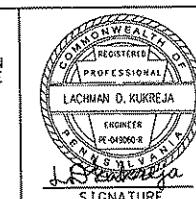
#### NOTES:

- CONSTRUCTION SHALL BE STEEL, 12 GAUGE, NEMA-3R OUTDOOR, WITH A FINISHCOAT OF ANSI-C1 LIGHT GRAY. PROVIDE RAIN SHIELDS OVER DOOR ENTRANCES.
- EQUIPMENT SHALL COMPLY WITH THE LATEST ANSI, IEEE, NEMA AND DLC STANDARDS.
- PROVIDE THREE (3) GROUNDING BALLS ON THE LINE SIDE OF THE UTILITY METERING SECTION.
- PROVIDE A GROUNDED BASE PLATE INSIDE THE TERMINATION COMPARTMENT, PRE-DRILLED WITH HOLES, FOR MOUNTING SURGE ARRESTORS. ARRESTORS TO BE FURNISHED & INSTALLED BY DLC.
- PROVIDE LOCKING PROVISIONS ON THE DOORS.
- INSIDE CUBICLE, SPACE HEATERS SHALL BE INSTALLED NEAR FLOOR TO PREVENT CONDENSATION.
- PROVIDE THREE (3) LIFTING EYES FOR METERING CTs.
- PTs SHALL BE DOUBLE-BUSHING TYPE.



NO.	DATE	DESCRIPTION	REVISIONS

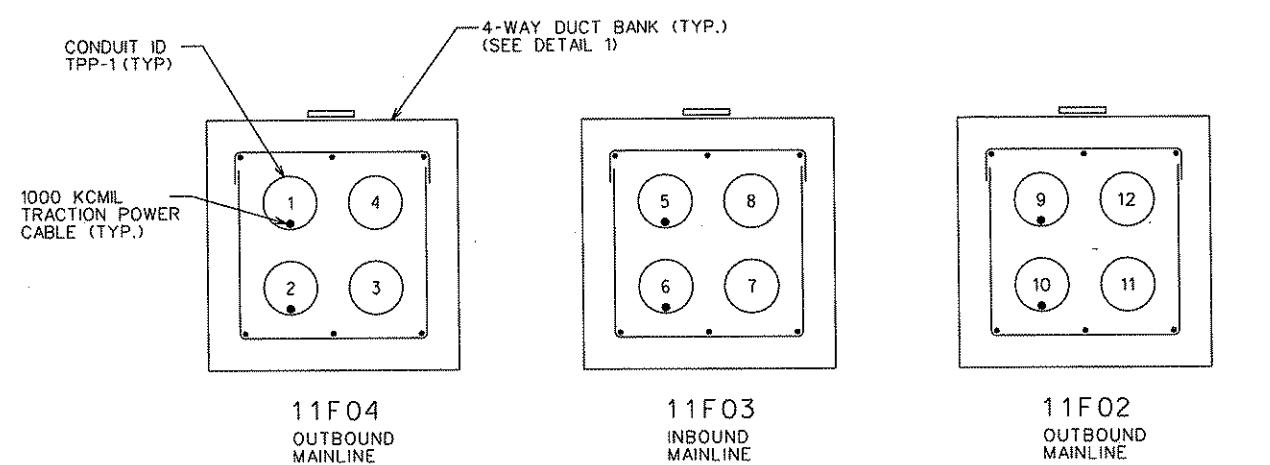
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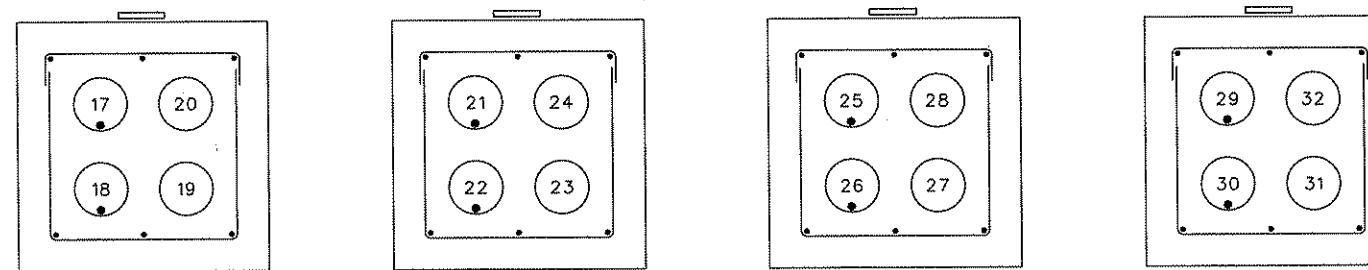
DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Dave J. Harrington*  
APPROVED DATE  
SIGNATURE

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

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
HIGH VOLTAGE METERING ENCLOSURE  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP025  
SHT. 289



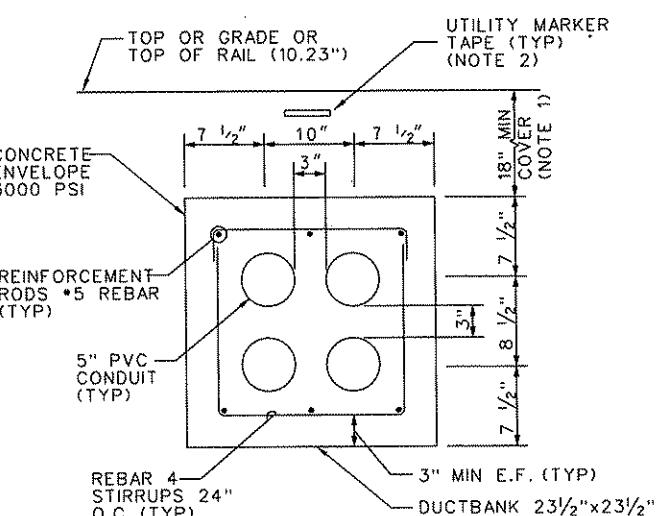
NORTH SHORE SUBSTATION  
POSITIVE DUCT BANK



NORTH SHORE SUBSTATION  
NEGATIVE DUCT BANK

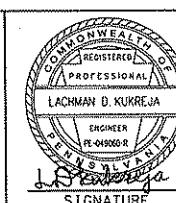
NOTES:

1. THE CONTRACTOR SHALL MAINTAIN AN 18" MINIMUM COVER, FROM TOP OF GRADE TO TOP OF DUCTBANK, WHEN NOT GOING UNDER TRACK, MINIMUM 48" UNDER RAILROAD TRACKS, FROM BOTTOM OF TIE.
  2. UTILITY MARKER TAPE SHALL BE PLACED 12" ABOVE BURIED INSTALLATION, PER 2005 NEC, ARTICLE 300.5 (D) (3).
  3. DUCT BANKS SHALL BE INSTALLED ON A 12" COMPACTED GRANULAR BASE.
  4. CONCRETE USED FOR ENCASEMENT SHALL BE CLASS "C" CONCRETE.
  5. SEE SITE PLAN DRAWING (TP013).



#### 4-WAY AC DUCT BANK SECTION

DETAIL

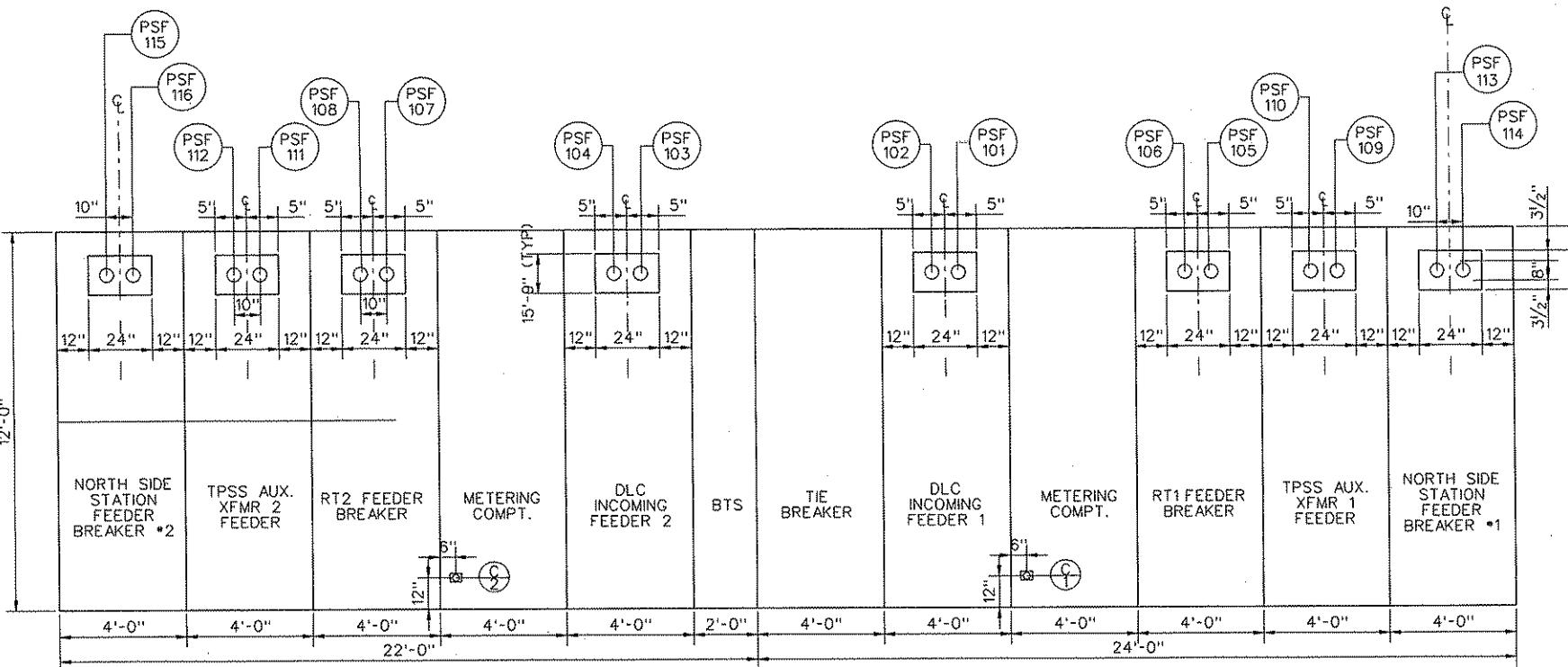


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Pittsburgh PA 15222

PITTSBURGH, PA. 15222  
  
Daniel J. Flaherty

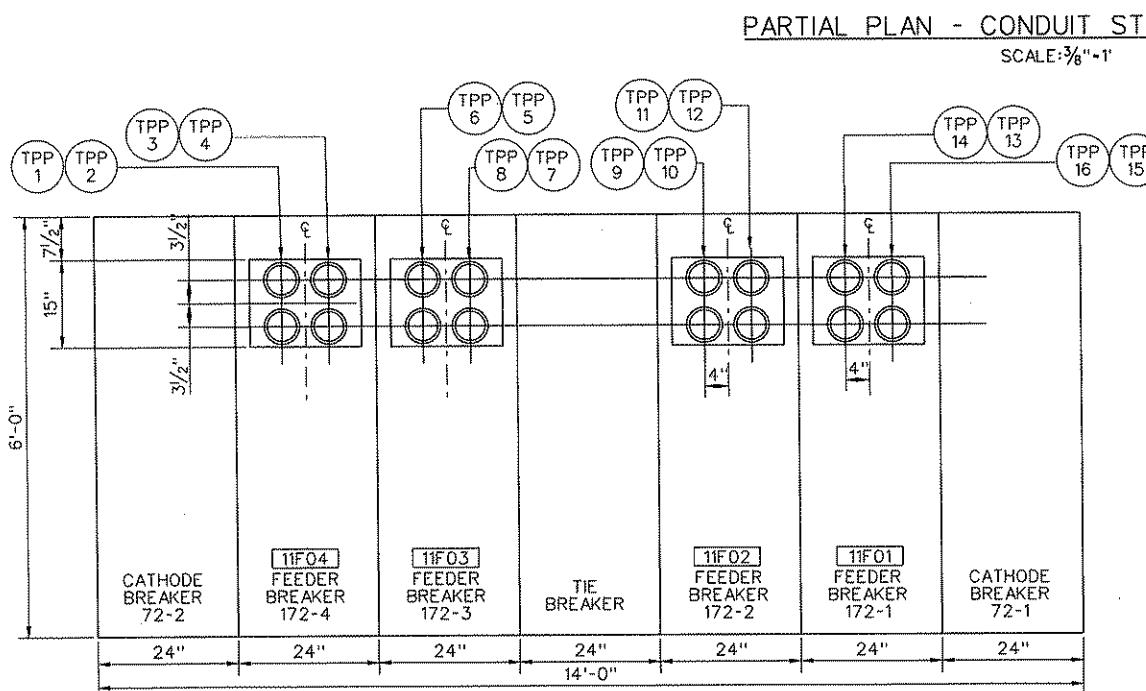
**PORT AUTHORITY OF ALLEGHENY COUNTY**  
 PITTSBURGH PENNSYLVANIA

**NORTH SHORE CONNECTOR  
 NSC TRAIN SYSTEM (SYSTEM WIDE)  
 NS SUBSTATION  
 DUCT BANK DETAILS**



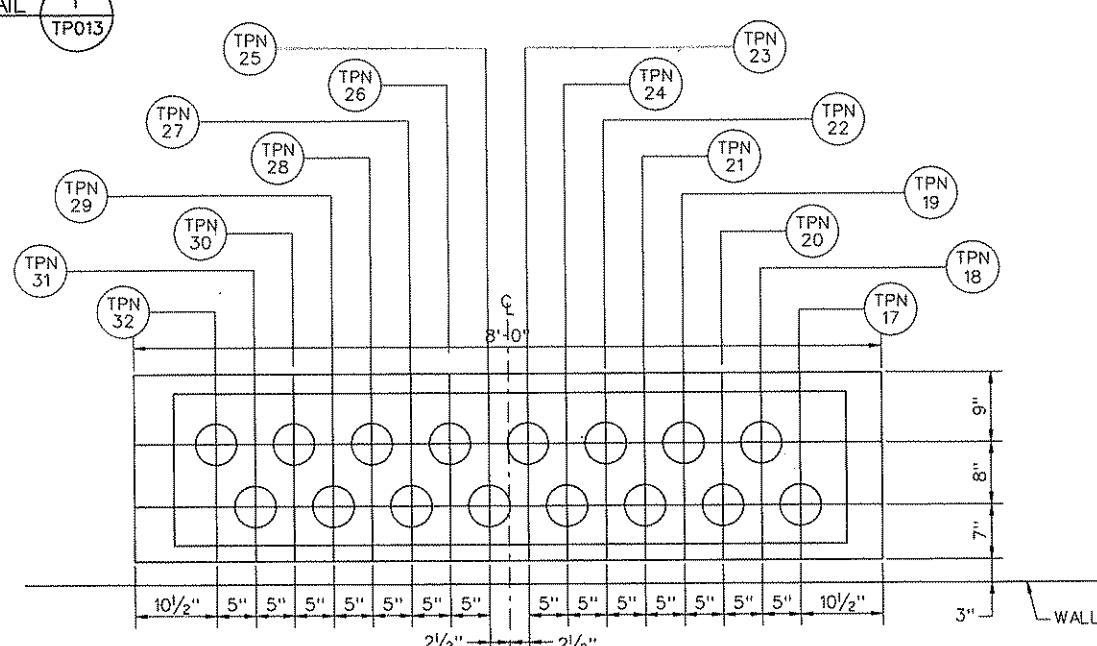
23 KV AC SWITCHGEAR NO. 2

23 KV AC SWITCHGEAR NO. 1



PARTIAL PLAN-650 VDC SWITCHGEAR

CONDUIT STUB-UP DETAIL 2  
SCALE:  $\frac{3}{4}''=1'$  TP013



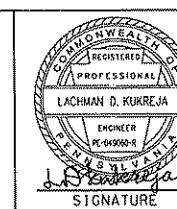
CONDUIT STUB-UP DETAIL 3  
SCALE: 1 ''=1' TP013

**PB AMERICAS, INC.**

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

NO.	DATE	DESCRIPTION
REVISIONS		

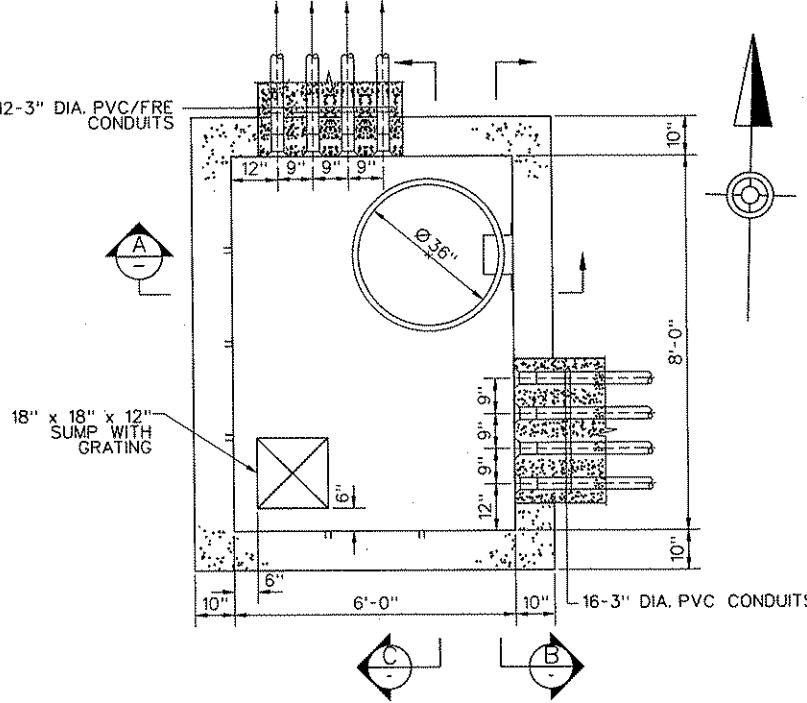
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FOUR GATEWAY CENTER  
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PITTSBURGH, PA. 15222  
*Daniel J. Harrington*  
APPROVED DATE  
SIGNATURE

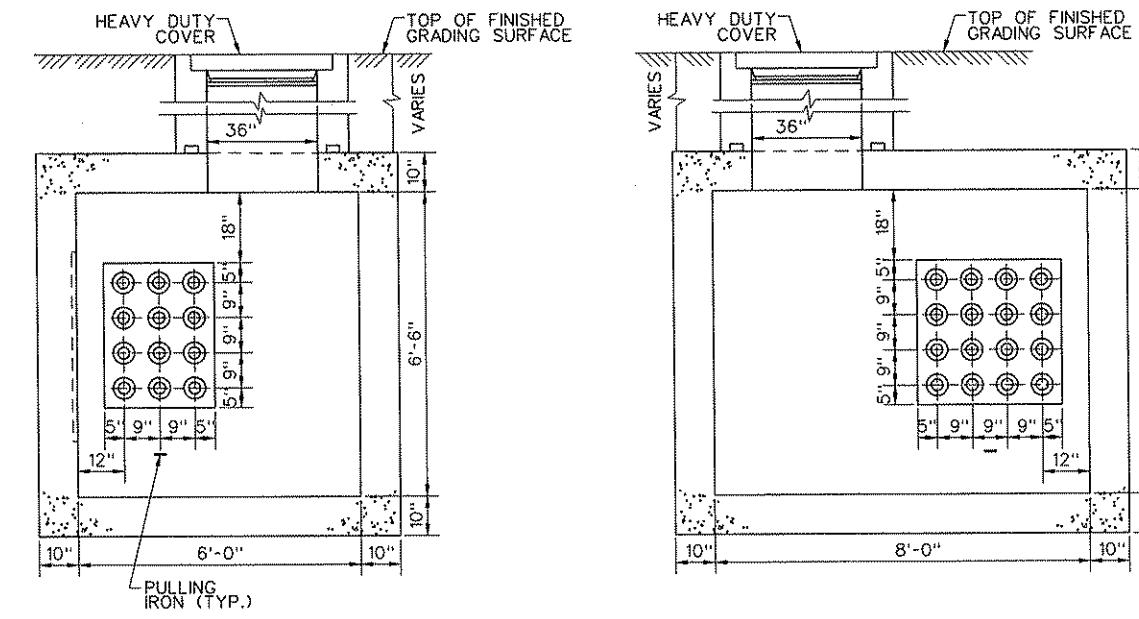
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DATE APRIL 28, 2008  
SCALE NTS  
NTS

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
CONDUIT DETAILS  
**Port Authority** CONTRACT NO. NSC-009  
DWG. NO. TP033 SHT. 291



PLAN  
TP POSITIVE MANHOLE

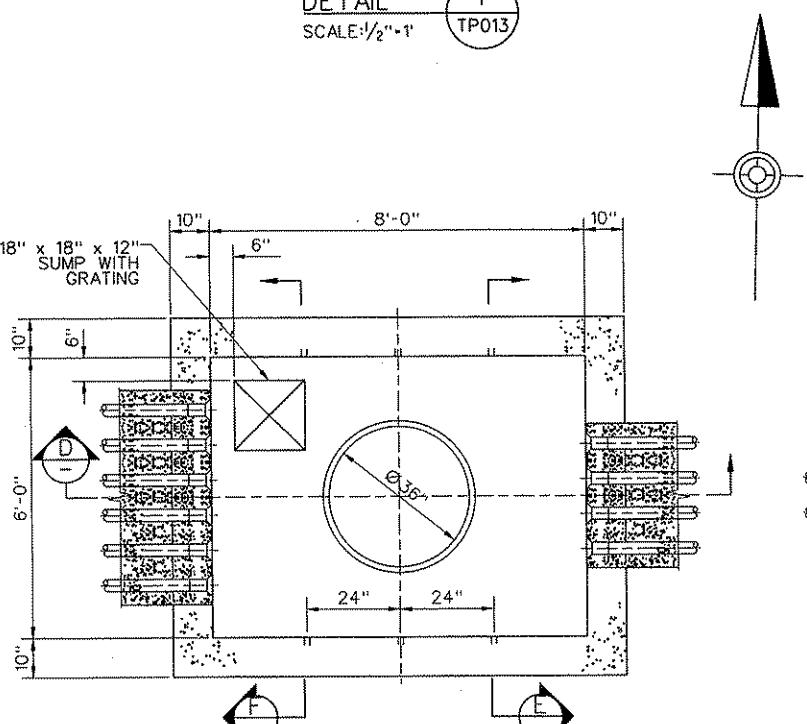
DETAIL 1  
SCALE: 1/2"-1  
TP013



SECTION  
SCALE: 1/2"-1

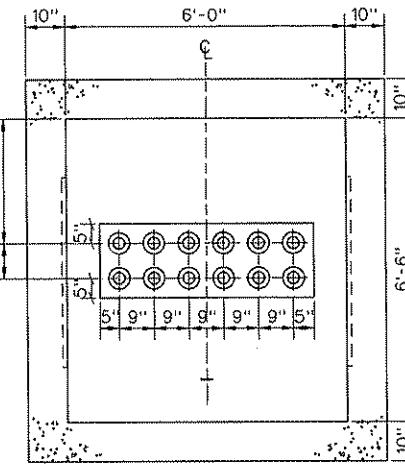
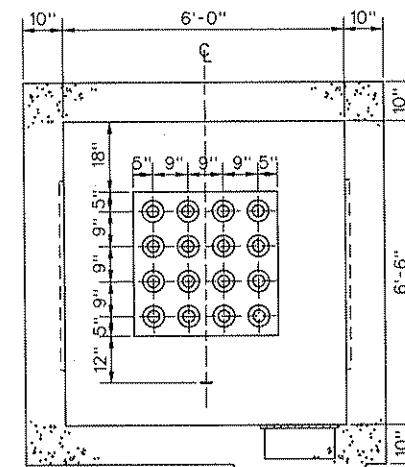
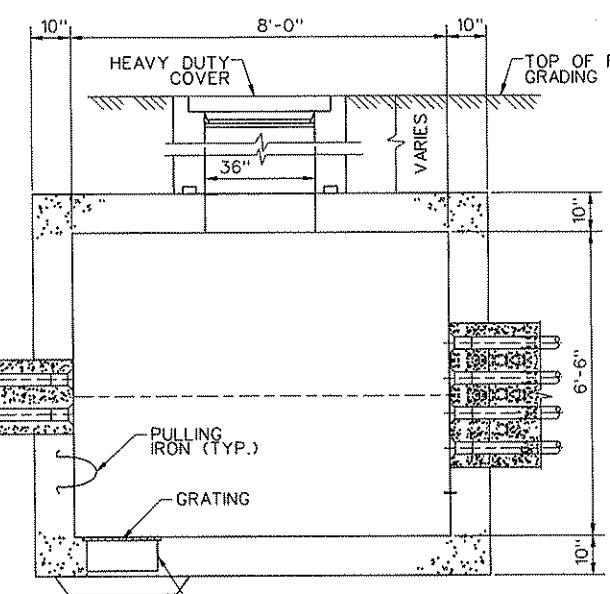
SECTION  
SCALE: 1/2"-1

INSERT FLUSHED ON WALL  
(FOR CABLE SUPPORT AND CLAMPS)



PLAN  
TP NEGATIVE MANHOLE

DETAIL 2  
SCALE: 1/2"-1  
TP013



NOTES:

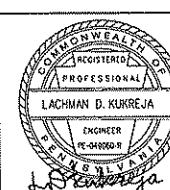
1. PROVIDE AND INSTALL CABLE SUPPORT AND FIBERGLASS REINFORCED CLEAT FOR EACH CABLES.
2. ALL METAL/ STEEL COMPONENTS, FRAME BRACKET SHALL BE GROUNDED.

PB AMERICAS, INC.

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

NO.	DATE	DESCRIPTION	REVISIONS

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DMJM HARRIS AECOM

FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222

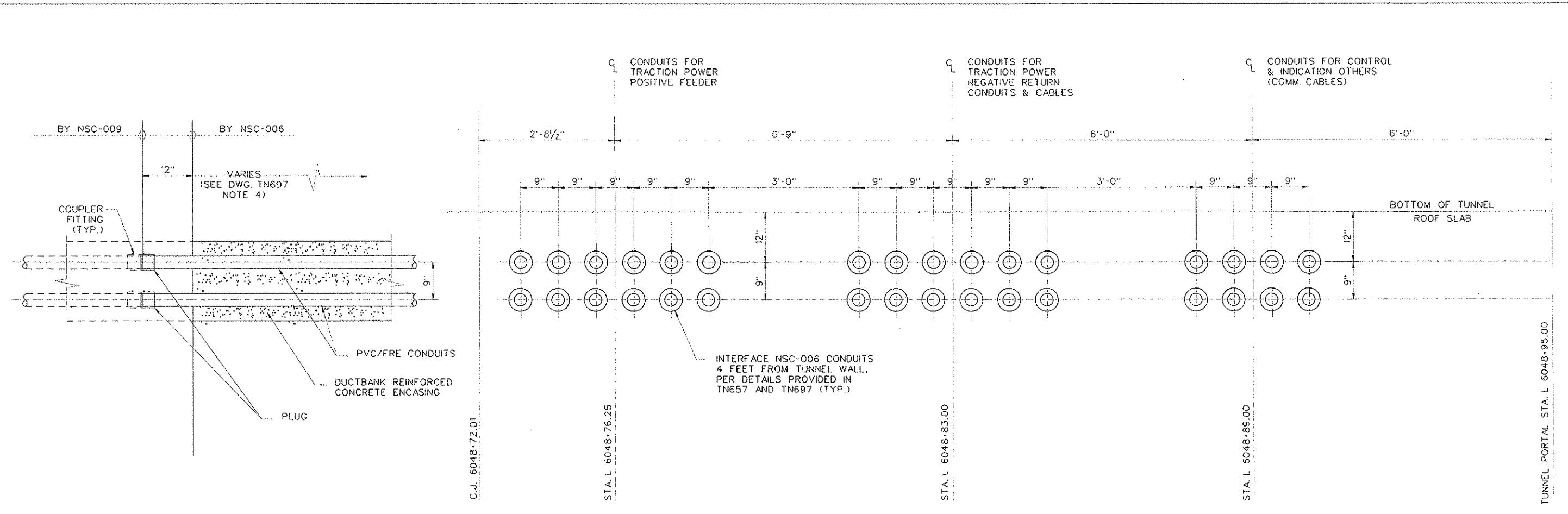
Daniel J. Hargan  
APPROVED DATE

DESIGNED LDK  
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CHECKED JSJ  
IN CHARGE DPH  
DATE APRIL 28, 2008  
SCALE AS SHOWN

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
PENNSYLVANIA

NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
MANHOLE DETAILS

Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP034  
SHT. 292



## TYPICAL - CONDUIT DUCTBANK INTERFACE

DETAIL 1  
TP013

SECTION A  
TP01

PB AMERICAS, INC.

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

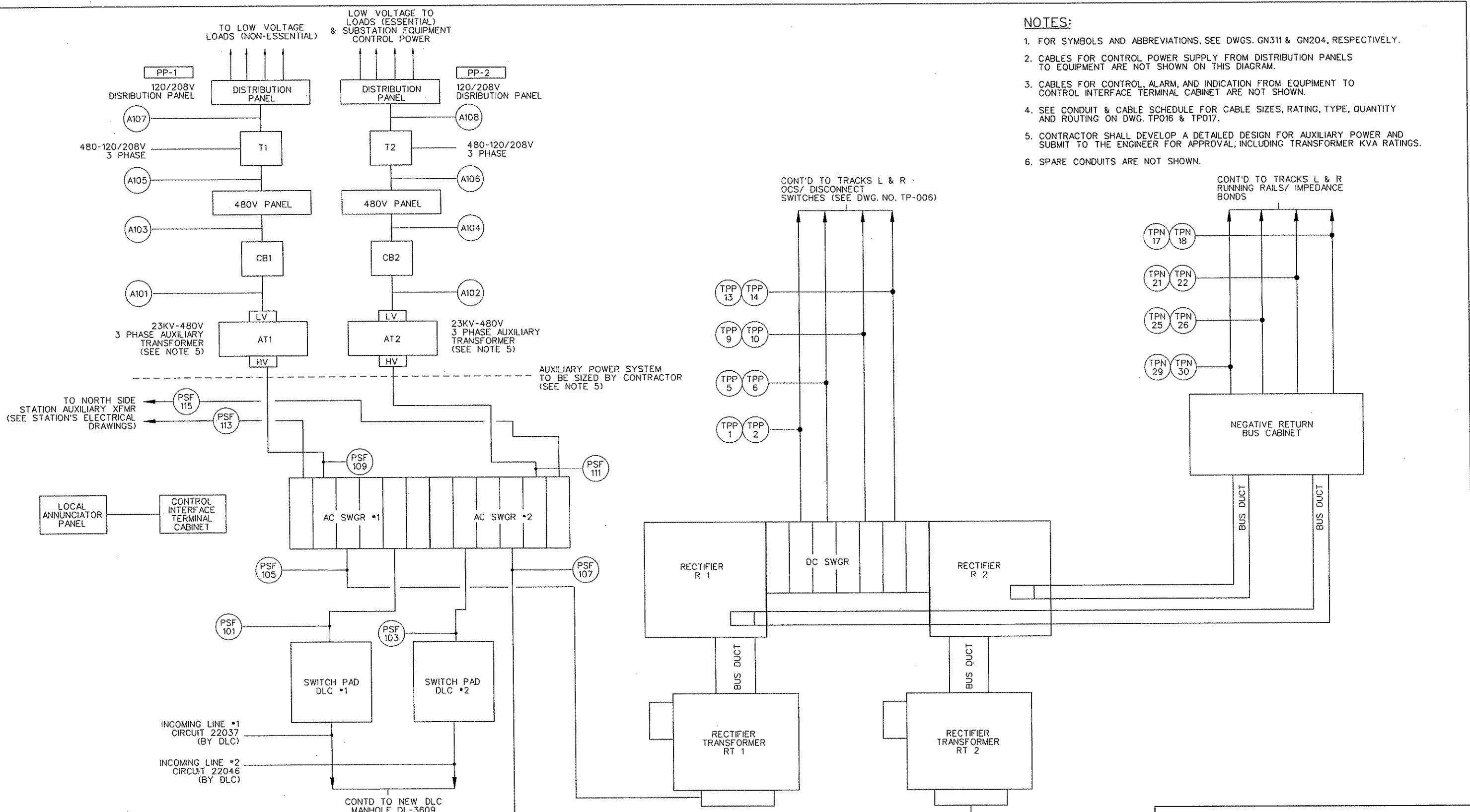
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**DMJM HARRIS** | AECOM  
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PITTSBURGH, PA. 15222  
*Daniel P. Harrington*  
APPROVED DATE

**NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
NS SUBSTATION  
DUCT BANK DETAILS AND SECTIONS**

<b>Port Authority</b> <small>connecting people to life</small>	CONTRACT NO.	NSC-009
	DWG. NO.	TP036



**NOTES:**

- FOR SYMBOLS AND ABBREVIATIONS, SEE DWGS. GN311 & GN204, RESPECTIVELY.
- CABLES FOR CONTROL POWER SUPPLY FROM DISTRIBUTION PANELS TO EQUIPMENT ARE NOT SHOWN ON THIS DIAGRAM.
- CABLES FOR CONTROL, ALARM, AND INDICATION FROM EQUIPMENT TO CONTROL INTERFACE TERMINAL CABINET ARE NOT SHOWN.
- SEE CONDUIT & CABLE SCHEDULE FOR CABLE SIZES, RATING, TYPE, QUANTITY AND ROUTING ON DWG. TP016 & TP017.
- CONTRACTOR SHALL DEVELOP A DETAILED DESIGN FOR AUXILIARY POWER AND SUBMIT TO THE ENGINEER FOR APPROVAL, INCLUDING TRANSFORMER KVA RATINGS.
- SPARE CONDUITS ARE NOT SHOWN.

**NORTH SHORE SUBSTATION EQUIPMENT  
CABLE INTERCONNECTION BLOCK DIAGRAM**

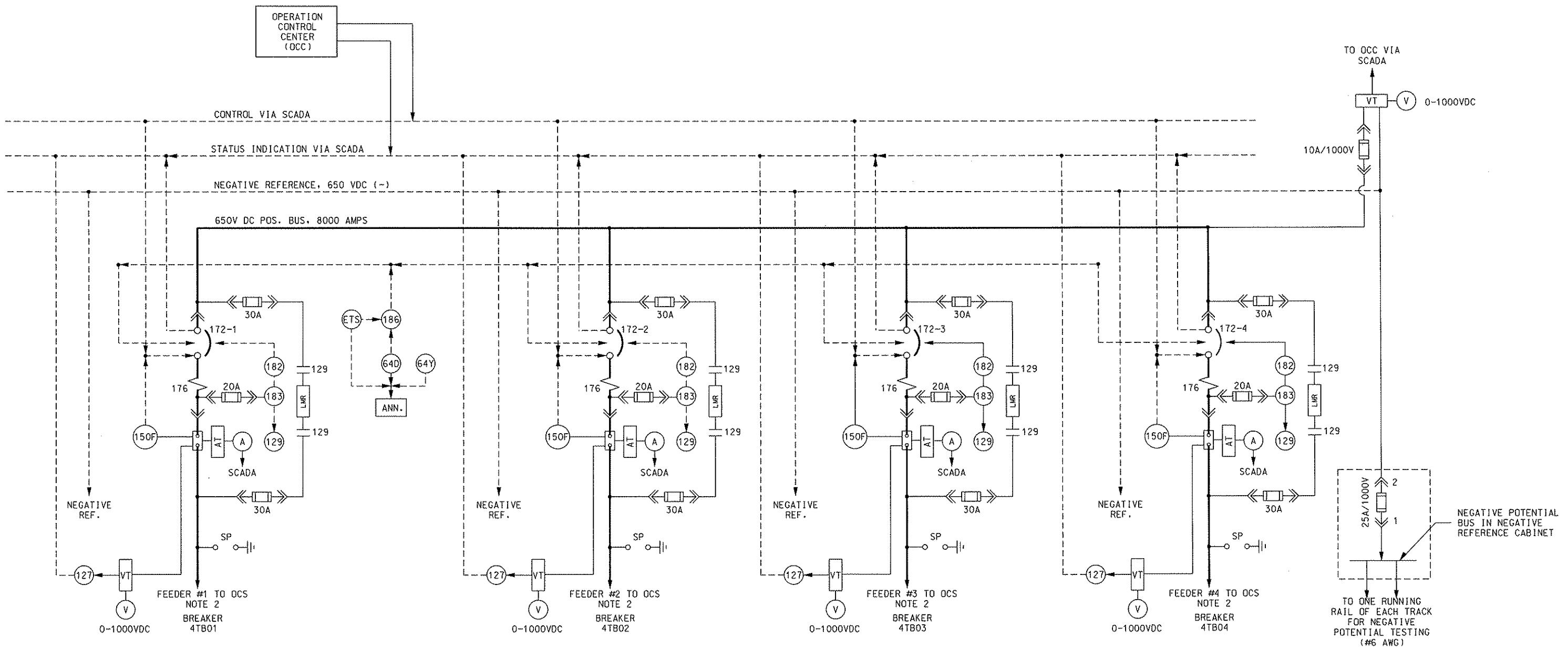
<b>PB AMERICAS, INC.</b>  Two Gateway Center, 18th Fl., Newark, N.J. 07102				
	NO.	DATE	DESCRIPTION	REVISONS

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*Daniel J. Harrington*  
APPROVED DATE  
NTS

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
**NORTH SHORE CONNECTOR**  
**NSC TRAIN SYSTEM (SYSTEM WIDE)**  
**NS SUBSTATION**  
**EQUIPMENT AND CABLE INTERCONNECTION BLOCK DIAGRAM**  
**Port Authority**  
CONTRACT NO. NSC-009  
DWG. NO. TP037  
SHT. 294



GATEWAY TIE BREAKER STATION  
(SEE DWG. TP103 FOR SCHEMATIC)

#### NOTES:

1. ALL FEEDER BREAKERS RATED 4,000 AMPS UNLESS OTHERWISE NOTED.
  2. EACH OCS FEEDER WILL BE COMPRISED OF TWO 1000KCMIL CABLES.
  3. CONTRACTOR TO PROVIDE A INTERCONNECTION DIAGRAM FOR CONNECTION BETWEEN EQUIPMENT WHICH SHALL INCLUDE A CABLE SCHEDULE.



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**DMJM HARRIS** | **AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel P. Harrington* 4/28/08  
APPROVED DATE

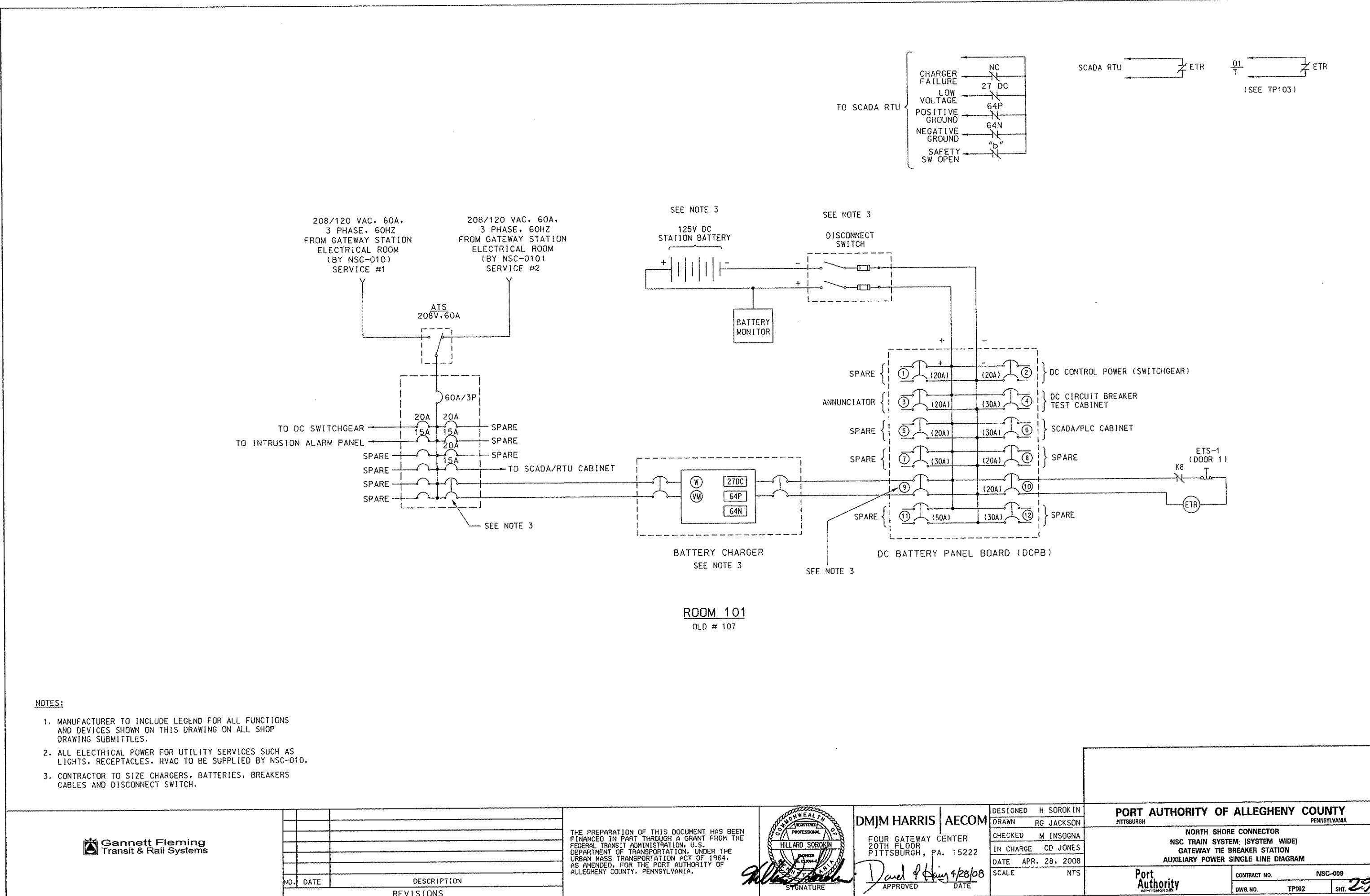
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DRAWN	RG JACKSON
CHECKED	M INSOGNA
IN CHARGE	CD JONES
DATE	APR. 28, 2008
SCALE	NTS

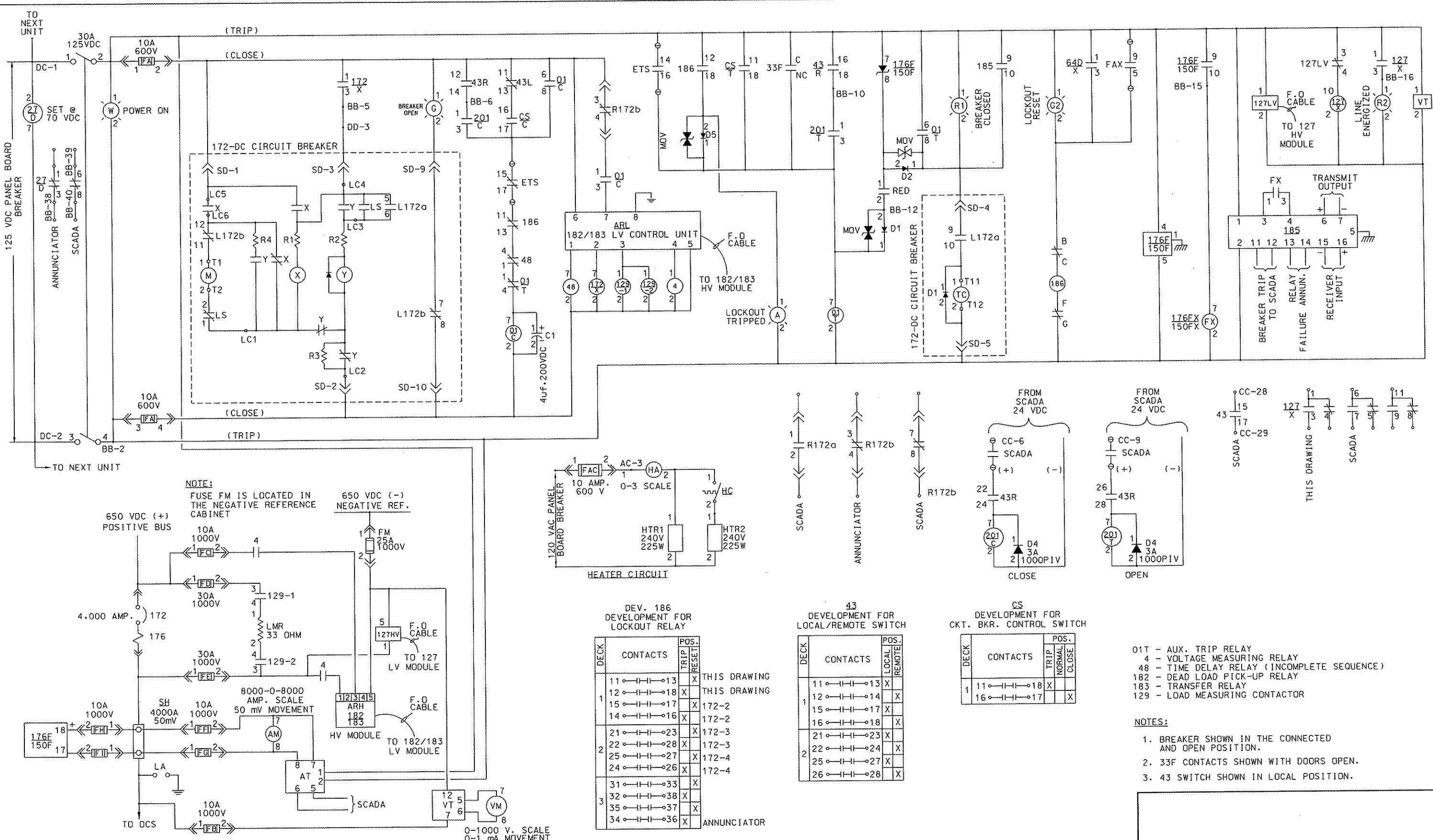
**PITTSBURGH**

**PENNSYLVANIA**

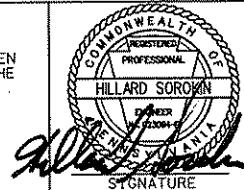
NORTH SHORE CONNECTOR  
 NSC TRAIN SYSTEM (SYSTEM WIDE)  
 GATEWAY TIE BREAKER STATION  
 POWER SINGLE LINE DIAGRAM

<b>Port Authority</b> <small>connecting people &amp;amp. places</small>	CONTRACT NO. <b>NSC-009</b>
<small>DWG. NO.</small>	<small>TP101</small>
<small>SHT.</small>	<small>29</small>





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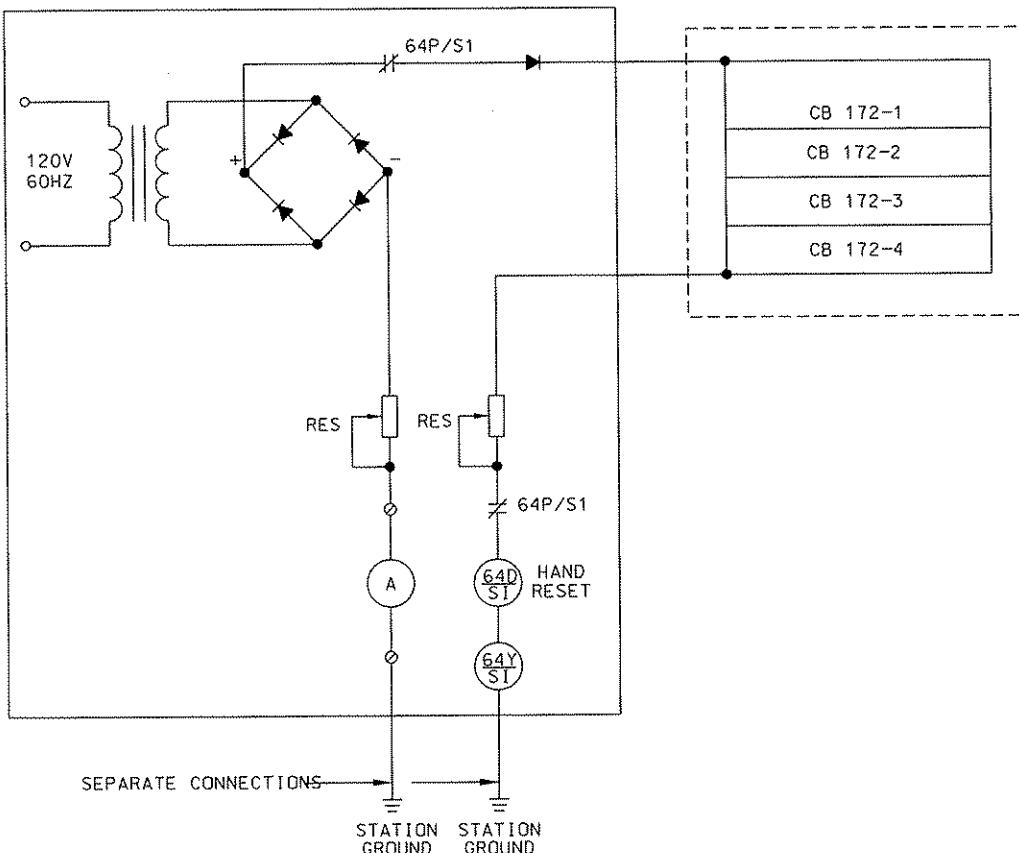
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20TH FLOOR  
PITTSBURGH, PA. 15222  
*Signature*  
APPROVED DATE  
4/28/08

PORT AUTHORITY OF ALLEGHENY COUNTY  
PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM: (SYSTEM WIDE)  
GATEWAY TIE BREAKER STATION  
TYPICAL CIRCUIT BREAKER CONTROL SCHEMATIC  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP103 SHT. 297

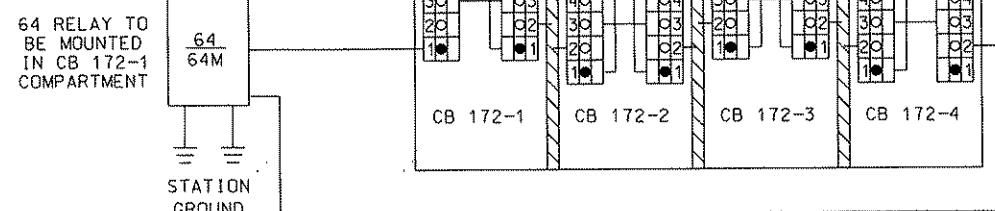
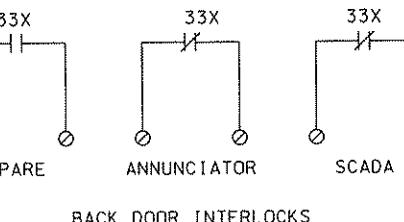
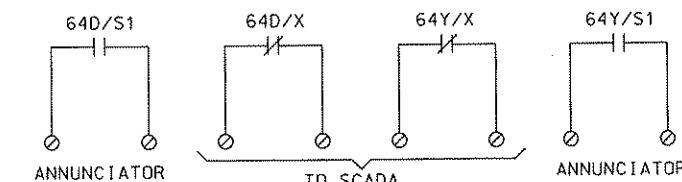
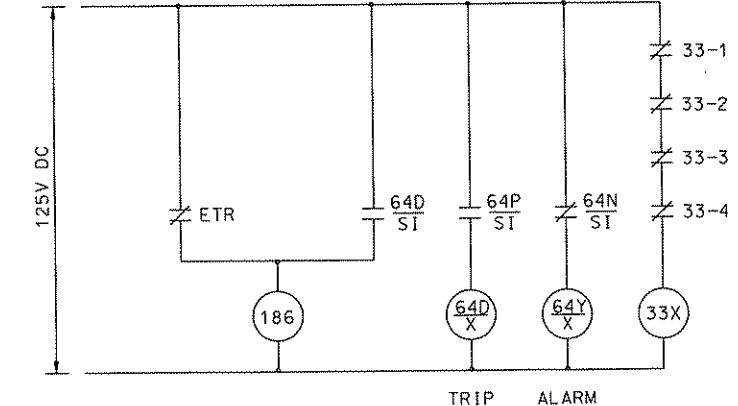
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Transit & Rail Systems

NO.	DATE	DESCRIPTION	REVISIONS

64 RELAY CAN  
BE POWERED BY  
120VAC AS SHOWN  
OR 125VDC AS SHOWN  
ON DWG# TP103



INSULATED  
FLOOR TOPPING



NOTES:

- MANUFACTURER TO INCLUDE LEGEND FOR ALL FUNCTIONS AND DEVICES SHOWN ON THIS DRAWING ON ALL SHOP DRAWING SUBMITTALS.
- ALL RGS CONDUITS ENTERING THE DC SWITCHGEAR SHALL HAVE FIRE NIPPLES TO ISOLATE ENCLOSURES.
- ALL CONTROL WIRING ENTERING OR LEAVING THE DC SWITCHGEAR SHALL BE 1000V INSULATED.

GATEWAY TIE BREAKER STATION

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



DMJM HARRIS | AECOM

FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222

APPROVED DATE  
*David J. Harris 4/28/08*

DESIGNED H SOROKIN  
DRAWN RG JACKSON

CHECKED M INSOGNA  
IN CHARGE CD JONES

DATE APR. 28, 2008

SCALE NTS

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH

NORTH SHORE CONNECTOR  
SYSTEMWIDE TRACTION POWER AND OCS  
GATEWAY TIE BREAKER STATION  
DC HOT AND GROUND STRUCTURE SCHEMATIC

Port Authority

CONTRACT NO. NSC-009  
DWG. NO. TP104 SHT. 298

Gannett Fleming  
Transit & Rail Systems

NO.	DATE	DESCRIPTION
REVISIONS		

## TRIP AND LOCKOUT SCHEDULE

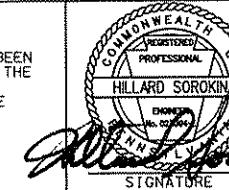
E = ENERGIZE

T = TRI

GATEWAY TIE BREAKER STATION



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AS AMENDED, FOR THE PORT AUTHORITY OF  
ALLEGHENY COUNTY, PENNSYLVANIA.

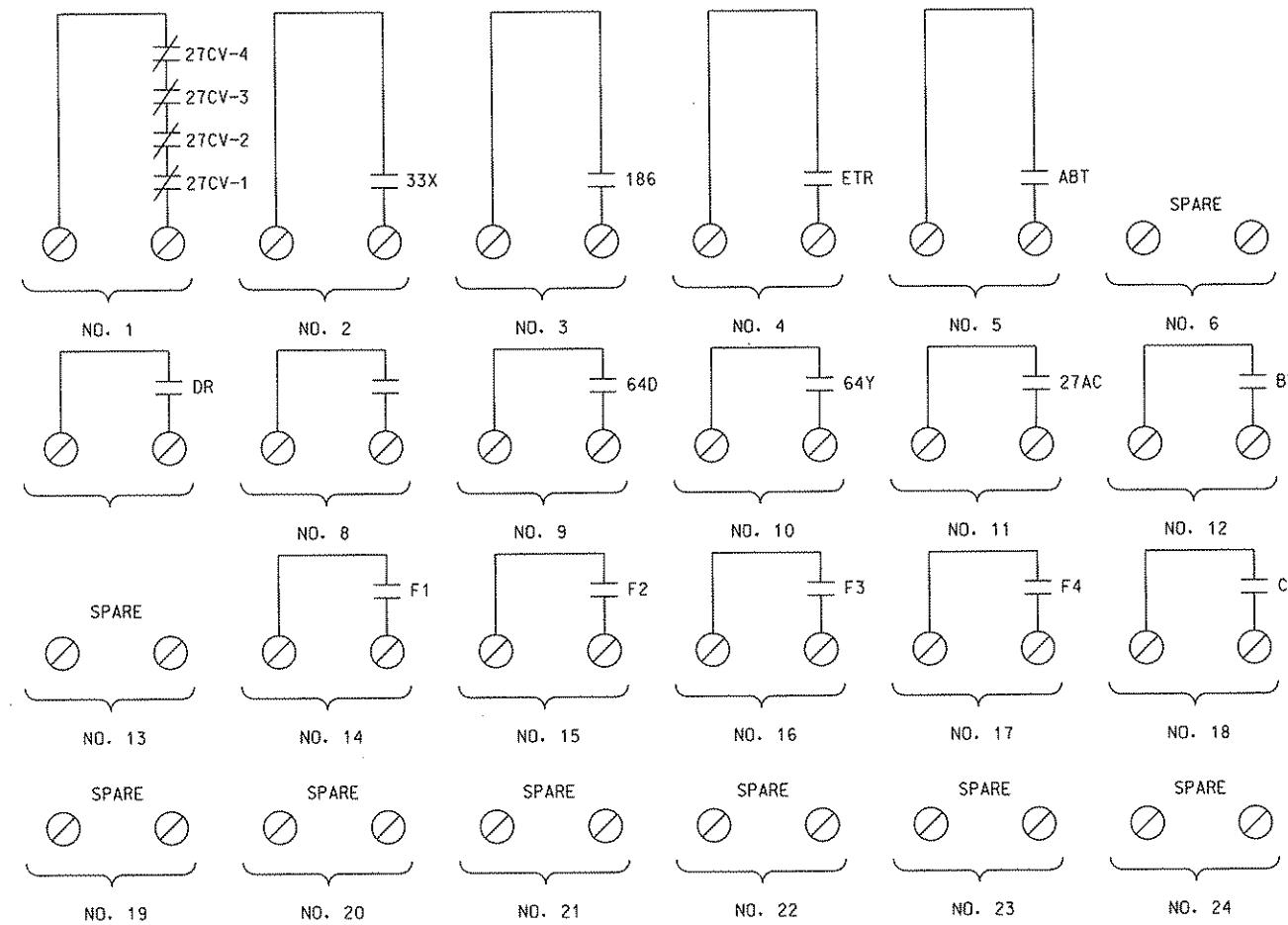


**DMJM HARRIS AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]* *Daniel J. Harrington 4/28/08*  
APPROVED DATE

DESIGNED	H SOROKI
DRAWN	RG JACKSON
CHECKED	M INSONG
IN CHARGE	CD JONES
DATE	APR. 28, 2001
SCALE	N.I.

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
 PITTSBURGH, PENNSYLVANIA

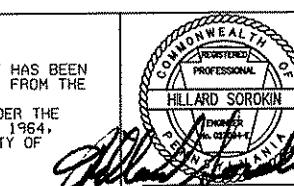
**NORTH SHORE CONNECTOR**  
**SYSTEMWIDE TRACTION POWER AND OCS**  
**GATEWAY TIE BREAKER STATION**  
**TRIP AND LOCKOUT SCHEDULE**



TIE BREAKER STATION ANNUNCIATOR					
LOSS OF DC CONTROL VOLTAGE	DOOR OPEN DEVICE 33X	LOCKOUT DEVICE 186	EMERGENCY TRIP	ABNORMAL DC BREAKER TRIP	
1	2	3	4	5	6
BUILDING DOOR OPEN		HOT STRUCTURE TRIP 64D	STRUCTURE GROUND 64Y	LOSS OF SERVICE POWER	BATTERY ROOM VENT FAILURE
7	8	9	10	11	12
	FEEDER # 1 TRIP	FEEDER # 2 TRIP	FEEDER # 3 TRIP	FEEDER # 4 TRIP	ETS CONTROL POWER FAILURE
13	14	15	16	17	18
19	20	21	22	23	24

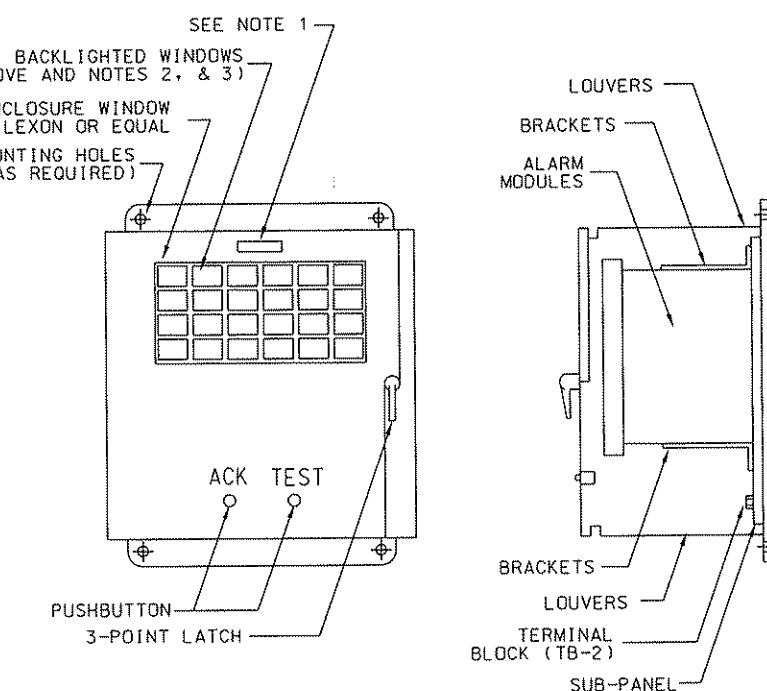
#### **NOTES:**

1. NAMEPLATE SHALL BE 25.4 mm x 76.2 mm [1" x 3"] LAMINATED PLASTIC BLACK AND SHALL BE ENGRAVED WITH 12.5 mm [1/2"] LETTERS "KO1S" FOR ANNUNCIATOR PANEL.
  2. WINDOW NUMBERS ARE FOR REFERENCE ONLY. DO NOT ENGRAVE. WINDOWS SHALL BE 76.2 mm x 84.1 mm [3" x 3<sup>5</sup>/<sub>16], AND LETTERING SHALL BE SIZED TO MAXIMIZE WINDOW SPACE.</sub>
  3. BLANK WINDOWS ARE SPARES.
  4. ALARM WINDOW CONFIGURATION IS TYPICAL, SHOWN FOR GUIDANCE ONLY.
  5. ANNUNCIATOR PANEL TO SUPPLY GENERAL ALARM TO SCADA



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DESIGNED H SOROKIN	DRAWN RG JACKSON	PORT AUTHORITY OF ALLEGHENY COUNTY PITTSBURGH PENNSYLVANIA	
CHECKED M INSOGNA		NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM WIDE) GATEWAY TIE BREAKER STATION ANNUNCIATOR PANEL	
IN CHARGE CD JONES	DATE APR. 28, 2008		
SCALE NTS		Port Authority	CONTRACT NO.



CONTROL POINTS

DC FDR NO. 172-1 CB CLOSE  
 DC FDR NO. 172-1 CB TRIP  
 DC FDR NO. 172-2 CB CLOSE  
 DC FDR NO. 172-2 CB TRIP  
 DC FDR NO. 172-3 CB CLOSE  
 DC FDR NO. 172-3 CB TRIP  
 DC FDR NO. 172-4 CB CLOSE  
 DC FDR NO. 172-4 CB TRIP

TO REMOTE TERMINAL UNIT

STATUS INDICATION POINTS

DC FDR NO. 172-1 CB CLOSE  
 DC FDR NO. 172-1 CB OPEN  
 DC FDR NO. 172-2 CB CLOSE  
 DC FDR NO. 172-2 CB OPEN  
 DC FDR NO. 172-3 CB CLOSE  
 DC FDR NO. 172-3 CB OPEN  
 DC FDR NO. 172-4 CB CLOSE  
 DC FDR NO. 172-4 CB OPEN

TO REMOTE TERMINAL UNIT

STATUS INDICATION POINTS

TIE BREAKER STATION TROUBLE  
 172-1 CB - LOCAL/REMOTE  
 172-1 CB - LOCAL/REMOTE  
 172-1 CB - LOCAL/REMOTE  
 172-1 CB - LOCAL/REMOTE

TO REMOTE TERMINAL UNIT

ALARM AND JUNCTION POINTS

\* LOSS OF DC CONTROL VOLTAGE  
 DOOR OPEN 33X  
 64DX/SI  
 64YX/SI

TO REMOTE POINTS

ANALOG (VOLTAGE)  
(NOTE 1)

DC BUS

TO REMOTE TERMINAL UNIT

ANALOG (CURRENT)  
(NOTE 2)

DC CURRENT(8F01)  
 DC CURRENT(8F02)  
 DC CURRENT(8F03)  
 DC CURRENT(8F04)

TO REMOTE TERMINAL UNIT

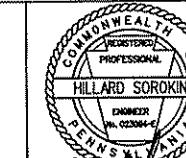
NOTES:

- SOURCE VOLTAGE DCV 0-800, OUTPUT 4-20 mA.
- SOURCE AMPERAGE 0 - 10,000, OUTPUT 4-20 mA.
- \* = PUT ALL FOUR(4) NORMALLY OPEN CONTACTS IN PARALLEL.

 Gannett Fleming  
Transit & Rail Systems

NO.	DATE	DESCRIPTION	REVISIONS

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DMJM HARRIS | AECOM  
 FOUR GATEWAY CENTER  
 20TH FLOOR  
 PITTSBURGH, PA. 15222  
 APPROVED DATE  
*Daniel J. Harrington 4/28/08*

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
 PITTSBURGH  
 NORTH SHORE CONNECTOR  
 SYSTEMWIDE TRACTION POWER AND OCS  
 GATEWAY TIE BREAKER STATION  
 RTU PANEL  
 Port Authority  
 CONTRACT NO. NSC-009  
 DWG. NO. TP108 SHT. 301

## SCADA CONTROL AND INDICATION TABLE

\* DENOTES CONTACT SETS IN SERIES

**NOTES:**

1. FROM ANNUNCIATOR PANEL.
  2. PROVIDE SCADA WITH 20% SPARE INPUT AND CONTROL POINTS



 <b>Gannett Fleming</b> Transit & Rail Systems		
NO.	DATE	DESCRIPTION
		REVISIONS

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DMJM HARRIS AECOM

FOUR GATEWAY CENTER

20TH FLOOR  
PITTSBURGH, PA. 15222

*Albinata*

Janet & Doug 4/28/08

APPROVED DATE

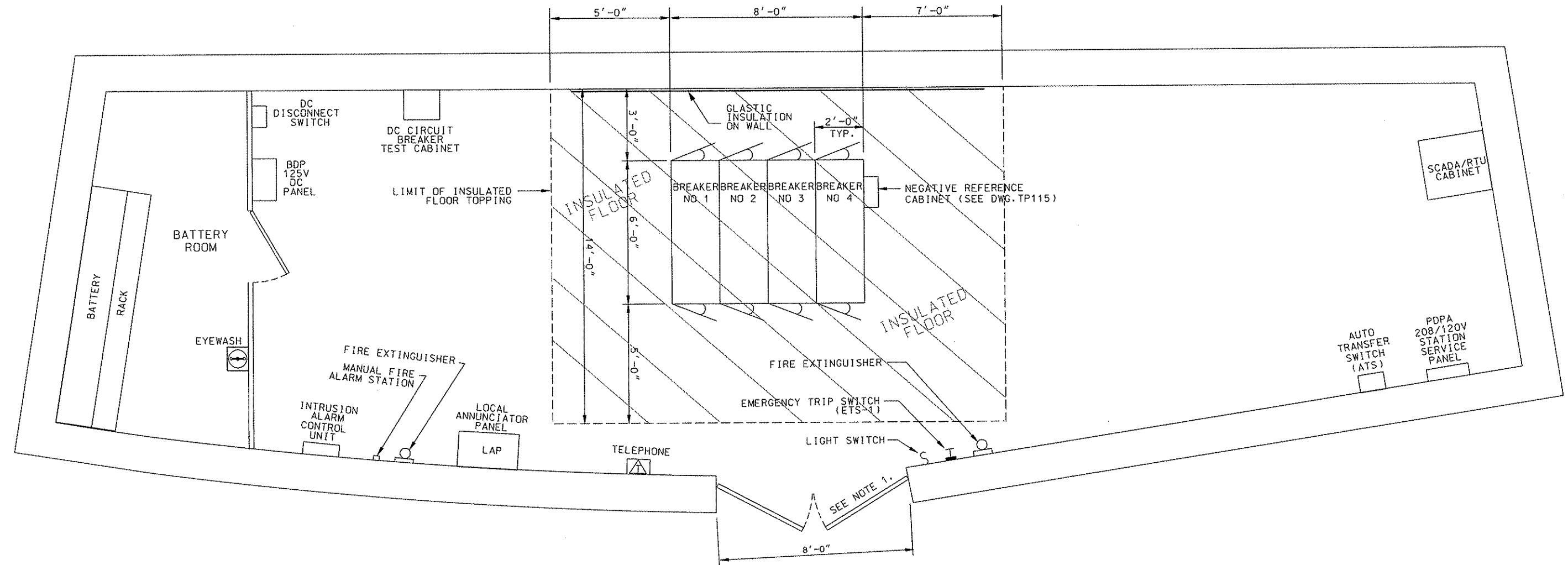
DESIGNED	H SOROKI
DRAWN	RG JACKSON
CHECKED	M INSONG
IN CHARGE	CD JONES
DATE	APR. 28, 2000
COM	100-1000000

**PITTSTON AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH PENNSYLVANIA

**NORTH SHORE CONNECTOR  
SYSTEMWIDE TRACTION POWER AND OCS  
GATEWAY TIE BREAKER STATION  
SCADA INDICATION AND CONTROL POINTS LIST**

Port Authority

CONTRACT NO.	NSC-009	
DWG NO.	TP109	SHT.



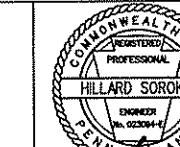
ROOM 101

OLD # 107

NOTES:

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

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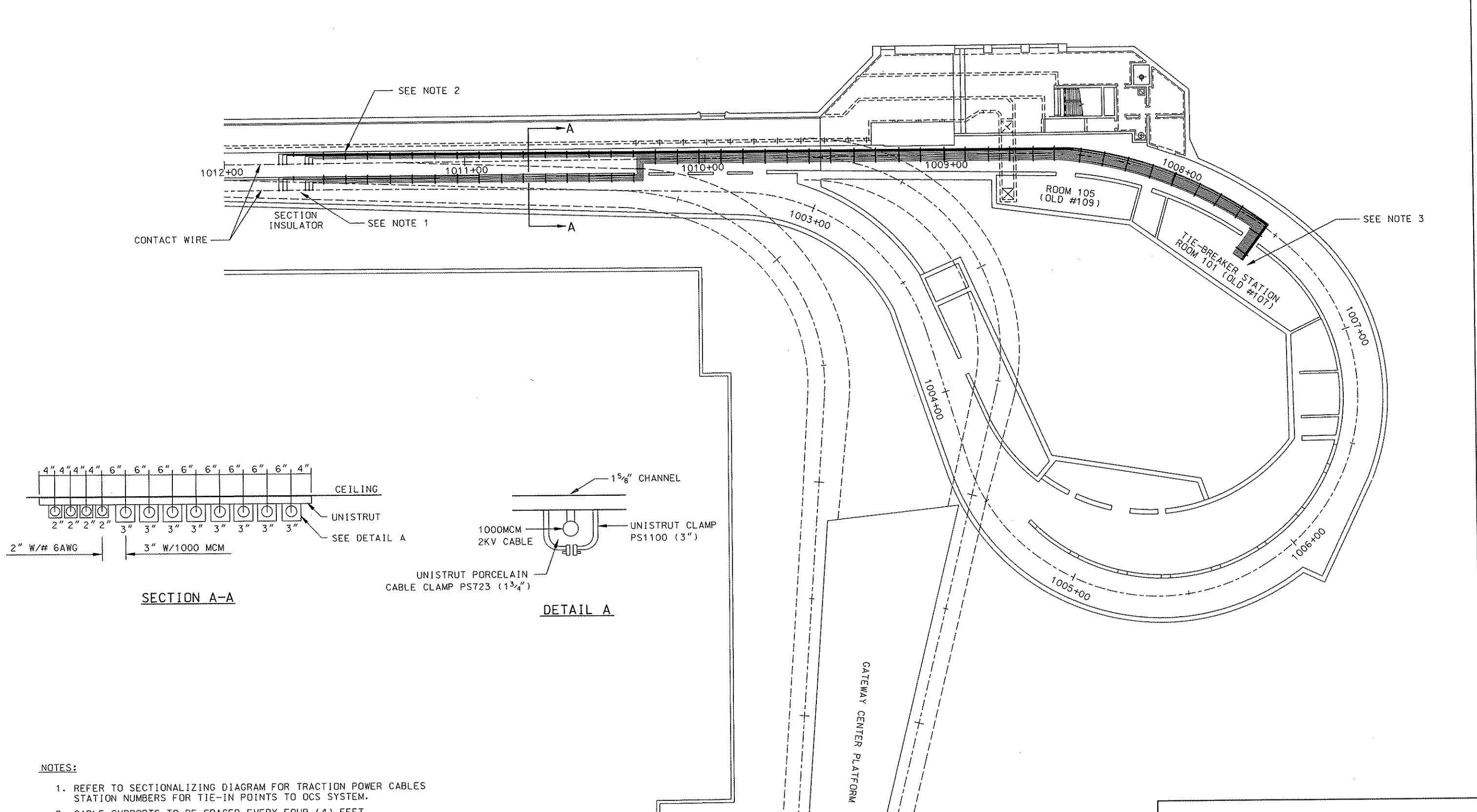


DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
HILLARD SOROKIN  
ENGINEER  
PA. 02034-47  
SIGNATURE  
APPROVED DATE  
*Dave J. Hays 4/28/08*

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

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

NO.	DATE	DESCRIPTION	REVISIONS



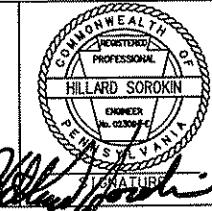
NOTES:

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
REVISIONS		

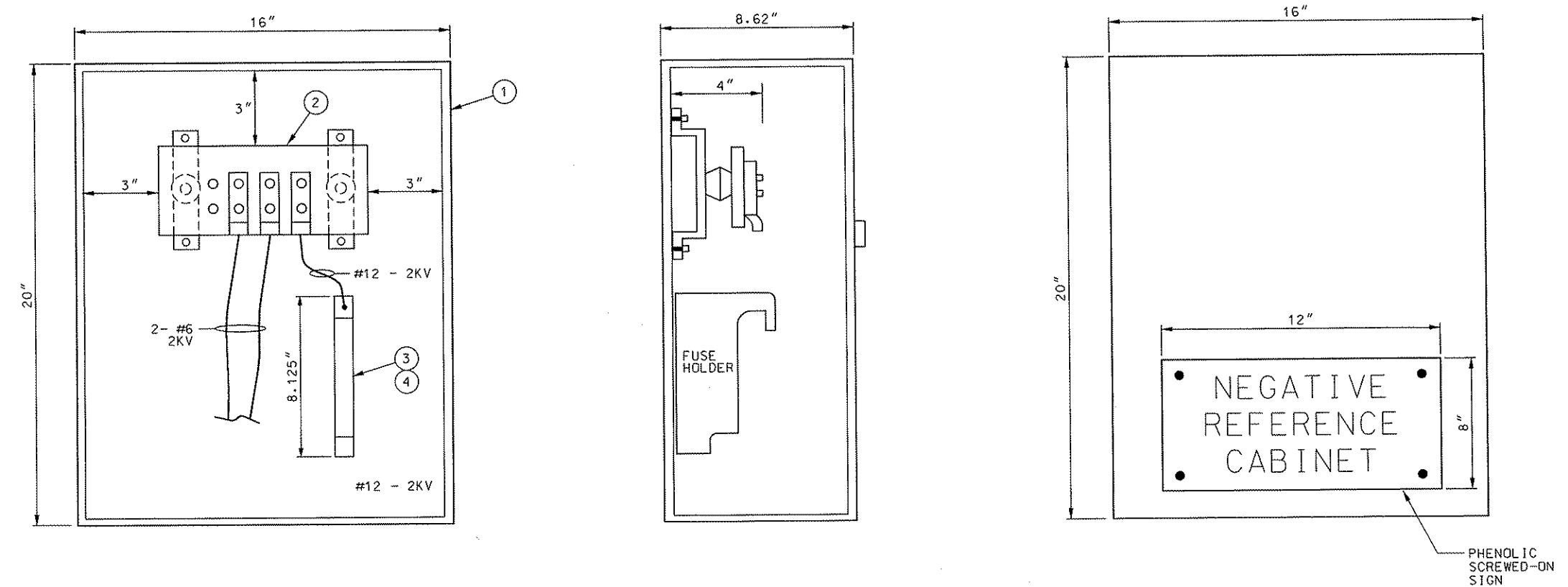
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel J. Harrington 4/28/08*  
APPROVED DATE

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
Pittsburgh  
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



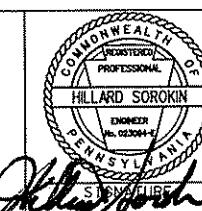
NEGATIVE  
REFERENCE  
CABINET  
(N.T.S.)

- ① - WALL MOUNTED CONTROL ENCLOSURE  
HOFFMAN #A-24N16LP WITH PANEL  
A-20N16MP 20"x16"x8.62".
- ② - BUS BAR KIT STORM COPPER COMPONENTS  
MODEL #SCGB-3KT, COPPER BAR  $\frac{1}{4}$ "x4"x10"  
WITH BRACKET AND INSULATOR 2015-3C  
(2500V).
- ③ - FUSE 25A, 1000VDC FUSE FERRAZ  
SHAWMUT CAT. E089497.
- ④ - FUSE HOLDER FERRAZ SHAWMUT CAT.  
PSI 20x127, 1 POLE, 1500V.

NO.	DATE	DESCRIPTION	REVISIONS

Gannett Fleming  
Transit & Rail Systems

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ALLEGHENY COUNTY, PENNSYLVANIA.



DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Dave P. Harris 4/28/08*  
APPROVED DATE

PORT AUTHORITY OF ALLEGHENY COUNTY PENNSYLVANIA	
NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM-WIDE) NEGATIVE REFERENCE CABINET GATEWAY TIE BREAKER STATION	
Port Authority	CONTRACT NO. NSC-009 DWG. NO. TP115 SHT. 308

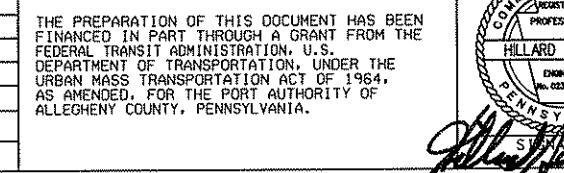
CABLE			CIRCUIT	ROUTING				CONDUIT	CABLE			CIRCUIT	ROUTING				CONDUIT												
NO.	CONSTRUCTION	SIZE AWG	INSULATION VOLTAGE TYPE	VOLTAGE	AC DC	FROM	VIA	TO	FUNCTION	NO.	SIZE & MATERIAL			VOLTAGE	AC DC	FROM	VIA	TO	FUNCTION	NO.	SIZE & MATERIAL								
DP1	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F01	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC1	6	1/C	12	600	90°C	120	AC	BATT.CHARGER	CONDUIT	RTU CABINET	ALARM INDICATION	1	3/4"C-RGS
DP2	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F01	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC2	2	1/C	12	600	90°C	120	AC	INTRUSION ALARM	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP3	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F02	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC3	2	1/C	12	600	90°C	120	AC	ETR	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP4	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F02	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC4	2	1/C	12	600	90°C	120	AC	FIRE ALARM	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP5	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F03	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC5	2	1/C	12	600	90°C	120	AC	ANNUNICATOR	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP6	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F03	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC6	30	1/C	12	600	90°C	120	AC	8F01	CONDUIT	RTU CABINET	ALARM INDICATION	1	2"C-PVC
DP7	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F04	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC7	30	1/C	12	600	90°C	120	AC	8F02	CONDUIT	RTU CABINET	ALARM INDICATION	1	2"C-PVC
DP8	1	1/C	1000	2KV	EPR	650	DC	BREAKER 8F04	CONDUIT	OCS	TIE BREAKER	1	3"C-PVC			SC8	30	1/C	12	600	90°C	120	AC	8F03	CONDUIT	RTU CABINET	ALARM INDICATION	1	2"C-PVC
DP9	-	-						ROOM DOOR	CONDUIT	OCS	SPARE	1	3"C-PVC			SC9	30	1/C	12	600	90°C	120	AC	8F04	CONDUIT	RTU CABINET	ALARM INDICATION	1	2"C-PVC
DP10	-	-						ROOM DOOR	CONDUIT	OCS	SPARE	1	3"C-PVC																
DN1	2	1/C	#6	2KV	EPR	650	DC	NEGATIVE REF.CABINET	CONDUIT	RAIL	NEGATIVE RETURN REF.	1	2"C-PVC			AN1	2	1/C	12	600	90°C	120	AC	ETR	CONDUIT	ANNUNICATOR	ALARM	1	3/4"C-RGS
DN2	1	1/C	#6	2KV	EPR	650	DC	NEGATIVE REF.CABINET	CONDUIT	BREAKER 8F01	VOLT TRANSDUCER	1	2"C-PVC			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
AC1	4/1	1/C	#6/10	600	90°C	120	AC	ELECTRICAL ROOM	CONDUIT	PANEL PNP	AUX.SERVICE	1	1"C-RGS			AN4	2	1/C	12	600	90°C	120	AC	BATTERY ROOM VENT.	CONDUIT	ANNUNICATOR	ALARM	1	3/4"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			AN5	2	1/C	12	600	90°C	120	AC	PNP	CONDUIT	ANNUNICATOR	ALARM	1	3/4"C-RGS
AC3	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	DC SWGR	CONTROL POWER	1	3/4"C-PVC			AN6	12	1/C	12	600	90°C	120	AC	8F01	CONDUIT	ANNUNICATOR	ALARM	1	1"C-PVC
AC4	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	RTU CABINET	CONTROL POWER	1	3/4"C-RGS			AN7	12	1/C	12	600	90°C	120	AC	8F02	CONDUIT	ANNUNICATOR	ALARM	1	1"C-PVC
AC5	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	INTRUSION ALARM	CONTROL POWER	1	3/4"C-RGS			AN8	12	1/C	12	600	90°C	120	AC	8F03	CONDUIT	ANNUNICATOR	ALARM	1	1"C-PVC
AC6	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	FIRE ALARM PANEL	CONTROL POWER	1	3/4"C-RGS			AN9	12	1/C	12	600	90°C	120	AC	8F04	CONDUIT	ANNUNICATOR	ALARM	1	1"C-PVC
AC7	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	EF-1	CONTROL POWER	1	3/4"C-RGS			CM1	18	PR.	22	60	90°C	120	AC	SCADA	CONDUIT	COMM. RM	COMM.	1	1"C-PVC
AC8	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	EF-2	CONTROL POWER	1	3/4"C-RGS																
AC9	2/1	1/C	#10/12	600	90°C	120	AC	PANEL PNP	CONDUIT	AIR CONDITIONER	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 CABINE1	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	DC SWGR	DC POWER	1	3/4"C-PVC																

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:

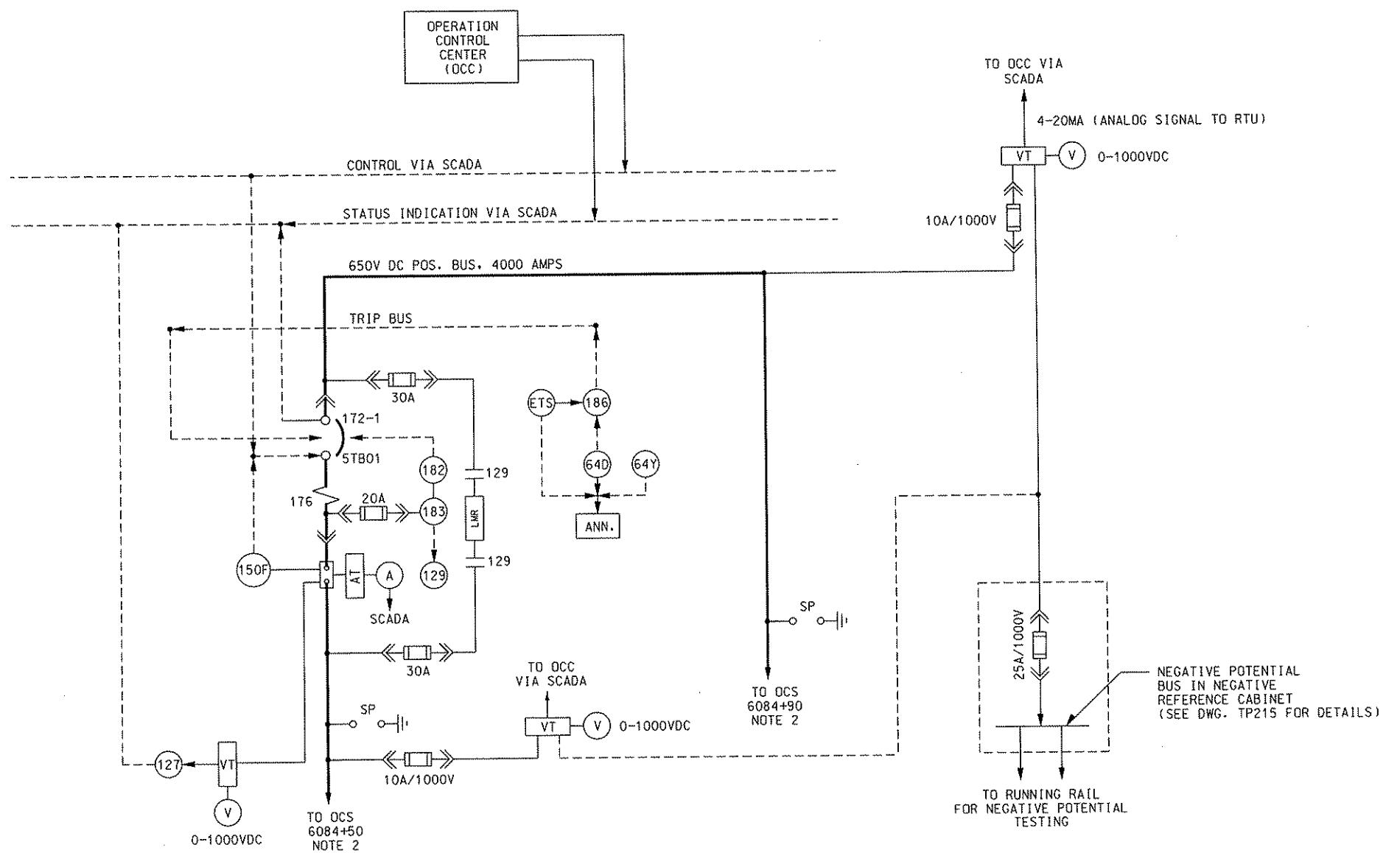
1. CONDUIT AND CABLE SCHEDULE IS TYPICAL AND PROVIDED FOR INFORMATION AND GUIDANCE ONLY. THE CONTRACTOR SHALL VERIFY THE SCHEDULE AND MAKE CHANGES/ADDITIONS AS REQUIRED FOR COMPLETE WORKING SYSTEM AT NO ADDITIONAL COST TO PORT AUTHORITY.
2. CONTRACTOR TO UTILIZE CABLE TRAY WHENEVER POSSIBLE TO MINIMIZE 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.

		Gannett Fleming Transit & Rail Systems	NO. DATE	DESCRIPTION	
				REVISIONS	



DMJM HARRIS | AECOM  
 FOUR GATEWAY CENTER  
 20TH FLOOR  
 PITTSBURGH, PA. 15222  
 APPROVED DATE  
*Dave H. Harris 4/28/08*

DESIGNED H SOROKIN  
 DRAWN HT TRAN  
 CHECKED M INSOGNA  
 IN CHARGE CD JONES  
 DATE APR. 28, 200



### ALLEGHENY CIRCUIT BREAKER ROOM

(SEE DWG. TP203 FOR SCHEMATIC)

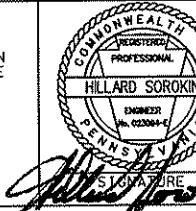
BREAKER 7F05

NOTES:

- ALL FEEDER BREAKERS RATED 4,000 AMPS UNLESS OTHERWISE NOTED.
- EACH OCS FEEDER WILL BE COMPRISED OF TWO 1000KCMIL CABLES.

Gannett Fleming Transit & Rail Systems			
NO.	DATE	DESCRIPTION	REVISIONS

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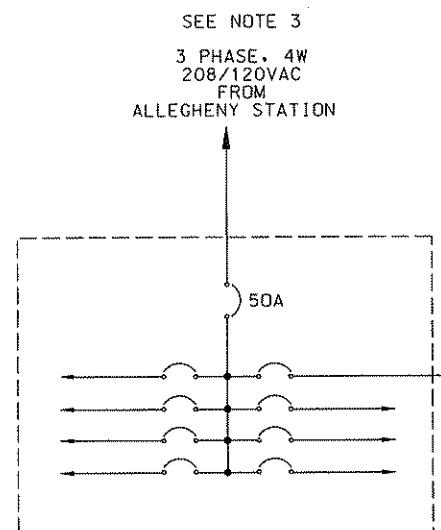
DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel J. Harris 4/28/08*

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

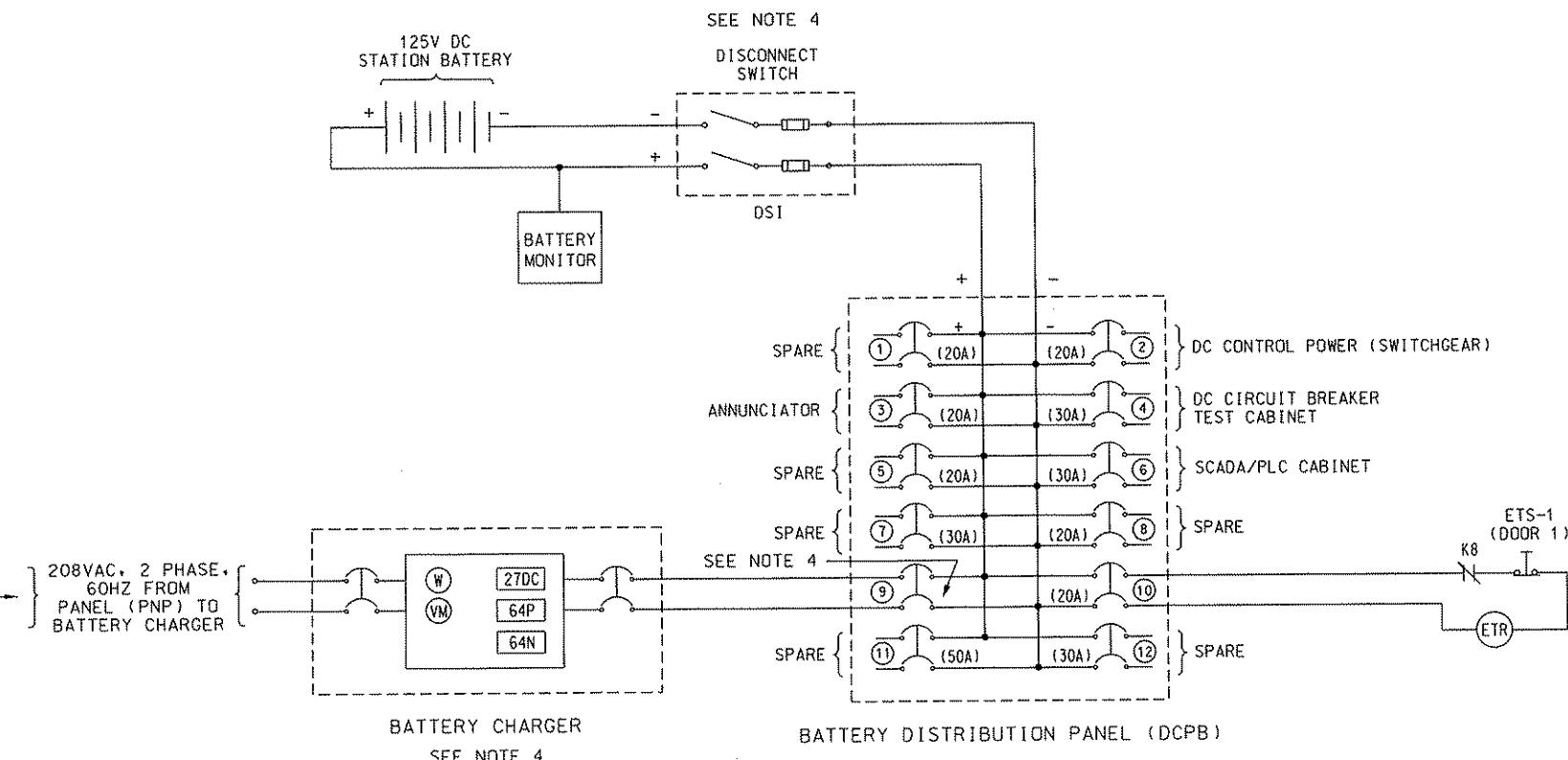
PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
ALLEGHENY CIRCUIT BREAKER ROOM  
POWER SINGLE LINE DIAGRAM  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP201 SHT. 301

CONNECTED VA PER PHASE	A	1300
	B	1000
	C	100

TOTAL CONNECTED VA	2400
TOTAL CONNECTED AMPS	11.5 @ 208 VAC



AUXILIARY PANEL PNP  
208/120VAC. 3 PHASE. 4W



## ALLEGHENY CIRCUIT BREAKER ROOM

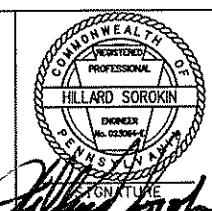
## NOTES

1. MANUFACTURER TO INCLUDE LEGEND FOR ALL FUNCTIONS AND DEVICES SHOWN ON THIS DRAWING ON ALL SHOP DRAWING SUBMITTLES.
  2. IF NO WIRE SIZE IS SPECIFIED USE #12 AWG PLUS #12G.
  3. FEED FROM ELECTRICAL ROOM 104 PANEL DP, CKJS, 1, 3, 5.  
SEE DWG. EL016, EL017 (NSC-012).
  4. CONTRACTOR TO SIZE CHARGERS, BATTERIES, BREAKERS CABLES AND DISCONNECT SWITCH.



No.	Date	DESCRIPTION
REVISIONS		

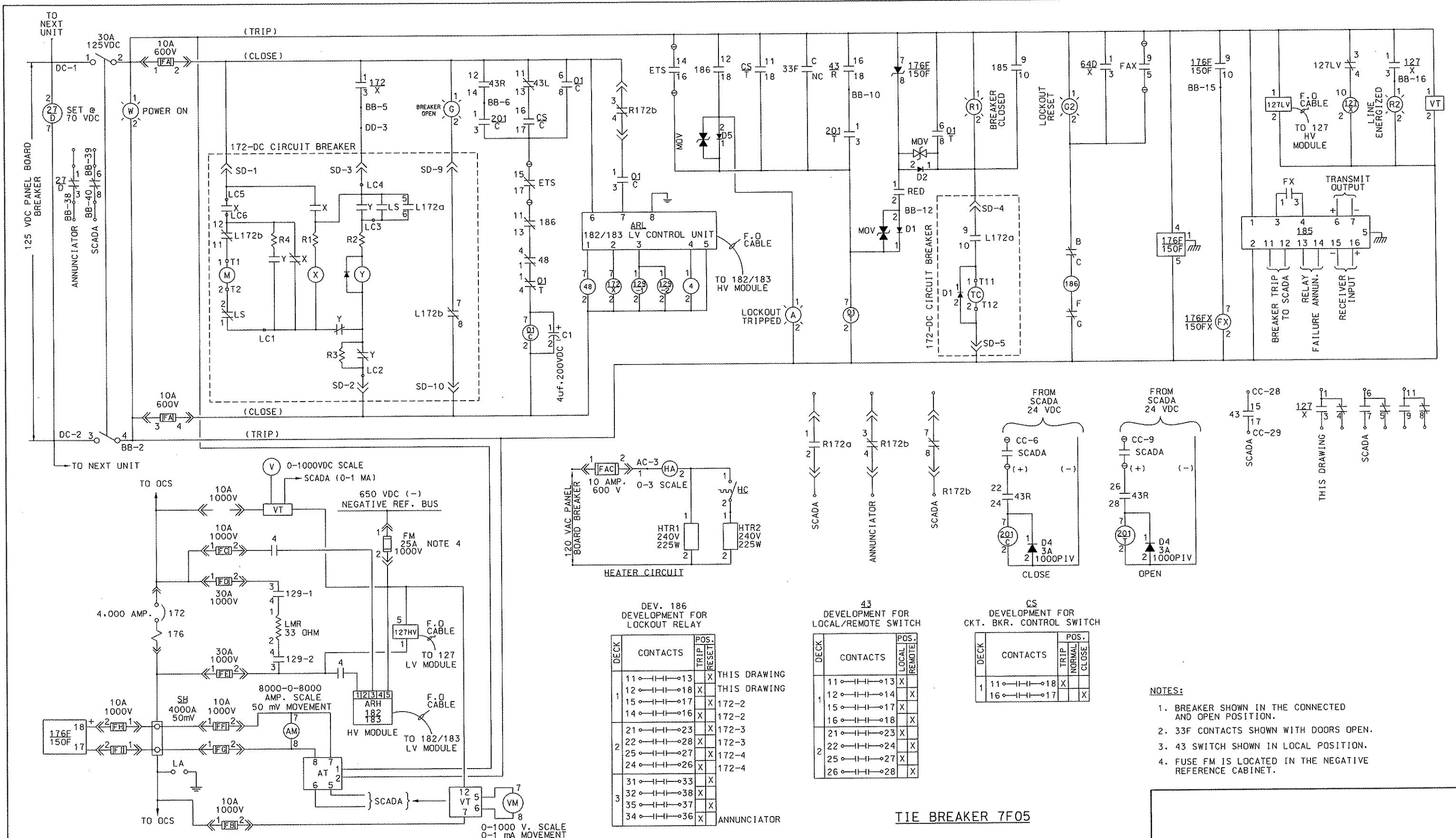
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**DMJM HARRIS | AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222

Daniel P. Fain 4/28/08

GNEED	H SOROKIN	PORT AUTHORITY OF ALLEGHENY COUNTY		
N	RG JACKSON	PITTSBURGH PENNSYLVANIA		
		NORTH SHORE CONNECTOR		
		SYSTEMWIDE TRACTION POWER AND OCS		
		ALLEGHENY CIRCUIT BREAKER ROOM		
		AUXILIARY POWER SINGLE LINE DIAGRAM		
APR. 28, 2008		 <small>Engineering Services</small>	CONTRACT NO.	NSC-009
E NTS			DWG. NO.	TP202



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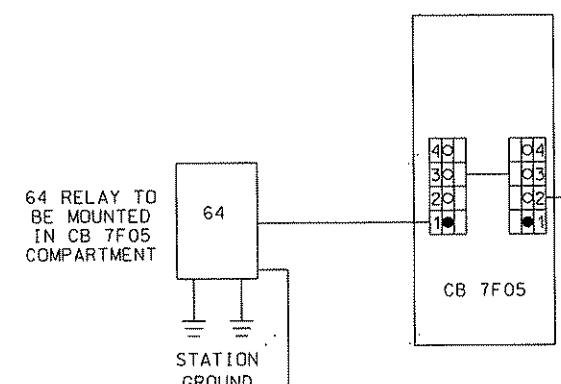
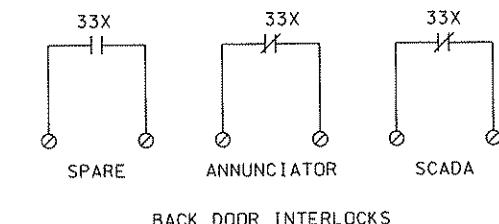
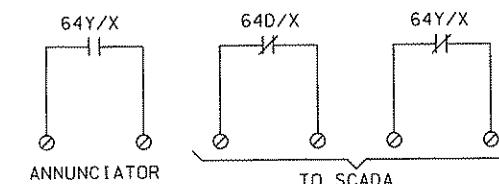
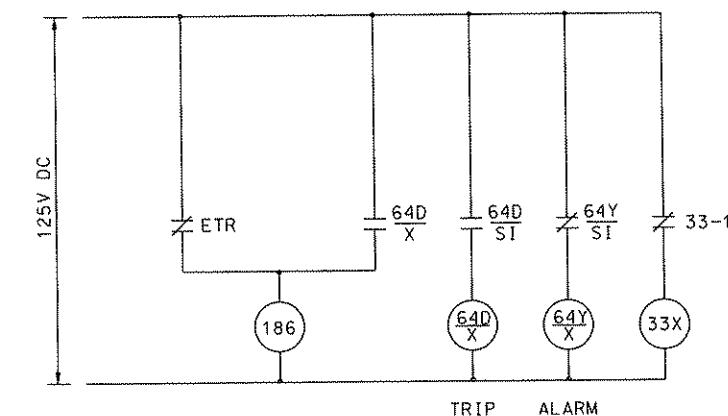
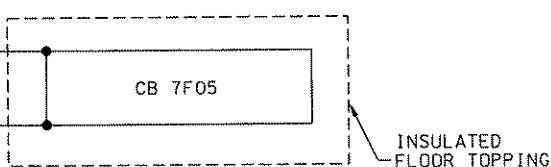
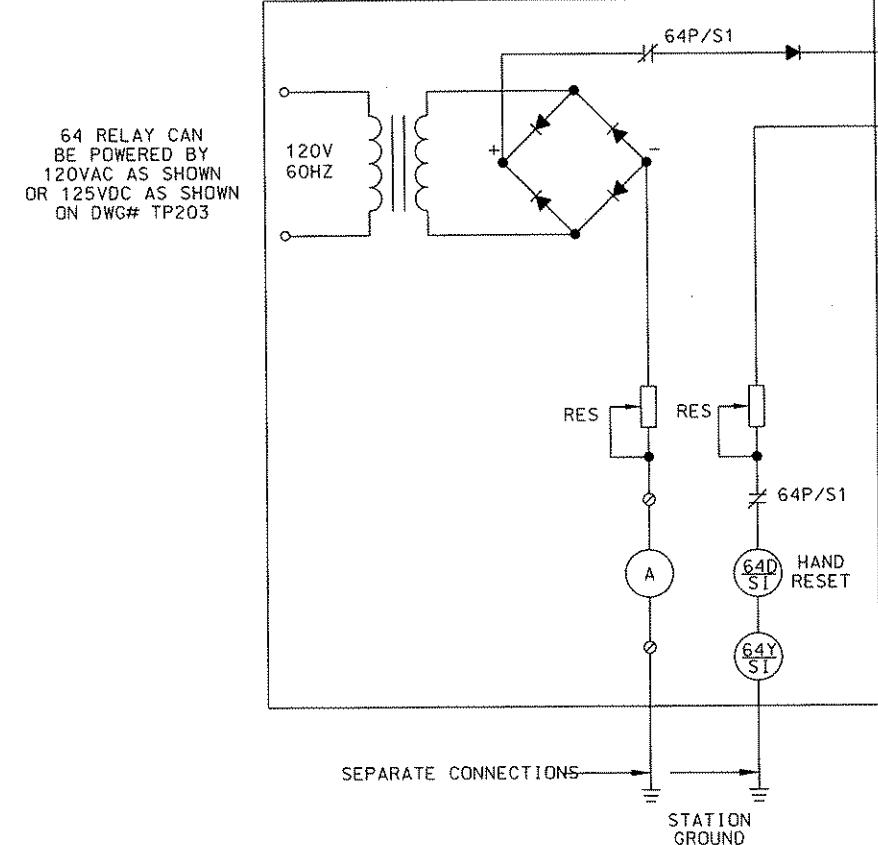
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ALLENTOWN COUNTY, PENNSYLVANIA.

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

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH PENNSYLVANIA

**NORTH SHORE CONNECTOR**  
**NSC TRAIN SYSTEM (SYSTEM WIDE)**  
**ALLEGHENY CIRCUIT BREAKER ROOM**  
**TYPICAL CIRCUIT BREAKER CONTROL SCHEMATIC**

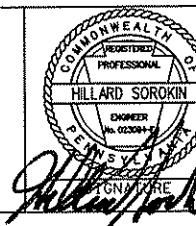


NOTES:

- MANUFACTURER TO INCLUDE LEGEND FOR ALL FUNCTIONS AND DEVICES SHOWN ON THIS DRAWING ON ALL SHOP DRAWING SUBMITTALS.
- ALL RGS CONDUITS ENTERING THE DC SWITCHGEAR SHALL HAVE FRE NIPPLES TO ISOLATE ENCLOSURES.
- ALL CONTROL WIRING ENTERING OR LEAVING THE DC SWITCHGEAR SHALL BE 1000V INSULATED.

ALLEGHENY CIRCUIT BREAKER ROOM

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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Dave J. Harris 4/28/08*  
SIGNATURE APPROVED 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  
NORTH SHORE CONNECTOR  
SYSTEMWIDE TRACTION POWER AND OCS  
ALLEGHENY CIRCUIT BREAKER ROOM  
DC HOT AND GROUND STRUCTURE SCHEMATIC  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP204  
SHT. 310

Gannett Fleming  
Transit & Rail Systems

NO.	DATE	DESCRIPTION
REVISIONS		

## TRIP AND LOCKOUT SCHEDULE

m = ENERGIZ

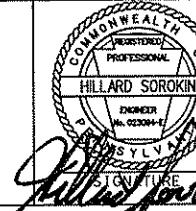
T = TR

## ALLEGHENY CIRCUIT BREAKER ROOM



NO.	DATE	DESCRIPTION
REVISIONS		

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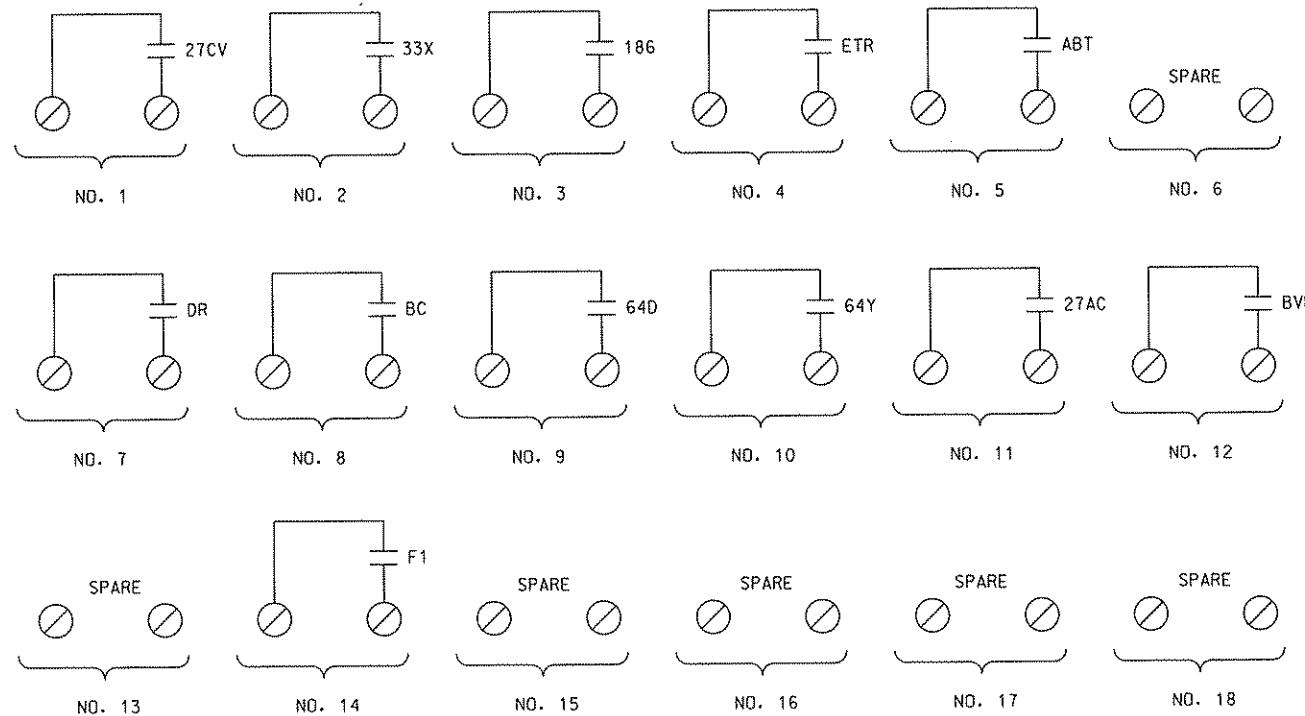


**DMJM HARRIS AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel P. Harrington 4/28/08*  
APPROVED DATE

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

**PITTSBURGH PORT AUTHORITY OF ALLEGHENY COUNTY PITTSTON PENNSYLVANIA**

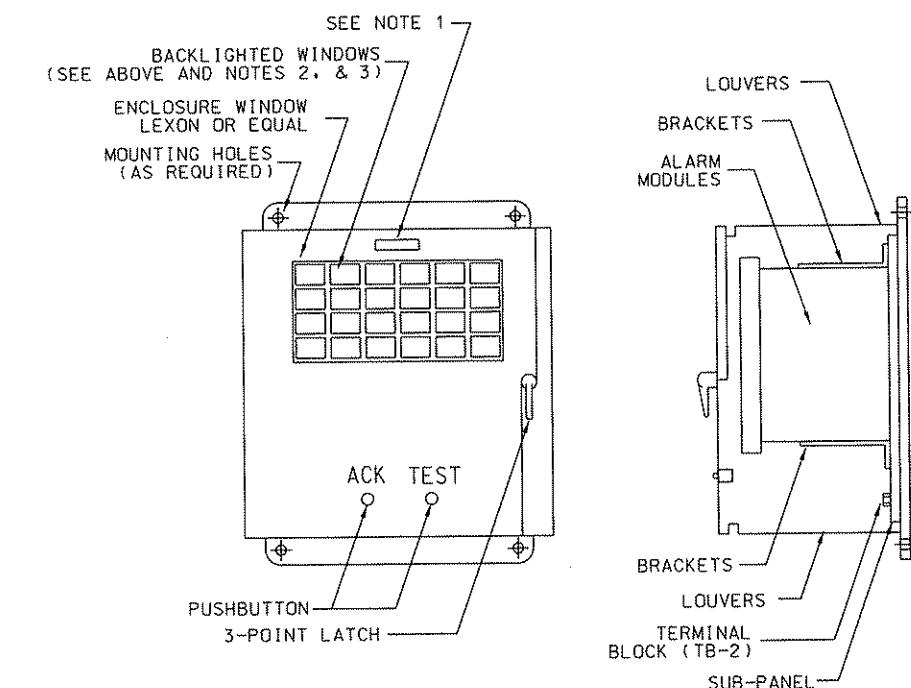
**NORTH SHORE CONNECTOR  
SYSTEMWIDE TRACTION POWER AND OCS  
ALLEGHENY CIRCUIT BREAKER ROOM  
TRIP AND LOCKOUT SCHEDULE**



TIE BREAKER STATION ANNUNCIATOR					
LOSS OF DC CONTROL VOLTAGE	DOOR OPEN DEVICE 33X	LOCKOUT DEVICE 186	EMERGENCY TRIP	ABNORMAL DC BREAKER TRIP	
1	2	3	4	5	6
BUILDING DOOR OPEN	BATTERY CHARGER PROBLEM	HOT STRUCTURE TRIP 64D	STRUCTURE GROUND 64Y	LOSS OF SERVICE POWER	BATTERY ROOM VENT FAILURE
7	8	9	10	11	12
	FEEDER #1 TRIP				
13	14	15	16	17	18

NOTES:

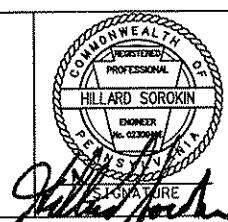
1. NAMEPLATE SHALL BE 25.4 mm x 76.2 mm [1" x 3"] LAMINATED PLASTIC BLACK AND SHALL BE ENGRAVED WITH 12.5 mm [1/2"] LETTERS "K015" FOR ANNUNCIATOR PANEL.
2. WINDOW NUMBERS ARE FOR REFERENCE ONLY. DO NOT ENGRAVE. WINDOWS SHALL BE 76.2 mm x 84.1 mm [3" x 35 $\frac{1}{16}$ "], AND LETTERING SHALL BE SIZED TO MAXIMIZE WINDOW SPACE.
3. BLANK WINDOWS ARE SPARES.
4. ALARM WINDOW CONFIGURATION IS TYPICAL, SHOWN FOR GUIDANCE ONLY.
5. ANNUNCIATOR PANEL TO SUPPLY GENERAL ALARM TO SCADA.



ANNUNCIATOR  
34"H x 32"W x 16"D

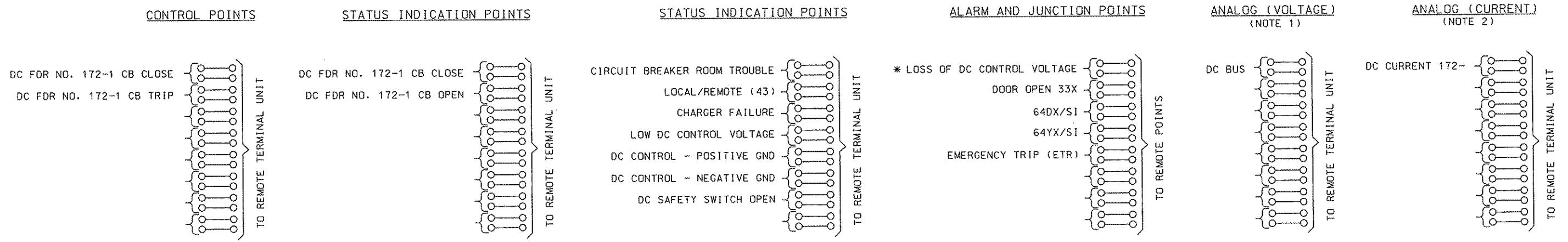
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*David P. Hays 4/28/08*  
SIGNATURE APPROVED DATE

PORT AUTHORITY OF ALLEGHENY COUNTY  
Pittsburgh  
NORTH SHORE CONNECTOR  
SYSTEMWIDE TRACTION POWER AND OCS  
ALLEGHENY CIRCUIT BREAKER ROOM  
ANNUNCIATOR PANEL  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP207  
SHT. 312

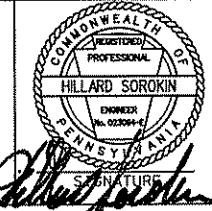


NOTES:

1. SOURCE VOLTAGE DCV 0-800, OUTPUT 4-20 mA.
2. SOURCE AMPERAGE 0 - 4,000, OUTPUT 4-20 mA.
3. \* = PUT ALL FOUR(4) NORMALLY OPEN CONTACTS IN PARALLEL.

NO.	DATE	DESCRIPTION	
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
HILLARD SOROKIN  
OWNER  
PA. 02384-4  
SIGNATURE  
APPROVED  
DATE  
*David J. Harris 4/28/08*

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
Pittsburgh  
North Shore Connector  
Systemwide Traction Power and OCS  
Allegheny Circuit Breaker Room  
RTU Panel  
Port Authority  
Contract No. NSC-009  
DWG. No. TP208  
Sht. 3/3

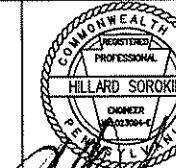
NOTES:

1. FROM ANNUNCIATOR PANEL.
  2. PROVIDE SCADA WITH 20% SPARE INPUT AND CONTROL POINT



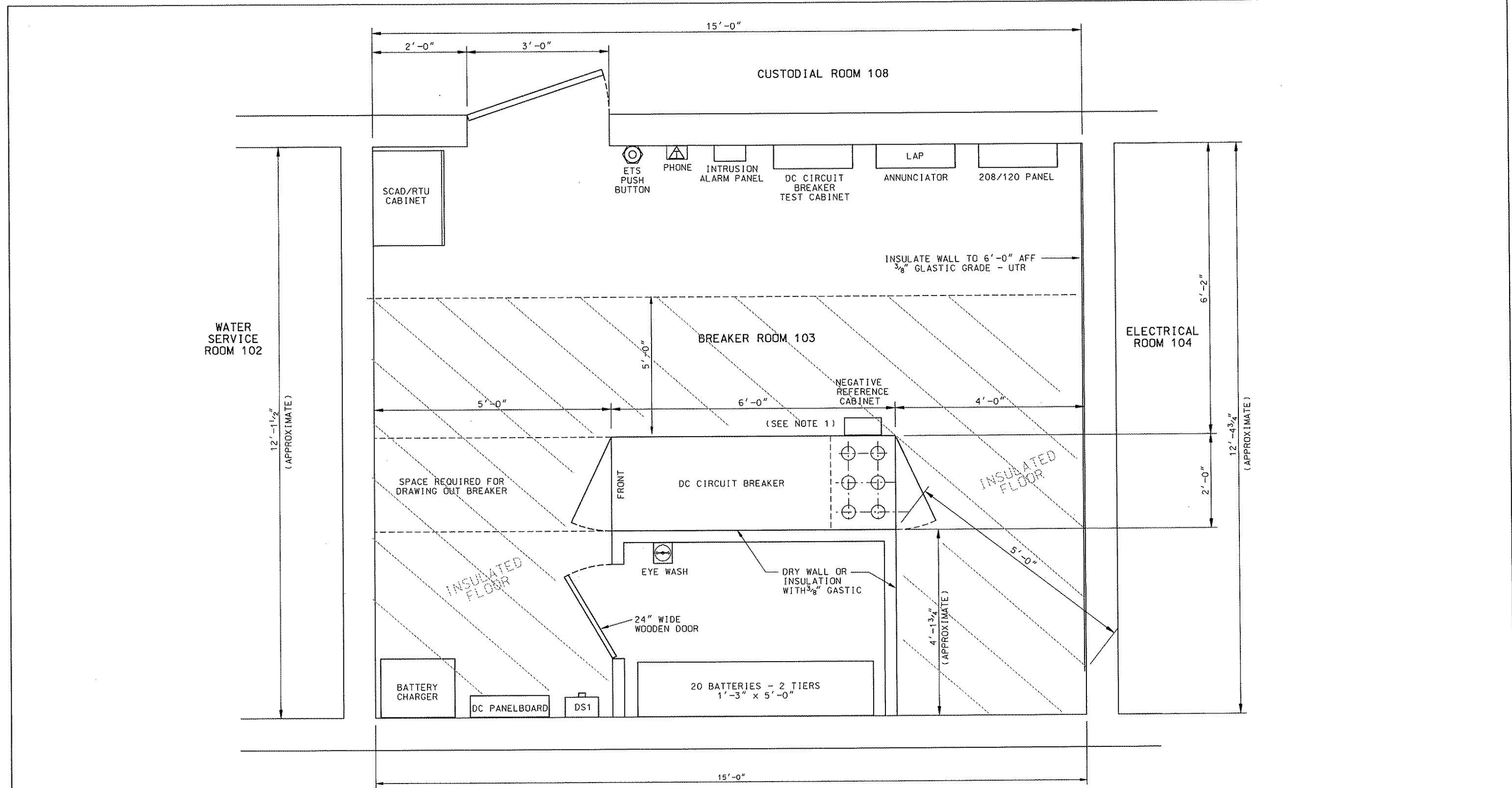
 <b>Gannett Fleming</b> Transit & Rail Systems		
NO.	DATE	DESCRIPTION
REVISIONS		

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FINANCED IN PART THROUGH A GRANT FROM THE  
FEDERAL TRANSIT ADMINISTRATION, U.S.  
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ALLEGHENY COUNTY, PENNSYLVANIA.



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

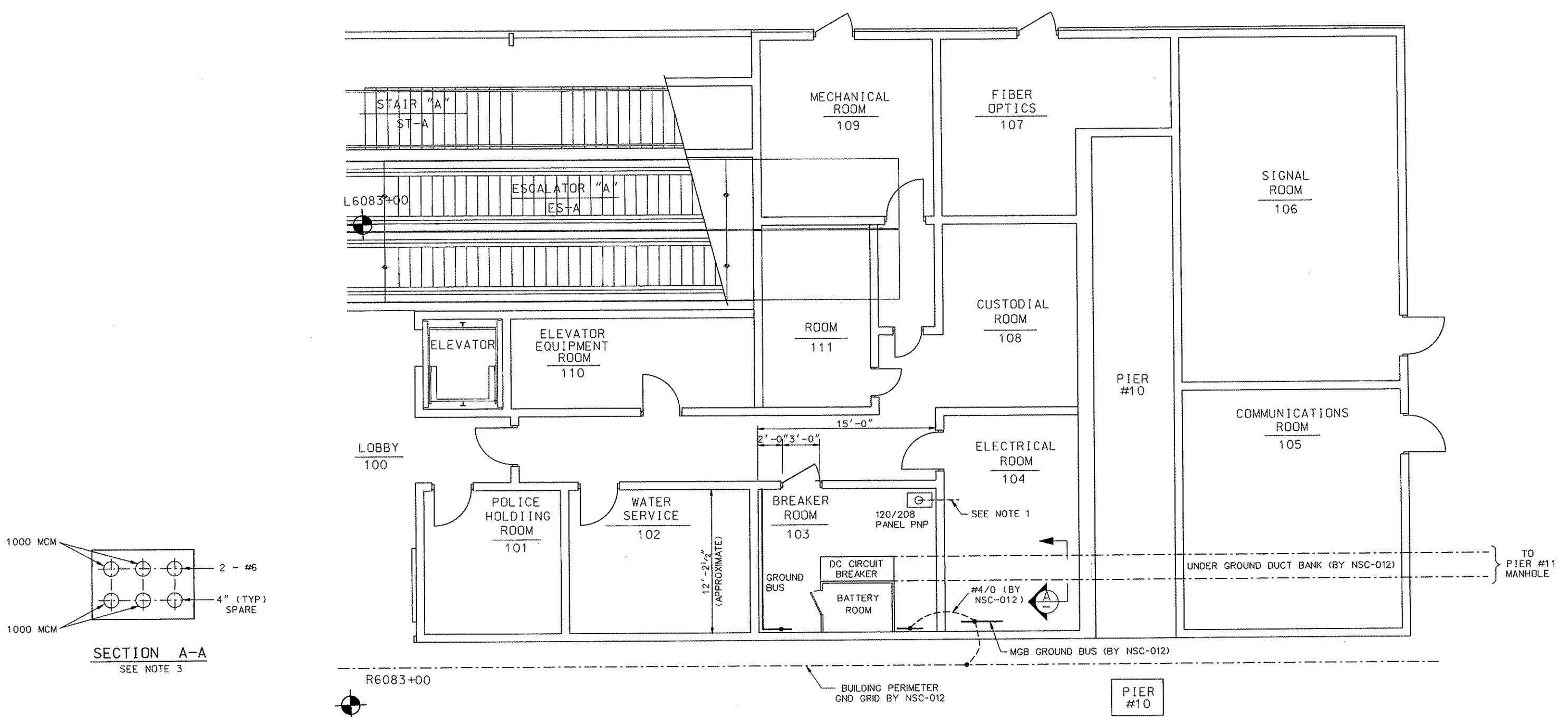
N	PORT AUTHORITY OF ALLEGHENY COUNTY PITTSBURGH		PENNSYLVANIA
ON	NORTH SHORE CONNECTOR SYSTEMWIDE TRACTION POWER AND OCS ALLEGHENY CIRCUIT BREAKER ROOM SCADA INDICATION AND CONTROL POINTS LIST		
IA	Port Authority of Allegheny County	CONTRACT NO.	NSC-009
LS		DWG NO.	TP209
08			
S			



**NOTES:**

1. SEE DWG. TP201 AND TP215 FOR DETAILS.

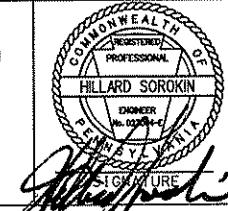
 <b>Gannett Fleming</b> Transit & Rail Systems			<p>THE PREPARATION OF THIS DOCUMENT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE PORT AUTHORITY OF ALLEGHENY COUNTY, PENNSYLVANIA.</p>	 <b>DMJM HARRIS   AECOM</b> FOUR GATEWAY CENTER 20TH FLOOR PITTSBURGH, PA. 15222 <i>David M. Harris</i> APPROVED DATE <i>4/28/08</i>	DESIGNED H SOROKIN
					DRAWN RG JACKSON
NO. DATE	DESCRIPTION	REVISIONS		CHECKED M INSOGNA	PORT AUTHORITY OF ALLEGHENY COUNTY PITTSBURGH
				IN CHARGE CD JONES	NORTH SHORE CONNECTOR NSC TRAIN SYSTEM: (SYSTEM WIDE) ALLEGHENY CIRCUIT BREAKER ROOM EQUIPMENT ARRANGEMENT PLAN
				DATE APR. 28, 2008	
				SCALE NTS	Port Authority
				CONTRACT NO. NSC-009	
				DWG. NO. TP211	SHT. 315



## NOTES:

1. PROVIDE SLAB 2" CONDUIT FROM ELECTRICAL ROOM 104 TO BREAKER ROOM 103 (PNP PANEL BOARD).
  2. SEE DWG. TP214 FOR DETAILS OF ROOM 103 GROUNDING.
  3. UNDER GROUND DUCT BANK BY NSC-012,  
SEE DWG. EL009 & EL 019 FOR DETAILS.

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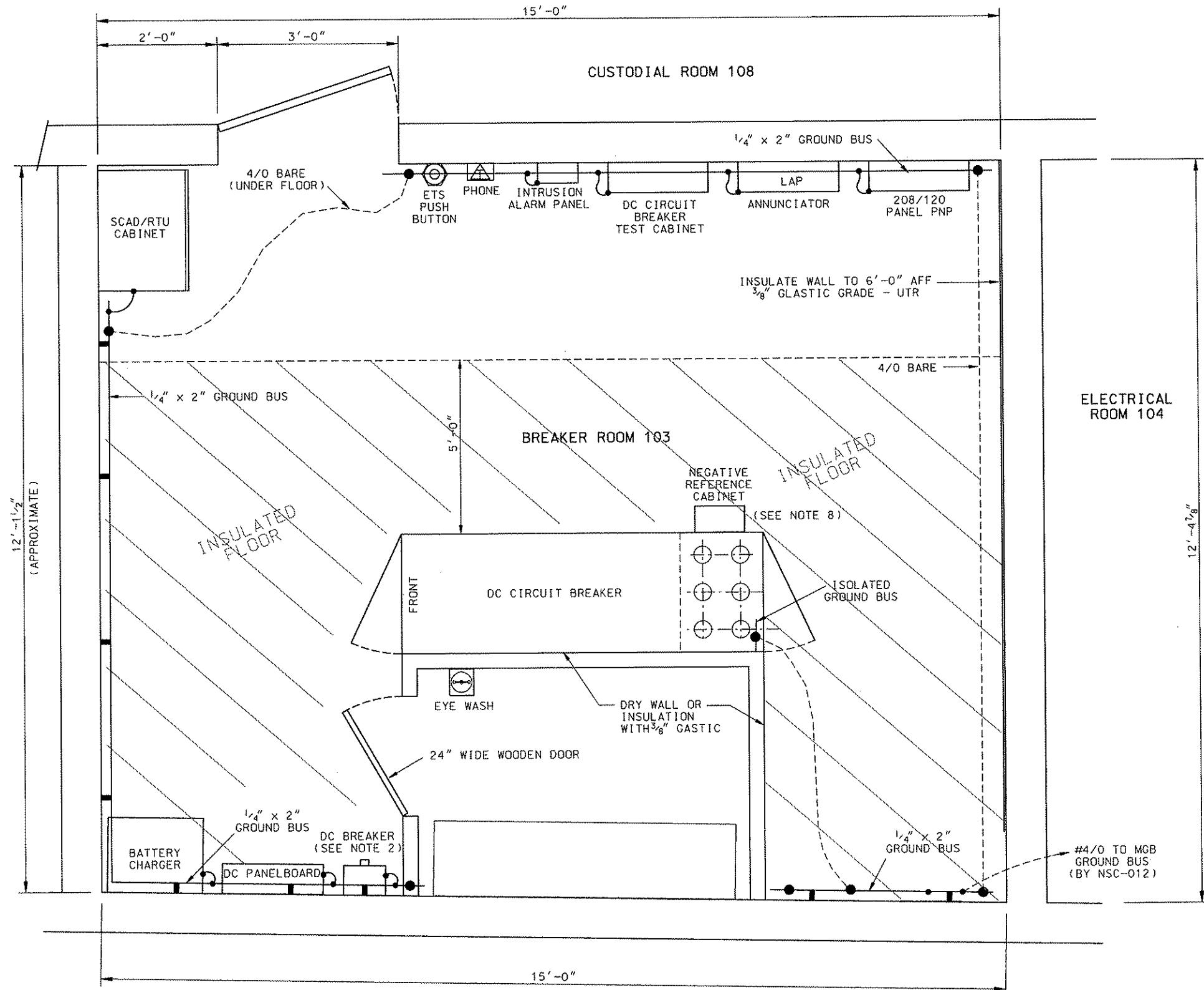
**DMJM HARRIS** | **AECOM**  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222

**PITTSBURGH** **PENNSYLVANIA**

**NORTH SHORE CONNECTOR  
TRAIN SYSTEM (SYSTEM WIDE)  
ALLEGHENY CIRCUIT BREAKER ROOM  
GROUND GRID AND DUCT BANK PLAN**

<b>CONTRACT NO.</b>	<b>NSC-009</b>
<b>DWG. NO.</b>	<b>TR212</b>

REF ID: A6200



#### ROOM 103 REFERENCE SERVICES

1. SERVICE TO ROOM: 208/120V, 50A FROM DP PANEL IN ROOM 104 CIRCUITS 1, 3 & 5. SEE DWG. EL009, EL017 (NSC-012)
2. ROOM HVAC (NSC-012)
  - EUH-1, 3KW, 277V HEATER
  - EF2, 500 CFM, 120V
3. ROOM 103 LIGHTING, SEE DWG. EL004 (NSC-012)
4. ROOM 103 RECEPTACLES, SEE DWG. EL009, EL017 (NSC-012)
5. ROOM 103 COMMUNICATIONS, SEE DWG. EL012 (NSC-012)
6. PERIMETER GROUNDING, SEE DWG. EL021 (NSC-012)

#### NOTES:

1. SEE DRAWING TP301 FOR ROOM GROUND BUS DETAILS.
2. ALL GROUND CABLES SHALL BE 4/0 STRANDED BARE COPPER CABLE.
3. ALL UNDERGROUND CONNECTIONS SHALL BE EXOTHERMIC WELDS.
4. ALL ABOVE GROUND CONNECTIONS SHALL BE BOLTED, EXCEPT TO STEEL COLUMNS.
5. ALL STEEL COLUMNS IN BREAKER ROOM 103 ARE TO BE GROUNDED.
6. GROUND CABLE TO DC CIRCUIT BREAKER TO BE INSULATED THROUGH A PVC CONDUIT.
7. ALL CONDUIT ENTERING OR EXITING DC CIRCUIT BREAKER TO BE ISOLATED (PVC).
8. SEE DWG. TP201 AND TP215 FOR DETAILS.

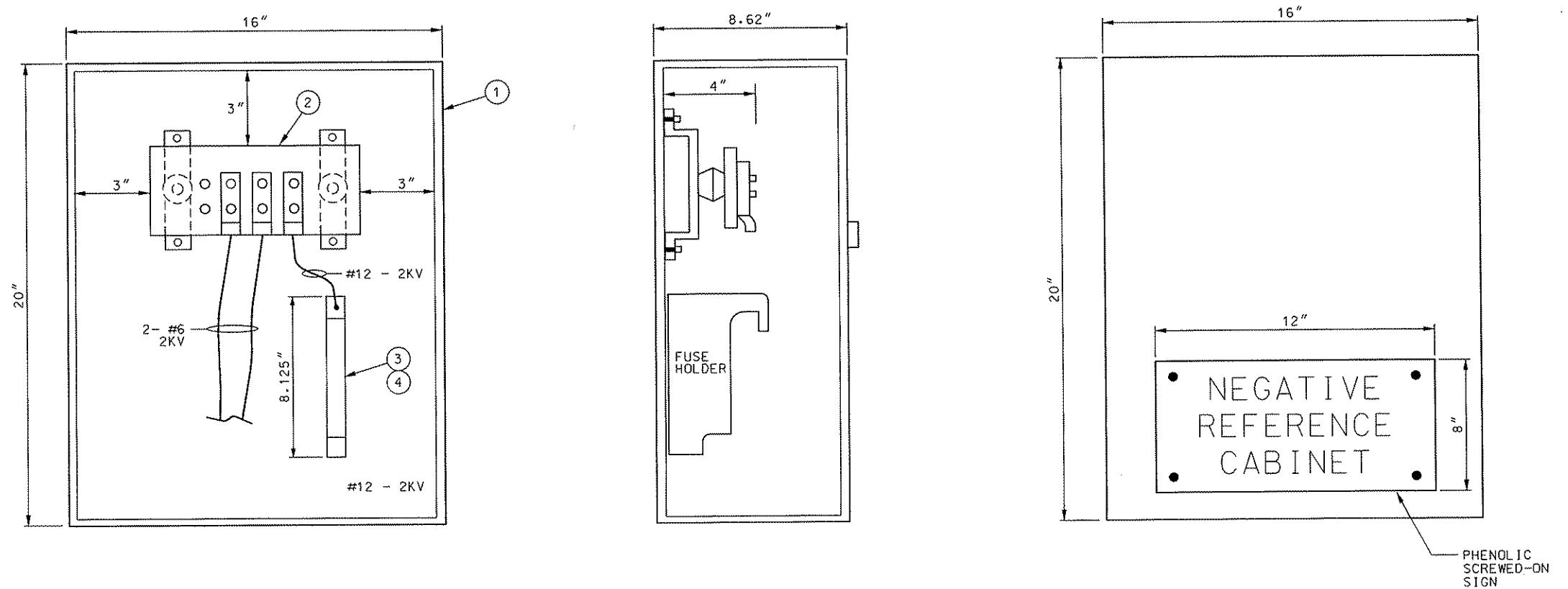
NO.	DATE	DESCRIPTION	REVISIONS
Gannett Fleming Transit & Rail Systems			

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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*David J. Harris 4/28/08*  
APPROVED DATE

PORT AUTHORITY OF ALLEGHENY COUNTY  
Pittsburgh  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM: (SYSTEM WIDE)  
ALLEGHENY CIRCUIT-BREAKER ROOM  
EQUIPMENT GROUND PLAN  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP214 SHT. 317

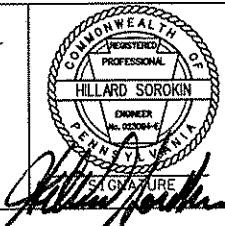


NEGATIVE  
REFERENCE  
CABINET  
(N.T.S)

- ① - WALL MOUNTED CONTROL ENCLOSURE  
HOFFMAN #A-24N168LP WITH PANEL  
A-20N16MP 20"x16"x8.62".
- ② - BUS BAR KIT STORM COPPER COMONETS  
MODEL #SCGB-3KT, COPPER BAR  $\frac{1}{4}$ "x4"x10"  
WITH BRACKET AND INSULATOR 2015-3C  
(2500V).
- ③ - FUSE 25A, 1000VDC FUSE FERRAZ  
SHAWMUT CAT. E089497.
- ④ - FUSE HOLDER FERRAZ SHAWMUT CAT.  
PSI 20x127, 1 POLE, 1500V.

 <b>Gannett Fleming</b> Transit & Rail Systems		
	NO. DATE	DESCRIPTION
		REVISIONS

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



DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daniel J. Henry 4/28/08*  
SIGNATURE  
APPROVED  
DATE

PORT AUTHORITY OF ALLEGHENY COUNTY PENNSYLVANIA	
NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM-WIDE) NEGATIVE REFERENCE CABINET ALLEGHENY TIE BREAKER STATION	
Port Authority	CONTRACT NO. NSC-009 DWG. NO. TP215 SHT. 318

CABLE				CIRCUIT	ROUTING				CONDUIT	CABLE				CIRCUIT	ROUTING				CONDUIT								
NO.	CONSTRUCTION	SIZE AWG	INSULATION VOLTAGE TYPE	VOLTAGE	AC DC	FROM	VIA	TO	FUNCTION	NO.	SIZE & MATERIAL	NO.	CONSTRUCTION	SIZE AWG	INSULATION VOLTAGE TYPE	VOLTAGE	AC DC	FROM	VIA	TO	FUNCTION	NO.	SIZE & MATERIAL				
DP1	1	1/C	1000	2KV	EPR	650	DC	BREAKER 7F05	CONDUIT	OCS 6088+85	TIE BREAKER	1	3"C-PVC	SC1	6	1/C	12	600	90°C	120	AC	BATT.CHARGER	CONDUIT	RTU CABINET	INDICATION	1	3/4"C-RGS
DP2	1	1/C	1000	2KV	EPR	650	DC	BREAKER 7F05	CONDUIT	OCS 6088+85	TIE BREAKER	1	3"C-PVC	SC2	2	1/C	12	600	90°C	120	AC	INTRUSION ALARM	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP3	1	1/C	1000	2KV	EPR	650	DC	BREAKER 7F05	CONDUIT	OCS 6088+86	TIE BREAKER	1	3"C-PVC	SC3	2	1/C	12	600	90°C	120	AC	ETR	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP4	1	1/C	1000	2KV	EPR	650	DC	BREAKER 7F05	CONDUIT	OCS 6088+86	TIE BREAKER	1	3"C-PVC	SC4	2	1/C	12	600	90°C	120	AC	FIRE ALARM	CONDUIT	RTU CABINET	ALARM	1	3/4"C-RGS
DP5	-	-	-	-	-	-	-	-	SPARE	1	3"C-PVC	SC5	4	1/C	12	600	90°C	120	AC	ANNUNCIATOR	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		
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 7F05	VOLT TRANSDUCER	1	1"C-PVC	AN1	2	1/C	12	600	90°C	120	AC	ETR	CONDUIT	ANNUNCIATOR	ALARM	1	3/4"C-RGS
AC1	4/1	1/C	#6/10	600	90°C	208	AC	ELECTRICAL ROOM	CONDUIT	PANEL PNP	SERVICE POWER	1	1"C-RGS	AN2	2	1/C	12	600	90°C	120	AC	FIRE ALARM	CONDUIT	ANNUNCIATOR	ALARM	1	3/4"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	AN3	4	1/C	12	600	90°C	120	AC	BATT.CHARGER	CONDUIT	ANNUNCIATOR	ALARM	1	3/4"C-RGS
AC3	2	1/C	#10	600	90°C	120	AC	PANEL PNP	CONDUIT	BREAKER 7F05	CONTROL POWER	1	3/4"C-RGS	AN4	2	1/C	12	600	90°C	120	AC	BATTERY ROOM VENT.	CONDUIT	ANNUNCIATOR	ALARM	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	AN5	2	1/C	12	600	90°C	120	AC	PNP	CONDUIT	ANNUNCIATOR	LOSS OF 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	AN6	12	1/C	12	600	90°C	120	AC	7F05	CONDUIT	ANNUNCIATOR	ALARM	1	1"C-PVC
AC6	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	FIRE ALARM PANEL	CONTROL POWER	1	3/4"C-RGS	CM1	18	PR.	22	300	90°C	48	DC	RTU CABINET	CONDUIT	COMM. ROOM	SCADA	1	1"C-RGS
AC7	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	EF-1	CONTROL POWER	1	3/4"C-RGS														
AC8	2	1/C	#12	600	90°C	120	AC	PANEL PNP	CONDUIT	EF-2	CONTROL POWER	1	3/4"C-RGS														
AC9	2/1	1/C	#10/12	600	90°C	208	AC	PANEL PNP	CONDUIT	AIR CONDITIONER	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	ANNUNCIATOR	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														

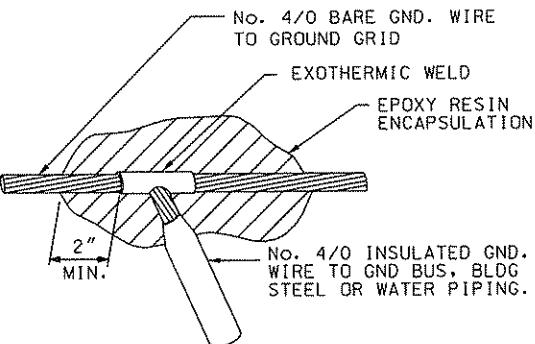
SEE NOTE 5

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

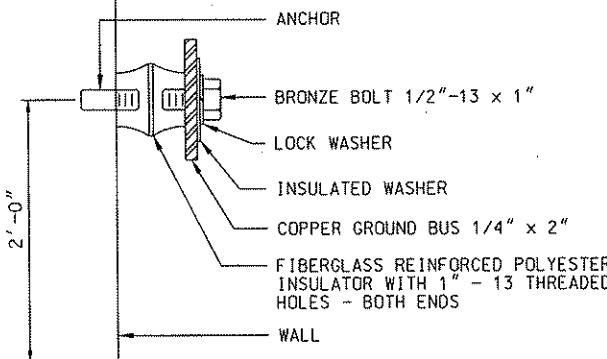
NOTES:

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.

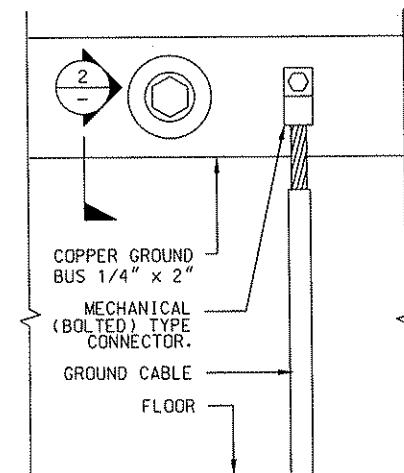
 <p>Gannett Fleming Transit &amp; Rail Systems</p>				<p>THE PREPARATION OF THIS DOCUMENT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE PORT AUTHORITY OF ALLEGHENY COUNTY, PENNSYLVANIA.</p> <table border="1"> <tr> <td>NO.</td> <td>DATE</td> <td>DESCRIPTION</td> <td>REVISIONS</td> </tr> </table>				NO.	DATE	DESCRIPTION	REVISIONS	<p>DMJM HARRIS   AECOM</p> <p>DESIGNED H SOROKIN DRAWN HT TRAN</p> <p>CHECKED M INSOGNA IN CHARGE CD JONES</p> <p>DATE APR. 28, 2008</p> <p>SCALE NTS</p> <p>Port Authority</p>				<p>PORT AUTHORITY OF ALLEGHENY COUNTY PENNSYLVANIA</p> <p>NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM WIDE) ALLEGHENY CIRCUIT BREAKER ROOM CONDUIT AND CABLE SCHEDULE</p> <p>Contract No. NSC-009 DWG. No. TP217 Sht. 3/1</p>			
								NO.	DATE	DESCRIPTION	REVISIONS								
<p>APPROVED DATE</p> <p>Daniel J. Harrington 4/28/08</p> <p>Signature</p>																			



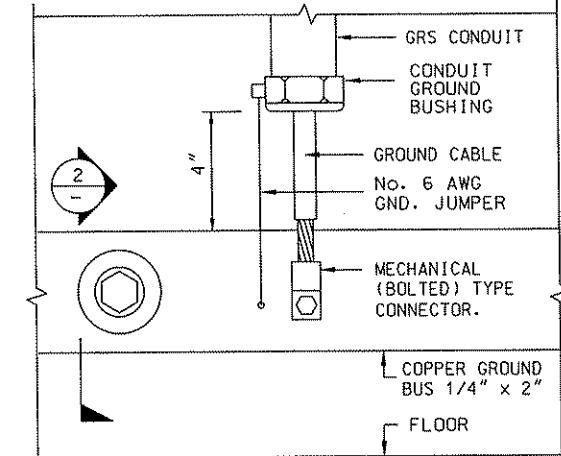
**1** - TYPICAL GROUND GRID EXOTHERMIC WELD CONNECTION WITH MOISTURE SEALING  
NO SCALE



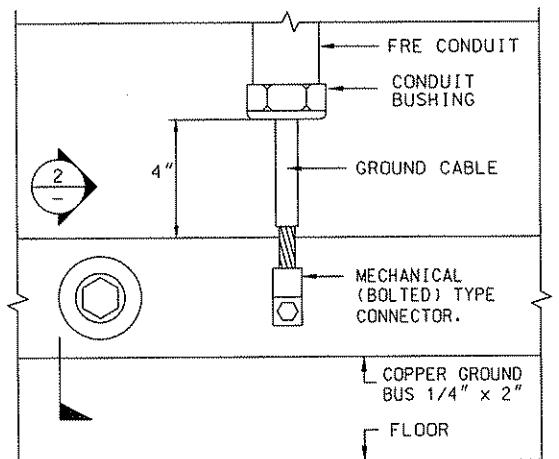
**2** - TYPICAL GROUND BUS MOUNTING  
NO SCALE



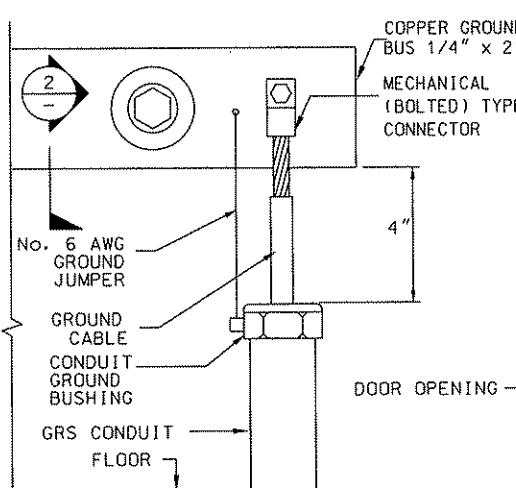
**3** - TYPICAL GROUND BUS CONNECTION FOR CAST IN CONCRETE SLAB GROUND WIRE  
AT SWGR,  
NO SCALE



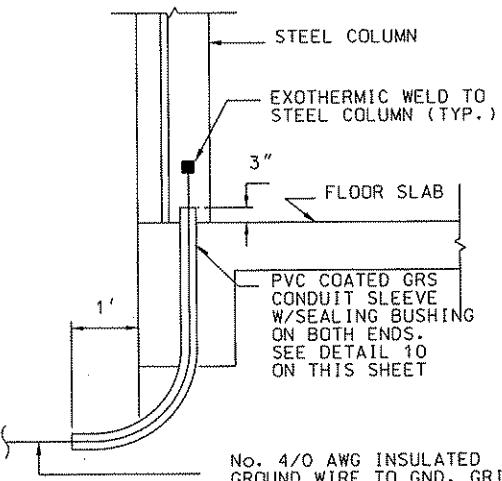
**4** - TYPICAL GROUND BUS CONNECTION IN EXPOSED GRS CONDUIT FOR EQUIPMENT GROUNDING  
NO SCALE



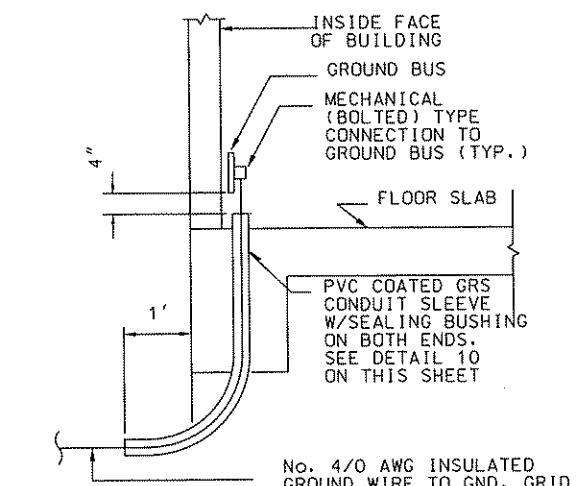
**5** - TYPICAL GROUND BUS CONNECTION IN EXPOSED FRE  
FOR DC SWGR. CONDUIT REQUIRES 2  
SEPARATE GROUND CONNECTIONS FOR 64 CKT  
NO SCALE



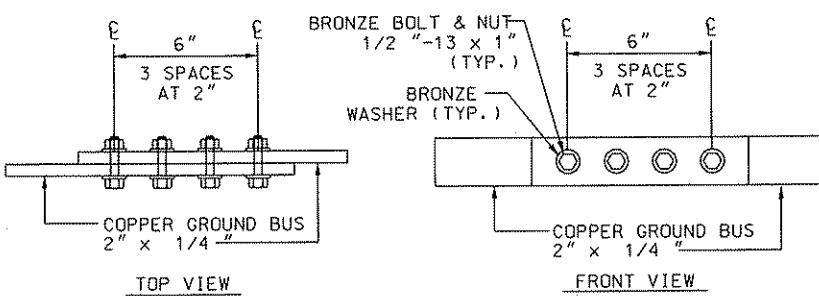
**6** - TYPICAL GROUND BUS CONNECTIONS AND JUMPERS  
AT DOOR OPENINGS  
NO SCALE



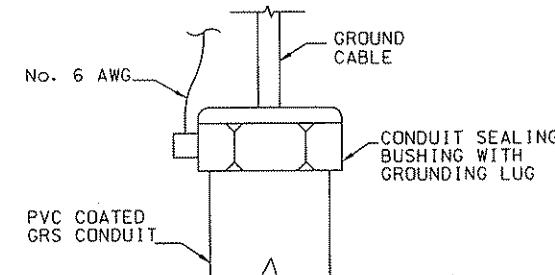
**7** - GROUNDING CONNECTION  
NO SCALE



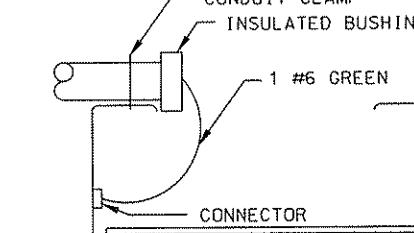
**8** - FROM GROUND GRID TO GROUND BUS  
NO SCALE



**9** - BUS SPLICE JOINT  
NO SCALE



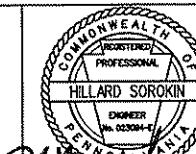
**10** - SLEEVE  
NO SCALE



**11** - TYPICAL CABLE TRAY CONNECTION  
NO SCALE

NO.	DATE	DESCRIPTION		REVISIONS

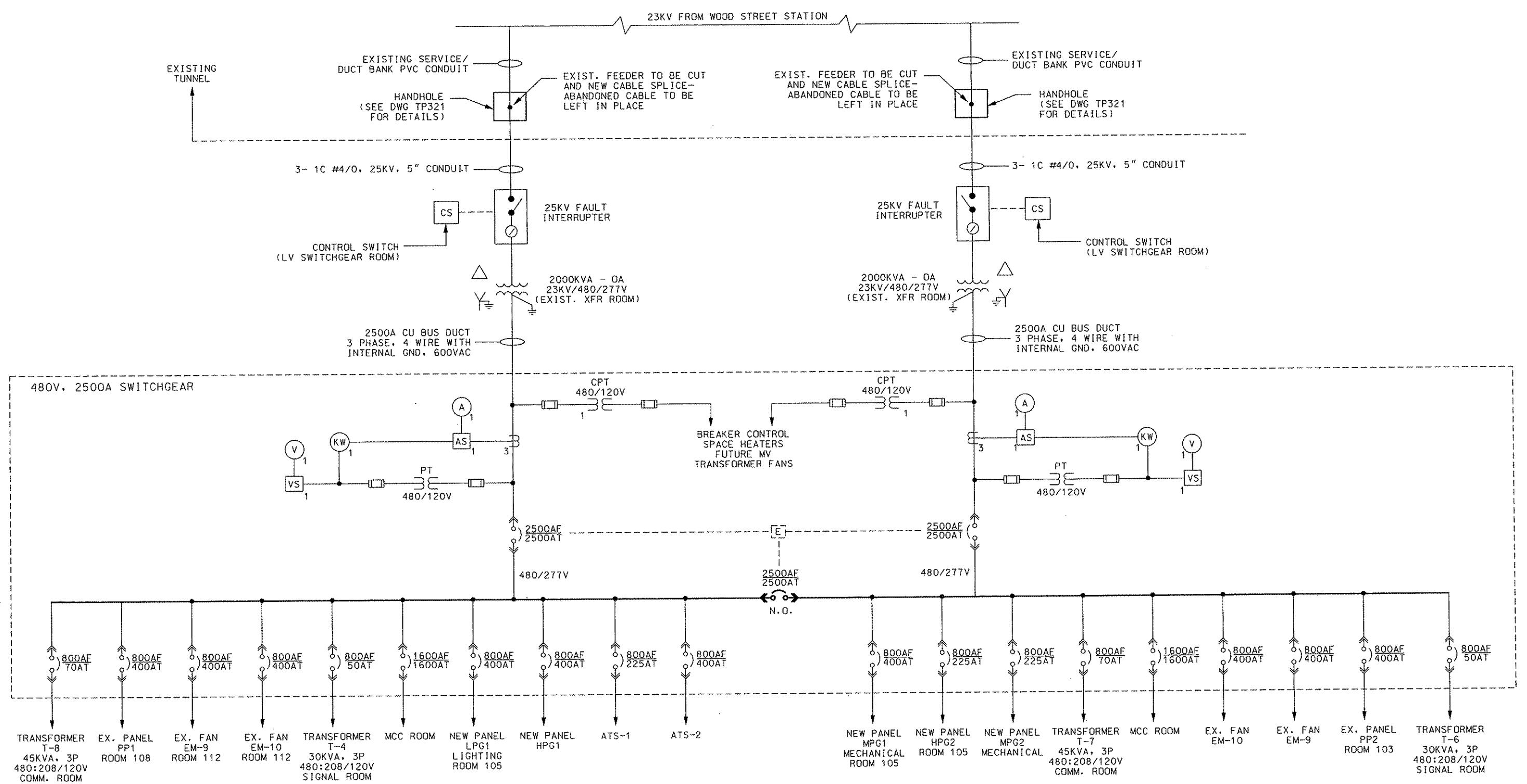
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Signature]*  
APPROVED DATE  
4/28/08

DESIGNED H SOROKIN  
DRAWN RG JACKSON  
CHECKED M INSONGA  
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)  
GROUNDING AND BONDING  
TYPICAL DETAILS  
Port Authority  
CONTRACT NO. NSC-009.  
DWG. NO. TP301 SHT. 320



NOTES:

- ALL BREAKERS ARE 480V, 3 PHASE.
- MAIN BREAKERS + TIE BREAKER ARE TO BE AUTOMATIC SWITCHED IN THE EVENT OF A LOSS OF ONE SOURCE. MAIN TO OPEN BEFORE TIE CLOSES.

NO.	DATE	DESCRIPTION	REVISIONS

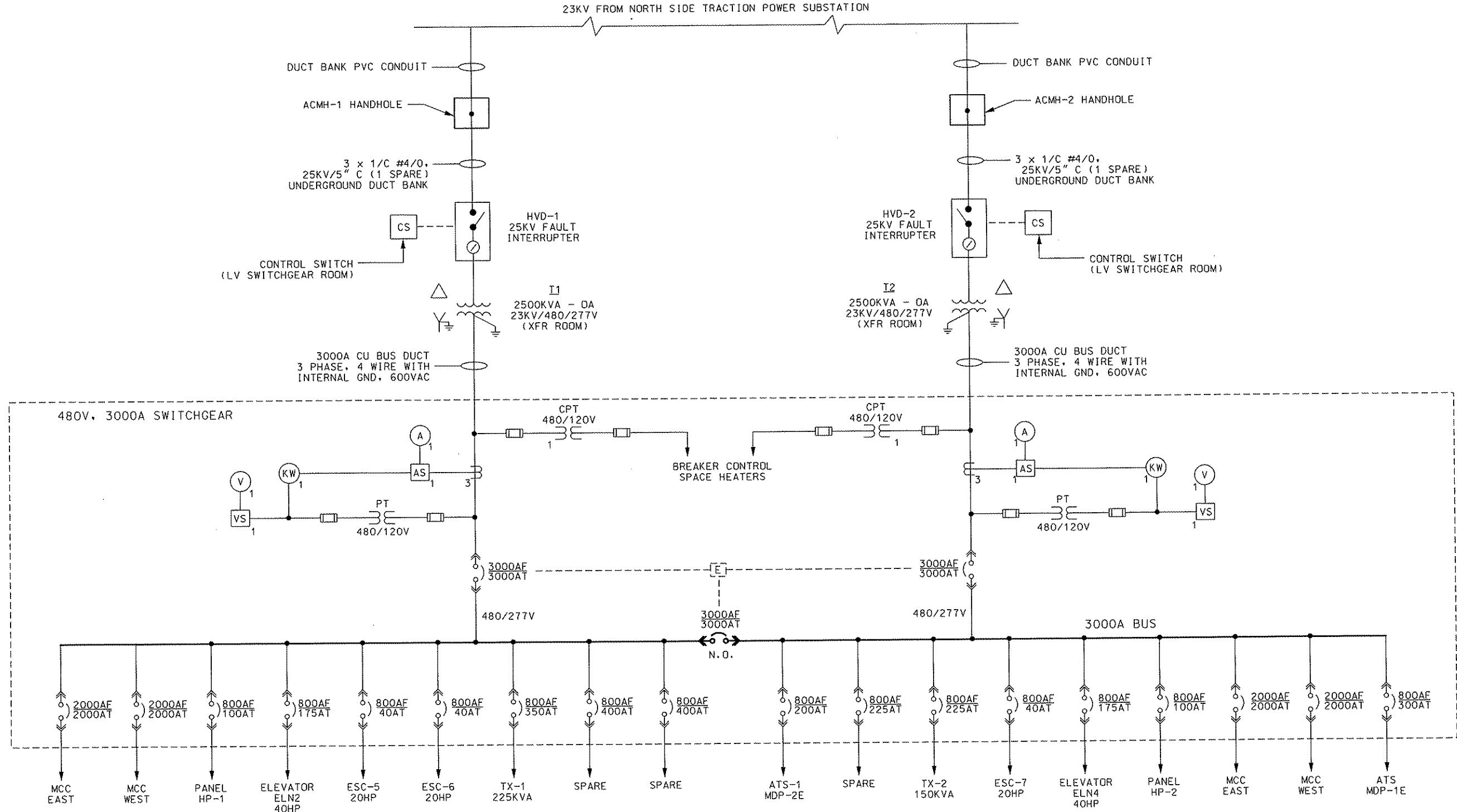
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Handwritten signatures over stamp]*

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

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSTURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
GATEWAY STATION - SUBSTATION  
INCOMING POWER - SINGLE LINE DIAGRAM  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP309  
SHT. 321

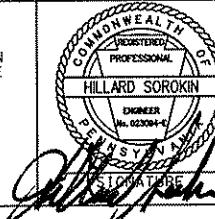


NOTES:

1. ALL BREAKERS ARE 480V, 3 PHASE.
2. MAIN BREAKERS + TIE BREAKER ARE TO BE AUTOMATIC SWITCHED IN THE EVENT OF A LOSS OF ONE SOURCE.  
MAIN TO OPEN BEFORE TIE CLOSES.

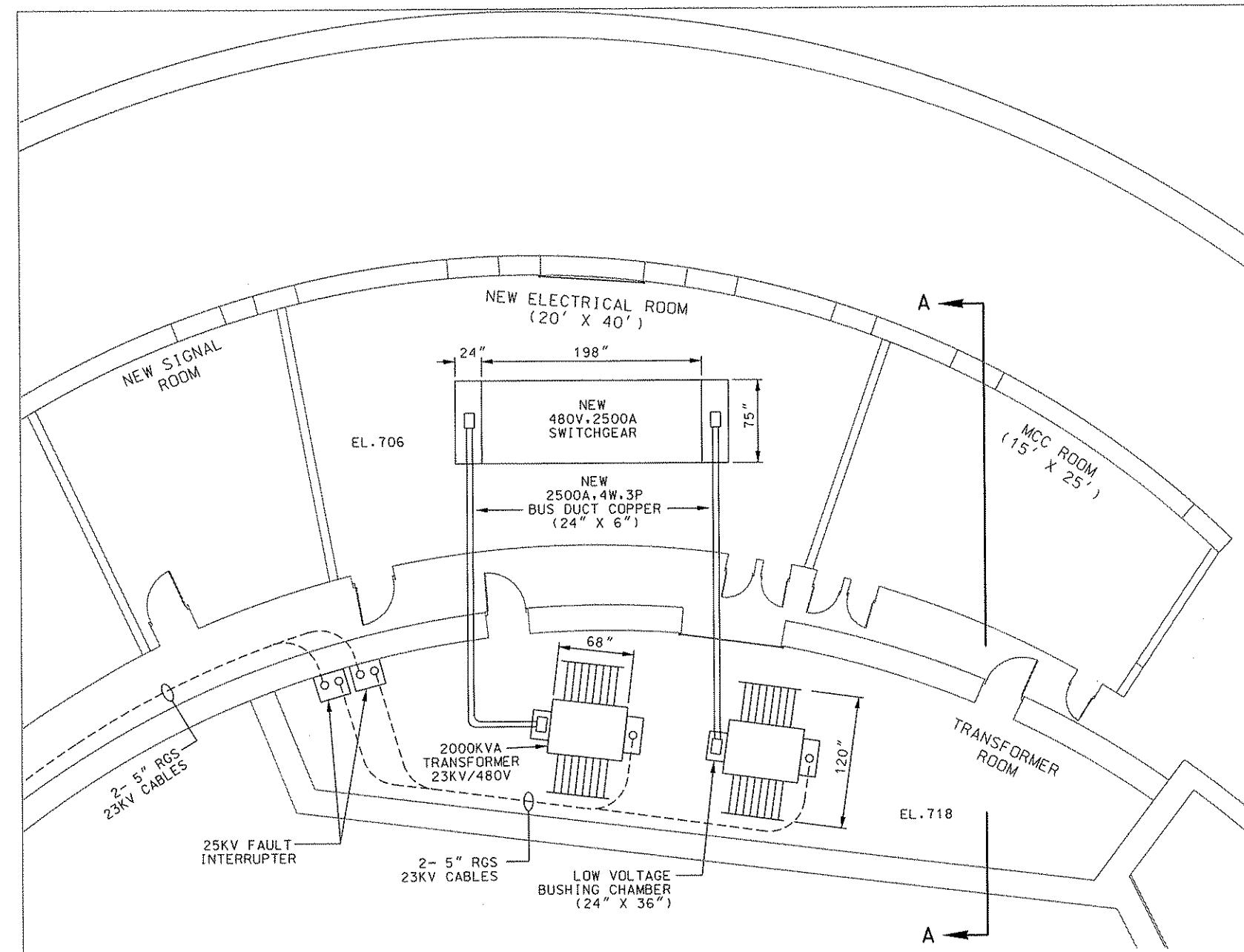
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
APPROVED DATE  
Signature: *Daniel J. Harris 4/28/08*

PORT AUTHORITY OF ALLEGHENY COUNTY Pittsburgh	
NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM WIDE) NORTH SIDE STATION - SUBSTATION INCOMING POWER - SINGLE LINE DIAGRAM	
DESIGNED H SOROKIN	CONTRACT NO. NSC-009
DRAWN HT TRAN	DWG. NO. TP310
CHECKED M INSOGNA	SHT. 327
IN CHARGE CD JONES	
DATE APR. 28, 2008	
SCALE NTS	
Port Authority	



SEE DWG. TP316 FOR VIEW "A-A"

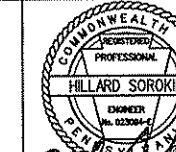
GATEWAY STATION  
SUBSTATION PLAN VIEW

NOTES:

1. CONTRACTOR RESPONSIBLE FOR EXACT ROUTING OF CONDUITS & CABLES.
2. ROUTING IS FOR DIAMETRIC PURPOSES ONLY.
3. ROUTING THROUGH WELLS + FLOOR OF THE BUS DUCTS AND CONDUITS IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
4. ALL PENTRATIONS SHALL HAVE 2 HOURS FIRE STOP INSTALLED.

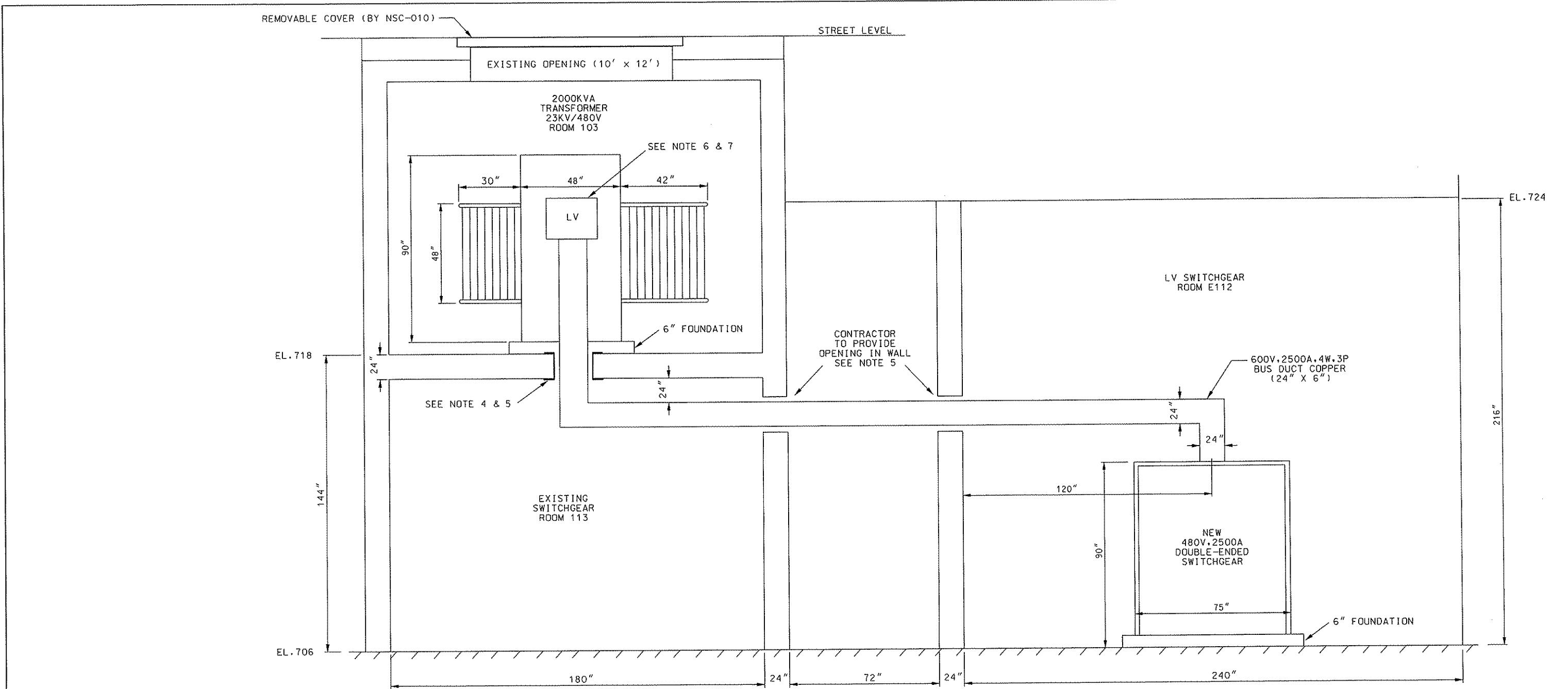
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*David J. Harris 4/28/08*  
APPROVED DATE

PORT AUTHORITY OF ALLEGHENY COUNTY PITTSBURGH	
NORTH SHORE CONNECTOR NSC TRAIN SYSTEM (SYSTEM WIDE) GATEWAY STATION SUBSTATION PLAN VIEW	
Port Authority	CONTRACT NO. NSC-009 DWG. NO. TP315 SHT. 323

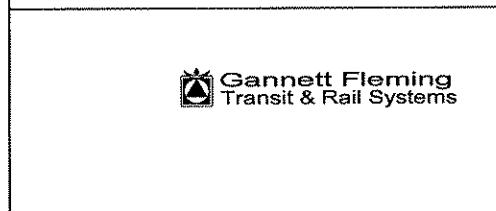


NOTES:

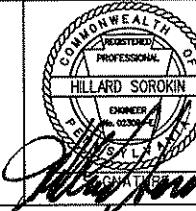
1. TRANSFORMER ROOMS MUST BE WATER TIGHT. REMOVABLE CEILING MUST BE DESIGNED SO THAT WATER DOES NOT MIGRATE INTO TRANSFORMER ROOM (BY NSC-010).
2. TRANSFORMER ROOMS MUST BE VENTED (BY NSC-010).
3. BUS DUCT SHALL BE SQUARE D, I-LINE BUSWAY CLASS 5600 OR EQUAL. FEEDER TYPE SQUARE D, ACF-24-RF OR EQUAL.
4. PROVIDE FLOOR FLANGE KIT WITH DRIP FLANGE & COLLAR.
5. OPENING IN FLOOR & WALLS FOR BUS DUCT TO BE 8" x 26" FOR FLOOR FLANGES.
6. BUS CONNECTION TO TRANSFORMER SHALL BE COORDINATED BY CONTRACTOR IF MANUFACTURES OF TRANSFORMER AND BUS DUCT ARE DIFFERENT.
7. CONNECTION BETWEEN BUS DUCT AND SECONDARY OF TRANSFORMER SHALL BE COPPER BAR OR FLEXIBLE CONNECTIONS.
8. CONTRACTOR/MANUFACTURE TO COORDINATE THE PHASING BETWEEN TRANSFORMER & SWITCHGEAR.
9. BUS DUCT TO BE SUPPORTED MINIMUM EVERY 10 FEET (MANUFACTURES INSTRUCTION).

GATEWAY STATION - VIEW "A-A"

SUBSTATION SECTIONAL  
SEE PLAN VIEW DWG. TP315



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HILLARD SOROKIN

ENGR.

4/28/08

DAVID J. HARRIS

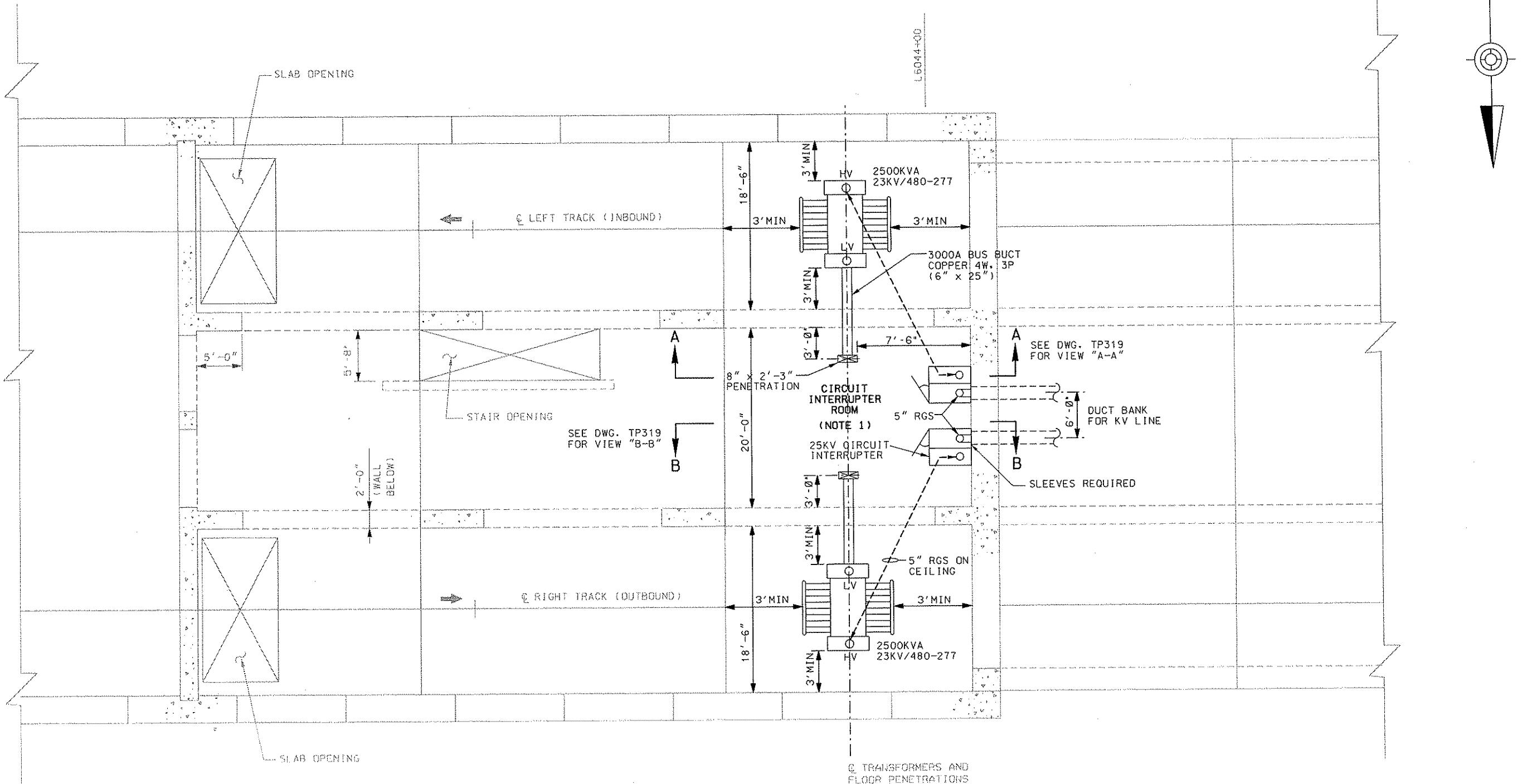
AECOM

APPROVED

4/28/08

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
Pittsburgh  
North Shore Connector  
NSC Train System (System Wide)  
Gateway Station  
Substation Sectional View  
**Port Authority**  
Contract No. NSC-009  
DWG. NO. TP316 Sh. 324



### CONCOURSE LEVEL PLAN

STA. L6043+17.54 TO STA. L6044+07.77  
STA. R6043+17.54 TO STA. R6044+07.77

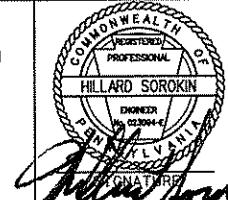
#### NOTE:

1. CIRCUIT INTERRUPTERS SHALL BE POSITIONED TO MAINTAIN WORKING SPACES IN ACCORDANCE WITH NESC.

Gannett Fleming  
Transit & Rail Systems

NO.	DATE	DESCRIPTION
		REVISIONS

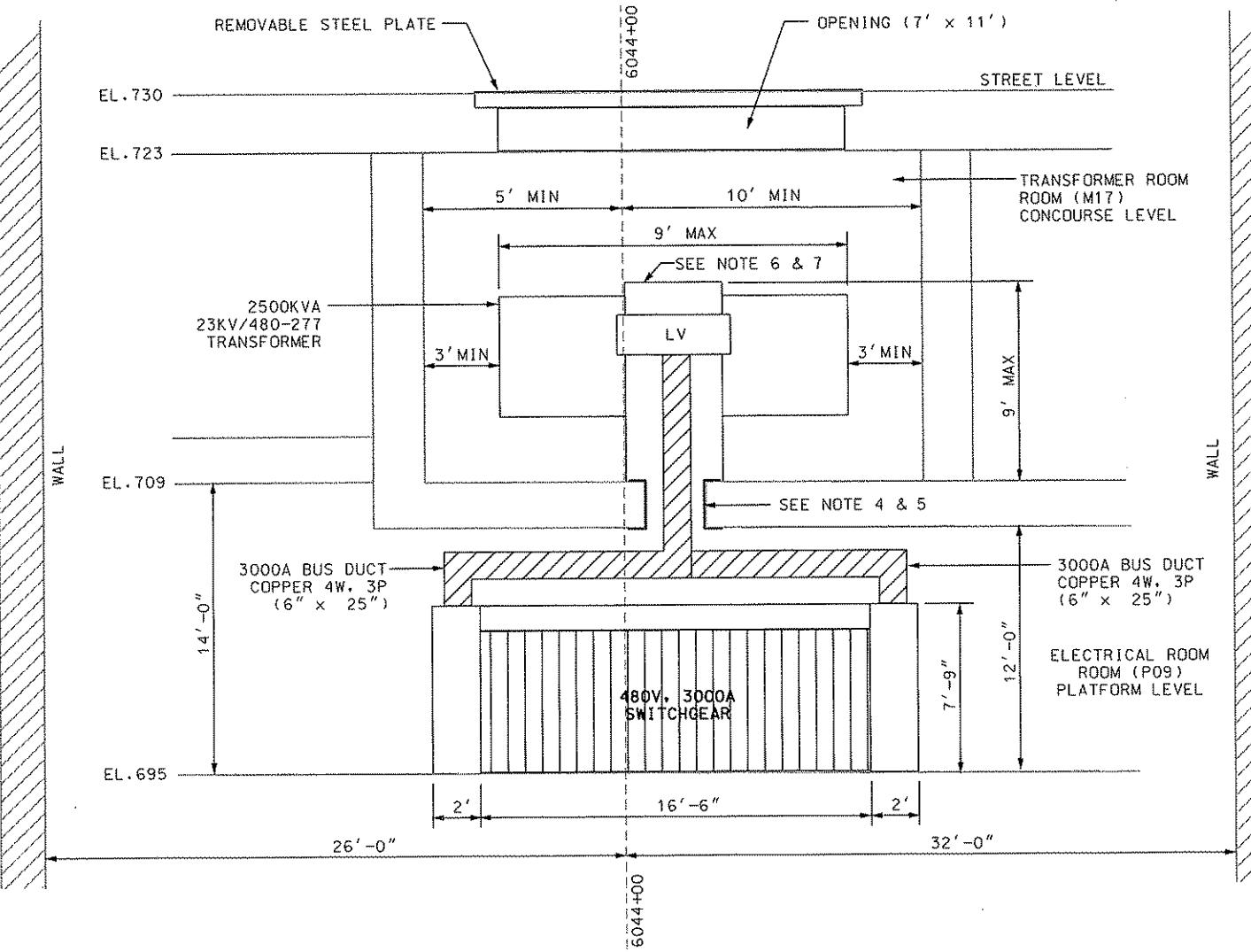
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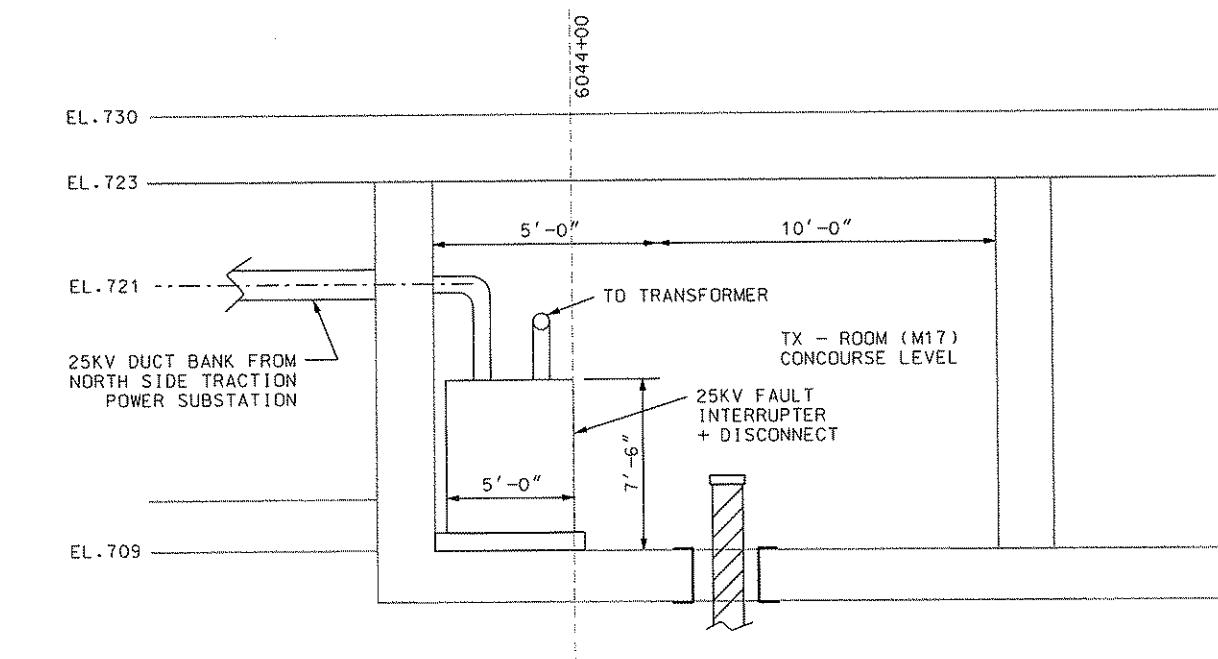
DMJM HARRIS | AECOM  
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PITTSBURGH, PA. 15222  
*Dave J. Harris 4/28/08*

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

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
TRANSFORMER AND ELECTRICAL ROOMS  
NORTH SIDE STATION - CONCOURSE LEVEL  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP317 SHT. 325



VIEW A-A



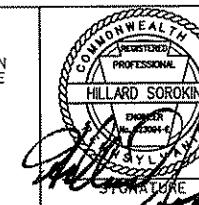
VIEW B-B

NOTES:

- TRANSFORMER ROOMS MUST BE WATER TIGHT. REMOVABLE CEILING MUST BE DESIGNED SO THAT WATER DOES NOT MIGRATE INTO TRANSFORMER ROOM.
- TRANSFORMER ROOMS MUST BE VENTED.
- BUS DUCT SHALL BE SQUARE D, I-LINE BUSWAY CLASS 5600 OR EQUAL. FEEDER TYPE SQUARE D, ACF-24-RF OR EQUAL.
- PROVIDE FLOOR FLANGE KIT WITH DRIP FLANGE & COLLAR.
- OPENING IN FLOOR FOR BUS DUCT TO BE 8" x 27" FOR FLOOR FLANGE.
- BUS CONNECTION TO TRANSFORMER SHALL BE COORDINATED BY CONTRACTOR IF MANUFACTURES OF TRANSFORMER AND BUS DUCT ARE DIFFERENT.
- CONNECTION BETWEEN BUS DUCT AND SECONDARY OF TRANSFORMER SHALL BE COPPER BAR OR FLEXIBLE CONNECTIONS.

NO.	DATE	DESCRIPTION	
		REVISIONS	

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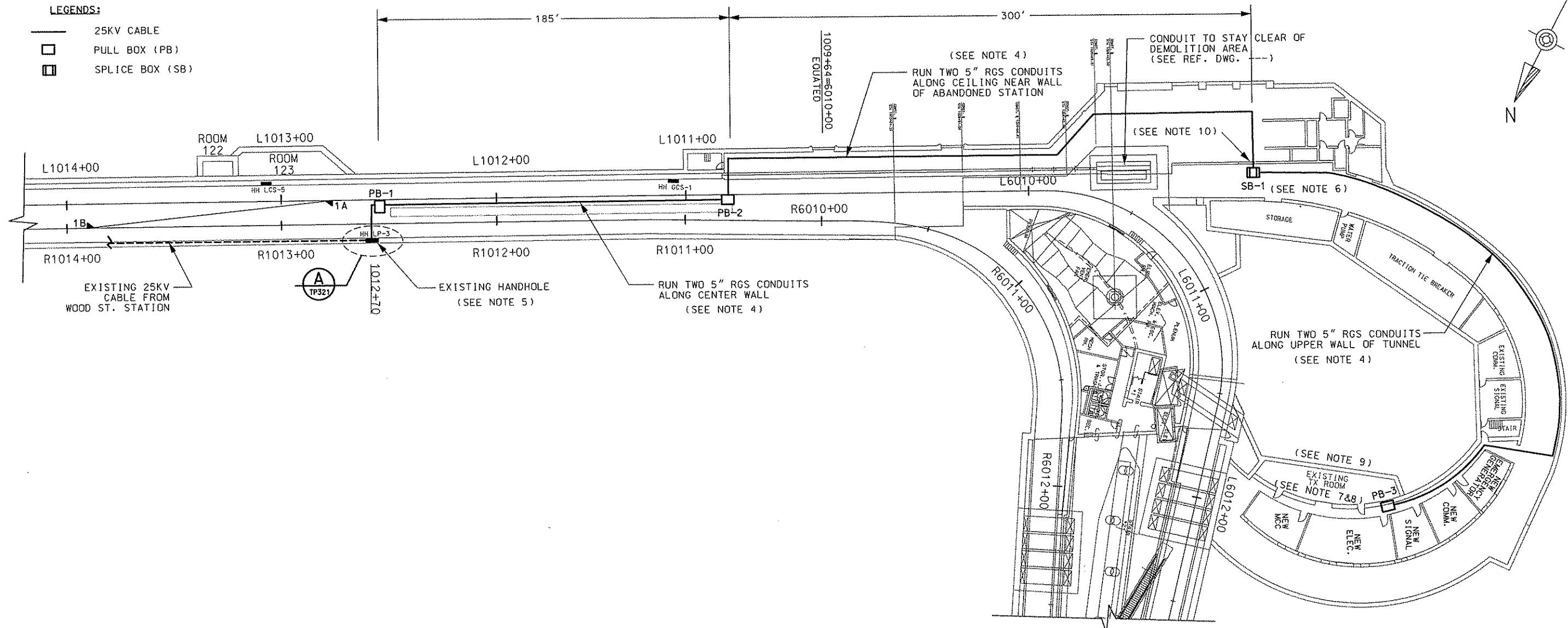
DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*[Handwritten signature]*  
APPROVED DATE  
David J. Henry 4/28/08

DESIGNED H SOROKIN  
DRAWN HT TRAN  
CHECKED JF SAMEAN  
IN CHARGE CD JONES  
DATE APR. 28, 2008  
SCALE NTS

PORT AUTHORITY OF ALLEGHENY COUNTY  
PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
TRANSFORMER AND DUCT BANK DETAILS  
NORTH SIDE STATION  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP319  
SH. 326

**LEGENDS:**

- 25KV CABLE
- PULL BOX (PB)
- SPLICE BOX (SB)

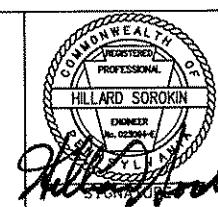


**NOTES:**

1. CONTRACTOR TO INSTALL TWO 5" RGS CONDUITS FROM EXISTING HANHOLE HHLP-3 TO EXISTING TRANSFORMER ROOM 104, WHICH IS ABOVE EXISTING ELECTRICAL ROOM.
2. CONTRACTOR SHALL SUPPORT CONDUITS EVERY 10 FEET.
3. PULL BOXES PB-1, PB-2, PB-3 & SB-1 TO BE LOCATED AND SIZED BY CONTRACTOR.
4. DRAWING IS DIAGRAMATIC ONLY. ACTUAL ROUTING TO BE DETERMINED IN FIELD BY CONTRACTOR.
5. EXISTING 25KV CABLES TO BE CUT AT HHLP-3 AND NEW 25KV CABLE SPLICED TO EXISTING SECTION FROM WOOD STREET STATION. 25KV CABLE AND CONDUIT FROM HHLP-3 WEST TO BE ABANDON.
6. THE NEW 25KV CABLES TO BE SPLICED AT SB-1 (~500'-600'). CONTRACTOR TO DETERMINE LOCATION AND SIZE OF SPLICE BOX.
7. CONTRACTOR TO BORE TWO 6" HOLES IN WALL OF EXISTING TRANSFORMER ROOM BEHIND PB-3 TO PULL 25KV CABLE INTO TX ROOM.
8. CONTRACTOR TO TERMINATE 25KV CABLE IN TX ROOM IN THE NEW FAULT INTERRUPTERS. SEE DRAWING TP315.
9. EXISTING TRANSFORMER ROOM 104 IS ABOVE EXISTING ELECTRICAL ROOM 103.
10. CONTRACTOR TO CORE BORE WALL FOR CABLES.

NO.	DATE	DESCRIPTION	
REVISIONS			

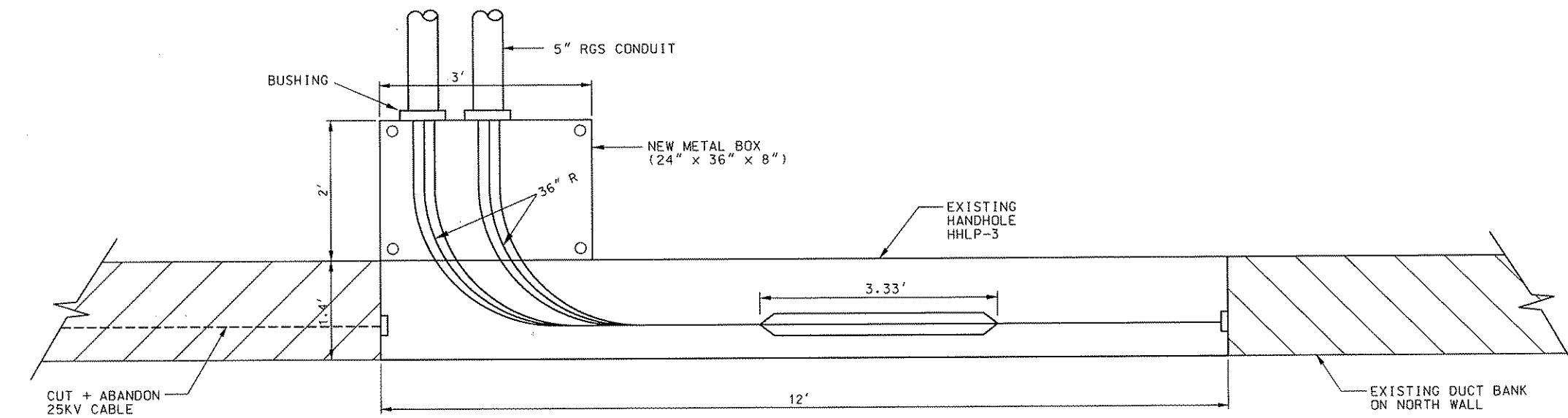
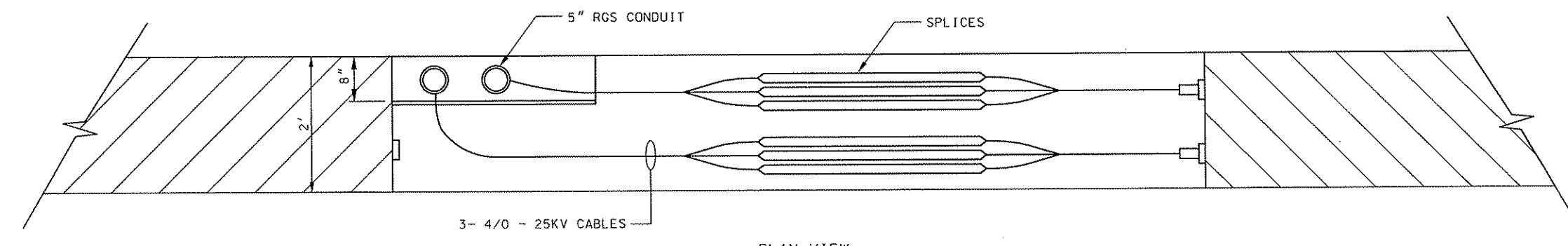
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
OWNER  
#02304-1  
SPLICE BOX  
APPROVED  
DATE  
4/28/08

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

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
**NORTH SHORE CONNECTOR**  
**NSC TRAIN SYSTEM (SYSTEM WIDE)**  
**25KV CABLES ROUTING**  
**GATEWAY STATION**  
**Port Authority**  
CONTRACT NO. NSC-009  
DWG. NO. TP320  
SHT. 327



ELEVATION VIEW

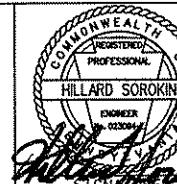
DETAIL A  
HANDHOLE HHLP-3 (1012+70)

NOTES:

1. REFER TO SPECIFICATION 16124 FOR CABLE REQUIREMENTS.
2. REFER TO SPECIFICATION 16120 FOR SPLICE REQUIREMENTS.

NO.	DATE	DESCRIPTION
REVISIONS		

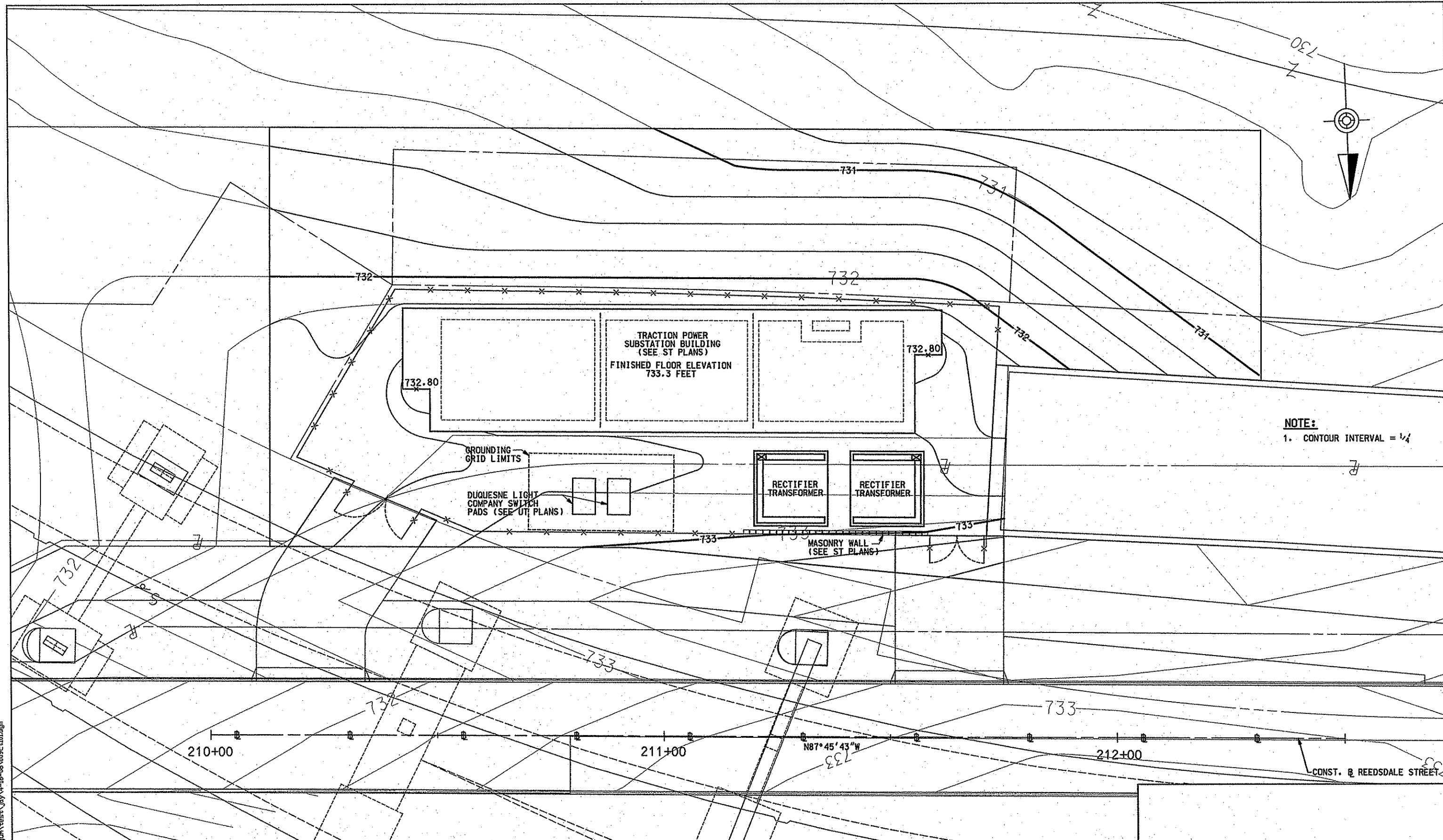
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*David J. Harris*  
APPROVED 4/28/08  
SIGNATURE DATE

DESIGNED H SOROKIN  
DRAWN HT TRAN  
CHECKED M INSOGNA  
IN CHARGE CD JONES  
DATE APR. 28, 2008  
SCALE 1" = 1'

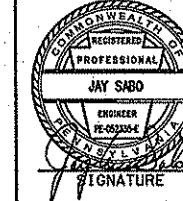
PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEM (SYSTEM WIDE)  
DETAIL A  
GATEWAY STATION  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. TP321  
SHT. 318



NO.	DATE	DESCRIPTION

NO.	DATE	DESCRIPTION

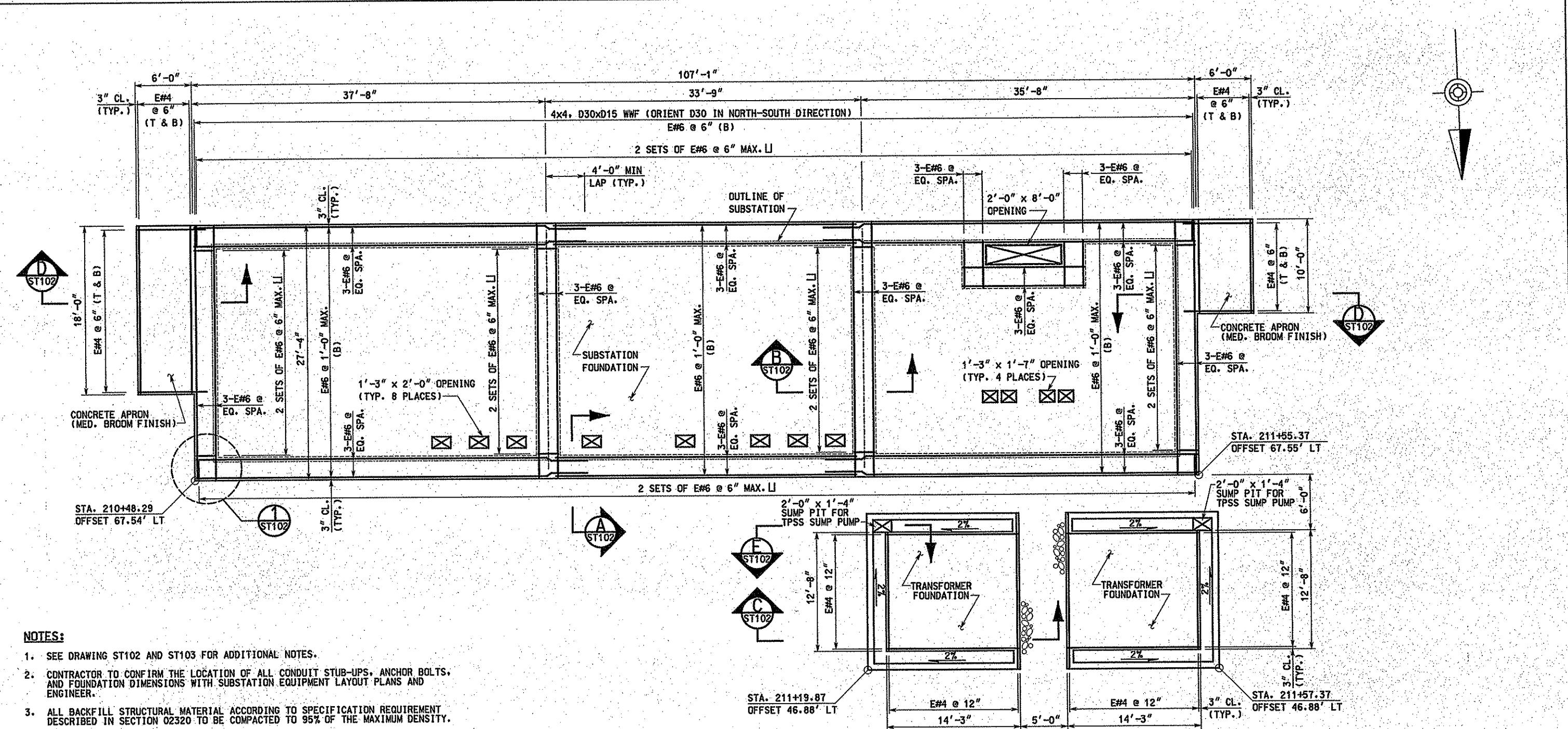
THE PREPARATION OF THIS DOCUMENT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL TRANSIT ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, FOR THE PORT AUTHORITY OF ALLEGHENY COUNTY, PENNSYLVANIA.



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

DESIGNED: MLH  
DRAWN: MLH  
CHECKED: JAS  
IN CHARGE: DPH  
DATE: APR. 21, 2008  
SCALE: 10' 5' 0 10'  
APPROVED: 11/21/08  
DATE:

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH  
PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEMS (SYSTEM WIDE)  
TRACTION POWER SUBSTATION  
CONTOUR PLAN  
Contract No.: NSC-009  
DWG. No.: CT101  
Sht. 329



### SUBSTATION FOUNDATION PLAN

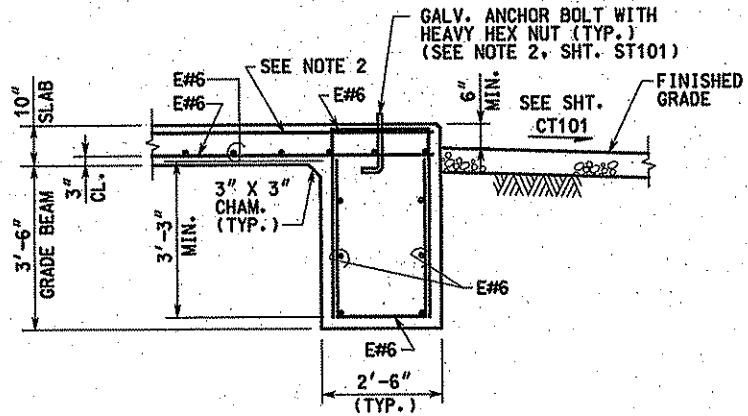
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**LEGEND**  
EF = EACH FACE  
T = TOP  
B = BOTTOM

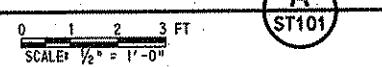
DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA 15222  
*Benjamin Joel Allis*  
SIGNATURE

APPROVED *D. O'Brien* 4/21/08  
DATE

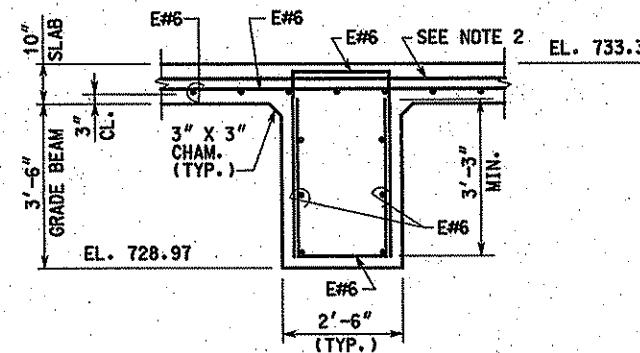
**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH  
PA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEMS  
TRACTION POWER SUBSTATION  
FOUNDATION PLAN  
**Port Authority**  
CONTRACT NO.: NSC-009  
DWG. NO. ST101 SHT. 330



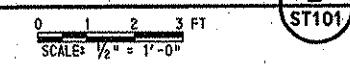
SECTION



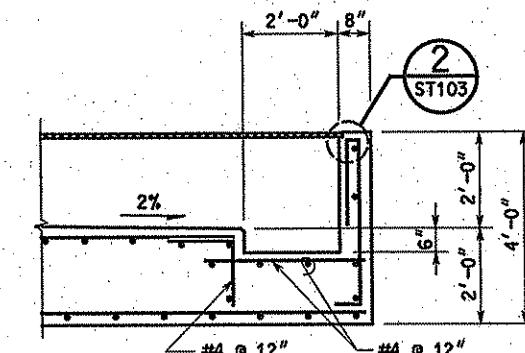
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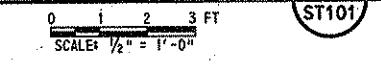
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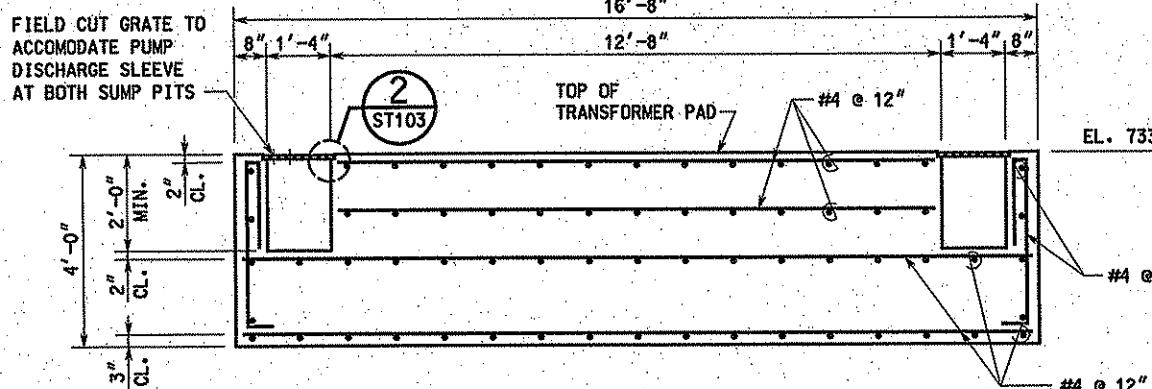
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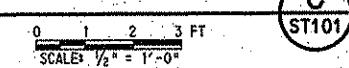
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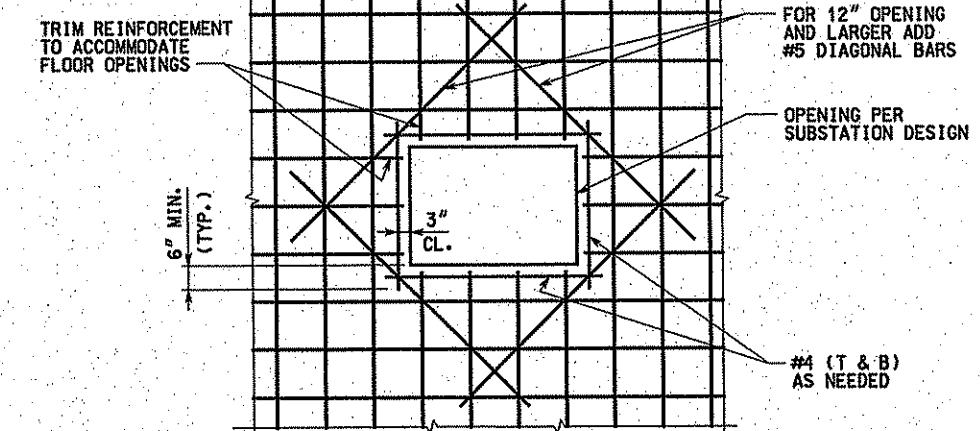
ST101

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SECTION



ST101

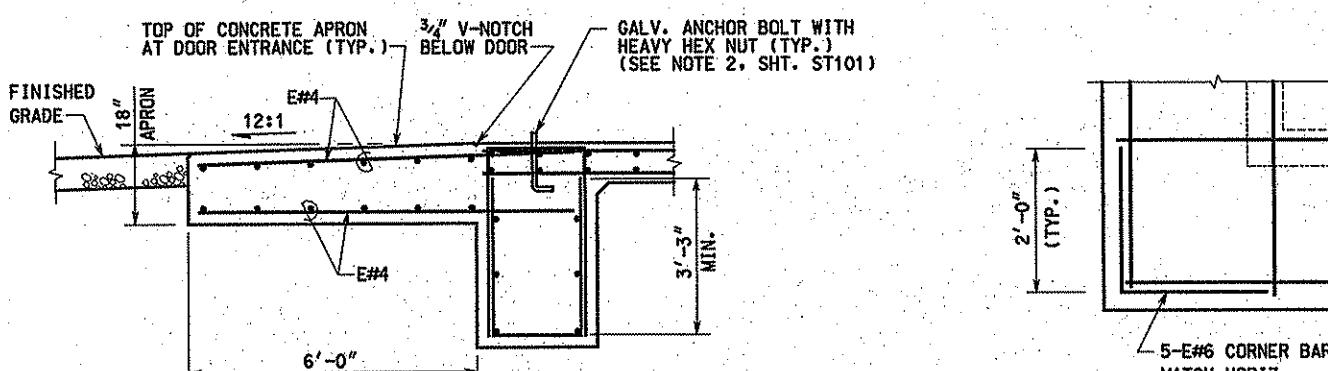
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SLAB OPENING

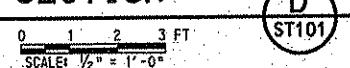
N.T.S.

## NOTES:

1. WORK THIS DRAWING WITH DRAWINGS ST101 AND ST103.
2. 4x4, D30xD15 STEEL WELDED WIRE FABRIC PLACE AT TOP OF THE SLAB.



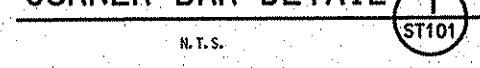
SECTION



ST101

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CORNER BAR DETAIL



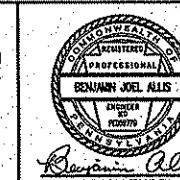
ST101

N.T.S.

## LEGEND

EF = EACH FACE  
T = TOP  
B = BOTTOM

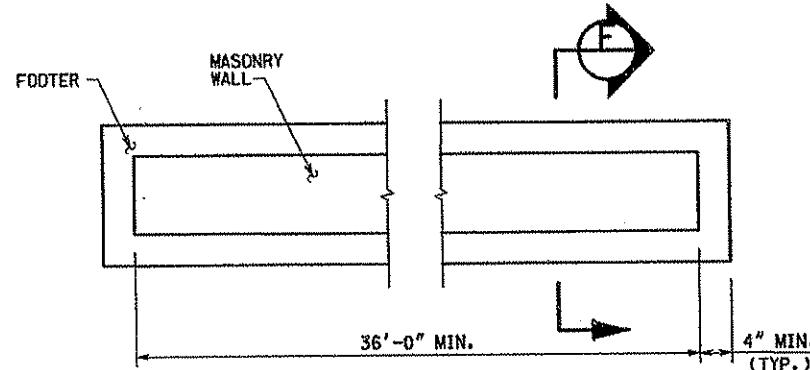
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DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA 15222  
Ded P. Harris  
APPROVED 4/21/08  
SIGNATURE

DESIGNED JMF  
DRAWN RED  
CHECKED RS  
IN CHARGE  
DATE APRIL 21, 2008  
SCALE  
DATE

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTTSBURGH  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEMS  
TRACTION POWER SUBSTATION  
FOUNDATION DETAILS  
CONTRACT NO. NSC-009  
Dwg. No. ST102 Sht. 331



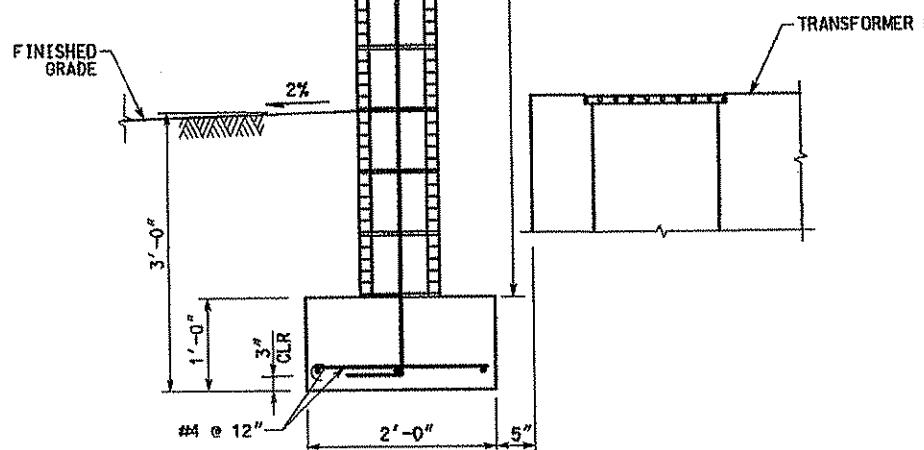
MASONRY WALL DETAIL

1  
CV001

SCALE: 1" = 1'-0"

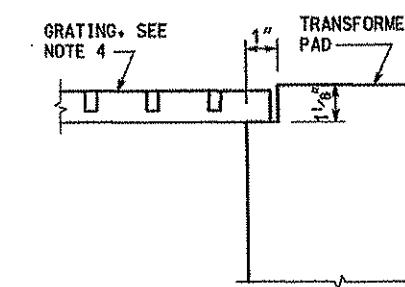
10" x 8" x 16" GROUND FACE  
ARCHITECTURAL CONCRETE  
MASONRY UNITS, GROUTED  
SOLID (FACING OUT)

8'-0" LONG #6 BAR  
@ 8" O.C. WITH  
STANDARD HOOK



SECTION

0 1 2 FT  
SCALE: 1" = 1'-0"



GRATING SUPPORT DETAIL

2  
ST102

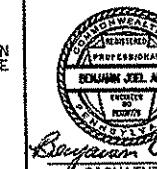
N.T.S.

NOTES:

- SEE DRAWINGS ST101 AND ST102 FOR ADDITIONAL NOTES.
- THE REBAR DETAILS SHOWN ON THIS SHEET ARE APPLICABLE UNLESS OTHERWISE NOTED OR REBAR DETAIL IS SHOWN ELSEWHERE.
- ALL CMU BLOCK SHALL BE A MINIMUM OF 2 HOUR FIRE RATING.
- GRATING SHALL HAVE 1" x 1/4" BEARING BARS AT 1 3/8" C.C. USE WELDED STEEL GRATING WITH SERRATED RECTANGULAR CROSS BARS AT 4" O.C. ALL GRATING MATERIAL SHALL BE HOT DIP GALVANIZED.

NO.	DATE	DESCRIPTION	REVISIONS	

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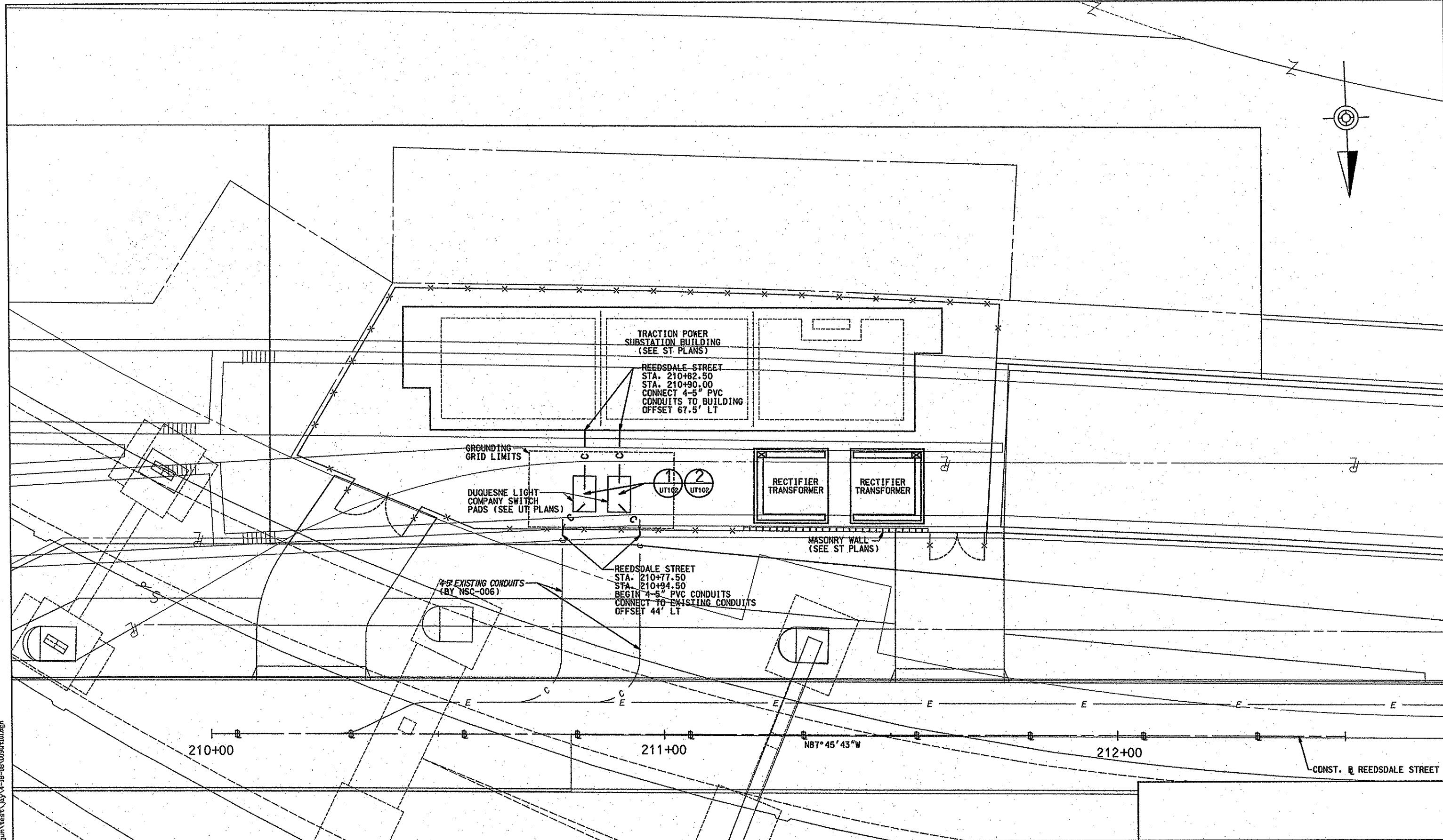


DMJM HARRIS | AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA 15222  
*Brian J. Allis*  
SIGNATURE  
APPROVED  
DATE: APRIL 21, 2008  
*David P. Klein* *4/26/08*  
DATE: APRIL 21, 2008

PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH, PENNSYLVANIA

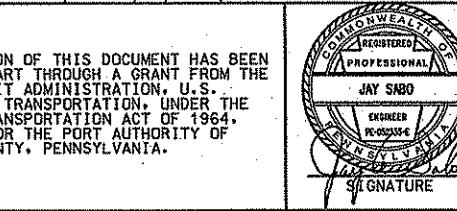
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEMS  
TRACTION POWER SUBSTATION  
FOUNDATION DETAILS

Port Authority	CONTRACT NO. NSC-009
DWG. NO. ST103	SET. 332



NO.	DATE	DESCRIPTION
REVISIONS		

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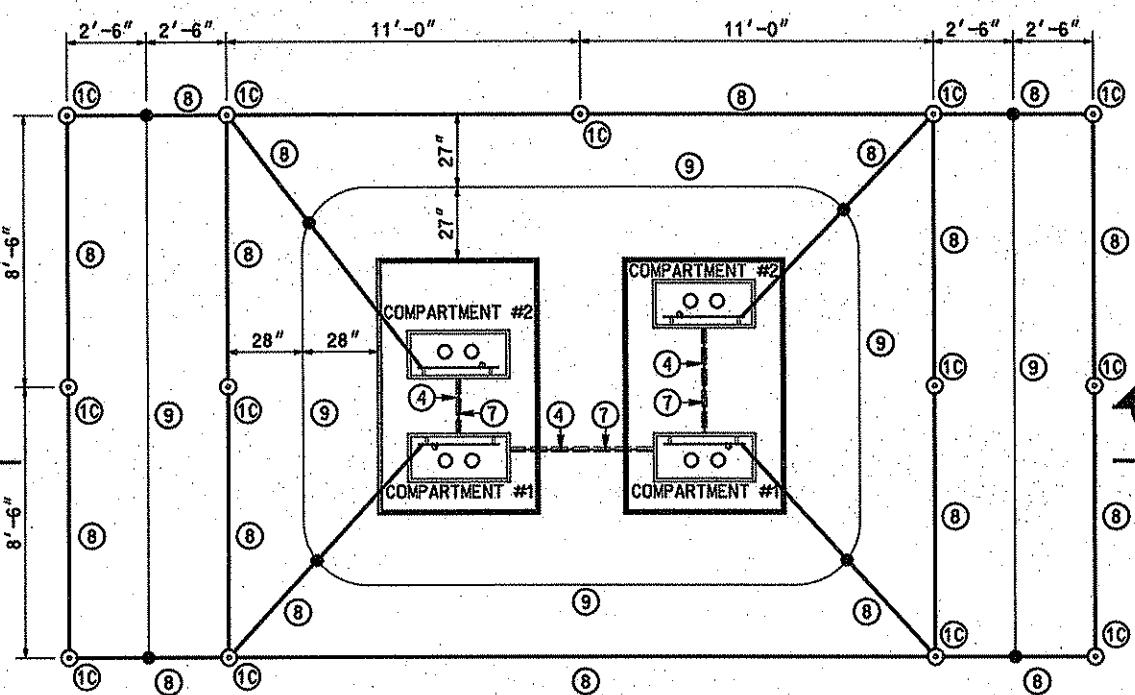
DMJM HARRIS AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Paul Phane*  
APPROVED *J. J. Phane* DATE *4/21/08*

DESIGNED MLH.  
DRAWN MLH.  
CHECKED JAS  
IN CHARGE DPH  
DATE APR. 21, 2008  
SCALE 10' 5' 0 10'  
10' 5' 0 10'

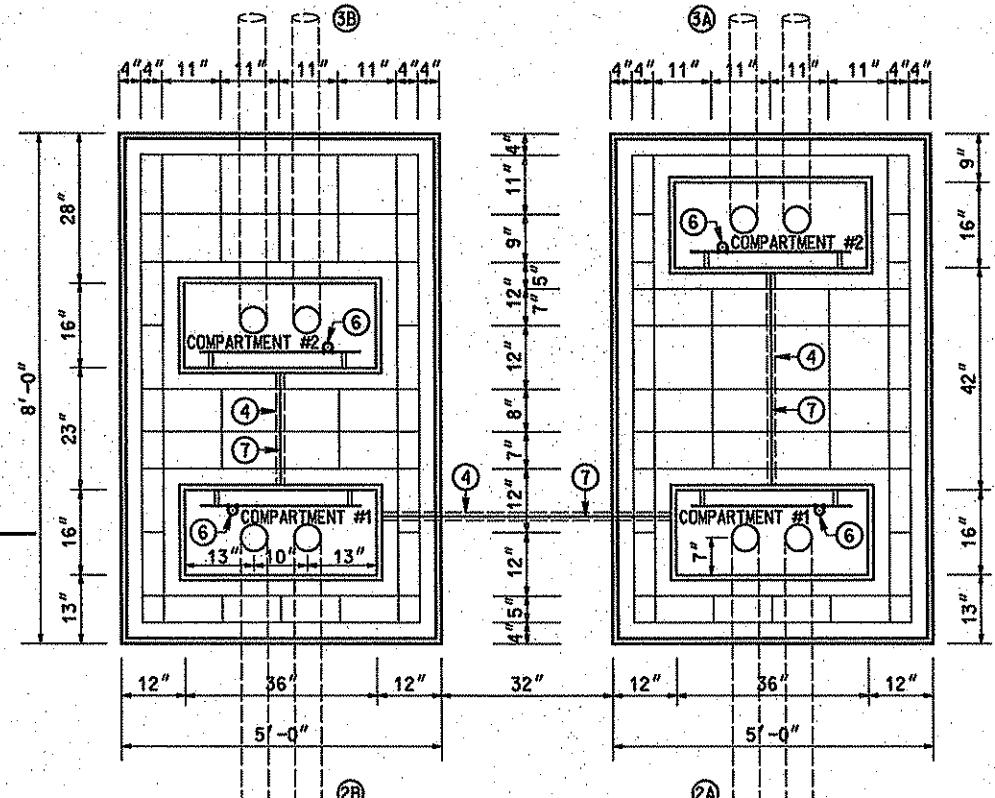
PORT AUTHORITY OF ALLEGHENY COUNTY  
PITTSBURGH, PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEMS (SYSTEM WIDE)  
TRACTION POWER SUBSTATION  
UTILITY PLAN  
Port Authority  
CONTRACT NO. NSC-009  
DWG. NO. UT101 SHT. 333

**NOTES**

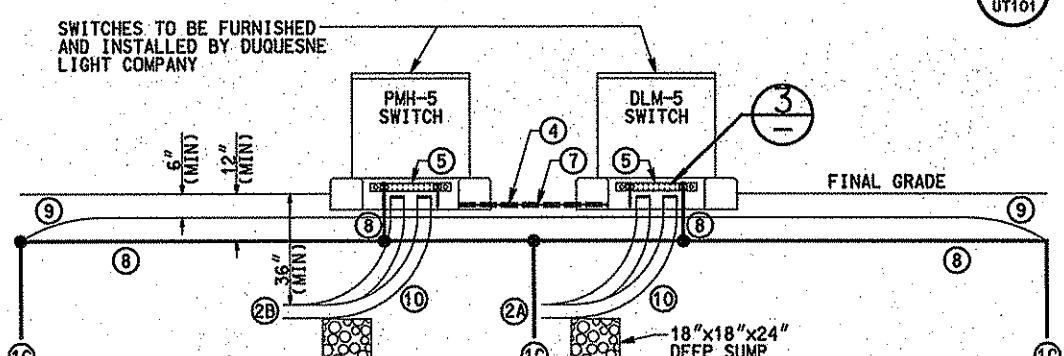
- ① CONSTRUCT SWITCHGEAR PADS, CONDUIT SYSTEM, AND GROUNDING SYSTEM TO CONFORM TO UNDERWRITERS AND LOCAL BUILDING CODES AND AS SHOWN ON THIS DRAWING. DUQUESNE LIGHT COMPANY MUST WITNESS OR INSPECT THE CONSTRUCTION OF THIS INSTALLATION AS FOLLOWS:  
A. THE INSTALLATION OF ALL PRIMARY CONDUITS AND BENDS PRIOR TO BACKFILLING.  
B. THE INSTALLATION OF CONCRETE FORMS AND REINFORCING BAR MATS PRIOR TO CONCRETE POUR.  
C. THE INSTALLATION OF GROUND RODS, GROUND GRID, AND BACKFILLING OVER GROUND GRID.  
D. FINAL PAD INSPECTION INCLUDING GROUND BUS INSTALLATION, GROUND ROD, AND GROUND GRID CONNECTIONS TO THE GROUND BUS, AND ANY OTHER ITEM AS DESIGNATED BY THE DUQUESNE LIGHT INSPECTOR OR ENGINEER AS REQUIRING INSPECTIONS.  
E. FOR VARIOUS INSPECTIONS CONTACT DUQUESNE LIGHT COMPANY
- ② INSTALL 2-5" PVC CONDUITS FROM EXISTING CONDUITS THAT WERE PLACED IN CONTRACT NSC-006.
- ③ INSTALL 2-5" PVC CONDUITS FROM DLM-5, COMPARTMENT #2 TO SUBSTATION BUILDING AT REEDSDALE STREET, STATION 210+90.00, OFFSET 55' LT.
- ④ INSTALL 1 1/2" PVC GROUND WIRE CONDUITS BETWEEN PAD OPENINGS.
- ⑤ INSTALL A 1/4" X 3" X 30" COPPER BAR GROUND BUS IN EACH OPENING OF THE PAD (SEE DETAIL 3 ON THIS DRAWING.) ALL HOLES SHALL BE DRILLED TO 3/16" DIAMETER. ALL WIRE CONNECTIONS TO THE GROUND BUS MUST BE BOLTED WITH A MINIMUM OF TWO 1/2" SILICON BRONZE OR STAINLESS STEEL BOLTS. GROUND BAR IS TO BE TINNED AT ALL CONNECTION LOCATIONS.
- ⑥ INSTALL ONE 3/4" X 10' COPPER CLAD GROUND ROD IN AND CONNECT TO GROUND BUS WITH A DOUBLE EYE BOLT CONNECTOR SIMILAR TO TELEDYNE-PENN UNION TYPE LDN-050N OR APPROVED EQUAL. ALTERNATE CONNECTORS MUST BE APPROVED BY DUQUESNE LIGHT COMPANY PRIOR TO INSTALLATION.
- ⑦ CONNECT THE GROUND BUSSES WITH A #4/0 AWG SOFT DRAWN STRANDED COPPER WIRE. CONNECTIONS TO BE MADE WITH COPPER CONNECTORS HAVING A MINIMUM OF TWO BOLTS OR COMPRESSIONS OVER EACH WIRE AND BE CONNECTED TO THE BUS BAR WITH A MINIMUM OF TWO 1/2" SILICON BRONZE OR STAINLESS STEEL BOLTS.
- ⑧ INSTALL A 4/0 SOFT DRAWN SOLID COPPER WIRE, GROUND GRID, AND CONNECT TO THE GROUND RODS WITH EXOTHERMIC WELDS.
- ⑨ INSTALL A #4 AWG SOFT DRAWN SOLID COPPER WIRE POTENTIAL GROUND GRID AND CONNECT TO THE 4/0 GROUND GRID AS INDICATED USING EXOTHERMIC WELDS.
- ⑩ TERMINATE EACH CONDUIT RUN WITH A 5" ID, 90°, 36"R GALVANIZED STEEL BEND COATED WITH A 40 MIL PVC JACKET. EXTEND BENDS 6" INTO PAD OPENING. DRILL FOUR 1/2" DIAMETER HOLES ON 2" C/C AT LOW POINT OF BEND. REMOVE ALL INTERNAL BURRS, AND INSTALL AN 18" X 18" X 24" DEEP SUMP. BACKFILL WITH AASHTO NO. 57 STONE. INSTALL A THREADED INSULATED GROUNDING BUSHING ON EACH BEND AND CONNECT TO THE GROUND BUS USING #4 SOFT DRAWN COPPER WIRE. CAP ALL CONDUIT.



**DUQUESNE LIGHT COMPANY SWITCH PAD  
EQUIPMENT LAYOUT AND GROUNDING SYSTEM DETAIL**

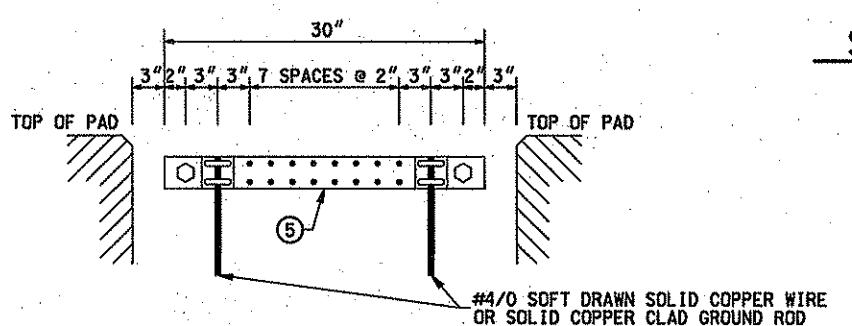


**DUQUESNE LIGHT COMPANY SWITCH PAD  
STRUCTURAL PLAN DETAIL**



**LEGEND**

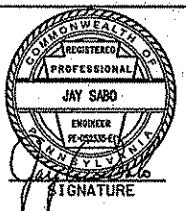
- #4 COPPER TO 4/0 COPPER BOND
- ◎ 3/4" X 10' COPPER CLAD GROUND ROD



**BUS BAR DETAIL**

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NO.	DATE	DESCRIPTION	REVISIONS



DMJM HARRIS AECOM  
FOUR GATEWAY CENTER  
20TH FLOOR  
PITTSBURGH, PA. 15222  
*Daryl P.*  
APPROVED *11/21/08*  
DATE

DESIGNED MLH/HOC  
DRAWN MLH  
CHECKED JAS  
IN CHARGE DPH  
DATE APR. 21, 2008  
SCALE *1/2"*  
NTS

**PORT AUTHORITY OF ALLEGHENY COUNTY**  
PITTSBURGH, PENNSYLVANIA  
NORTH SHORE CONNECTOR  
NSC TRAIN SYSTEMS (SYSTEM WIDE)  
TRACTION POWER SUBSTATION  
DUQUESNE LIGHT COMPANY SWITCH PAD DETAILS  
**Port Authority**  
CONTRACT NO. NSC-009  
DWG. NO. UT102  
SHT. 34