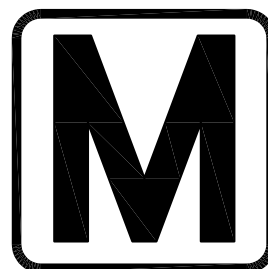


# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY



metro

## SIX (6) TIE BREAKER STATION UPGRADES ORANGE AND BLUE LINES DC, MD AND VA

G01TB - BENNING ROAD TBS

G02TB2 - 67TH AVE TBS

K07TB1 - OGDEN ST. TBS

G02TB1 - 56TH PLACE TBS

K06TB2 - GREENWICH ST. TBS

K07TB2 - PROSPERITY AVE. TBS

### VOLUME 3A - TECHNICAL DRAWINGS

CONTRACT NO. FQ15237

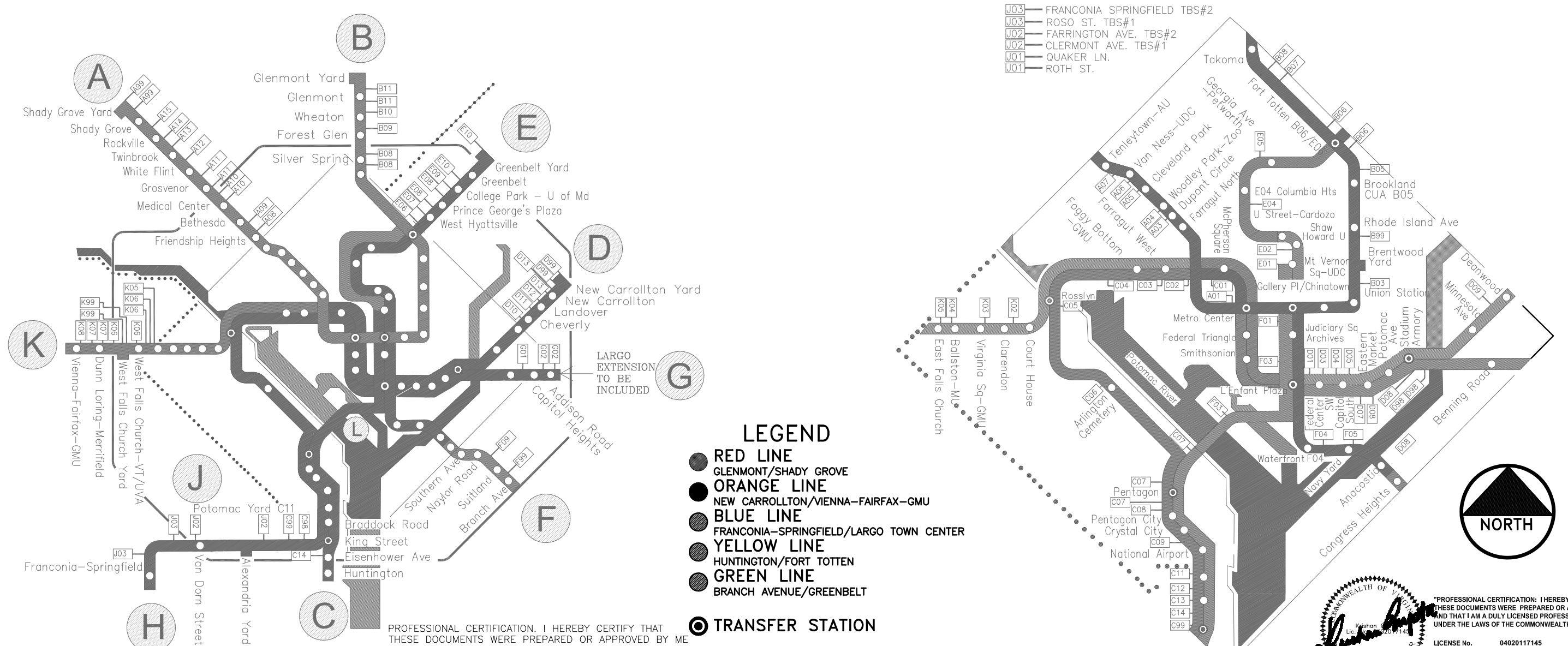
JULY 20, 2015

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|--|---|--|--|---|--|---|
| <b>STATION A ROUTE</b>   | <b>STATION B ROUTE</b>  | <b>STATION C ROUTE</b>   | <b>STATION D ROUTE</b>   | <b>STATION E ROUTE</b>  | <b>STATION F ROUTE</b>   | <b>STATION K ROUTE</b>  |
| A99 SHADY GROVE YARD TBS#1<br>A99 SHADY GROVE YARD TBS#2<br>A15 HUNGERFORD DRIVE<br>A14 VIERS MILL<br>A13 HIGHWOOD<br>A12 CARROL<br>A11 FLANDERS TBS#2<br>A11 MONTROSE AVE. TBS#1<br>A10 LOCUST HILL TBS#2<br>A10 MEDICAL CENTER TBS#1<br>A09 NORWOOD DR.<br>A08 FRIENDSHIP HEIGHTS<br>A07 RENO RD.<br>A06 VAN NESS<br>A05 CLEVELAND PARK<br>A04 WOODLEY PARK<br>A03 DUPONT<br>A01 METRO | B02 JUDICIARY SQ.<br>B03 K ST.<br>B99 NORTH YD.<br>B05 MICHIGAN AVE.<br>B06 BROOKLAND AVE.<br>B06 FORT TOTTEN<br>B07 SANDY SPRING<br>B08 SILVER SPRING TBS#1<br>B08 NOYES LN. TBS#2<br>B09 HILDAROSE DR.<br>B10 WHEATON<br>B11 GLENMONT SOUTH TBS#1<br>B11 GLENMONT NORTH TBS#2 | C98 TELEGRAPH RD.<br>C14 EISENHOWER AVE.<br>C13 KING ST.<br>C12 BASHFORD LN.<br>C11 POTOMAC R.R. YD.<br>C09 CRYSTAL CITY<br>C08 PENTAGON CITY<br>C07 PENTAGON SOUTH<br>C07 PENTAGON NORTH<br>C06 ARLINGTON CEMETARY<br>C06 MEMORIAL BRIDGE<br>C05 ROSSLYN<br>C04 FOGGY BOTTOM<br>C02 MCPHERSON SQ. | D01 FEDERAL TRIANGLE<br>D03 L'ENFANT PLAZA EAST<br>D05 CAPITOL SOUTH<br>D06 EASTERN MARKET<br>D08 STADIUM ARMY<br>D98 ANACOSTIA AVE.<br>D98 BENNING RD.<br>D09 KENILWORTH AVE.<br>D10 ADDISON RD.<br>D11 BEAVER RD.<br>D12 LANDOVER RD.<br>D13 NEW CARROLLTON<br>D13 HARKINS RD.<br>D99 NEW CARROLLTON YD. TBS#1<br>D99 NEW CARROLLTON YD. TBS#2 | E10 GREENBELT YD.<br>E10 55TH AVE.<br>E09 COLLEGE PARK<br>E08 QUEENS CHAPEL RD. TBS#2<br>E08 31ST AVE. TBS#1<br>E07 EASTERN AVE. & GALLOWAY ST.<br>E06 6TH PLACE & GALLATIN ST. TBS#2<br>E05 GEORGIA AVE.<br>E04 CHAPIN ST.<br>E02 SHAW<br>E01 MOUNT VERNON SQ. | F01 GALLERY PLACE<br>F03 MARYLAND AVE. TBS#1<br>F03 L'ENFANT PLAZA SOUTH TBS#2<br>F04 WATERFRONT<br>F05 ANACOSTIA RIVER<br>F09 NAYLOR RD.<br>F99 BRANCH AVE. YD. | K08 YEONAS DR.<br>K07 PROSPERITY AVE. TBS#2<br>K07 OGDEN ST. TBS#1<br>K06 WEST FALLS CHURCH<br>K06 WEST FALLS CHURCH YD. LEAD<br>K99 WEST FALLS CHURCH YARD #1<br>K99 WEST FALLS CHURCH YARD #2<br>K06 GREENWICH ST. TBS#2<br>K06 HAYCOCK RD. TBS#1<br>K05 NORTH 25TH ST.<br>K05 NORTH 11TH ST.<br>K04 BUCHANAN ST.<br>K03 BALLSTON<br>K02 CLARENDON CIRCLE |

- STATION G ROUTE**
- G01 BENNING RD.
  - G02 56TH PLACE TBS#1
  - G02 67TH AVE. TBS#2
  - G05 LARGO TOWN CENTER

- STATION J ROUTE**
- J03 FRANCONIA SPRINGFIELD TBS#2
  - J03 ROSO ST. TBS#1
  - J02 FARRINGTON AVE. TBS#2
  - J02 CLERMONT AVE. TBS#1
  - J01 QUAKER LN.
  - J01 ROTH ST.



PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 0032300 EXPIRATION DATE: 10-16-2015.

- LEGEND**
- RED LINE  
GLENMONT/SHADY GROVE
  - ORANGE LINE  
NEW CARROLLTON/VIENNA-FAIRFAX-GMU
  - BLUE LINE  
FRANCONIA-SPRINGFIELD/LARGO TOWN CENTER
  - YELLOW LINE  
HUNTINGTON/FORT TOTTEN
  - GREEN LINE  
BRANCH AVENUE/GREENBELT
  - TRANSFER STATION



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA.  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

DESIGNED			DRAWN			CHECKED		
JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

REFERENCE DRAWINGS		REVISIONS	
NUMBER	TITLE	DATE	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>	
SYSTEM MAP	
CONTRACT NO. FQ15237	SCALE NONE
DRAWING NO. TBS-G-001	SHEET NO. 1 OF 60

**INDEX OF DRAWINGS:**

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<b>GENERAL DRAWINGS</b>				<b>G01TBS - BENNING RD. TBS</b>			
0	COVER SHEET			36	K07TB2-TB-500	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	PANELBOARD SCHEDULES
1	TBS-G-001		SYSTEM MAP	37	G01TBS-TB-001	G01 - BENNING RD. TIE BREAKER STATION	VICINITY MAP
2	TBS-G-002		INDEX OF DRAWINGS	38	G01TBS-TB-200	G01 - BENNING RD. TIE BREAKER STATION	EQUIPMENT LAYOUT PLAN - NEW
3	TBS-G-003		GENERAL NOTES AND ABBREVIATIONS	39	G01TBS-TB-201	G01 - BENNING RD. TIE BREAKER STATION	EQUIPMENT GROUNDING PLAN - NEW
4	TBS-G-004		TYPICAL DETAILS - SHEET 1 OF 5	40	G01TBS-TB-202	G01 - BENNING RD. TIE BREAKER STATION	EQUIPMENT ELEVATIONS
5	TBS-G-005		TYPICAL DETAILS - SHEET 2 OF 5	41	G01TBS-TB-300	G01 - BENNING RD. TIE BREAKER STATION	CONDUIT AND CABLE SCHEDULE
6	TBS-G-006		TYPICAL DETAILS - SHEET 3 OF 5	42	G01TBS-TB-400	G01 - BENNING RD. TIE BREAKER STATION	480V SINGLE LINE DIAGRAM - NEW
7	TBS-G-007		TYPICAL DETAILS - SHEET 4 OF 5	43	G01TBS-TB-401	G01 - BENNING RD. TIE BREAKER STATION	SUPERVISORY AND CONTROL DIAGRAM - NEW
8	TBS-G-008		TYPICAL DETAILS - SHEET 5 OF 5	44	G01TBS-TB-500	G01 - BENNING RD. TIE BREAKER STATION	PANELBOARD SCHEDULE
9	TBS-G-009		EQUIPMENT SUPERVISORY ID	<b>G02TB1 - 56TH PLACE TBS</b>			
10	TBS-G-010		TYPICAL SUPERVISORY AND CONTROL DIAGRAM	45	G02TB1-TB-001	G02TB1 - 56TH PLACE TIE BREAKER STATION	VICINITY MAP
11	TBS-G-011		EQUIPMENT SCHEDULE	46	G02TB1-TB-200	G02TB1 - 56TH PLACE TIE BREAKER STATION	EQUIPMENT LAYOUT PLAN - NEW
12	TBS-G-012		TYPICAL CONTACT RAIL JUMPERS	47	G02TB1-TB-201	G02TB1 - 56TH PLACE TIE BREAKER STATION	EQUIPMENT GROUNDING PLAN - NEW
<b>K06TB2 - GREENWICH TBS</b>				48	G02TB1-TB-202	G02TB1 - 56TH PLACE TIE BREAKER STATION	EQUIPMENT ELEVATIONS
13	K06TB2-TB-001	K06TB2 - GREENWICH ST. TIE BREAKER STATION	VICINITY MAP	49	G02TB1-TB-300	G02TB1 - 56TH PLACE TIE BREAKER STATION	CONDUIT AND CABLE SCHEDULE
14	K06TB2-TB-200	K06TB2 - GREENWICH ST. TIE BREAKER STATION	EQUIPMENT LAYOUT PLAN - NEW	50	G02TB1-TB-400	G02TB1 - 56TH PLACE TIE BREAKER STATION	480V SINGLE LINE DIAGRAM - NEW
15	K06TB2-TB-201	K06TB2 - GREENWICH ST. TIE BREAKER STATION	EQUIPMENT GROUNDING PLAN - NEW	51	G02TB1-TB-401	G02TB1 - 56TH PLACE TIE BREAKER STATION	SUPERVISORY AND CONTROL DIAGRAM - NEW
16	K06TB2-TB-202	K06TB2 - GREENWICH ST. TIE BREAKER STATION	EQUIPMENT ELEVATIONS	52	G02TB1-TB-500	G02TB1 - 56TH PLACE TIE BREAKER STATION	PANELBOARD SCHEDULES
17	K06TB2-TB-300	K06TB2 - GREENWICH ST. TIE BREAKER STATION	CONDUIT AND CABLE SCHEDULE	<b>G02TB2 - 67TH AVE TBS</b>			
18	K06TB2-TB-400	K06TB2 - GREENWICH ST. TIE BREAKER STATION	480V SINGLE LINE DIAGRAM - NEW	53	G02TB2-TB-001	G02TB2 - 67TH AVE. TIE BREAKER STATION	VICINITY MAP
19	K06TB2-TB-401	K06TB2 - GREENWICH ST. TIE BREAKER STATION	SUPERVISORY AND CONTROL DIAGRAM - NEW	54	G02TB2-TB-200	G02TB2 - 67TH AVE. TIE BREAKER STATION	EQUIPMENT LAYOUT PLAN - NEW
20	K06TB2-TB-500	K06TB2 - GREENWICH ST. TIE BREAKER STATION	PANELBOARD SCHEDULES	55	G02TB2-TB-201	G02TB2 - 67TH AVE. TIE BREAKER STATION	EQUIPMENT GROUNDING PLAN - NEW
<b>K07TB1 - OGDEN ST. TBS</b>				56	G02TB2-TB-202	G02TB2 - 67TH AVE. TIE BREAKER STATION	EQUIPMENT ELEVATIONS
21	K07TB1-TB-001	K07TB1 - OGDEN ST. TIE BREAKER STATION	VICINITY MAP	57	G02TB2-TB-300	G02TB2 - 67TH AVE. TIE BREAKER STATION	CONDUIT AND CABLE SCHEDULE
22	K07TB1-TB-200	K07TB1 - OGDEN ST. TIE BREAKER STATION	EQUIPMENT LAYOUT PLAN - NEW	58	G02TB2-TB-400	G02TB2 - 67TH AVE. TIE BREAKER STATION	480V SINGLE LINE DIAGRAM - NEW
23	K07TB1-TB-201	K07TB1 - OGDEN ST. TIE BREAKER STATION	EQUIPMENT GROUNDING PLAN - NEW	59	G02TB2-TB-401	G02TB2 - 67TH AVE. TIE BREAKER STATION	SUPERVISORY AND CONTROL DIAGRAM - NEW
24	K07TB1-TB-202	K07TB1 - OGDEN ST. TIE BREAKER STATION	EQUIPMENT ELEVATIONS	60	G02TB2-TB-500	G02TB2 - 67TH AVE. TIE BREAKER STATION	PANELBOARD SCHEDULES
25	K07TB1-TB-300	K07TB1 - OGDEN ST. TIE BREAKER STATION	CONDUIT AND CABLE SCHEDULE				
26	K07TB1-TB-400	K07TB1 - OGDEN ST. TIE BREAKER STATION	480V SINGLE LINE DIAGRAM - NEW				
27	K07TB1-TB-401	K07TB1 - OGDEN ST. TIE BREAKER STATION	SUPERVISORY AND CONTROL DIAGRAM - NEW				
28	K07TB1-TB-500	K07TB1 - OGDEN ST. TIE BREAKER STATION	PANELBOARD SCHEDULES				
<b>K07TB2 - PROSPERITY AVE. TBS</b>							
29	K07TB2-TB-001	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	VICINITY MAP				
30	K07TB2-TB-200	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	EQUIPMENT LAYOUT PLAN - NEW				
31	K07TB2-TB-201	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	GROUNDING PLAN - NEW				
32	K07TB2-TB-202	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	EQUIPMENT ELEVATIONS				
33	K07TB2-TB-300	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	CONDUIT AND CABLE SCHEDULE				
34	K07TB2-TB-400	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	480V SINGLE LINE DIAGRAM - NEW				
35	K07TB2-TB-401	K07TB2 - PROSPERITY AVE. TIE BREAKER STATION	SUPERVISORY AND CONTROL DIAGRAM - NEW				



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REVISION SUBMITTED		APPROVED		DATE		DATE		CONTRACT NO. FQ15237		SCALE NONE		DRAWING NO. TBS-G-002		SHEET NO. 2 OF 60	

-VA Regulations 18VAC10-20-760

**GENERAL NOTES FOR EQUIPMENT VENDOR:**

- THIS CONTRACT IS FOR INSTALLATION WORK OF FACILITIES.
- DIMENSIONS AND INSTALLATION CLEARANCES AS SHOWN ARE APPROXIMATE AND WILL NECESSARILY VARY DEPENDING ON FINAL DIMENSIONS OF FURNISHED EQUIPMENT. MINOR DEVIATIONS IN EQUIPMENT LOCATIONS AND CLEARANCES WILL BE CONSIDERED DURING SHOP DRAWING REVIEW BY WMATA.
- FOR TYPICAL DETAILS SEE DRAWINGS TP-G-006 THROUGH TP-G-010.
- INSTALL AND GROUND RACEWAYS, CONDUITS, AND EQUIPMENT PER NATIONAL ELECTRICAL CODE AND AS INDICATED (DC SWITCHGEAR AND POSITIVE CABLE TRAY ARE NOT GROUNDED).
- ALL BOLTED CONNECTIONS FOR CURRENT CARRYING CONDUCTORS SHALL BE MADE WITH NON-FERROUS WASHERS AND HEX HEAD BOLTS AND NUTS. MATERIALS SHALL BE COMPATIBLE WITH CONNECTORS AND LUGS.
- THIS CONTRACT SHALL INCLUDE AT NO ADDITIONAL COST TO THE AUTHORITY. THE RELOCATION AND RECONNECTION OF ELECTRICAL EQUIPMENT IN THE SUBSTATION INCLUDING (BUT NOT LIMITED TO) EXISTING TRANSFORMER, PANELS, CIRCUIT BREAKERS, SWITCHES, CONDUITS, GROUND BUSES, LIGHTING FIXTURES, UPS, BATTERIES, AND ANCILLARY EQUIPMENT INCLUDING MECHANICAL DUCTS, EYE WASH UNITS, ETC. AS REQUIRED TO INSTALL MATERIALS SHOWN ON THE CONTRACT DRAWINGS. ALL WORK SHALL HAVE PRIOR APPROVAL FROM WMATA ENGINEERING.
- LOCATION OF PANELBOARDS, TEST CABINETS, AND OTHER WALL MOUNTED EQUIPMENT ARE APPROXIMATE. CONTRACTOR SHALL VERIFY CLEARANCES AND INTERFERENCE BY FIELD SURVEY AND RELOCATE IF NECESSARY TO SUIT FIELD CONDITIONS. ALL WORK SHALL HAVE PRIOR APPROVAL FROM THE ENGINEER.
- EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS THE MOUNTING HEIGHT TO THE TOP OF NEW ELECTRICAL EQUIPMENT ABOVE THE FLOOR INSTALLED IN TBS SHALL BE AS FOLLOWS:

HMI - 5'-6"  
DISCONNECT SWITCH 5'-6"  
DC/AC CIRCUIT BREAKER TEST CABINET 5'-0"  
ENCLOSED CIRCUIT BREAKER 5'-6"  
DC DISTRIBUTION PANEL 6'-0"  
AC POWER PANEL 6'-0"  
BATTERY CYCLE MONITOR - 6'-0"

} WALL MOUNTED  
ALL STATIONS

BATTERY CHARGER & BATTERY  
DC SWITCHGEAR  
VOLTAGE REGULATOR  
RTU

} FLOOR MOUNTED  
ALL STATIONS

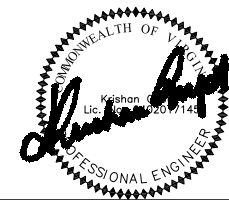
- MINIMUM VERTICAL CLEARANCE OF CABLE TRAYS FROM TOP OF LOWER TRAY TO BOTTOM OF UPPER TRAY SHALL BE 12" WHERE RUNNING PARALLEL (ONE ABOVE THE OTHER) AND 6" WHERE CROSSING.
- RACEWAY RUNS AND CABLE TRAY LOCATIONS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS AND METHOD OF SUPPORT SHALL BE DETERMINED AND PROVIDED BY THE CONTRACTOR. WORK SHALL HAVE PRIOR APPROVAL FROM THE WMATA ENGINEER.
- ALL EQUIPMENT LAYOUT AND CLEARANCES SHOWN ON THESE CONTRACT DRAWINGS ARE BASED UPON MAXIMUM PERMISSIBLE DIMENSIONS OF VENDOR EQUIPMENT. THESE LAYOUTS SHALL BE ADJUSTED, BASED UPON ACTUAL FURNISHED EQUIPMENT WHERE NECESSARY AND SUBMITTED TO AUTHORITY REPRESENTATIVE FOR APPROVAL.
- ALL DIMENSIONS SHOWN FOR CLEARANCES TO WALLS, OPENINGS AND OTHER EQUIPMENT ARE MINIMUM AND MUST BE MAINTAINED. CONTRACTOR SHALL OBTAIN APPROVAL OF AUTHORITY REPRESENTATIVE IF A REVISION IN THE EQUIPMENT LAYOUT IS REQUIRED TO ACCOMMODATE THE EQUIPMENT FURNISHED.
- ALL DIMENSIONS SHOWN ARE APPROXIMATE. EXACT MEASUREMENTS SHALL BE MADE AT THE SITE BY CONTRACTOR/DESIGNER.
- INSULATING TOPPING SHALL BE PROVIDED AS SHOWN WITH A MINIMUM OF 3'-0" AROUND DC SWITCHGEAR AND 4'-6" IN FRONT OF DC SWITCHGEAR.
- REPLACED LIGHTING FIXTURES SHALL BE INSTALLED AS SHOWN ON CONTRACT DRAWINGS.
- PROVIDE 2#12 & 1#12G IN 3/4"C FOR NEW AND REPLACED LIGHTING FIXTURE BRANCH CIRCUITS. ALL NORMAL LIGHT FIXTURES INSIDE TBS ROOMS ARE TYPE 1. EMERGENCY LIGHT FIXTURES ARE TYPE 10. OUTDOOR LIGHT FIXTURES ARE TYPE 8.
- PROVIDE/REPLACE STATION SWITCHES FOR LIGHTING FIXTURES FOR ALL FACILITIES.
- THE TEMPORARY JUMPER CONNECTION CONSISTS OF FOUR (4) 1000KCM UNSHIELDED CABLE AS STIPULATED IN SPECIFICATION SECTION 16128 UNLESS OTHERWISE NOTED.
- ONE LINE DIAGRAMS SHOWN ARE FOR GUIDANCE ONLY.

- FIELD VISIT AND TESTING INFORMATION IS REQUIRED PRIOR TO ANY MODIFICATIONS.
- ALL WORK SHOULD BE PERFORMED IN ACCORDANCE WITH LOCAL CODE AND NEC. WHERE LOCAL CODE AND NEC IS PERMISSIVE, THE SPECIFICATION GOVERN. LOCAL AUTHORITY GOVERNS ALL.
- CONTRACTOR SHALL REPLACE OR RESTORE TO ORIGINAL CONDITION EXISTING EQUIPMENT AND MATERIAL DAMAGE BY THE CONTRACTOR DURING THE COURSE OF THIS CONTRACT AT NO ADDITIONAL COST TO WMATA.
- DIRECTORIES OF EXISTING PANELBOARDS MODIFIED BY THE CONTRACTOR SHALL BE REPLACED WITH NEW TYPED DIRECTORIES IDENTIFYING THE UPDATED CIRCUITS.
- ALL NEW POSITIVE CABLE TRAY SHALL BE FIBERGLASS, AS MANUFACTURED BY ROBROY INDUSTRIES OR APPROVED EQUAL.
- THE REQUIREMENTS FOR CONDUIT, CABLE, AND WIRING ARE SHOWN ON PLANS, DETAILS, ONE LINE DIAGRAMS, WIRING DIAGRAMS, AND/OR SCHEDULES. THE CONTRACTOR SHALL ALSO REFER TO THE APPROPRIATE SPECIFICATION AND DESIGN CRITERIA TO DETERMINE THE MATERIAL QUANTITY AND INSTALLATION REQUIREMENTS.
- FILL DEPRESSED FLOOR AREAS IN AREAS WHERE NO INSULATED TOPPING IS INSTALLED WITH CONCRETE TO PROVIDE FINISH FLOOR SURFACE FLUSH WITH ADJACENT FINISHED FLOOR SURFACED.
- WHERE INSULATING TOPPING IS INSTALLED ON FINISHED FLOOR, FEATHER EDGES TO MEET THE UN-TOPPED FLOOR SURFACE WITHOUT PRESENTING A RIDGE ON THE FLOOR.
- ALL UNGROUNDED EQUIPMENT, SUCH AS DC SWITCHGEAR ARE REQUIRED TO BE INSTALLED AT A MINIMUM OF 3' CLEARANCE FROM GROUNDED EQUIPMENT, WALLS, AND COLUMNS. WHERE SPACE IS LESS THAN 3'-0", INSULATED SHEETS ON WALLS AND COLUMNS SHALL BE INSTALLED FROM FLOOR TO MINIMUM HEIGHT OF 12" ABOVE HEIGHT OF RESPECTIVE EQUIPMENT.
- ANY ENLARGEMENT OF EXISTING OPENINGS IN WALL OR FLOOR SHALL BE COORDINATED WITH APPROVED SHOP DRAWINGS FROM VENDOR AND DETAILS SUBMITTED TO ENGINEER FOR APPROVAL.
- WHERE EXISTING EQUIPMENT SUCH AS DC SWITCHGEAR IS REPLACED. CONTRACTOR IS REQUIRED TO PROVIDE NECESSARY MOUNTING AND LEVELING CHANNELS, HARDWARE, FOUNDATION BOLTS AND OTHER SIMILAR ITEMS. EXISTING EMBEDDED FLOOR CHANNELS MAY BE REUSED.
- SOME WIRING AND CIRCUIT CONFIGURATIONS/ROUTING AS SHOWN ON DRAWINGS MAY REQUIRE REVISION BASED ON VENDOR DRAWINGS. CONTRACTOR SHALL REFLECT THESE CHANGES AS WELL AS INCORPORATE THEM INTO AS-BUILT DRAWINGS AT NO ADDITIONAL COST TO THE AUTHORITY.
- PROVIDE NEW CABLES AS INDICATED ON CABLE SCHEDULES.
- PROVIDE NEW CONDUITS. NEW CONDUITS SHALL BE GALVANIZED RIGID STEEL (EXCEPT PROVIDE FRE NON-METALLIC CONDUIT FOR FINAL CONNECTION TO DC SWITCHGEAR, DC SWITCHBOARDS, AND RECTIFIERS).
- PROVIDE AND INSTALL WIRING AS DEFINED IN CABLE SCHEDULE ALL EXISTING CIRCUITS IN CABLE SCHEDULE ARE TO REMAIN UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL INSTALL ALL IDENTIFIED EQUIPMENT SHOWN ON CONTRACT DRAWINGS. THE WORK SHALL BE IN ACCORDANCE WITH DESIGN CRITERIA AND SPECIFICATION.
- THE CONTRACTOR SHALL DEVELOPED DETAILED INSTALLATION DRAWINGS, INTERCONNECTION DRAWINGS, CABLE SCHEDULE, DTS INTERCONNECTION DIAGRAMS BASED ON CONTRACT DRAWINGS AND SUBMITTED TO WMATA FOR APPROVAL.
- VENDOR DRAWINGS FOR EACH FACILITY WILL BE PROVIDED BY WMATA TO THE EXTENT POSSIBLE, AS THE CONTRACT PROGRESSES. THESE DRAWINGS ARE NOT CONFORMED OR FIELD VERIFIED. THE CONTRACTOR SHALL ASSURE THE SUITABILITY OF THESE VENDOR DRAWINGS TO PERFORM THE REQUIRED WORK BY APPROPRIATE FILED SURVEY AND CHECKS.

\*\*\* **PROVIDE = THE PROVISION OF NEW EQUIPMENT, INSTALLATION, TESTING, MOUNTING AND CONNECTIONS REQUIRED FOR A FULLY FUNCTIONAL INSTALLATION.** \*\*\*

**ABBREVIATIONS**

- |  |                                    |
|--|------------------------------------|
| 3PH - THREE PHASE  | PT - POTENTIAL TRANSFORMER         |
| AEMS - AUTOMATED ENERGY MANAGEMENT SYSTEM                                      | PWR - POWER                        |
| A.F.F. - INDICATES MOUNTING HEIGHT ABOVE FINISHED FLOOR TO BOTTOM OF EQUIPMENT | RTU - REMOTE TERMINAL UNIT         |
| ATS - AUTOMATIC TRANSFER SWITCH  | SWGR. - SWITCHGEAR                 |
| AUX, - AUXILIARY   | SW. - SWITCH                       |
| AVR - AUTOMATIC VOLTAGE REGULATOR  | TBS - TIE BREAKER STATION          |
| BKR - BREAKER  | TYP. - TYPICAL                     |
| CA. TRAY - CABLE TRAY  | UPS - UNINTERRUPTIBLE POWER SUPPLY |
| CAB - CABINET  | W - WIDTH                          |
| CKT. - CIRCUIT   | XDCR - TRANSDUCER                  |
| CB - CIRCUIT BREAKER   | XFMR - TRANSFORMER                 |
| CND. - CONDUIT   |                                    |
| CT - CURRENT TRANSFORMER   |                                    |
| CSM - CABLE SHIELD MONITOR   |                                    |
| DIO - DISTRIBUTED INPUT/OUTPUT MODULE  |                                    |
| DPM - DIGITAL POWER METER  |                                    |
| DTR - DIGITAL TRACE RECORDER   |                                    |
| D.T.S. - DATA TRANSMISSION SYSTEM  |                                    |
| EMERG. - EMERGENCY   |                                    |
| EQUIP. - EQUIPMENT   |                                    |
| ECB - ENCLOSED CIRCUIT BREAKER   |                                    |
| FDR - FEEDER   |                                    |
| FPP/FDP - FIBER PATCH PANEL/FIBER DISTRIBUTION PANEL                           |                                    |
| HMI - HUMAN MACHINE INTERFACE  |                                    |
| I.B. - INBOUND TRACK   |                                    |
| INCOM - INCOMING   |                                    |
| J.B. - JUNCTION BOX  |                                    |
| KV - KILOVOLTS   |                                    |
| KVA - KILOVOLT AMPERES   |                                    |
| KW - KILOWATTS   |                                    |
| - LENGTH   |                                    |
| LV - LOW VOLTAGE   |                                    |
| MTD - MOUNTED  |                                    |
| MPR - MULTIFUNCTION PROTECTION RELAY   |                                    |
| MW - MEGA WATTS  |                                    |
| NEG - NEGATIVE   |                                    |
| N.I.C. - NOT IN CONTRACT   |                                    |
| NO. - NUMBER   |                                    |
| O.B. - OUTBOUND TRACK  |                                    |
| OCC - OPERATION CONTROL CENTER   |                                    |
| PNL - PANEL  |                                    |
| POS - POSITIVE   |                                    |



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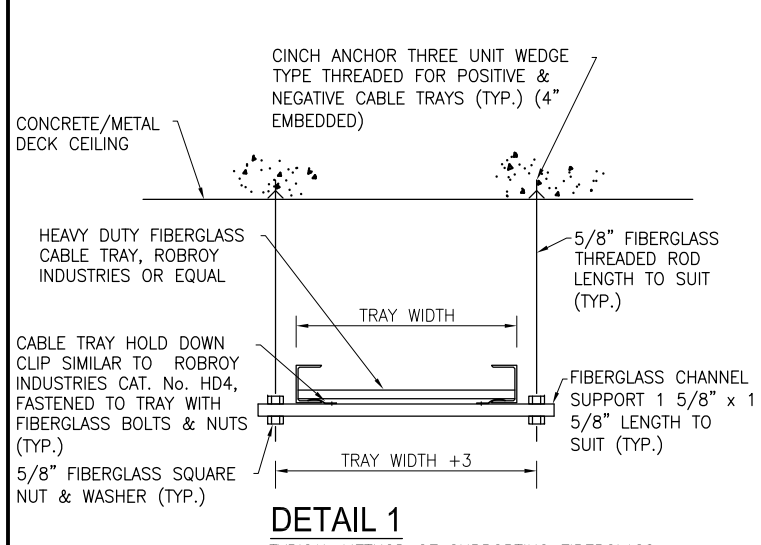
LICENSE No. 04020117145  
EXPIRATION DATE: 10/31/2015

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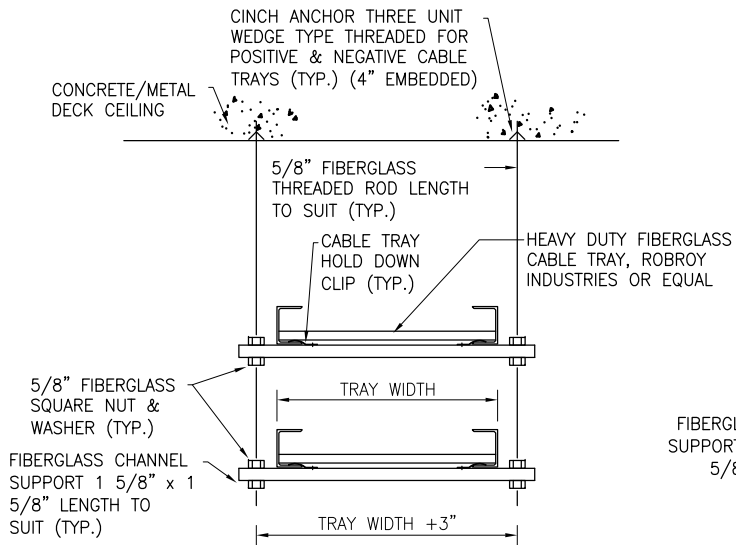
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DESIGNED JAJ 4/4/15 DATE		DRAWN JAJ 5/20/15 DATE		CHECKED PK 6/1/15 DATE		<b>REFERENCE DRAWINGS</b> NUMBER TITLE DATE NUM DESCRIPTION			<b>REVISIONS</b> NUMBER TITLE DATE NUM DESCRIPTION			WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES CENI - POWER SYSTEMS ENGINEERING			SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA GENERAL NOTES AND ABBREVIATIONS		
REVISION SUBMITTED DATE APPROVED DATE DEPUTY CHIEF ENGINEER						CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-003	SHEET NO. 3 OF 60								

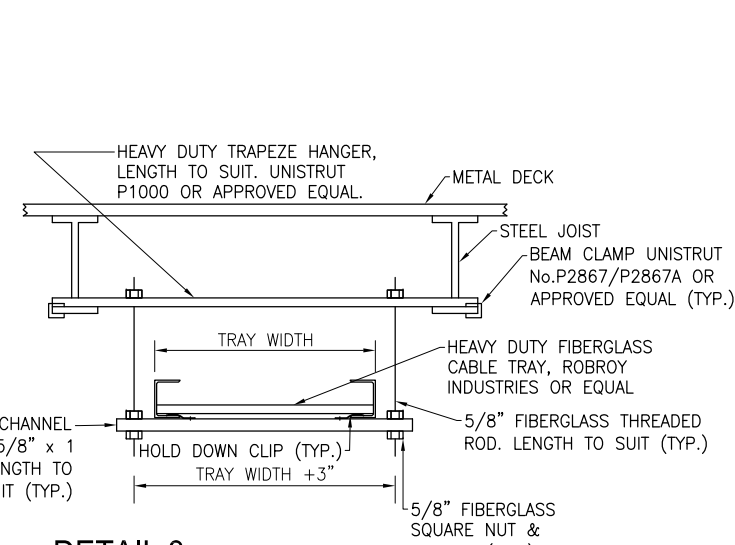
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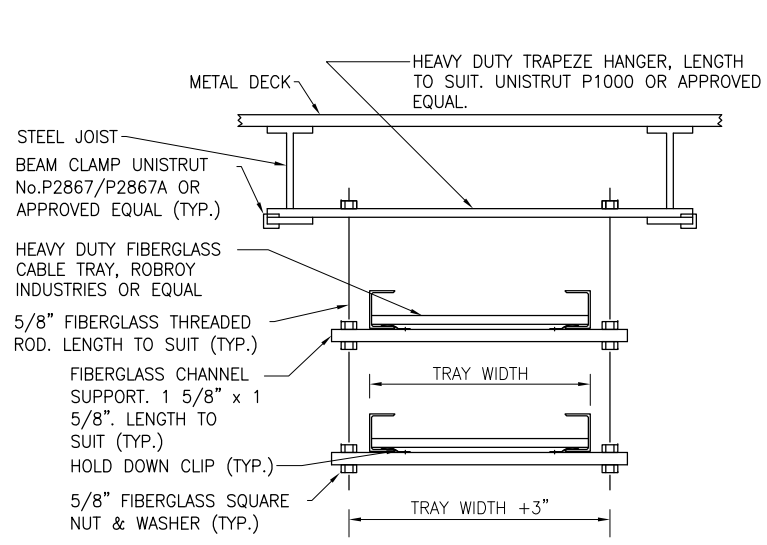
**DETAIL 1**  
 TYPICAL METHOD OF SUPPORTING FIBERGLASS CABLE TRAY (POSITIVE AND NEGATIVE TRAYS ONLY) FROM CONCRETE/METAL DECK CEILING. SEE NOTE 1.



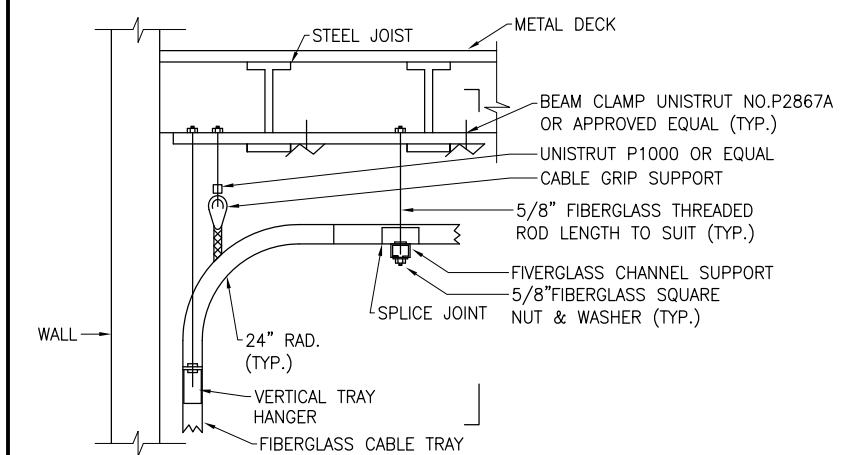
**DETAIL 2**  
 TYPICAL METHOD OF SUPPORTING TWO FIBERGLASS CABLE TRAYS (POSITIVE & NEGATIVE TRAYS ONLY) FROM CONCRETE/METAL DECK CEILING. SEE NOTE 1.



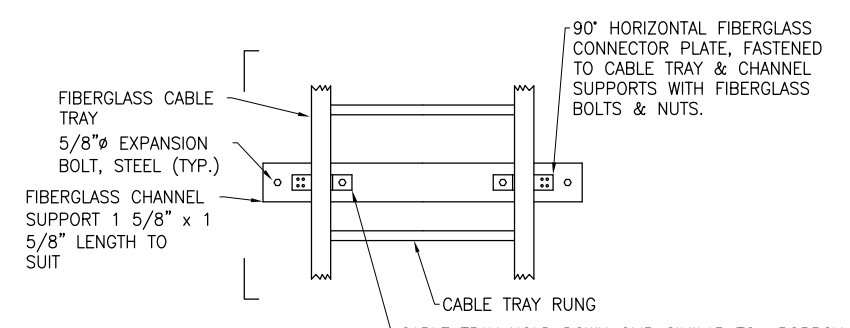
**DETAIL 3**  
 TYPICAL METHOD OF SUPPORTING FIBERGLASS CABLE TRAYS (POSITIVE & NEGATIVE TRAYS ONLY) FROM STEEL JOIST CEILING. SEE NOTE 1.



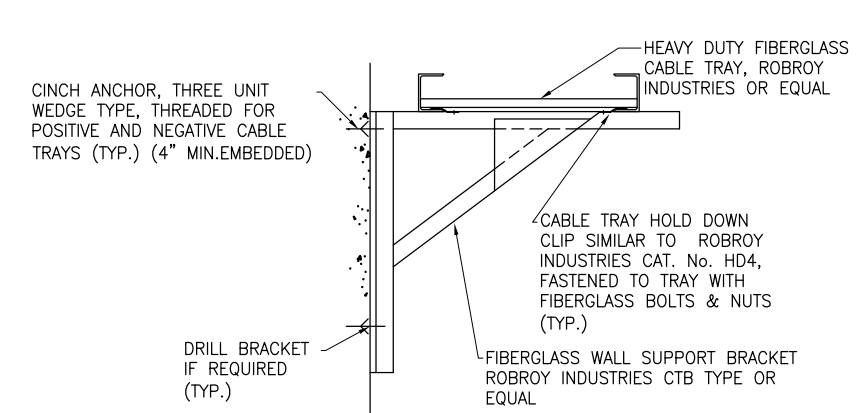
**DETAIL 4**  
 TYPICAL METHOD OF SUPPORTING TWO FIBERGLASS CABLE TRAYS (POSITIVE & NEGATIVE TRAYS ONLY) FROM STEEL JOIST CEILING. SEE NOTE 1.



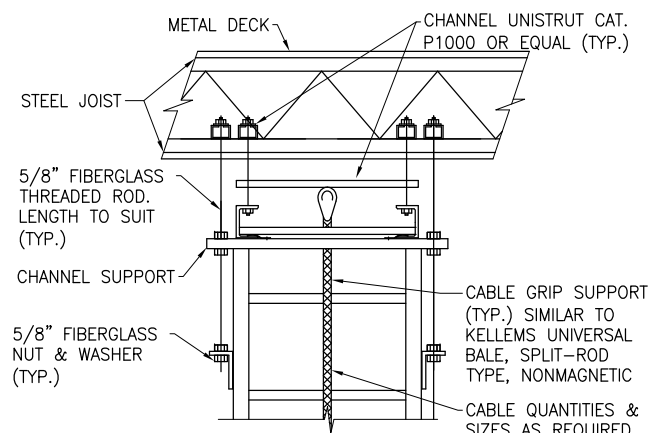
**DETAIL 5**  
 TYPICAL METHOD FOR SUPPORTING FIBERGLASS CABLE TRAYS (POSITIVE & NEGATIVE TRAYS ONLY) AND CABLE FOR VERTICAL DROPS GREATER THAN 9'-0". SEE NOTE 1.



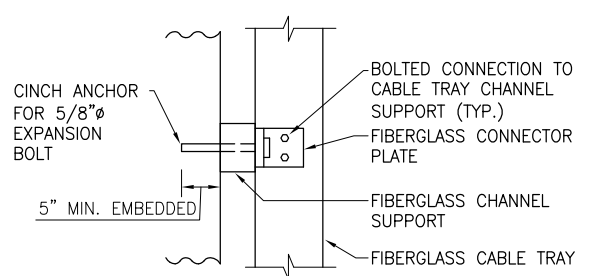
**DETAIL 6**  
 TYPICAL METHOD FOR SUPPORTING ALL POSITIVE & NEGATIVE FIBERGLASS CABLE TRAYS, FLAT TO WALL (UNLESS OTHERWISE NOTED). SEE NOTES 1 AND 2.



**DETAIL 7**  
 TYPICAL METHOD OF SUPPORTING FIBERGLASS CABLE TRAY (POSITIVE & NEGATIVE TRAY ONLY) FROM CONCRETE WALL. SEE NOTES 1 AND 2.



**SECTION A-A**  
 (DETAIL 5)



**SECTION B-B**  
 (DETAIL 6)

**NOTES:**

- ALL CABLE TRAYS SHALL BE SUPPORTED AT ELBOWS AND TEES, HORIZONTAL RUNS OF CABLE TRAYS SHALL BE SUPPORTED AT NOT MORE THAN 10'-0" ON CENTERS FOR POSITIVE AND NEGATIVE CABLE TRAYS AND NOT MORE THAN 12'-0" ON CENTERS FOR OTHER CABLE TRAYS.
- FOR TRAY SUPPORTS OTHER THAN POSITIVE AND NEGATIVE CABLE TRAYS, BOLT SUPPORT CLIPS OR WALL BRACKETS DIRECTLY TO WALL WITH 5/8" EXPANSION BOLTS.



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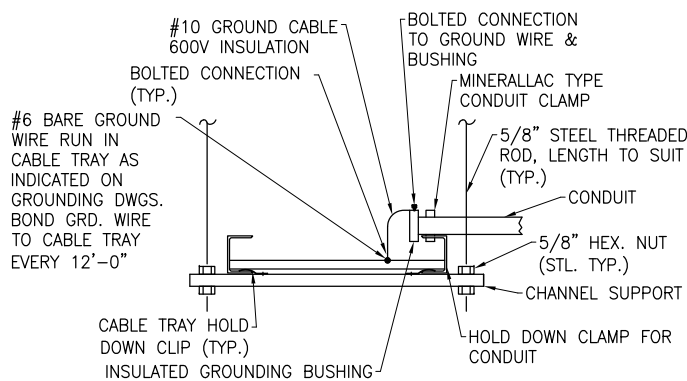
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 DEPUTY CHIEF ENGINEER

**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**

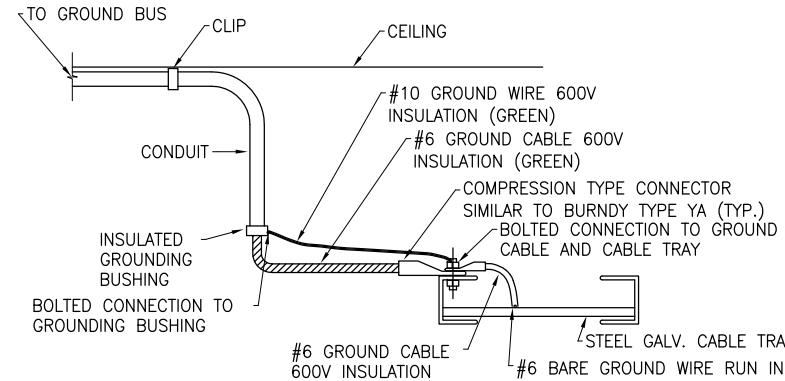
TYPICAL DETAILS - SHEET 1 OF 5

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-004	SHEET NO. 4 OF 60
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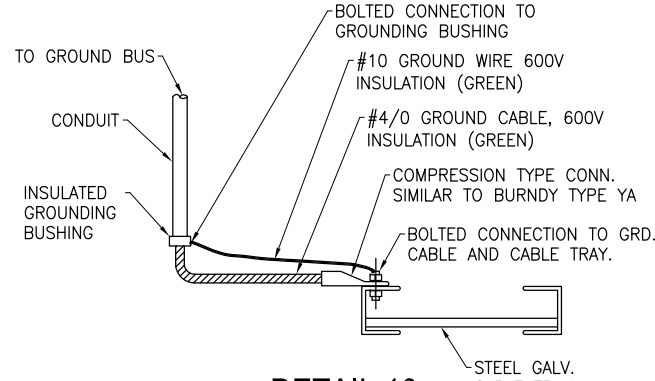
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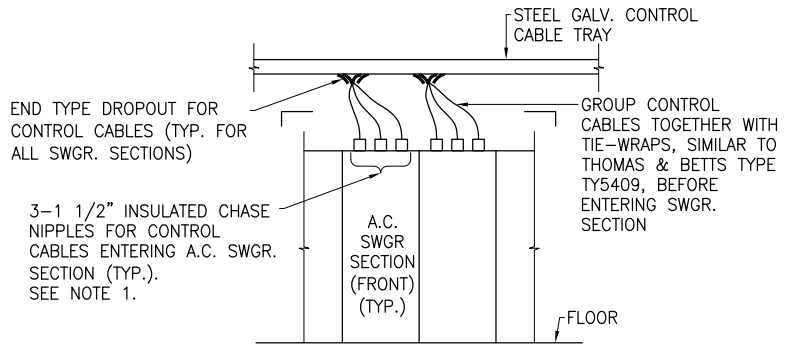
**DETAIL 8**  
 TYPICAL METHOD OF SUPPORTING GALV. STEEL CABLE TRAY AND GROUNDING OF CONDUIT. (FOR A.C. POWER AND CONTROL CIRCUITS)



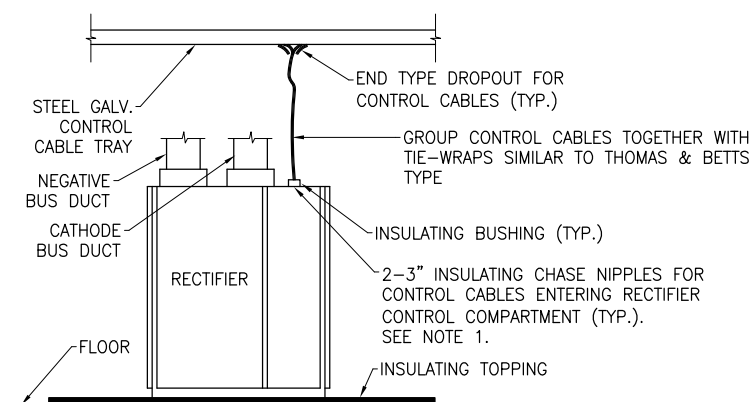
**DETAIL 9**  
 TYPICAL GROUND CONNECTION TO STEEL GALV. CONTROL CABLE TRAY



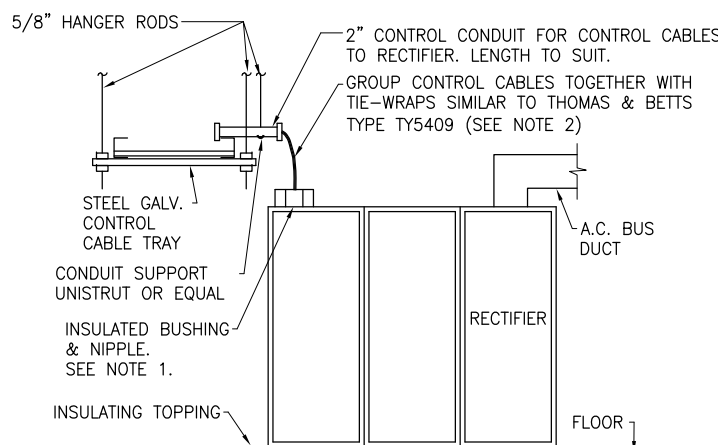
**DETAIL 10**  
 TYPICAL GROUND CONNECTION TO STEEL GALV. INCOMING LINE CABLE TRAY



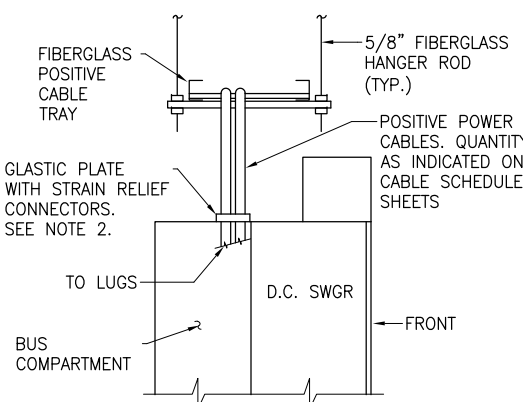
**DETAIL 11**  
 TYPICAL METHOD OF ROUTING CONTROL CABLES TO A.C. SWITCHGEAR. SEE NOTE 1.



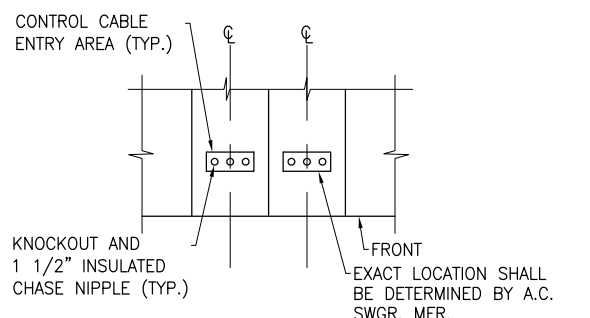
**DETAIL 12**  
 TYPICAL METHOD OF RUNNING CONTROL CABLES FROM CABLE TRAY TO RECTIFIER WHERE CONTROL CABLE TRAY IS LOCATED DIRECTLY OVER RECTIFIER.



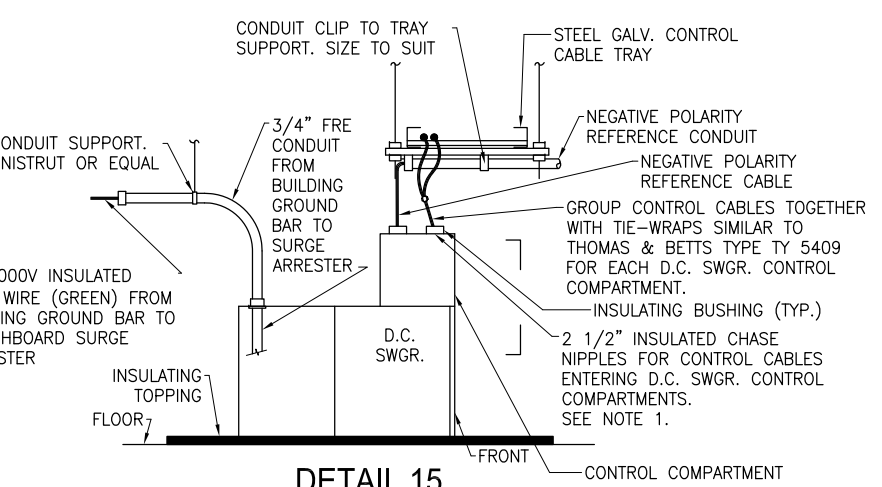
**DETAIL 13**  
 TYPICAL METHOD OF RUNNING CONTROL CABLES FROM CABLE TRAY TO RECTIFIER WHERE CONTROL CABLE TRAY IS NOT LOCATED DIRECTLY OVER RECTIFIER (UNLESS SHOWN OTHERWISE ON PLANS).



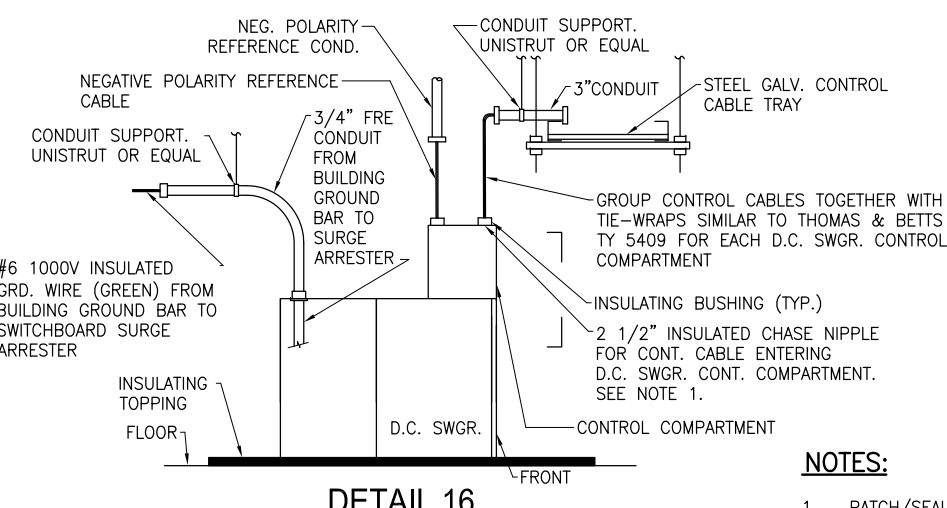
**DETAIL 14**  
 TYPICAL METHOD OF RUNNING POSITIVE POWER CABLES FROM CABLE TRAY TO D.C. SWITCHGEAR FEEDER BREAKER BUS.



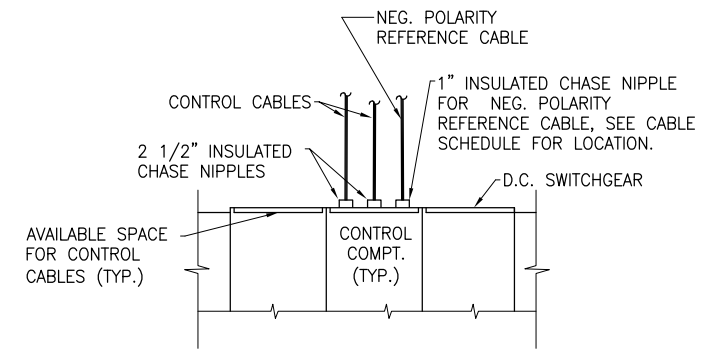
**SECTION A-A**  
 (DETAIL 11)



**DETAIL 15**  
 TYPICAL METHOD OF RUNNING CABLES FROM CABLE TRAY AND CONDUITS TO D.C. SWGR. WHERE CONTROL CABLE TRAY IS LOCATED DIRECTLY OVER CONTROL COMPARTMENT OF D.C. SWITCHGEAR.



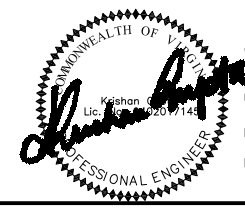
**DETAIL 16**  
 TYPICAL METHOD OF RUNNING CABLES FROM CABLE TRAY AND CONDUITS TO D.C. SWITCHGEAR WHERE CONTROL CABLE TRAY IS NOT LOCATED DIRECTLY OVER CONTROL COMPARTMENTS OF D.C. SWITCHGEAR.



**SECTION B-B**  
 (DETAILS 15,16)

**NOTES:**

- PATCH/SEAL ALL CHASE NIPPLES AND OPENINGS, USED FOR CABLES TO ENTER THE SWITCHBOARD WITH SEAL COMPOUND PER SPECIFICATION 16052.
- SEE DETAIL 17 ON DRAWING DD-TP-SSI-003 FOR GLASTIC PLATE.



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REFERENCE DRAWINGS			REVISIONS		
DESIGNED	DATE	TITLE	NUMBER	DATE	DESCRIPTION
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JAJ	5/20/15				
PK	6/1/15				

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**CENI - POWER SYSTEMS ENGINEERING**

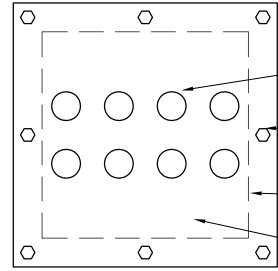
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 DEPUTY CHIEF ENGINEER

**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**

TYPICAL DETAILS - SHEET 2 OF 5

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-005	SHEET NO. 5 OF 60
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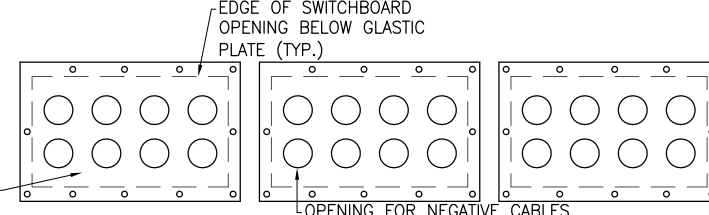
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**DETAIL 17**

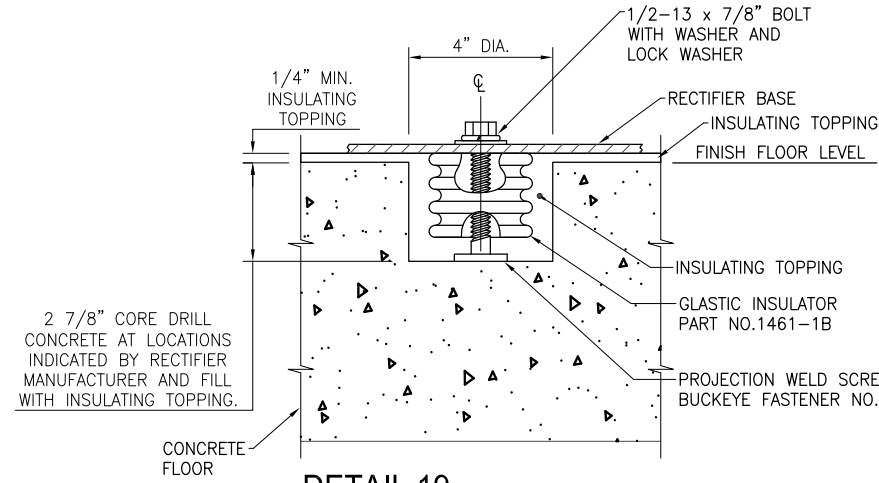
TYPICAL METHOD OF SUPPORTING POSITIVE CABLES AS THEY ENTER FEEDER BREAKER BUS COMPARTMENTS AT TOP OF DC SWITCHGEAR

- OPENING FOR POSITIVE CABLES. QUANTITY AS REQUIRED (TYP.)
- BOLT FOR FASTENING GLASTIC PLATE TO ENCLOSURE (TYP.)
- EDGE OF SWGR. OPNG. BELOW GLASTIC PLATE
- REMOVE GLASTIC PLATE AND DRILL ONE HOLE OF REQUIRED SIZE FOR EACH CABLE WITH HOLE APPROX. ALIGNED WITH THE ASSOCIATED FEEDER CABLE TERMINAL CONNECTOR AT THE BUS. PROVIDE LIQUDTIGHT STRAIN RELIEF CONNECTOR SIMILAR TO THOMAS AND BETTS (T&B) CAT. NO.2574 AT EACH HOLE



**DETAIL 18**

TYPICAL METHOD OF SUPPORTING NEGATIVE CABLES AS THEY ENTER NEGATIVE SWITCHBOARD

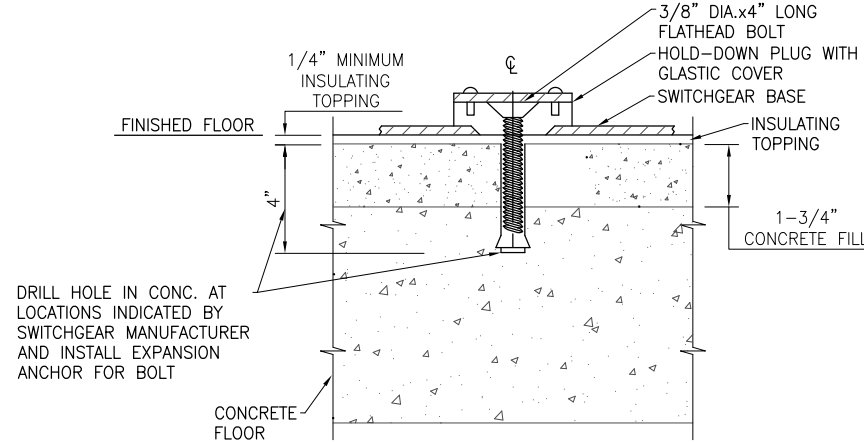


**DETAIL 19**

TYPICAL METHOD OF ANCHORING RECTIFIER

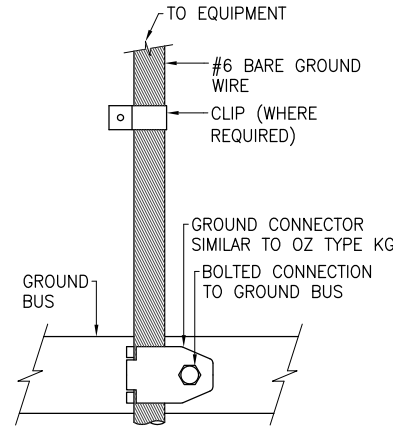
**NOTES:**

- HORIZONTAL BUS DUCT SUPPORTS SHALL BE LOCATED ON CORNERS WITHIN 1'-0" OF THE INSIDE EDGE OF EACH LEG AND ON STRAIGHT SECTIONS AT A MAXIMUM INTERVAL OF 8'-0".
- VERTICAL BUS DUCT SUPPORT(S) SHALL BE LOCATED AT THE TOP OF THE VERTICAL BUS DUCT SECTION AND AT INTERMEDIATE INTERVALS AS MARKED ON THE VERTICAL BUS DUCT SECTION OR AS RECOMMENDED BY THE MANUFACTURER.



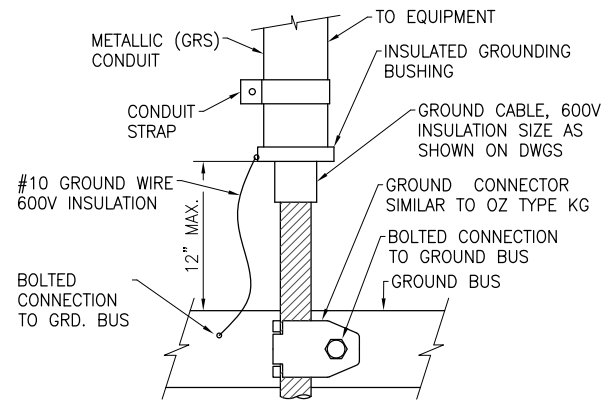
**DETAIL 20**

TYPICAL METHOD OF ANCHORING DC SWITCHGEAR



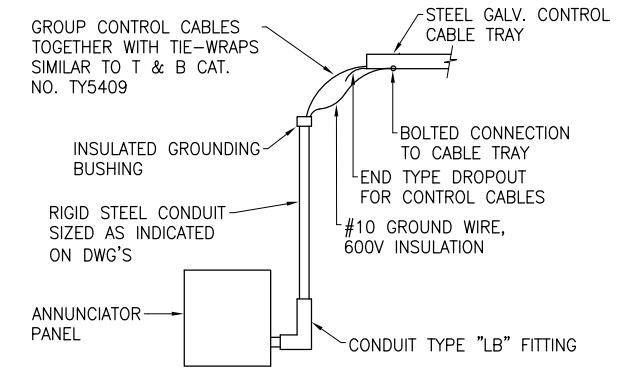
**DETAIL 21**

TYPICAL GROUND CONNECTION FROM BARE GROUND WIRE TO GROUND BUS



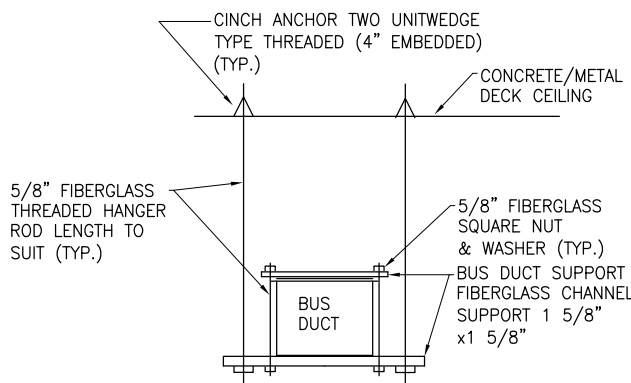
**DETAIL 22**

TYPICAL GROUND CONNECTION FROM INSULATED GROUND CABLE IN METALLIC CONDUIT TO GROUND BUS



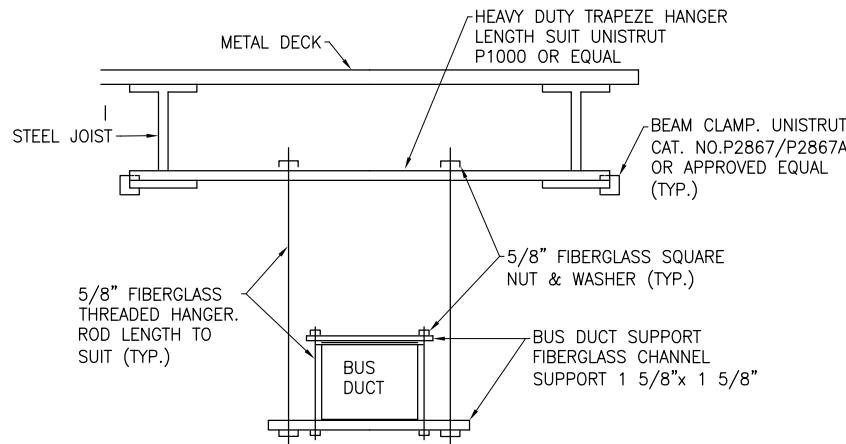
**DETAIL 23**

TYPICAL METHOD OF RUNNING CONTROL CABLES FROM CONTROL CABLE TRAY TO ANNUNCIATOR PANEL



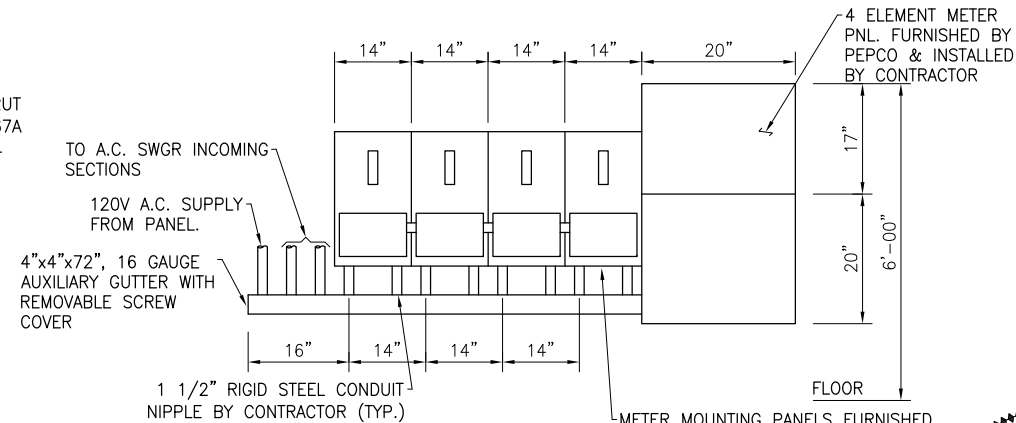
**DETAIL 24**

TYPICAL METHOD OF SUPPORTING BUS DUCT FROM CONCRETE/METAL DECK CEILING. SUPPORT BUS DUCT EVERY 8'-0" AND PROVIDE AT LEAST TWO SUPPORTS PER DUCT ASSEMBLY AT EACH CORNER. SEE NOTES 1 AND 2.



**DETAIL 25**

TYPICAL METHOD OF SUPPORTING BUS DUCT FROM STEEL JOIST CEILING. SEE NOTE S1 AND 2.



**DETAIL 26**

TYPICAL METHOD OF INSTALLING METERING PANEL. ALL EQUIPMENT AND MATERIALS SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS OTHERWISE NOTED.



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NAME	DATE	DATE	DATE	NAME	DATE	NAME	DATE	NAME	DATE	NAME	DATE
JAJ	4/4/15	JAJ	5/20/15	PK	6/1/15						

REFERENCE DRAWINGS				REVISIONS			
NUMBER	TITLE	DATE	NUM	DESCRIPTION	DATE	NUM	DESCRIPTION

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**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**

**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED \_\_\_\_\_ DATE \_\_\_\_\_

DEPUTY CHIEF ENGINEER

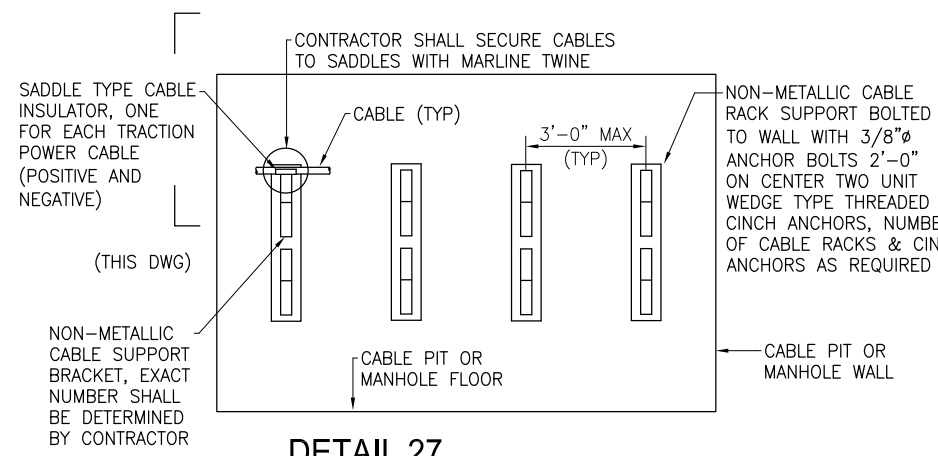
**SIX (6) TIE BREAKER STATIONS UPGRADES**

**ORANGE AND BLUE LINES DC, MD AND VA**

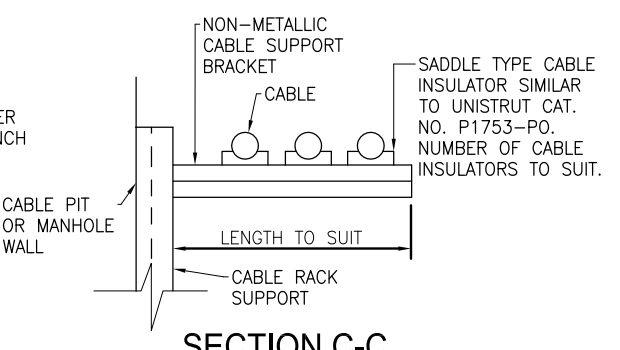
TYPICAL DETAILS - SHEET 3 OF 5

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-006	SHEET NO. 6 OF 60
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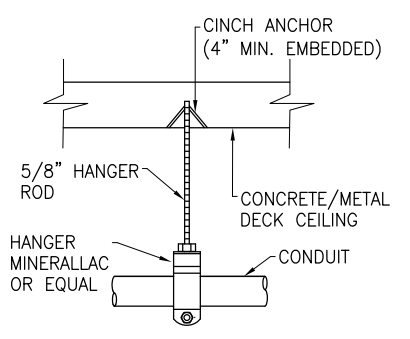
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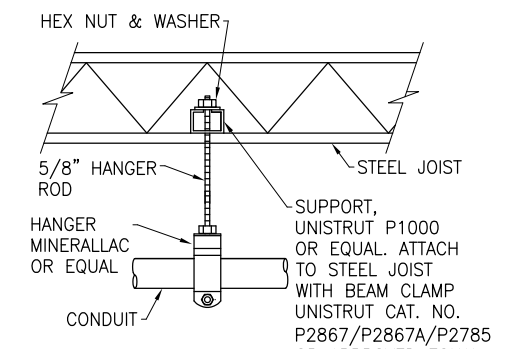
**DETAIL 27**  
 TYPICAL METHOD OF SUPPORTING TRACTION POWER CABLES IN CABLE PITS AND MANHOLES, CONTRACTOR SHALL PROVIDE CABLE RACKS AS REQD



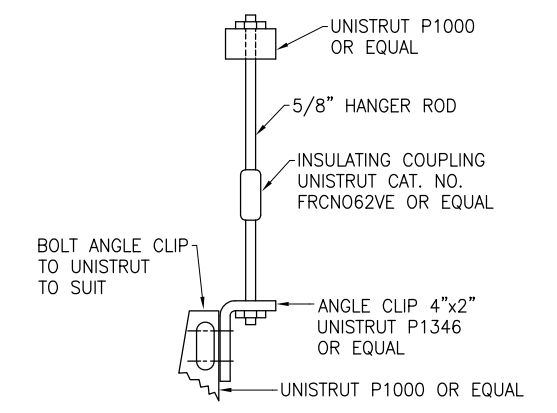
**SECTION C-C**  
 (DETAIL 27)



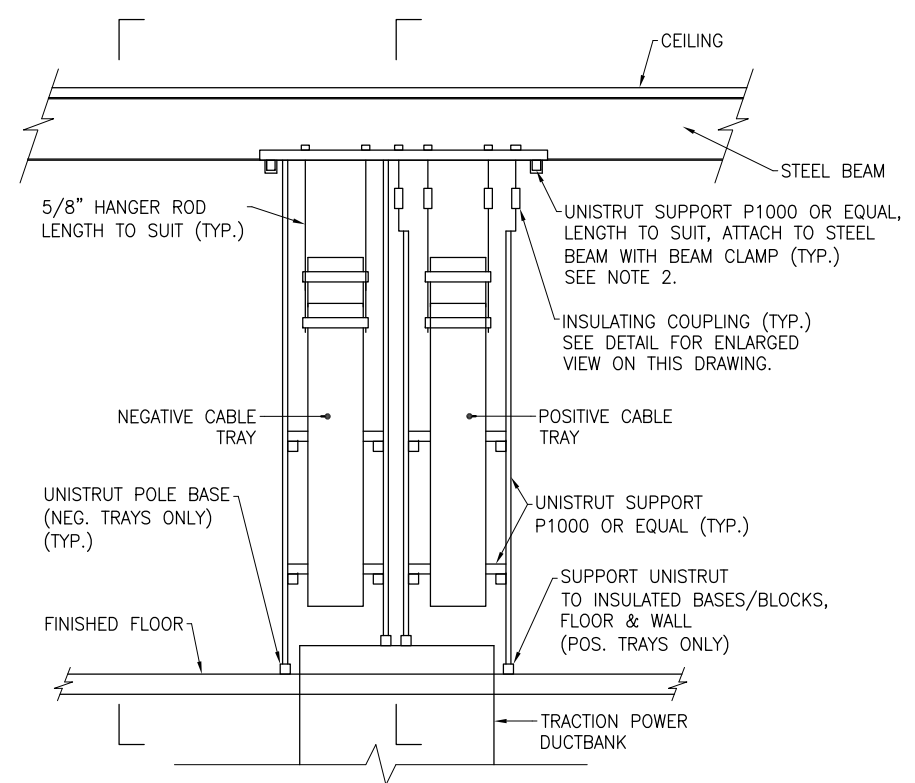
**DETAIL 28**  
 TYPICAL METHOD OF SUPPORTING CONDUIT FROM CONCRETE DECK CEILING



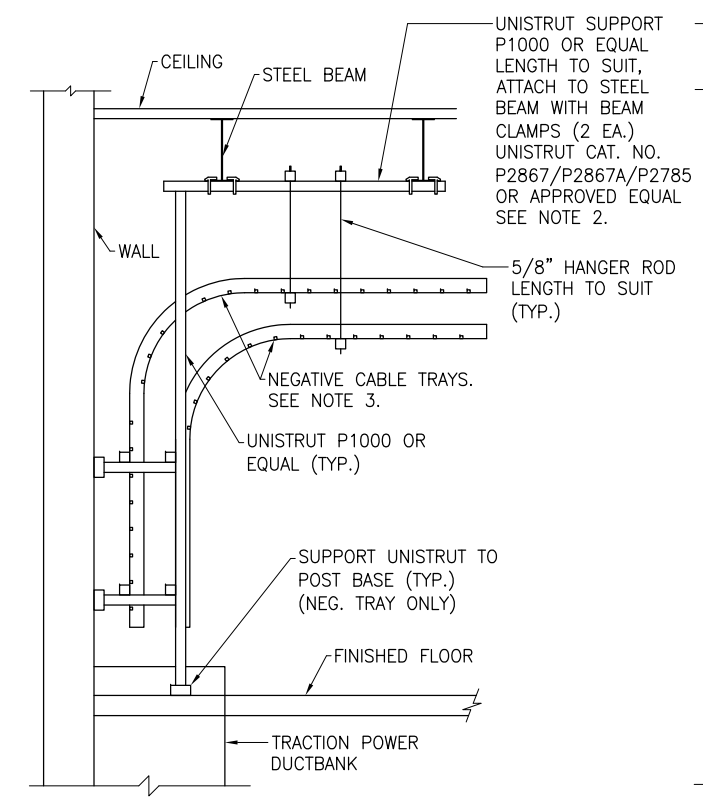
**DETAIL 29**  
 TYPICAL METHOD OF SUPPORTING CONDUIT FROM STEEL JOIST CEILING



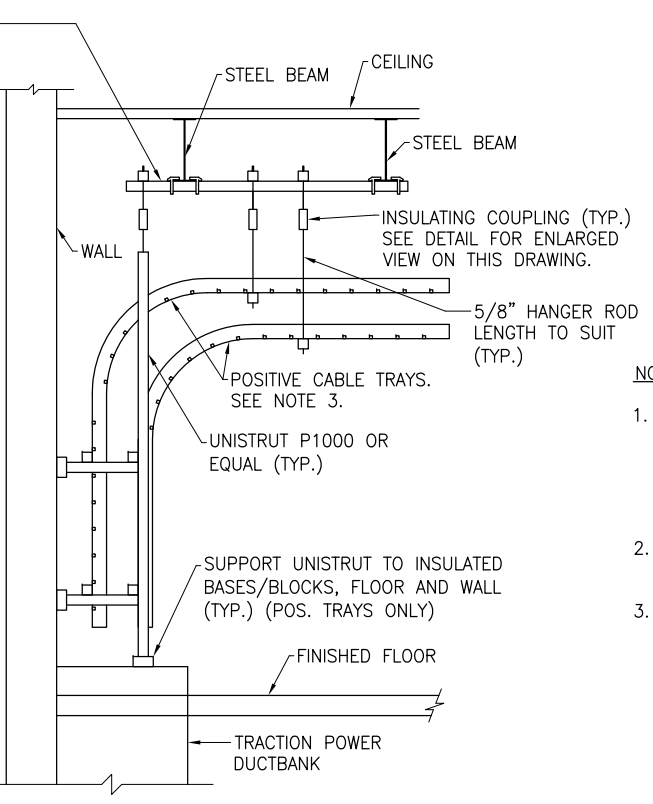
**ENLARGED VIEW HANGER SUPPORT**  
 (DETAIL 30)  
 (DETAIL 30, SECTION D-D)



**DETAIL 30**  
 TYPICAL TRANSITION OF TRACTION POWER POSITIVE AND NEGATIVE CABLES FROM CABLE TRAYS TO DUCTBANK. SEE NOTES 1 AND 2.



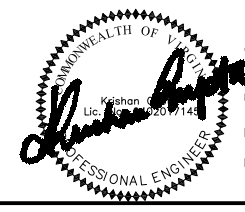
**SECTION A-A**  
 (DETAIL 30)



**SECTION B-B**  
 (DETAIL 30)

**NOTES:**

- ALL CABLE TRAYS SHALL BE SUPPORTED AT ELBOWS AND TEES. HORIZONTAL RUNS OF CABLE TRAYS SHALL BE SUPPORTED AT NOT MORE THAN 10'-0" ON CENTERS FOR POSITIVE AND NEGATIVE CABLE TRAYS AND AT NOT MORE THAN 12'-0" ON CENTERS FOR OTHER CABLE TRAYS.
- AT CONCRETE/METAL DECK CEILING, USE CINCH ANCHOR TWO-UNIT WEDGE TYPE THREADED TO SUPPORT HANGER RODS.
- THE CABLE TRAY BOTTOM OF THE HORIZONTAL SECTIONS AND 90-DEGREE VERTICAL BENDS IS INSTALLED TOWARD THE FLOOR, AND THE BOTTOM OF THE VERTICAL SECTIONS IS INSTALLED TOWARD THE WALL.



"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

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JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

REFERENCE DRAWINGS		REVISIONS	
NUMBER	TITLE	DATE	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_  
 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

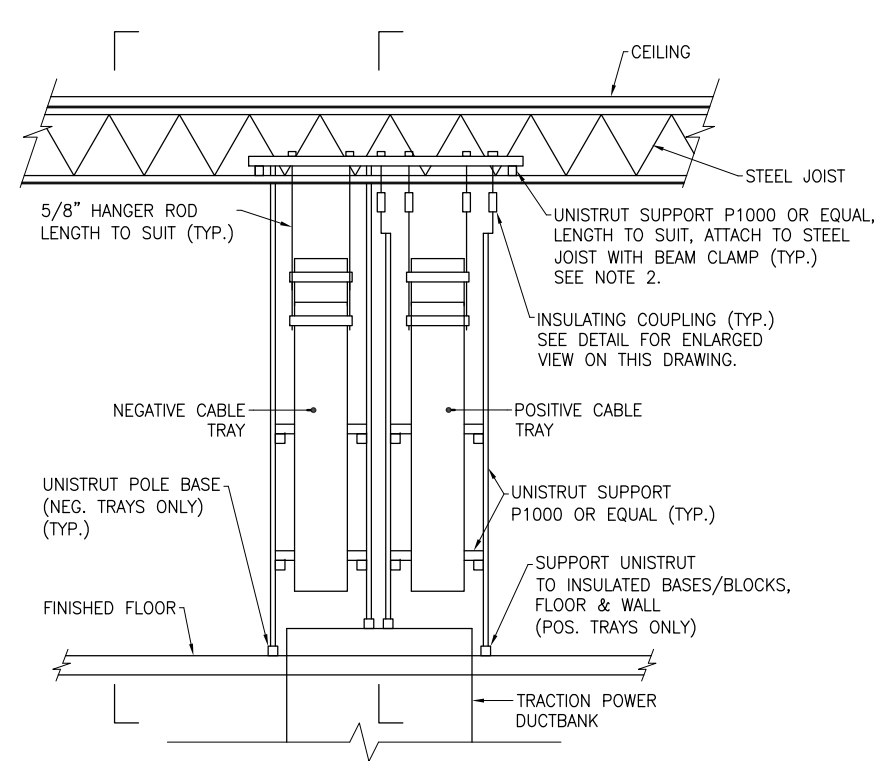
**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**

TYPICAL DETAILS - SHEET 4 OF 5

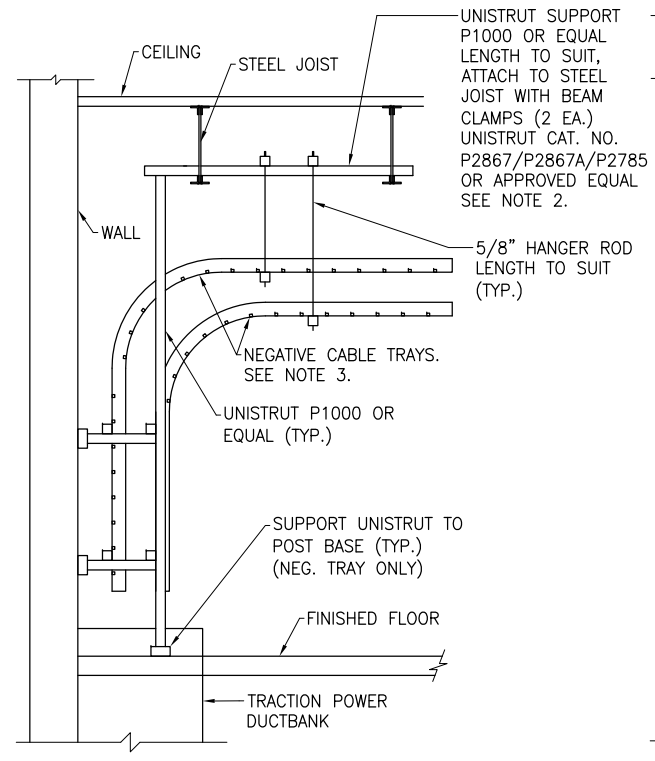
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-007	SHEET NO. 7 OF 60
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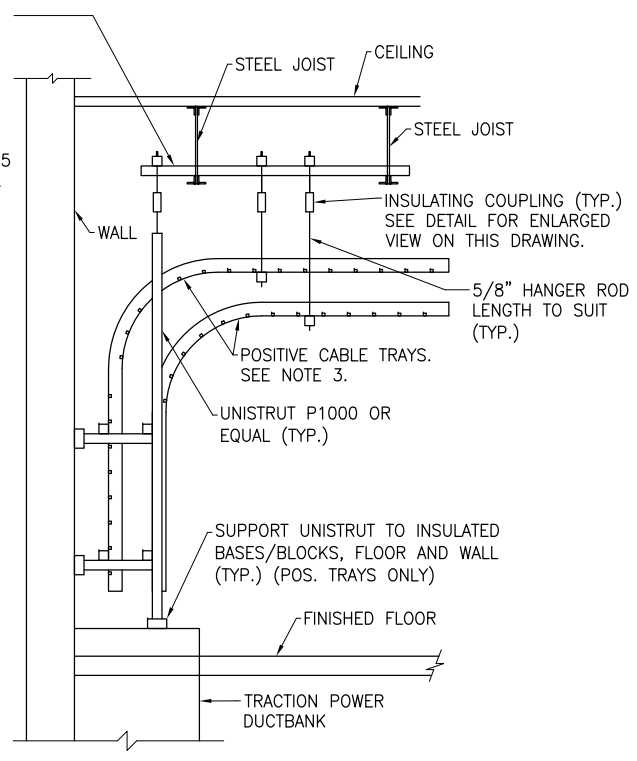
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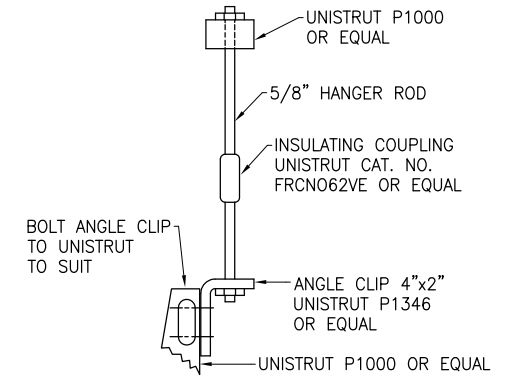
**DETAIL 31**  
 TYPICAL TRANSITION OF TRACTION POWER POSITIVE AND NEGATIVE CABLES FROM CABLE TRAYS TO DUCTBANK. SEE NOTES 1 AND 2.



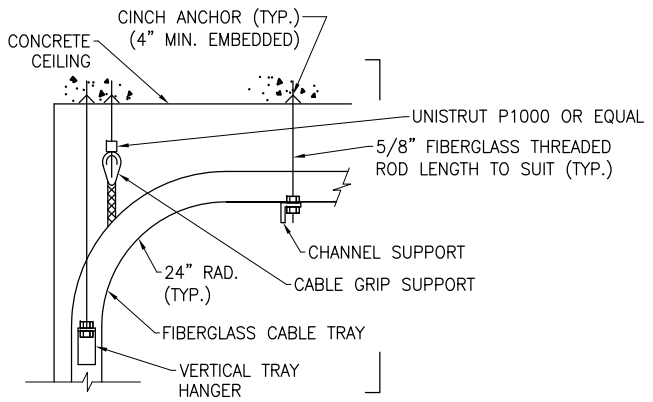
**SECTION A-A**  
 (DETAIL 31)



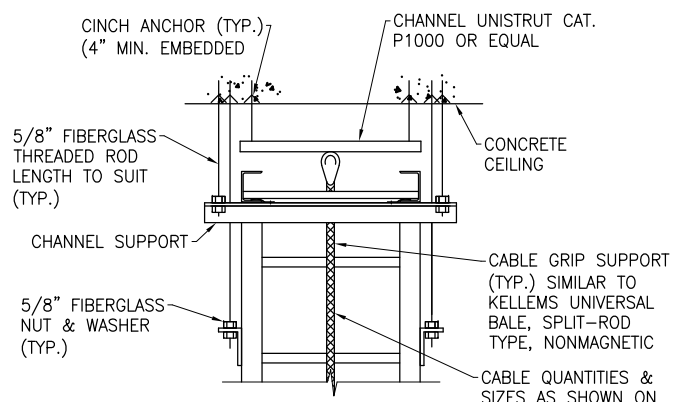
**SECTION B-B**  
 (DETAIL 31)



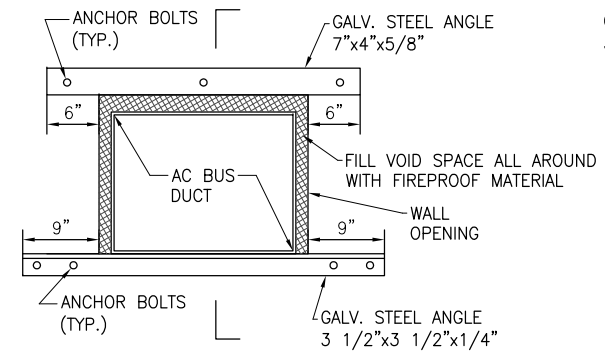
**ENLARGED VIEW HANGER SUPPORT**  
 (DETAIL 31)  
 (DETAIL 31, SECTION D-D)



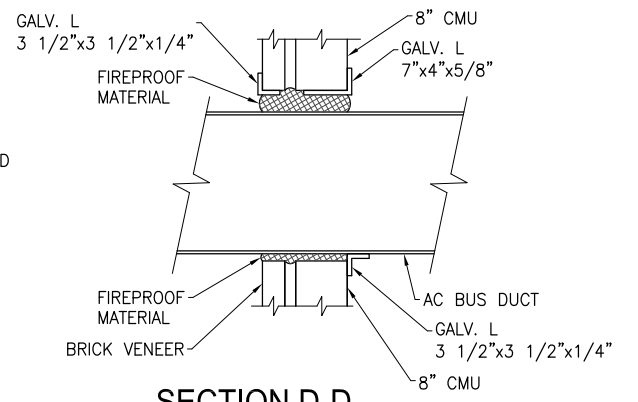
TYPICAL METHOD FOR SUPPORTING FIBERGLASS CABLE TRAYS (POSITIVE & NEGATIVE TRAYS ONLY) AND CABLE FOR VERTICAL DROPS GREATER THAN 9'-0"



**SECTION C-C**



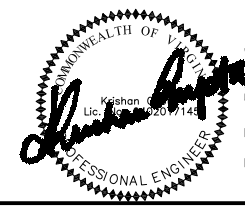
**DETAIL 33**  
 TYPICAL METHOD OF SUPPORTING AC BUS DUCT PASSING THRU WALL TO RECTIFIER TRANSFORMER



**SECTION D-D**

**NOTES:**

- ALL CABLE TRAYS SHALL BE SUPPORTED AT ELBOWS AND TEES. HORIZONTAL RUNS OF CABLE TRAYS SHALL BE SUPPORTED AT NOT MORE THAN 10'-0" ON CENTERS FOR POSITIVE AND NEGATIVE CABLE TRAYS AND AT NOT MORE THAN 12'-0" ON CENTERS FOR OTHER CABLE TRAYS.
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REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_  
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**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**

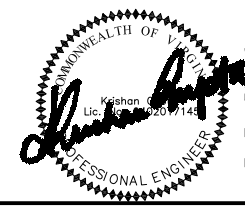
TYPICAL DETAILS - SHEET 5 OF 5

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-008	SHEET NO. 8 OF 60
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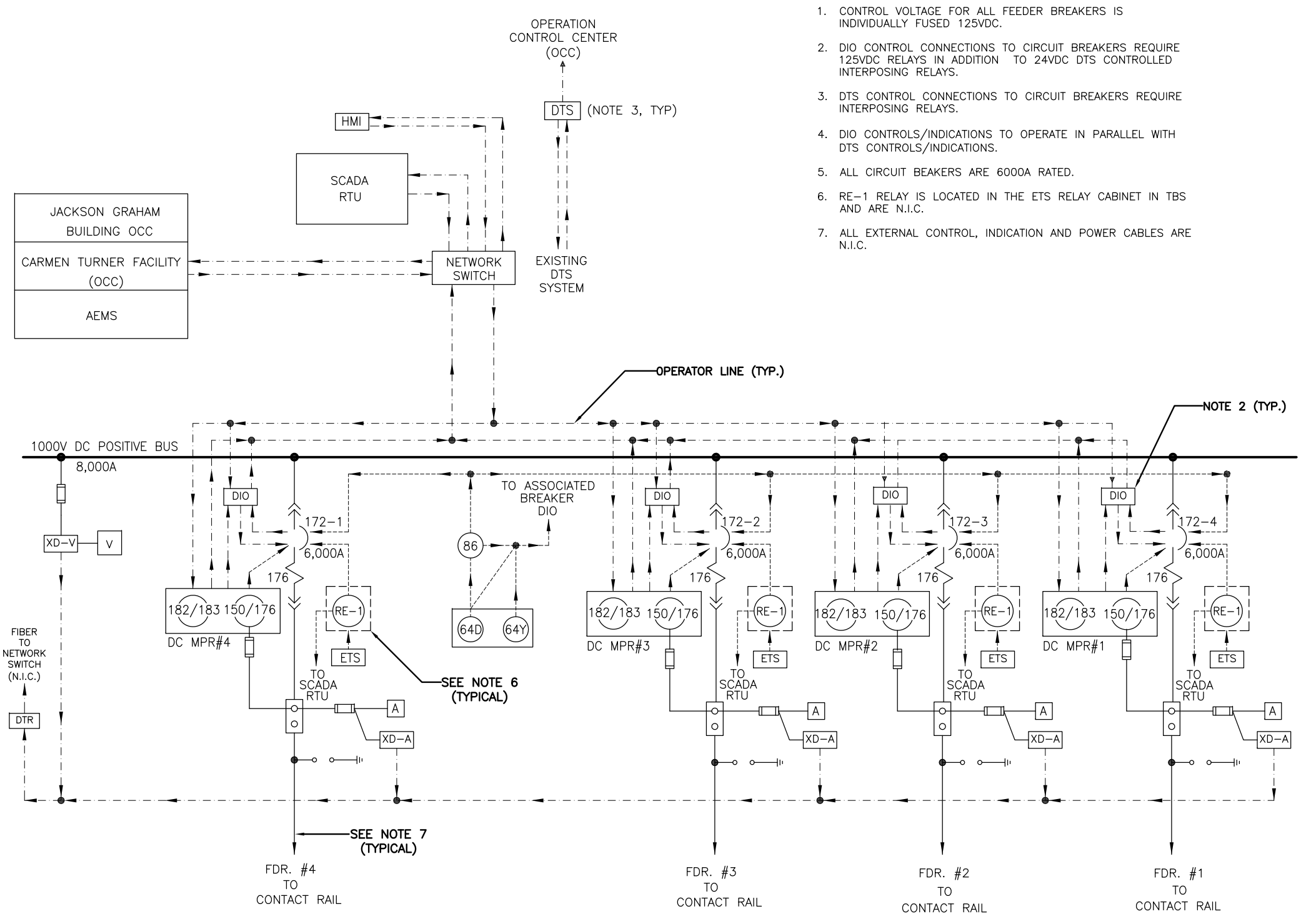
SUBSTATION NAME	ID	DC SWGR CUBICLE	CABLE ENTRY	SUPERVISORY CONTROL ID	DESCRIPTION
BENNING ROAD	G01	1	TOP	E-G01-44	FEEDER #4
		2		E-G01-46	FEEDER #5
		3		E-G01-42	FEEDER #2
		4		E-G01-41	FEEDER #1
		5		E-G01-43	FEEDER #3
56TH PLACE	G02TB1	1	TOP	E-G02-41	FEEDER #1
		2		E-G02-43	FEEDER #3
		3		E-G02-42	FEEDER #2
		4		E-G02-44	FEEDER #4
67TH AVENUE	G02TB2	1	TOP	E-G02-61	FEEDER #1
		2		E-G02-63	FEEDER #3
		3		E-G02-62	FEEDER #2
		4		E-G02-64	FEEDER #4
GREENWICH STREET	K06TB2	1	TOP	E-K06-63	FEEDER #3
		2		E-K06-61	FEEDER #1
		3		E-K06-62	FEEDER #2
		4		E-K06-64	FEEDER #4
OGDEN STREET	K07TB1	1	TOP	E-K07-44	FEEDER #4
		2		E-K07-42	FEEDER #2
		3		E-K07-43	FEEDER #3
		4		E-K07-41	FEEDER #1
PROSPERITY AVENUE	K07TB2	1	TOP	E-K07-62	FEEDER #2
		2		E-K07-64	FEEDER #4
		3		E-K07-61	FEEDER #1
		4		E-K07-63	FEEDER #3



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DESIGNED JAJ 4/4/15 <small>DATE</small> DRAWN JAJ 5/20/15 <small>DATE</small> CHECKED PK 6/1/15 <small>DATE</small>	<b>REFERENCE DRAWINGS</b> <small>NUMBER TITLE DATE NUM DESCRIPTION</small>	<b>REVISIONS</b> <small>DATE NUM DESCRIPTION</small>	 <b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b> <small>REVISION SUBMITTED DATE APPROVED DATE</small> <small>DEPUTY CHIEF ENGINEER</small>	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> <b>EQUIPMENT SUPERVISORY ID</b>	<small>CONTRACT NO.</small> <b>FQ15237</b>	<small>SCALE</small> NONE	<small>DRAWING NO.</small> TBS-G-009	<small>SHEET NO.</small> 9 OF 60
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 Time: 09:55:52 am  
 Date: Tue, 21 Jul 2015



- NOTES:**
- CONTROL VOLTAGE FOR ALL FEEDER BREAKERS IS INDIVIDUALLY FUSED 125VDC.
  - DIO CONTROL CONNECTIONS TO CIRCUIT BREAKERS REQUIRE 125VDC RELAYS IN ADDITION TO 24VDC DTS CONTROLLED INTERPOSING RELAYS.
  - DTS CONTROL CONNECTIONS TO CIRCUIT BREAKERS REQUIRE INTERPOSING RELAYS.
  - DIO CONTROLS/INDICATIONS TO OPERATE IN PARALLEL WITH DTS CONTROLS/INDICATIONS.
  - ALL CIRCUIT BEAKERS ARE 6000A RATED.
  - RE-1 RELAY IS LOCATED IN THE ETS RELAY CABINET IN TBS AND ARE N.I.C.
  - ALL EXTERNAL CONTROL, INDICATION AND POWER CABLES ARE N.I.C.

LEGEND	
DEVICE	DESCRIPTION
A	AMMETER
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
ETS	EMERGENCY TRIP STATION AT TRACKSIDE
HMI	HUMAN MACHINE INTERFACE
RE-1	ETS AUXILIARY RELAY
V	VOLT METER
XD-A	CURRENT TRANSDUCER
XD-V	VOLTAGE TRANSDUCER
64D	DC SWGR. GRD. RELAY HOT STRUCTURE
64Y	DC SWGR. GRD. RELAY GRD. STRUCTURE
86	LOCK-OUT RELAY HAND RESET
172	DC AIR CKT. BKR.
176	DC BKR SERIES TRIP DEVICE
DC MPR	DC MULTI-PURPOSE PROTECTION RELAY
150/176	DC OVERCURRENT/RATE-OF-RISE RELAY
182/183	DC LOAD MEASURING/RECLOSEING RELAY
[Symbol]	FUSE
[Symbol]	SHUNT
[Symbol]	SURGE ARRESTER
[Symbol]	DISTRIBUTED INPUT OUTPUT MODULE
[Symbol]	DIGITAL TRACE RECORDER

\*\*\* THIS DRAWING IS FOR (4) FOUR FEEDER BREAKERS. \*\*\*  
 THE ACTUAL NUMBER OF DC FEEDER BREAKERS ARE INDICATED ON DRAWING TBS-G-009.

**TYPICAL TIE BREAKER STATION - ONE LINE DIAGRAM**



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**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b>			
TYPICAL SUPERVISORY AND CONTROL DIAGRAM			
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-010	SHEET NO. 10 OF 60

Drawing File: H:\FQ15237\DRG\GNP\TBS-G-011.DWG  
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### 100% 8-CAR TIE-BREAKER STATION EQUIPMENT SCHEDULE

TIE-BREAKER STATION NAME	TIE- BREAKER DESIGNATION	NEW DC SWITCHGEAR (6KA BREAKERS)	NEW DC SWITCHGEAR TEST CABINET	NEW DC SWITCHGEAR INSULATION PAD	NEW BATTERY BANK	NEW BATTERY CHARGER	NEW ENCLOSED CIRCUIT BREAKER	NEW BATTERY CYCLE MONITOR	NEW 3KVA ISOLATION TRANSFORMER WITH PANELBOARD	NEW 480Y/277V PANELBOARD	NEW 208Y/120V PANELBOARD	NEW 480V-208Y/120V 15KVA TRANSFORMER	NEW DC PANELBOARD	NEW EMERG LED LIGHT FIXTURE TYPE 10	NEW NORMAL LIGHT FIXTURE TYPE 1	NEW OUTDOOR LIGHT FIXTURE TYPE 8	NEW EYE WASH STATION	REMARKS
BENNING ROAD	G01TBS	FIVE (5)	ONE (1)	ONE (1)	----	----	----	----	ONE (1)	----	----	----	ONE (1)	ONE (1)	EIGHT (8)	----	----	
56TH STREET	G02TB1	FOUR (4)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	----	ONE (1)	ONE (1)	ONE (1)	TWO (2)	SIX (6)	----	ONE (1)	
67TH AVE	G02TB2	FOUR (4)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	----	ONE (1)	ONE (1)	ONE (1)	ONE (1)	SIX (6)	----	ONE (1)	
GREENWICH ST.	K06TB2	FOUR (4)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	FIVE (5)	ONE (1)	ONE (1)	
OGDEN ST. (NOTE 1)	K07TB1	FOUR (4)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	SIX (6)	ONE (1)	ONE (1)	
PROSPERITY AVE.	K07TB2	FOUR (4)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	ONE (1)	FIVE (5)	----	ONE (1)	

**NOTE:**  
 1. FOR OGDEN ST TBS, PROVIDE A NEW 45KVA VOLTAGE REGULATOR.

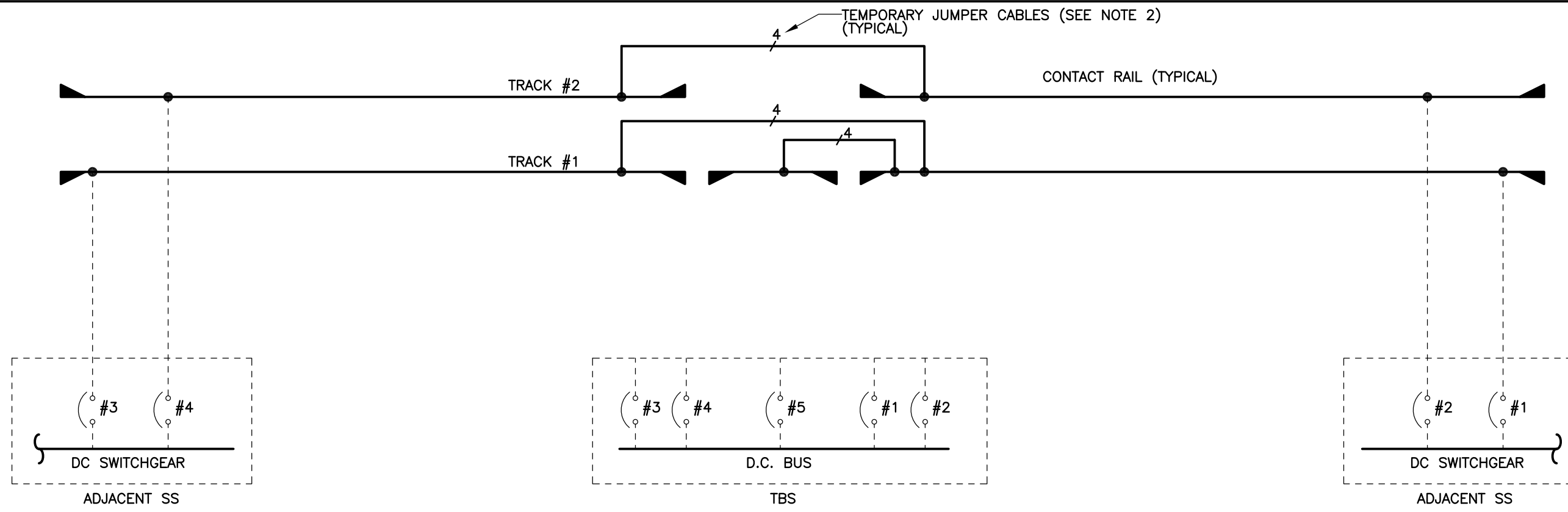


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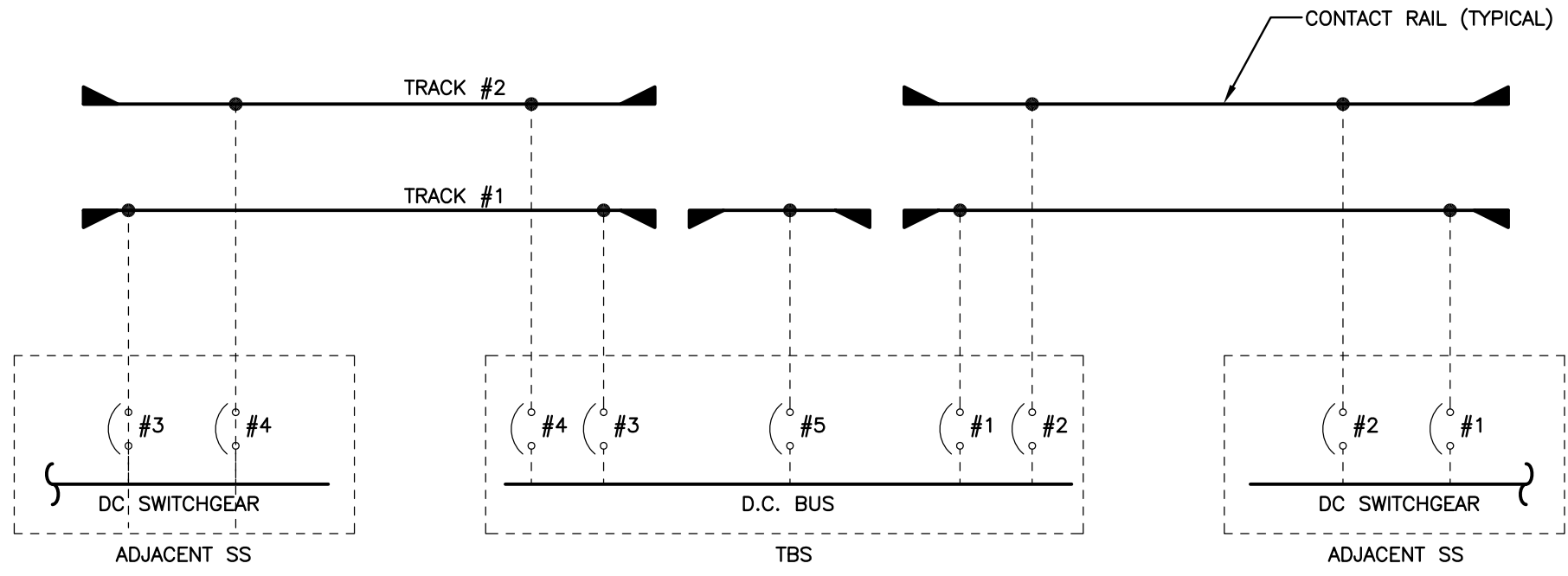
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REFERENCE DRAWINGS		REVISIONS																													
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		REVISION SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____ DEPUTY CHIEF ENGINEER	CONTRACT NO. FQ15237 SCALE NONE DRAWING NO. TBS-G-011 SHEET NO. 11 OF 60																												

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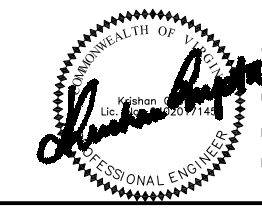
CONTACT RAIL SCHEMATIC—  
TEMPORARY RECONFIGURATION ("JUMPERS ONLY")  
DURING CONSTRUCTION



CONTACT RAIL SCHEMATIC— EXISTING CONFIGURATION

**NOTE:**

1. THIS DRAWING PROVIDES EXAMPLE OF "JUMPER ONLY" POWER SCHEME. REFER TO SPECIFICATION 16128.
2. NUMBER INDICATES NUMBER OF 1000KCMIL CABLES. CABLES SHALL BE SECURED ON CHANNELS EVERY 4 FEET.



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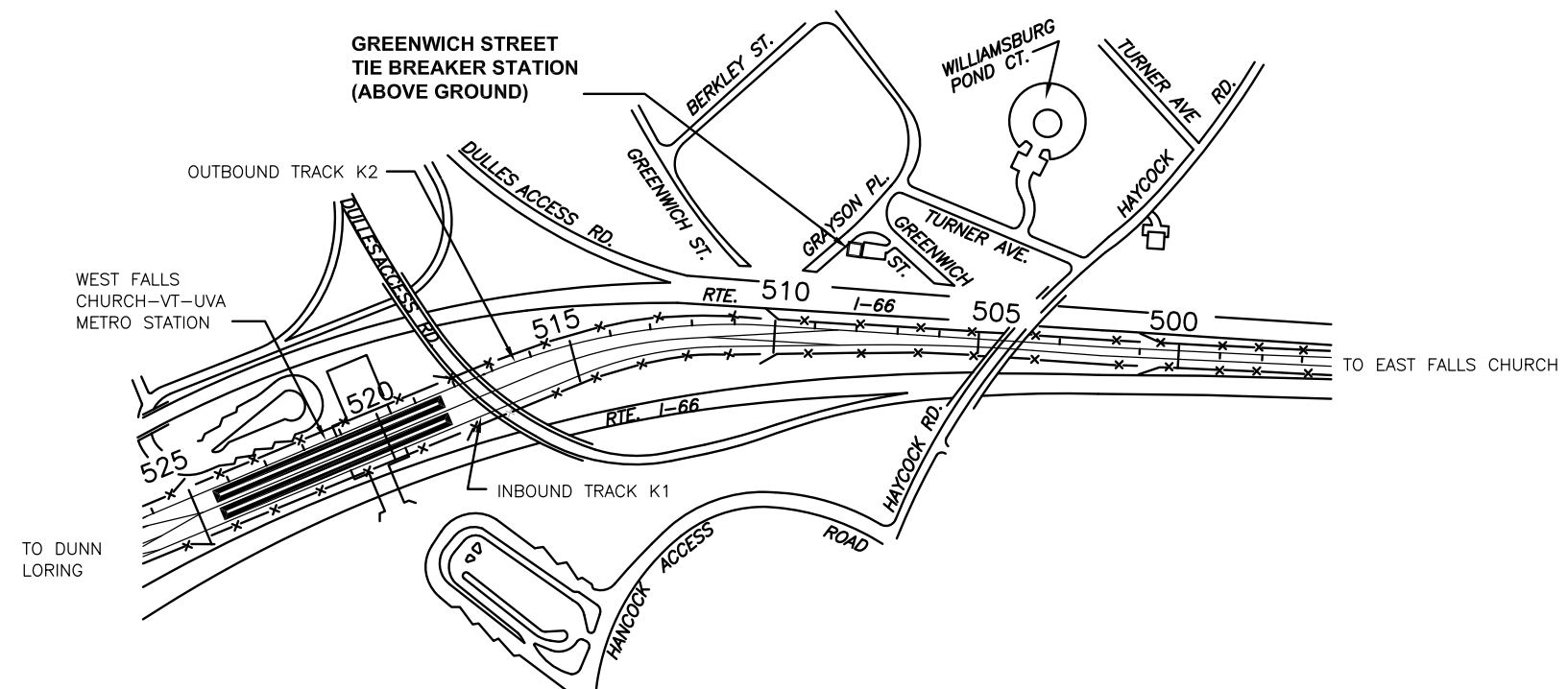
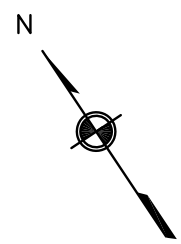
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**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**

TYPICAL CONTACT RAIL JUMPERS

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. TBS-G-012	SHEET NO. 12 OF 60
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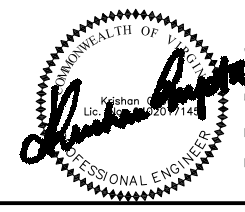
**GREENWICH STREET-K06-2**

**SITE ACCESS**

1. CHAIN MARKER: Sta. 508+66.69.
2. ABOVE GROUND TIE BREAKER STATION.
3. PERSONAL ACCESS VIA DRIVEWAY.
4. EQUIPMENT ACCESS FROM DRIVEWAY.



**TIE BREAKER ACCESS**



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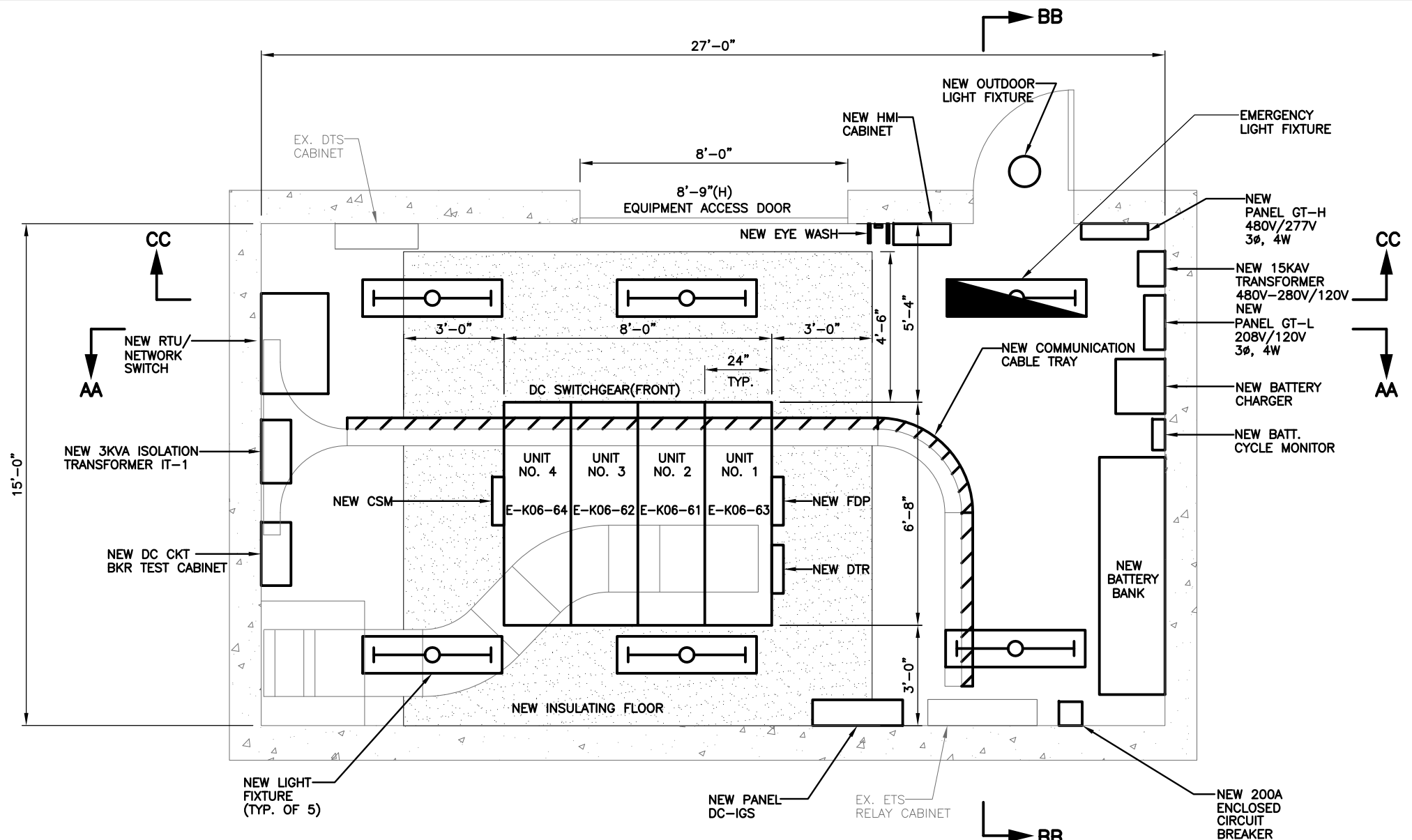
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**CENI - POWER SYSTEMS ENGINEERING**

DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 ENGINEER OF RECORD

**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**  
 K06TB2 - GREENWICH ST. TIE BREAKER STATION  
 VICINITY MAP

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. K06TB2-TB-001	SHEET NO. 13 OF 60
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Drawing File: H:\FQ15237\DRG\TBS\K06TB2 - GREENWICH ST TBS\K06TB2-TB-200.DWG  
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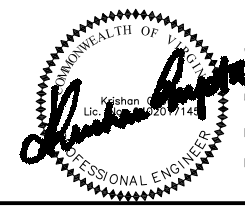
**A** | **EQUIPMENT LAYOUT PLAN - NEW** | **K06TB2-TB-202**  
**K06TB2-TB-200** | GREENWICH ST. TBS | SCALE: 1/2"=1'-0"

**DESCRIPTION OF MAJOR WORK**

1. REMOVE EXISTING DC SWITCHGEAR AND PROVIDE AND INSTALL NEW DC SWITCHGEAR.
2. REMOVE EXISTING BATTERY BANK AND PROVIDE AND INSTALL NEW BATTERY BANK.
3. PROVIDE AND INSTALL A NEW 3KVA ISOLATION TRANSFORMER IT1 WITH PANEL.
4. REMOVE EXISTING DC CIRCUIT BREAKER TEST CABINET AND PROVIDE AND INSTALL NEW DC CIRCUIT BREAKER TEST CABINET.
5. REMOVE EXISTING DC DISTRIBUTION PANEL AND PROVIDE AND INSTALL NEW DC DISTRIBUTION PANEL DC-IGS.
6. REMOVE EXISTING LIGHT FIXTURES AND PROVIDE AND INSTALL NEW LIGHT FIXTURES AND PROVIDE AND INSTALL NEW EMERGENCY LIGHT FIXTURE. REMOVE EXISTING OUTDOOR LIGHT FIXTURE AND PROVIDE AND INSTALL NEW OUTDOOR LIGHT FIXTURE. SEE GENERAL NOTES FOR WIRING INFORMATION.
7. REMOVE EXISTING 15KVA TRANSFORMER AND PROVIDE AND INSTALL NEW 15KVA, 480V-208V/120V TRANSFORMER
8. REMOVE EXISTING PANEL GT-H AND PROVIDE AND INSTALL NEW 480V/277V, 3φ, 4W AC PANEL GT-H.
9. REMOVE EXISTING PANEL GT-L AND PROVIDE AND INSTALL NEW 208V/120V, 3φ, 4W AC PANEL GT-L.
10. REMOVE EXISTING EMERG. PANEL EAC-IGS.
11. REMOVE EXISTING ANNUNCIATOR PANEL AND ALL ASSOCIATED CABLING.
12. REMOVE EXISTING DC TO AC INVERTER.
13. REMOVE EXISTING EYE WASH AND PROVIDE AND INSTALL NEW EYE WASH EQUIPMENT.
14. REMOVE EXISTING INSULATING FLOOR AND PROVIDE AND INSTALL NEW INSULATING FLOOR.
15. CONTRACTOR SHALL ADD (1) 1000KCMIL POSITIVE FEEDER TO BREAKER E-K06-63.
16. CONTRACTOR SHALL PROVIDE AND INSTALL NEW BATTERY CYCLE MONITOR.
17. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 200A ENCLOSE CIRCUIT BREAKER.
18. REMOVE EXISTING BATTERY CHARGER AND PROVIDE AND INSTALL NEW BATTERY CHARGER.

**DESCRIPTION OF SCADA WORK:**

1. PROVIDE AND INSTALL NEW HMI CABINET.
2. PROVIDE AND INSTALL NEW CABLE SHIELD MONITOR(CSM).
3. PROVIDE AND INSTALL NEW RTU/NETWORK SWITCH CABINET.
4. PROVIDE AND INSTALL NEW DIGITAL TRACE RECORDER (DTR).
5. PROVIDE AND INSTALL NEW FIBER DISTRIBUTION PANEL FOR DC SWITCHGEAR (FDP-DC).
6. PROVIDE AND INSTALL A 8 INCH WIDE MINIMUM WIRE-MESH TYPE COMMUNICATION CABLE TRAY, ALONG WITH SUPPORTS, GROUNDING, ISOLATION AND FITTING REQUIREMENTS AS PER THE MANUFACTURES'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.



"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

DESIGNED			DRAWN			CHECKED		
JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

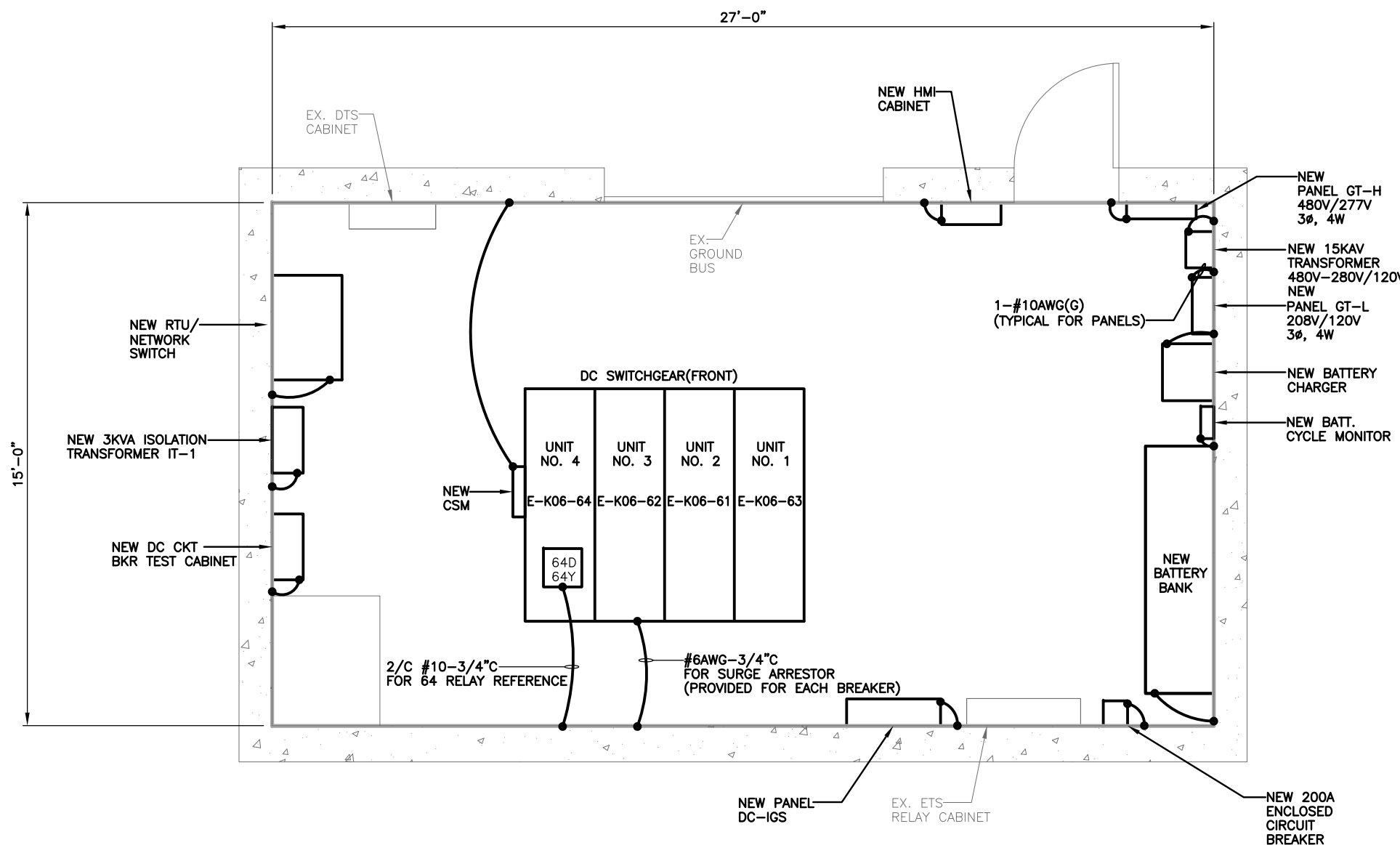
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**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b>		<b>ORANGE AND BLUE LINES DC, MD AND VA</b>	
K06TB2 - GREENWICH ST. TIE BREAKER STATION			
EQUIPMENT LAYOUT PLAN - NEW			
CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K06TB2-TB-200	SHEET NO. 14 OF 60

Drawing File: H:\FQ15237\DRAWING\TBS\K06TB2 - GREENWICH ST TBS\K06TB2-TB-201.DWG  
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**NOTES:**

- DRAWING SHOWS GROUNDING REQUIREMENTS FOR NEW OR REPLACEMENT EQUIPMENT. CONTRACTOR DOES NOT NEED TO MODIFY GROUNDING OF EXISTING EQUIPMENT THAT IS NOT BEING REPLACED.
- ALL GROUND CONDUCTORS RUN BETWEEN EQUIPMENT AND SUBSTATION GROUND BUS SHALL BE 1-#6 BARE CU CONDUCTOR UNLESS OTHERWISE SHOWN.
- THE NEW DTR MOUNTED ON THE DC SWITCHGEAR (NOT SHOWN ON THIS DRAWING) SHALL BE GROUNDED TO THE GROUND BUS BAR WITH #10AWG.

**A** | **EQUIPMENT GROUNDING PLAN - NEW**  
 K06TB2-TB-201 | GREENWICH ST. TBS | SCALE: 1/2" = 1'-0"



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JAJ	5/20/15
CHECKED	DATE
PK	6/1/15

REFERENCE DRAWINGS	
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REVISIONS		
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**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

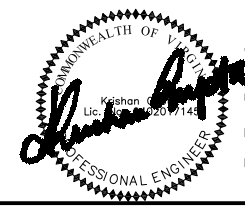
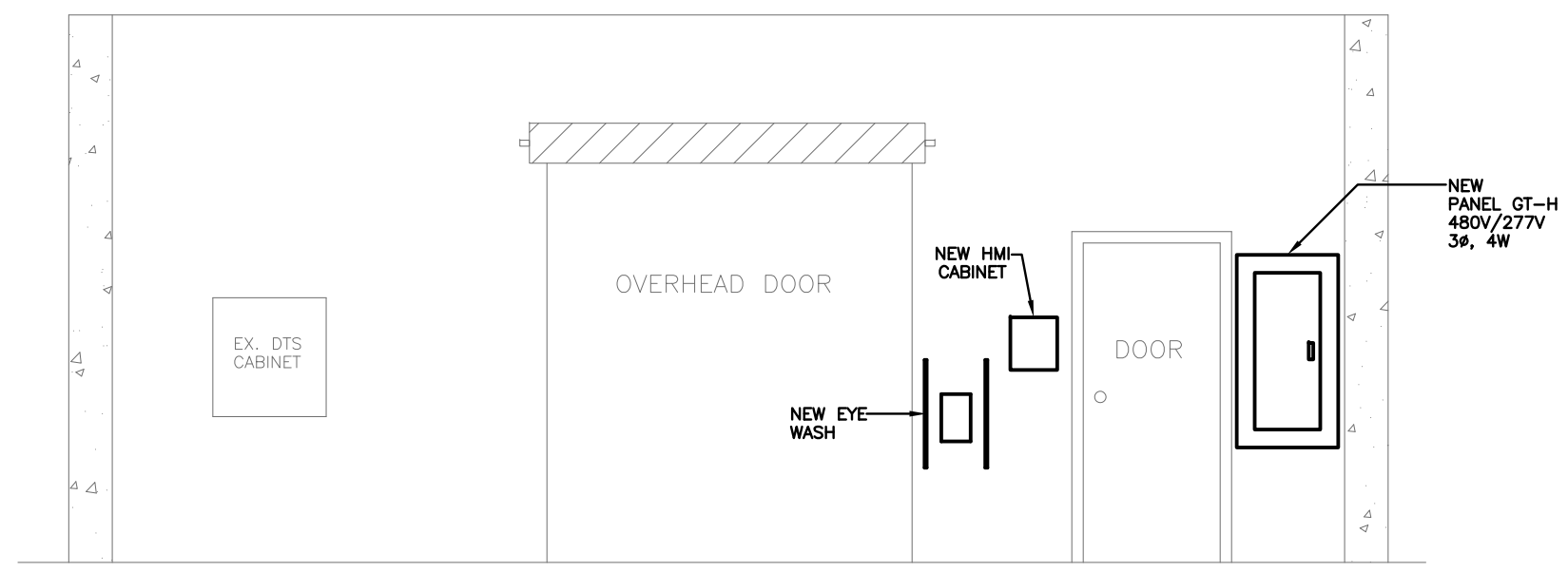
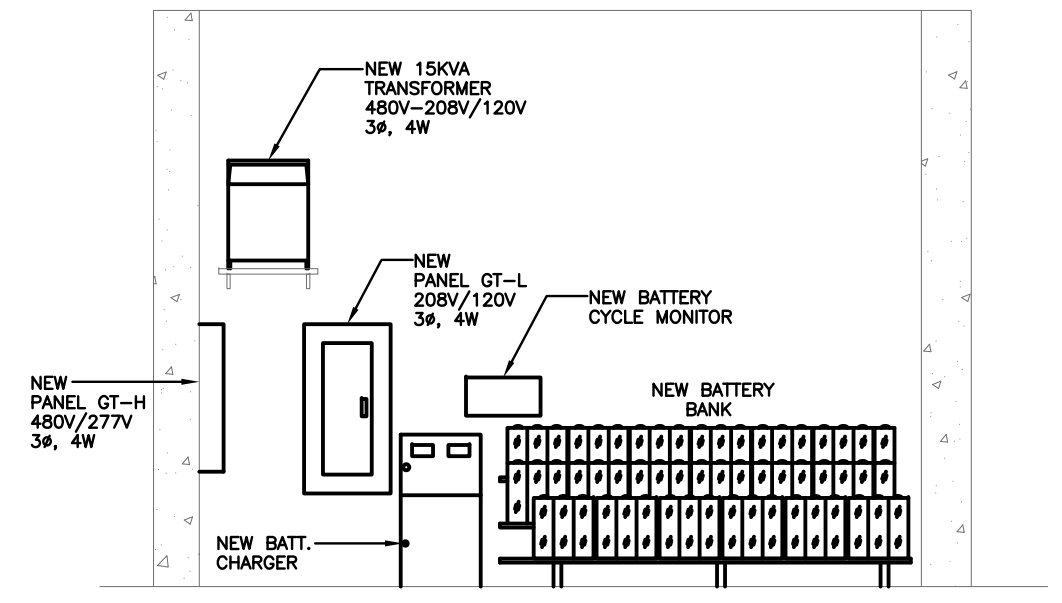
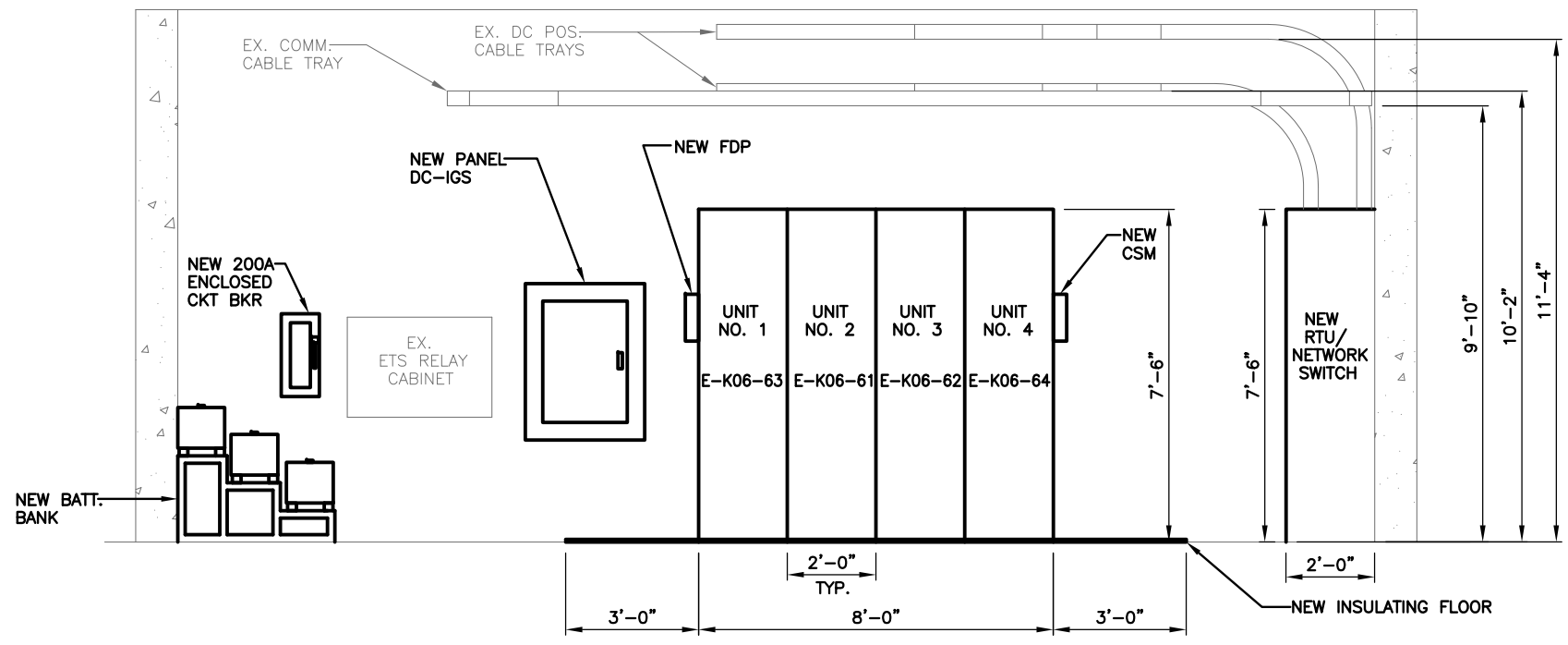
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 DATE \_\_\_\_\_ DEPUTY CHIEF ENGINEER DATE \_\_\_\_\_

**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**  
**K06TB2 - GREENWICH ST. TIE BREAKER STATION**  
**EQUIPMENT GROUNDING PLAN - NEW**

CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K06TB2-TB-201	SHEET NO. 15 OF 60
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**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

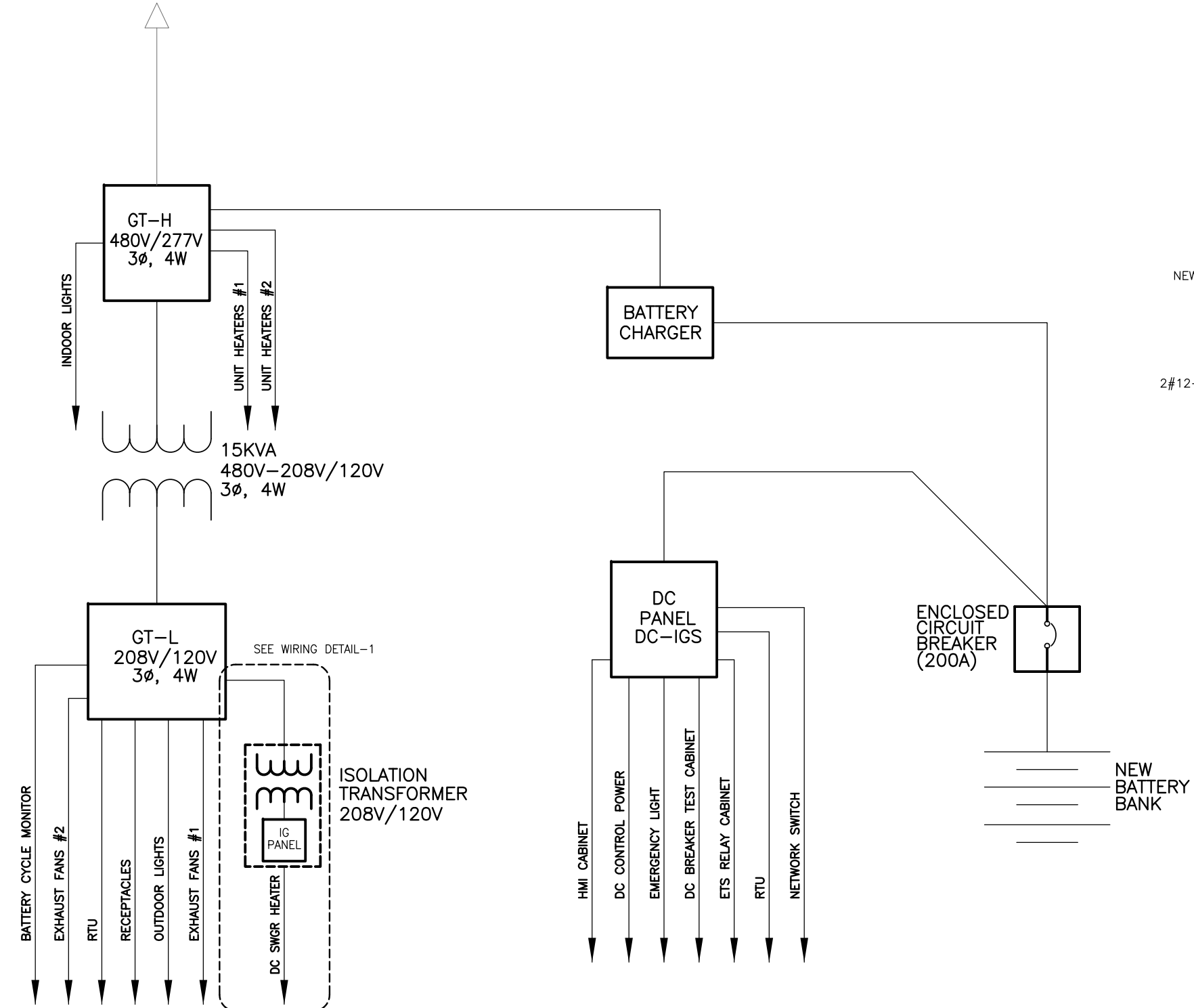
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 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> K06TB2 - GREENWICH ST. TIE BREAKER STATION EQUIPMENT ELEVATIONS			
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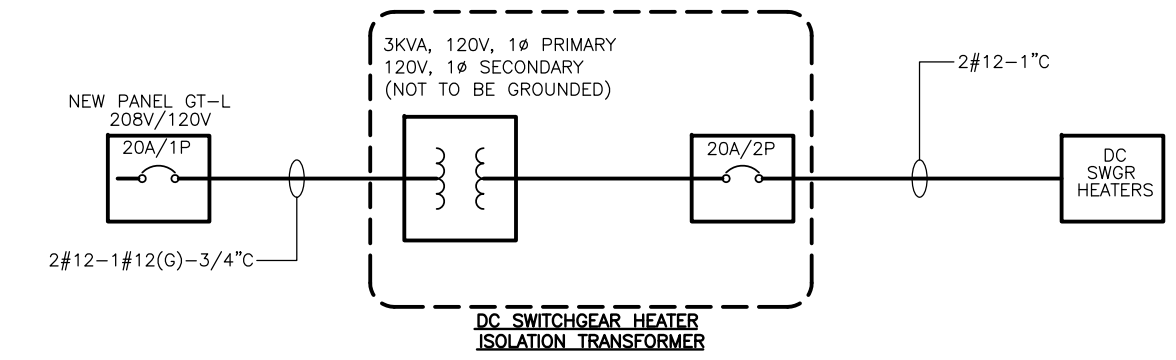


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ELECTRICAL ROOM SWITCHBOARD NO.2



**NOTE:**  
 1. ALL NEW CONDUITS TO BE INSTALLED ARE RGS TYPE CONDUITS CONNECTED TO THE DC SWITCHGEAR REQUIRED TO HAVE 1" MIN. OF FRE TYPE CONDUIT ENTERING DC SWITCHGEAR.



**1** | **DETAIL**  
 K06TB2-TB-400 | GREENWICH ST. TIE BREAKER STATION SCALE: N.T.S

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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

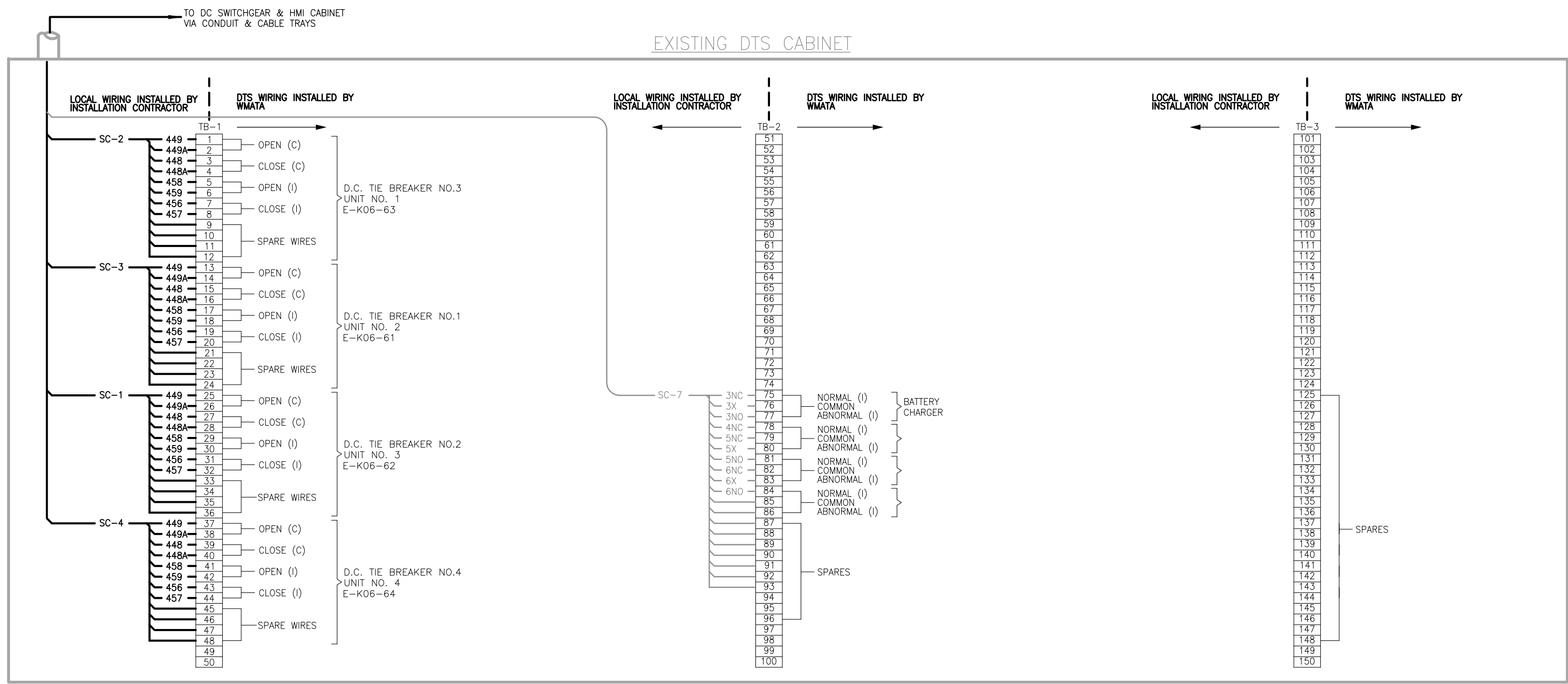
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REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>			
K06TB2 - GREENWICH ST. TIE BREAKER STATION			
480V SINGLE LINE DIAGRAM - NEW			
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. K06TB2-TB-400	SHEET NO. 18 OF 60

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**TIE BREAKER STATION**

**NOTES:**

1. WIRING & TERMINATION FOR BATTERY CHARGER IS NOT REQUIRED WHEN D.C. POWER IS SUPPLIED FROM PASSENGER STATION. TERMINALS NOT USED WILL BECOME SPARES WITH JUMPER AT TERMINALS 76-75.
2. WHEN TWO TIE BREAKER STATIONS ARE IN THE SAME RTU CONTROL AREA, THE SECOND TIE BREAKER STATION WILL USE A DIFFERENT SERIES OF BREAKER NUMBERS. SEE TABLE AT LEFT.
3. FOR SECOND TIE BREAKER STATION, USE NUMERAL 6 INSTEAD OF 4.
4. SIX ADDITIONAL WIRES ARE BROUGHT TO DTS CABINET, THREE FOR ETS TRIP AND THREE SPARES. WMATA WILL CONNECT THEM TO TERMINAL BLOCKS AS REQUIRED.

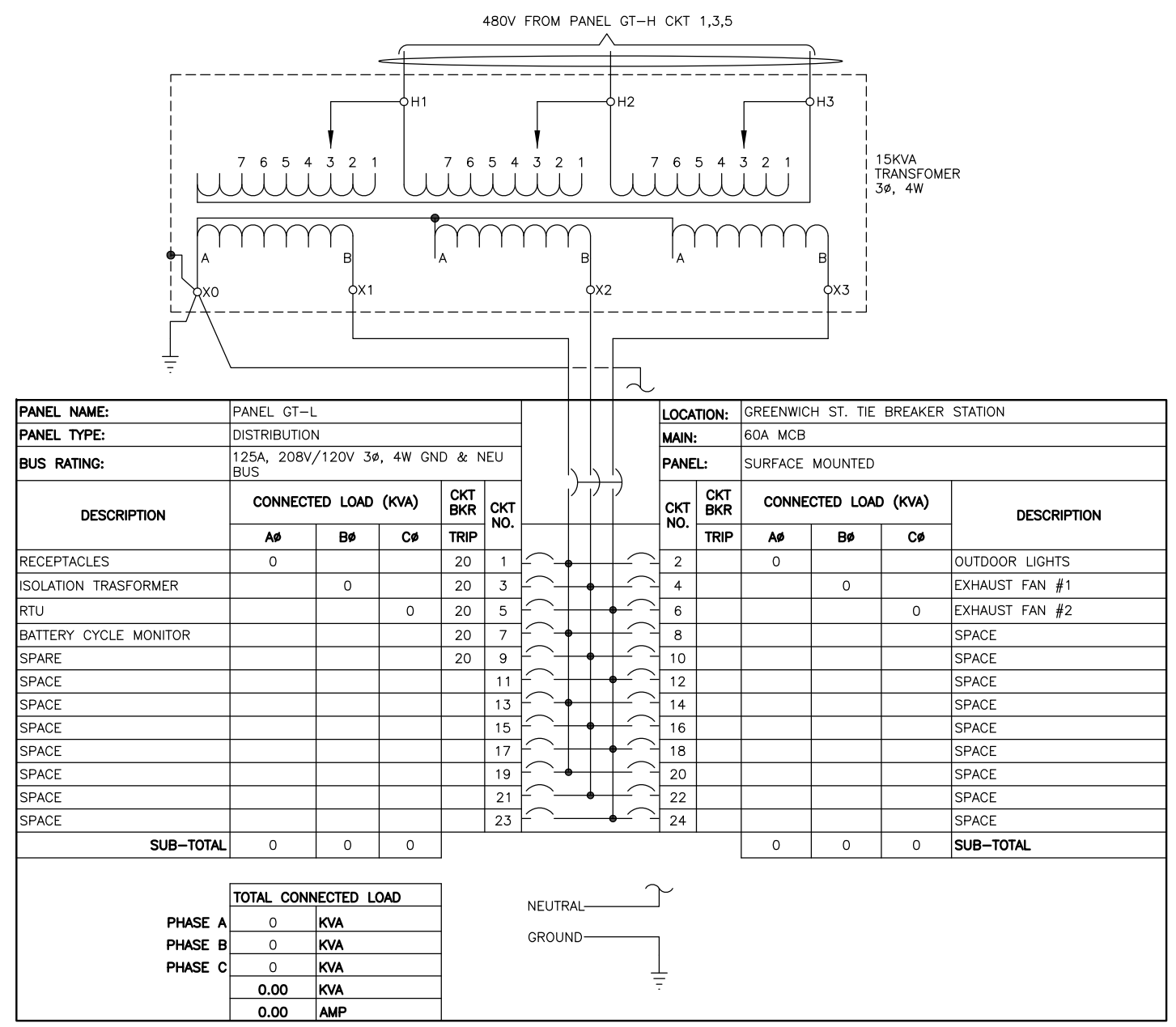
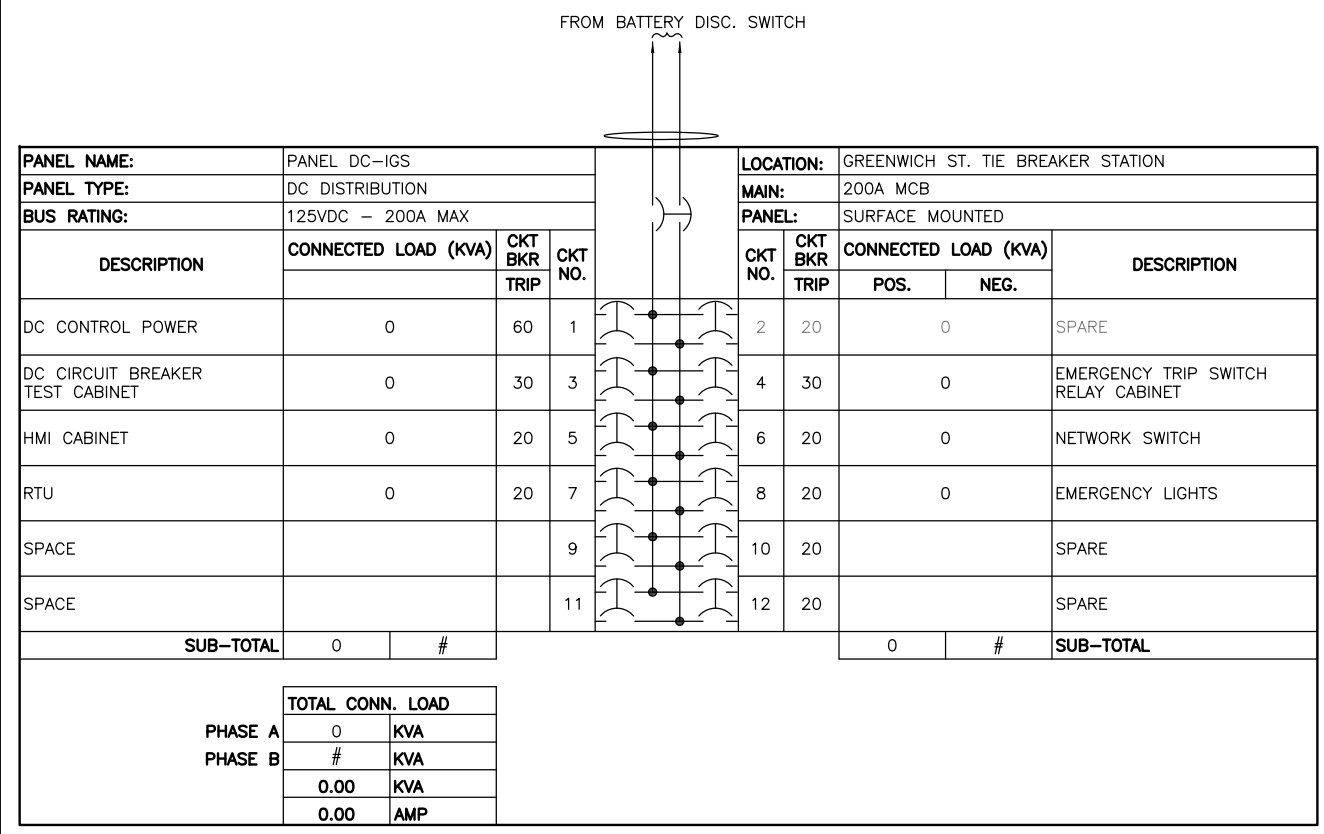
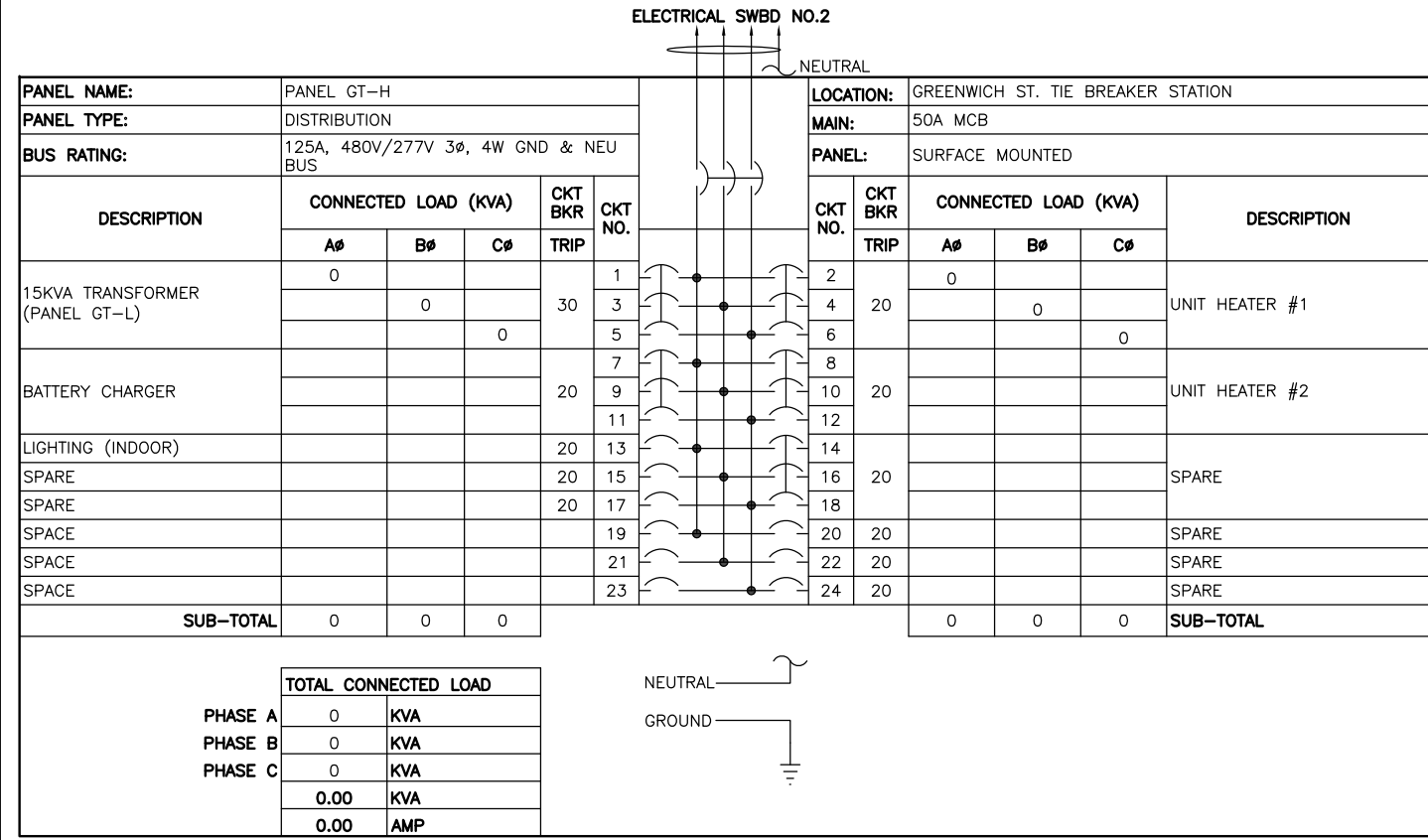
**LEGEND:**  
 (I) — DENOTES INDICATION  
 (C) — DENOTES CONTROL  
 \* — SEE NOTE 2

FUNCTION	BRK NO.	1 ST TBS BRK NO.	2 ND TBS BRK NO.	YARD AREA INTERFACE BRK NO.
DC TIE BRK NO.	1	41	61	81
	2	42	62	82
	3	43	63	83
	4	44	64	84
	5	45	65	85
	6	46	66	86
	7	47	67	87
	8	48	68	88

**PROFESSIONAL ENGINEER**  
 Keshan Singh  
 License No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 \*PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA.\*  
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<b>DESIGNED</b> JAJ 4/4/15 <small>DATE</small>			<b>REVISIONS</b> <small>NUMBER TITLE DATE NUM DESCRIPTION</small>			<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <small>metro</small>			<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b> K06TB2 - GREENWICH ST. TIE BREAKER STATION SUPERVISORY AND CONTROL DIAGRAM - NEW			
<b>DRAWN</b> JAJ 5/20/15 <small>DATE</small>						<b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>						
<b>CHECKED</b> PK 6/1/15 <small>DATE</small>						<b>REVISION SUBMITTED</b> _____ <b>APPROVED</b> _____ <small>DATE</small> <small>DATE</small> <small>DEPUTY CHIEF ENGINEER</small>			<b>CONTRACT NO.</b> FQ15237	<b>SCALE</b> NONE	<b>DRAWING NO.</b> K06TB2-TB-401	<b>SHEET NO.</b> 19 OF 60

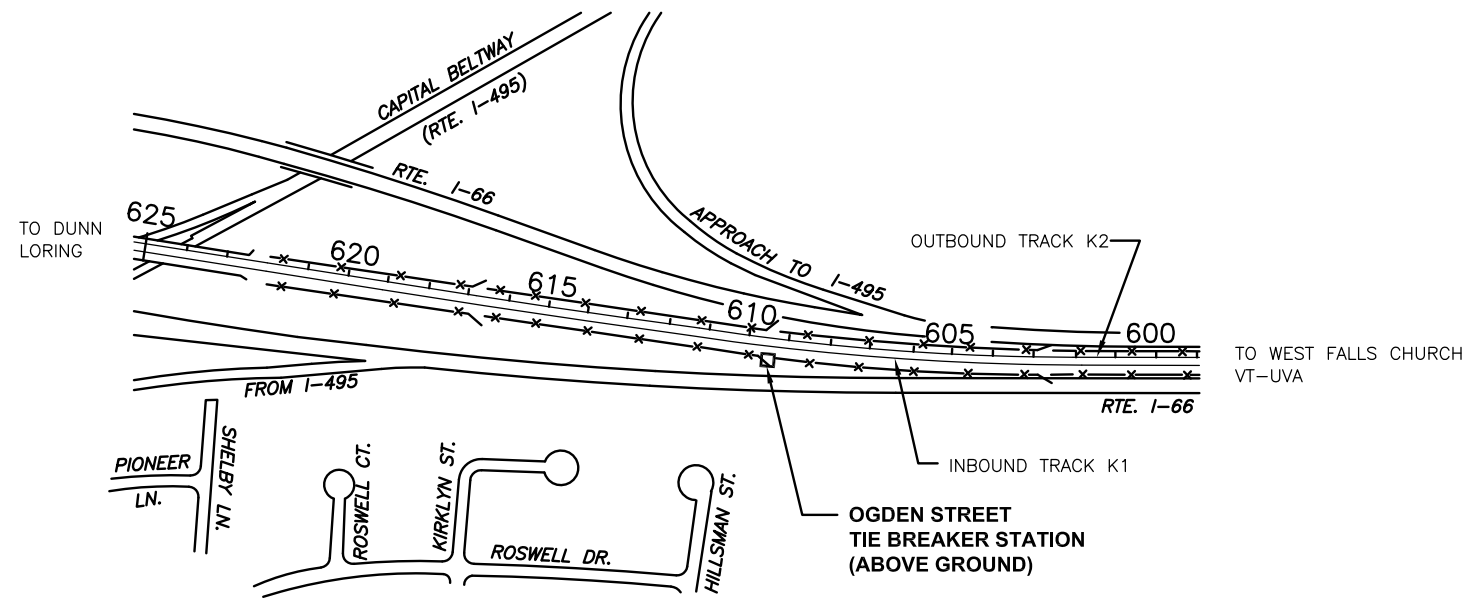
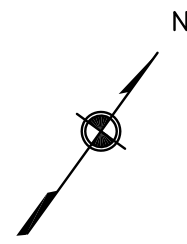
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DESIGNED: JAJ 4/4/15 DRAWN: JAJ 5/20/15 CHECKED: PK 6/1/15	<b>REFERENCE DRAWINGS</b> NUMBER TITLE DATE NUM DESCRIPTION	<b>REVISIONS</b> NUMBER TITLE DATE NUM DESCRIPTION	 <b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> <b>K06TB2 - GREENWICH ST. TIE BREAKER STATION</b> <b>PANELBOARD SCHEDULES</b>	CONTRACT NO. FQ15237 SCALE NONE DRAWING NO. K06TB2-TB-500 SHEET NO. 20 OF 60
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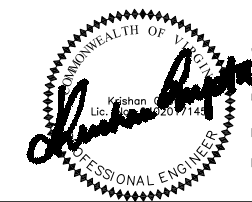
**SITE ACCESS**

1. CHAIN MARKER: Sta. 609+59.65.
2. ABOVE GROUND TIE BREAKER STATION.
3. PERSONAL ACCESS VIA DRIVEWAY.
4. EQUIPMENT ACCESS FROM INBOUND TRACK K1 SIDE.
5. FOR TBS TYPE AND ACCESS REFER TO DRAWINGS TBS-TB-008 AND TBS-TB-009.

**OGDEN STREET-K07-1**



**TIE BREAKER ACCESS**



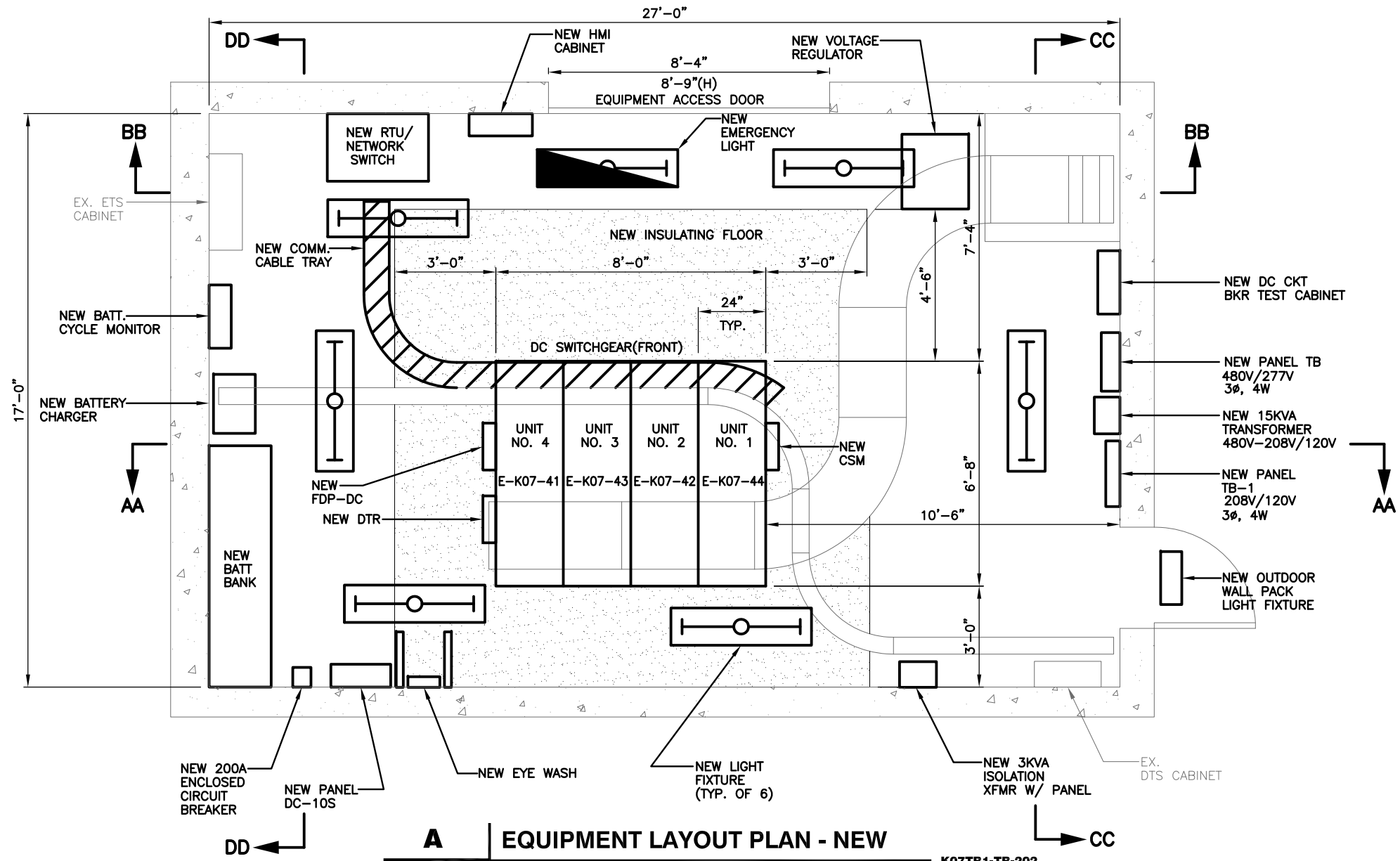
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 Images: .\..\..\ROBINSON-ELECT-MECH-ELEC-MECH-PWR AutoCAD Folder\WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif



**A** | **EQUIPMENT LAYOUT PLAN - NEW**  
 K07TB1-TB-200 | OGDEN STREET TBS | K07TB1-TB-202 | SCALE: 1/2"=1'-0"

**DESCRIPTION OF MAJOR WORK:**

1. REMOVE EXISTING DC SWITCHGEAR AND PROVIDE AND INSTALL NEW DC SWITCHGEAR.
2. REMOVE EXISTING BATTERY BANK AND PROVIDE AND INSTALL NEW BATTERY BANK.
3. PROVIDE AND INSTALL A NEW 3KVA ISOLATION TRANSFORMER IT1 WITH PANEL.
4. REMOVE EXISTING DC CIRCUIT BREAKER TEST CABINET AND PROVIDE AND INSTALL NEW DC CIRCUIT BREAKER TEST CABINET.
5. REMOVE EXISTING DC DISTRIBUTION PANEL AND PROVIDE AND INSTALL NEW DC DISTRIBUTION PANEL DC-10S.
6. REMOVE EXISTING LIGHT FIXTURES AND PROVIDE AND INSTALL NEW LIGHT FIXTURES AND PROVIDE AND INSTALL NEW EMERGENCY LIGHT FIXTURE. REMOVE EXISTING OUTDOOR WALL PACK LIGHT AND PROVIDE AND INSTALL NEW OUTDOOR WALL PACK LIGHT. SEE GENERAL NOTES FOR WIRING INFORMATION.
7. REMOVE EXISTING 15KVA TRANSFORMER AND PROVIDE AND INSTALL NEW 15KVA, 480V-208V/120V TRANSFORMER
8. REMOVE EXISTING PANEL TB AND PROVIDE AND INSTALL NEW 480V/277V, 3Ø, 4W AC PANEL TB.
9. REMOVE EXISTING PANEL TB-1 AND PROVIDE AND INSTALL NEW 208V/120V, 3Ø, 4W AC PANEL TB-1.
10. REMOVE EXISTING EMERG. PANEL EAC-10S
11. REMOVE EXISTING DC TO AC INVERTER.
12. REMOVE EXISTING EYE WASH AND PROVIDE AND INSTALL NEW EYE WASH EQUIPMENT.
13. REMOVE EXISTING INSULATING FLOOR AND PROVIDE AND INSTALL NEW INSULATING FLOOR.
14. REMOVE EXISTING VOLTAGE REGULATOR AND PROVIDE AND INSTALL NEW VOLTAGE REGULATOR.
15. REMOVE EXISTING BATTERY CHARGER AND PROVIDE AND INSTALL NEW BATTERY CHARGER.
16. REMOVE EXISTING ANNUNCIATOR PANEL AND ASSOCIATED CABLING.
17. CONTRACTOR SHALL PROVIDE AND INSTALL NEW BATTERY CYCLE MONITOR.
18. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 200A ENCLOSED CIRCUIT BREAKER.

**DESCRIPTION OF SCADA WORK:**

1. PROVIDE AND INSTALL NEW HMI CABINET.
2. PROVIDE AND INSTALL NEW CABLE SHIELD MONITOR(CSM).
3. PROVIDE AND INSTALL NEW RTU/NETWORK SWITCH.
4. PROVIDE AND INSTALL NEW DIGITAL TRACE RECORDER (DTR).
5. PROVIDE AND INSTALL NEW FIBER DISTRIBUTION PANEL FOR DC SWITCHGEAR (FDP-DC).
6. PROVIDE AND INSTALL A 8 INCH WIDE MINIMUM WIRE-MESH TYPE COMMUNICATION CABLE TRAY, ALONG WITH SUPPORTS, GROUNDING, ISOLATION AND FITTING REQUIREMENTS AS PER THE MANUFACTURER'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.



"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

DESIGNED			DRAWN			CHECKED		
JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

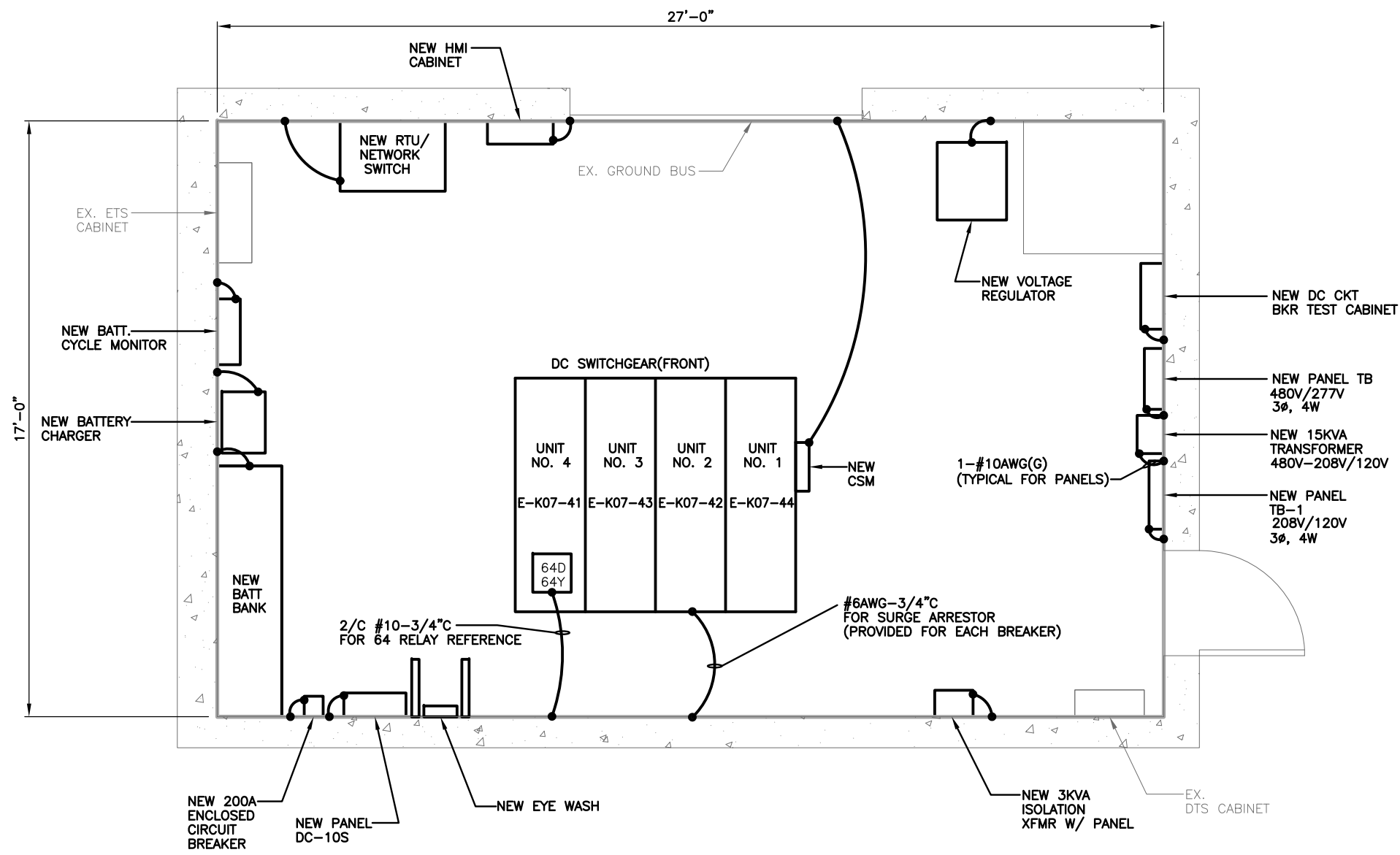
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NUMBER	TITLE	DATE	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 metro  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER


<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> K07TB1 - OGDEN ST. TIE BREAKER STATION EQUIPMENT LAYOUT PLAN - NEW			
CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K07TB1-TB-200	SHEET NO. 22 OF 60

Drawing File: H:\FQ15237\DRG\TBS\K07TB1 - OGDEN ST TBS\K07TB1-TB-201.DWG  
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 Images: .\..\ROBINSON-ELECT-MECH-ELEC-MECH-PWR AutoCAD Folder\WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif



- NOTES:**
- DRAWING SHOWS GROUNDING REQUIREMENTS FOR NEW OR REPLACEMENT EQUIPMENT. CONTRACTOR DOES NOT NEED TO MODIFY GROUNDING OF EXISTING EQUIPMENT THAT IS NOT BEING REPLACED.
  - ALL GROUND CONDUCTORS RUN BETWEEN EQUIPMENT AND SUBSTATION GROUND BUS SHALL BE 1-#6 BARE CU CONDUCTOR UNLESS OTHERWISE SHOWN.
  - THE NEW DTR MOUNTED ON THE DC SWITCHGEAR (NOT SHOWN ON THIS DRAWING) SHALL BE GROUNDED TO THE GROUND BUS BAR WITH #10AWG.


**A** | **EQUIPMENT GROUNDING PLAN - NEW**  
 K07TB1-TB-201 | OGDEN STREET TBS | SCALE: 1/2"=1'-0"

  
 "PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
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		DATE

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NUMBER	TITLE

REVISIONS		
DATE	NUM	DESCRIPTION

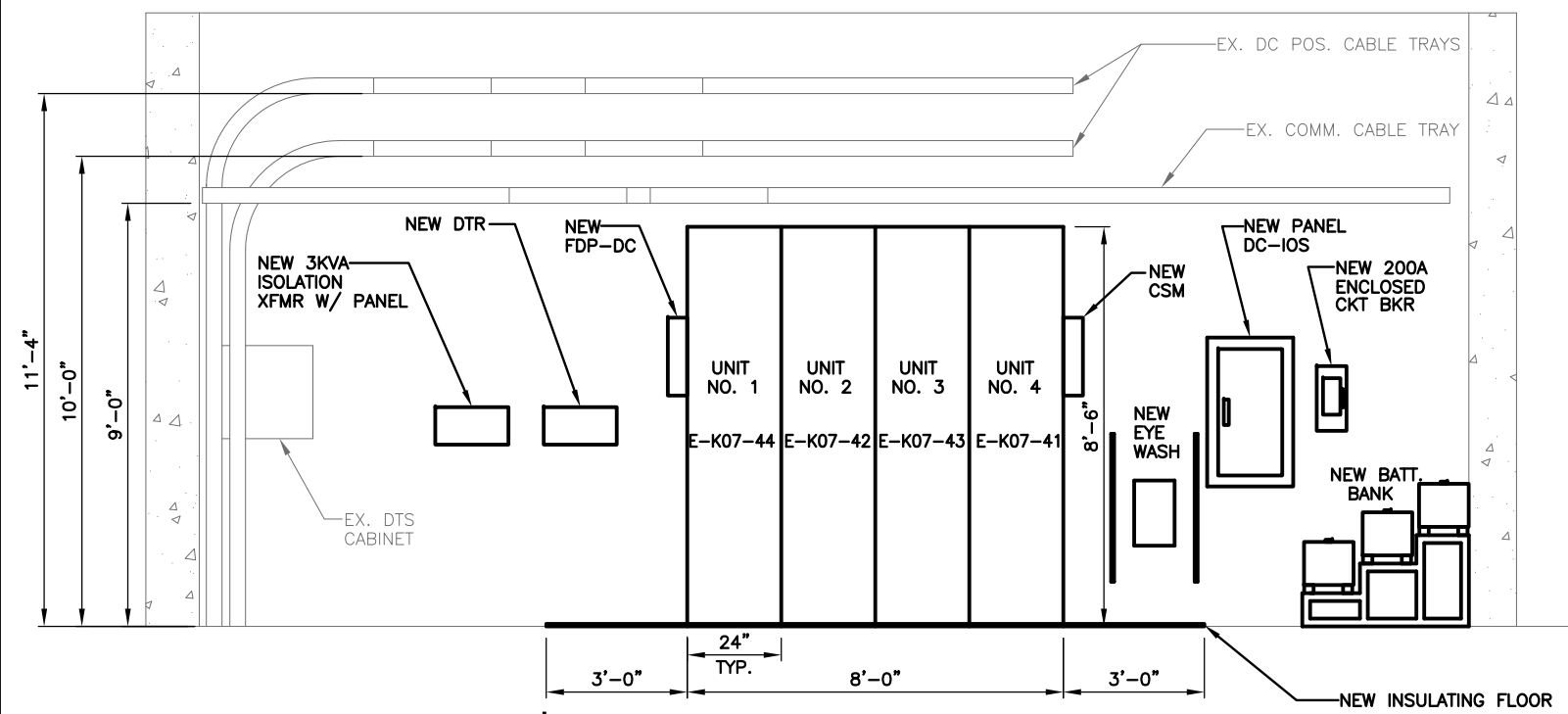

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_  
 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

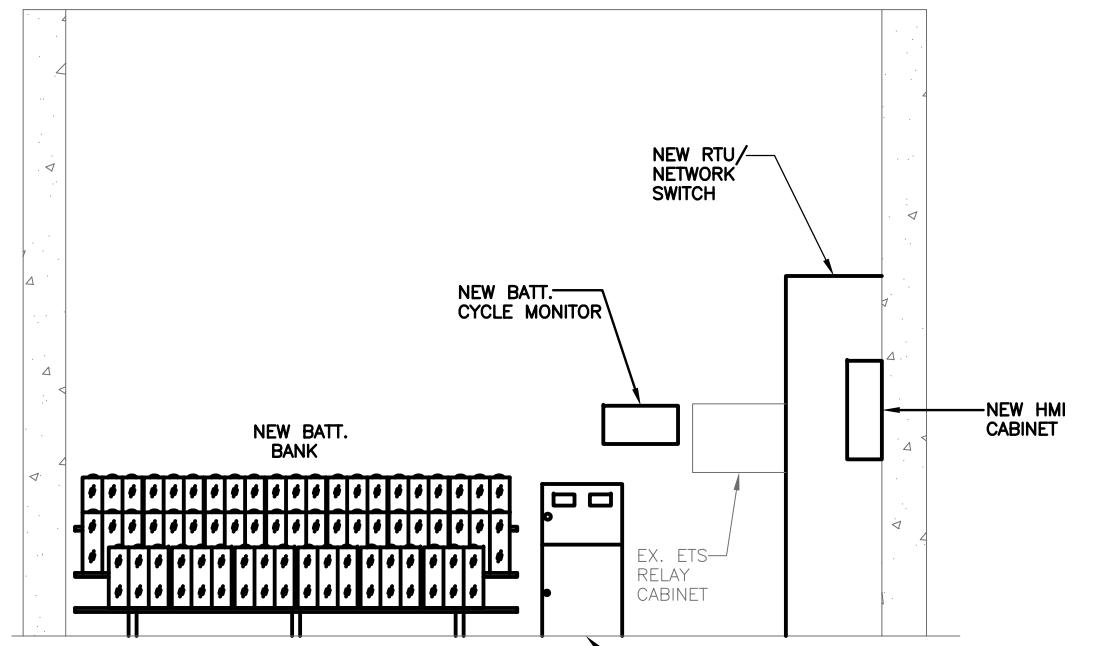
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CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K07TB1-TB-201	SHEET NO. 23 OF 60



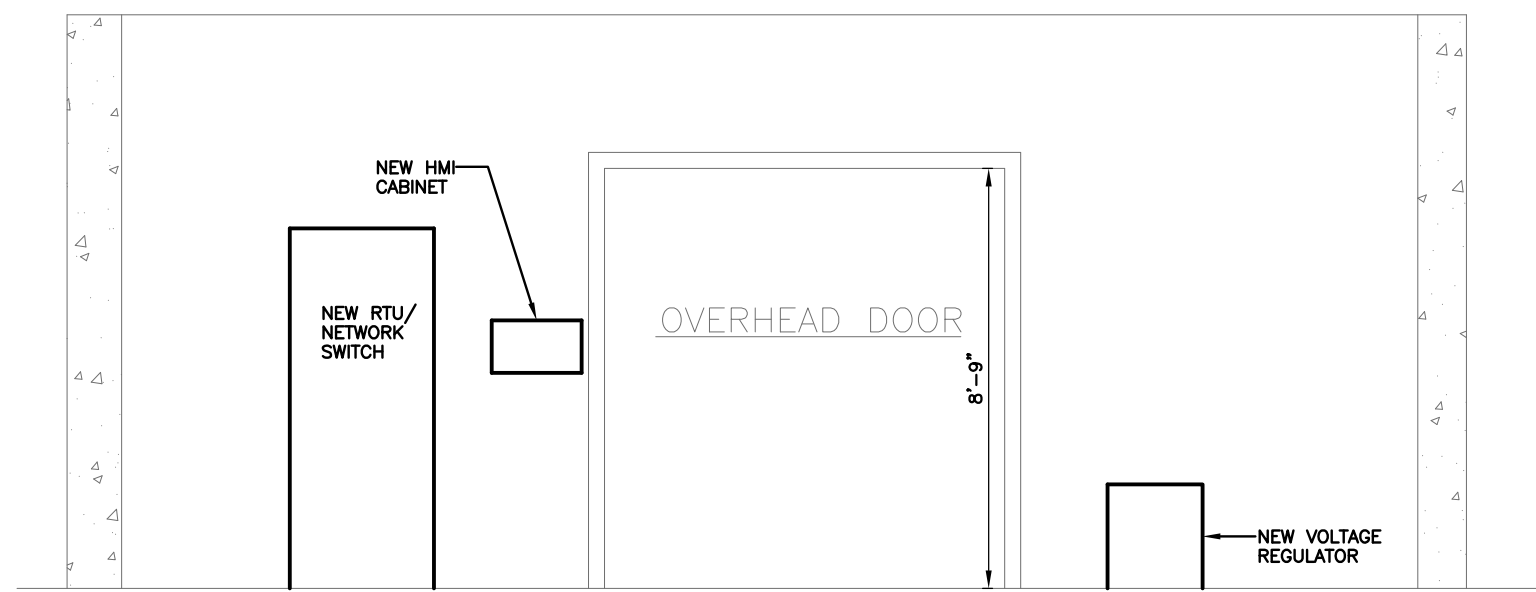
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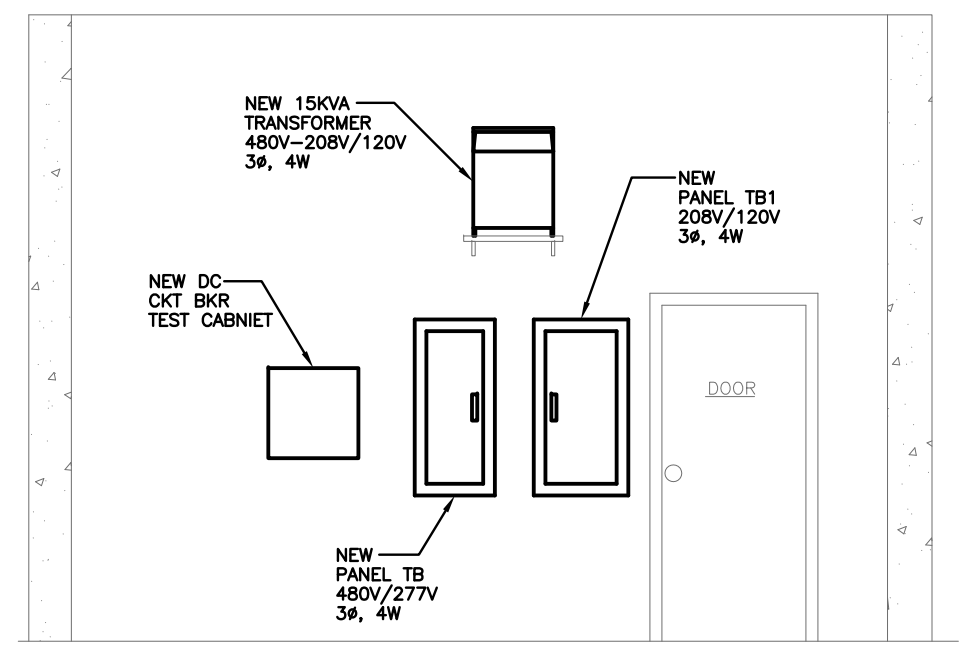
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 K07TB1-TB-202 | OGDEN ST. TBS | SCALE: 1/2"=1'-0"  
 K07TB1-TB-200



**DD** | EQUIPMENT ELEVATIONS  
 K07TB1-TB-202 | OGDEN ST. TBS | SCALE: 1/2"=1'-0"  
 K07TB1-TB-201



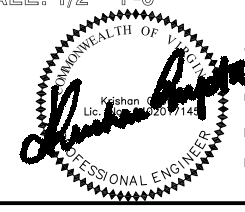
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 K07TB1-TB-200



**CC** | EQUIPMENT ELEVATIONS  
 K07TB1-TB-202 | OGDEN ST. TBS | SCALE: 1/2"=1'-0"  
 K07TB1-TB-200

**NOTES:**

- SEE NOTES ON DWG. K07TB1-TB-200.



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**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 metro  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
 CENI - POWER SYSTEMS ENGINEERING

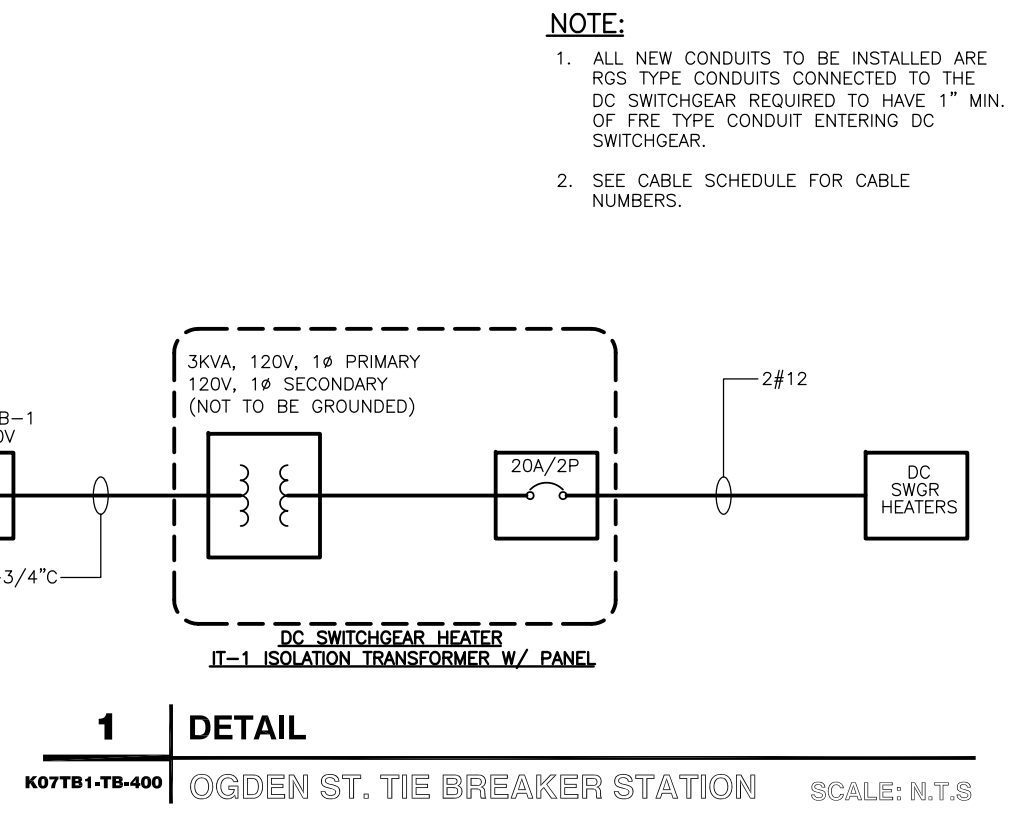
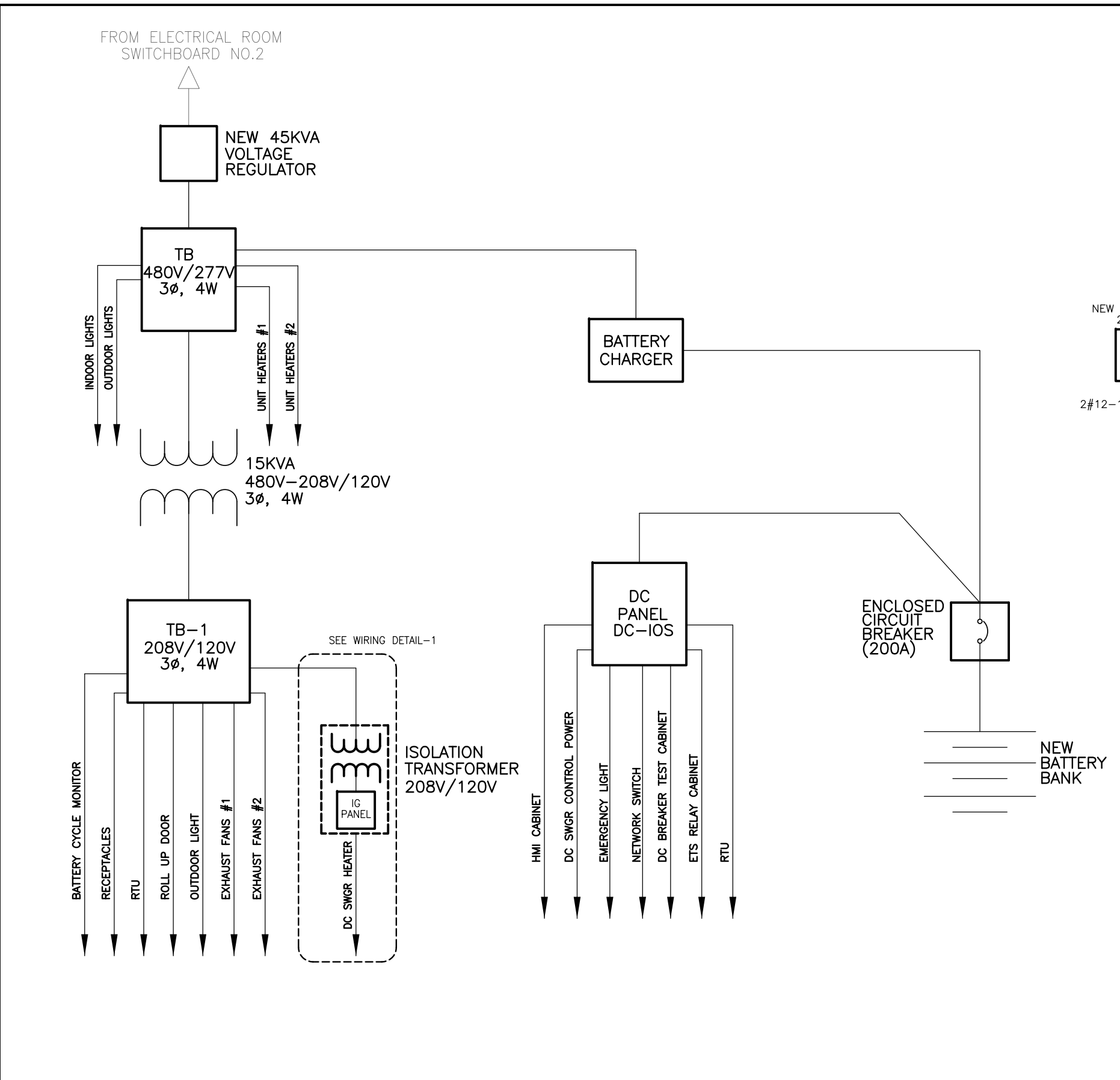
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 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**  
 K07TB1 - OGDEN ST. TIE BREAKER STATION  
 EQUIPMENT ELEVATIONS

CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K07TB1-TB-202	SHEET NO. 24 OF 60
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-VA Regulations 18VAC10-20-760

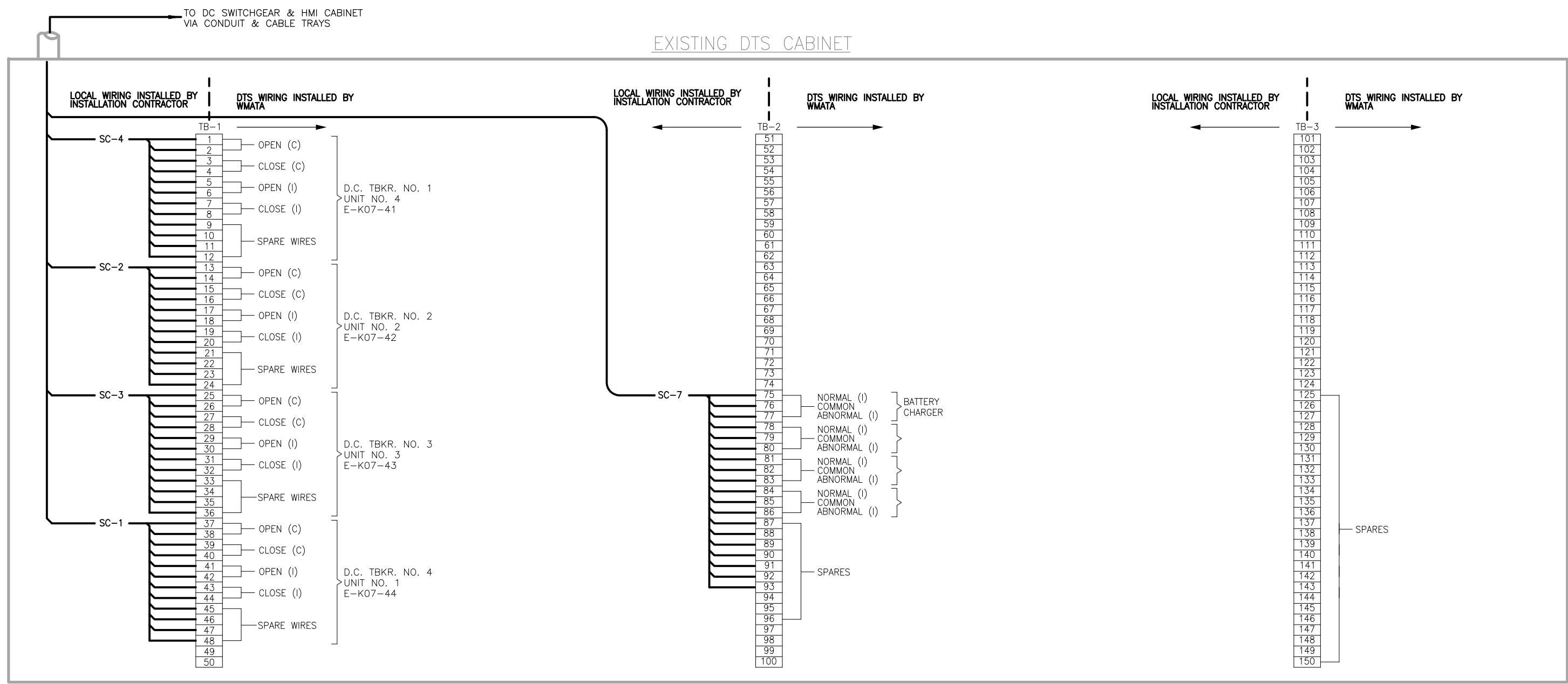
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PK		6/1/15									

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES          ORANGE AND BLUE LINES DC, MD AND VA</b> K07TB1 - OGDEN ST. TIE BREAKER STATION 480V SINGLE LINE DIAGRAM - NEW			
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. K07TB1-TB-400	SHEET NO. 26 OF 60

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### TIE BREAKER STATION

**NOTES:**

1. WIRING & TERMINATION FOR BATTERY CHARGER IS NOT REQUIRED WHEN D.C. POWER IS SUPPLIED FROM PASSENGER STATION. TERMINALS NOT USED WILL BECOME SPARES WITH JUMPER AT TERMINALS 76-75.
2. WHEN TWO TIE BREAKER STATIONS ARE IN THE SAME RTU CONTROL AREA, THE SECOND TIE BREAKER STATION WILL USE A DIFFERENT SERIES OF BREAKER NUMBERS. SEE TABLE AT LEFT.
3. FOR SECOND TIE BREAKER STATION, USE NUMERAL 6 INSTEAD OF 4.
4. SIX ADDITIONAL WIRES ARE BROUGHT TO DTS CABINET, THREE FOR ETS TRIP AND THREE SPARES. WMATA WILL CONNECT THEM TO TERMINAL BLOCKS AS REQUIRED.

**LEGEND:**  
 (I) — DENOTES INDICATION  
 (C) — DENOTES CONTROL  
 \* — SEE NOTE 2

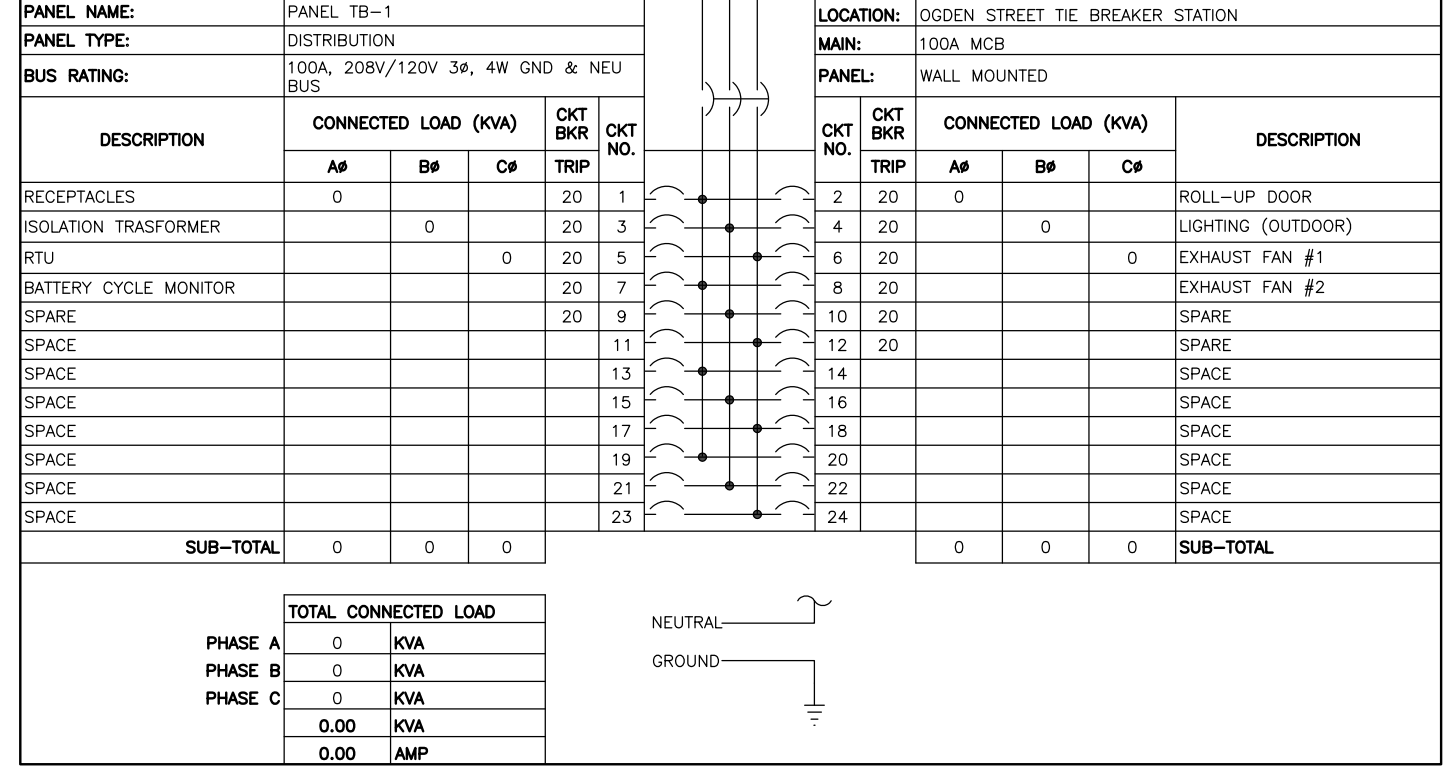
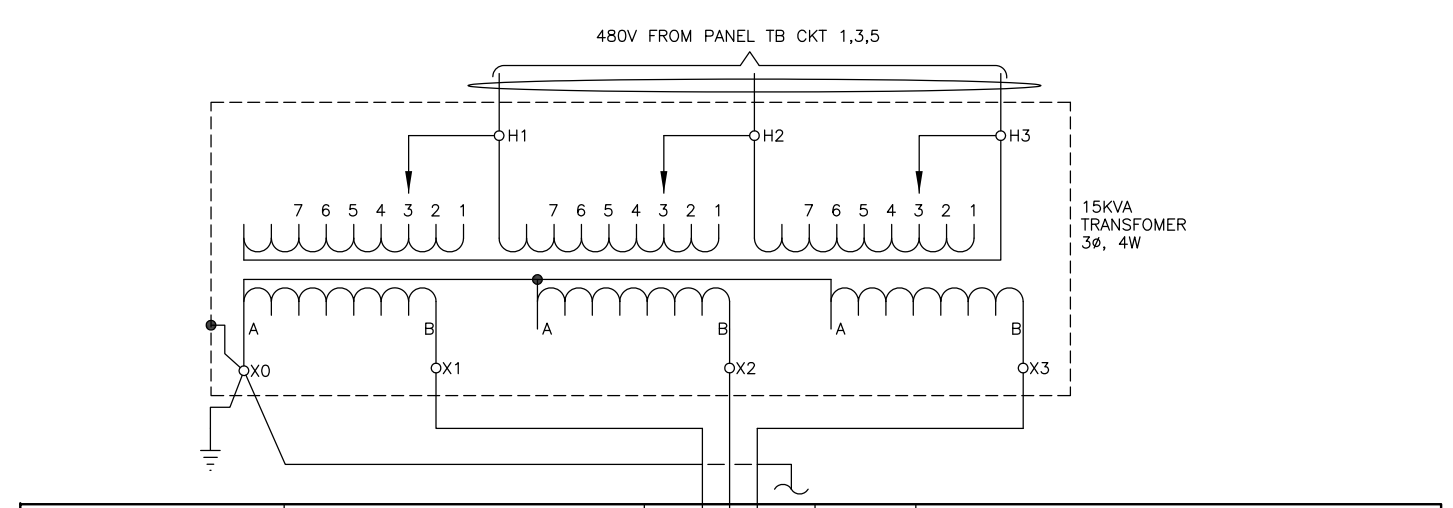
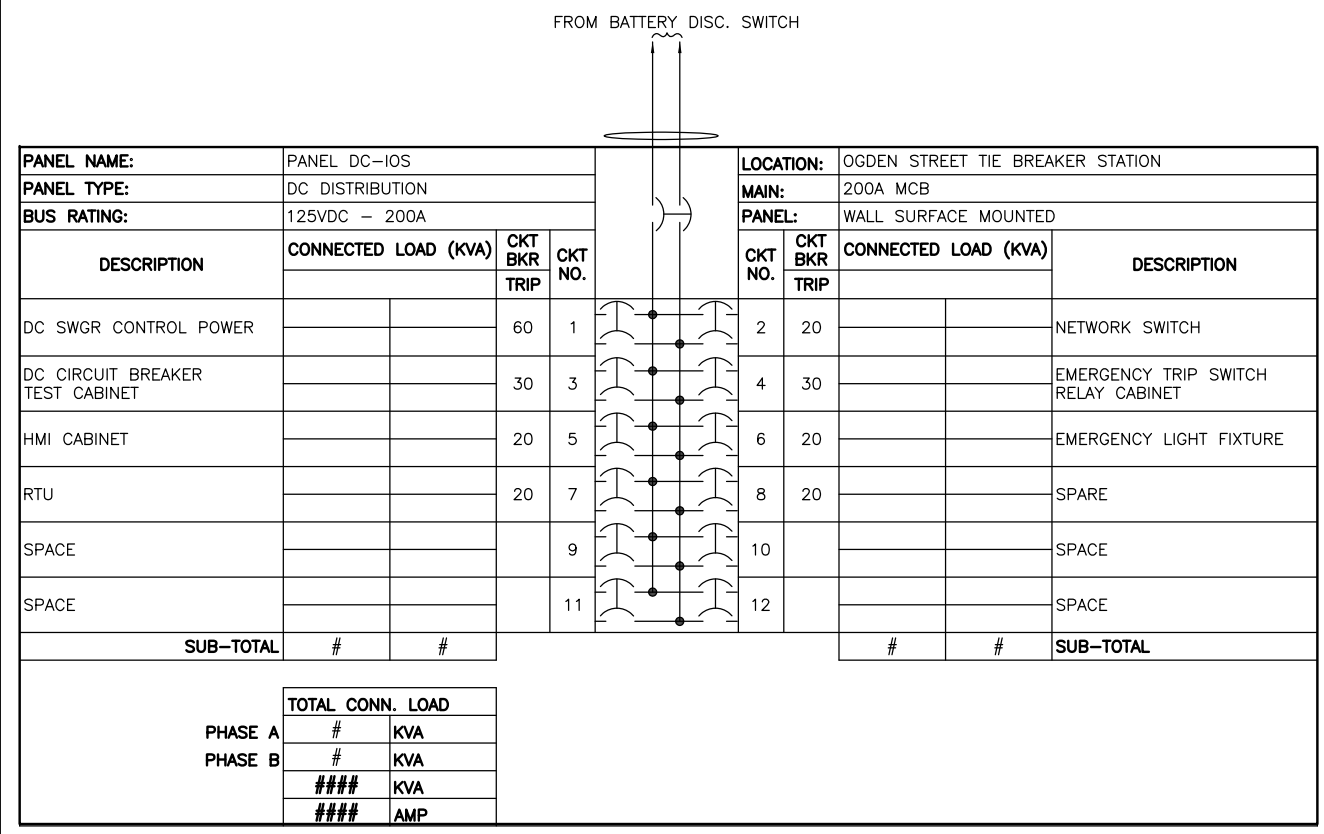
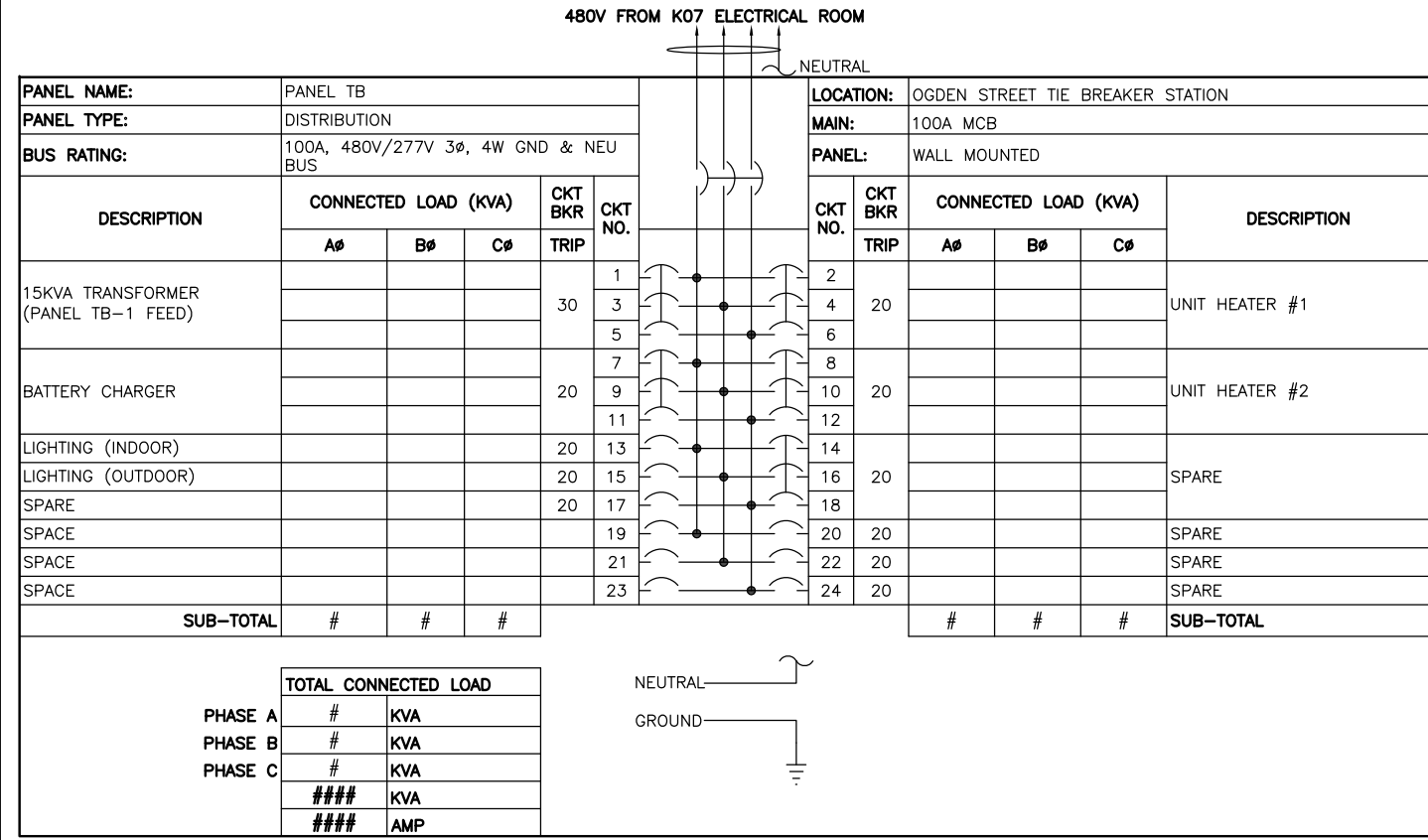
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DC TIE BRK NO.	1	41	61	81
	2	42	62	82
	3	43	63	83
	4	44	64	84
	5	45	65	85
	6	46	66	86
	7	47	67	87
	8	48	68	88



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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015

DESIGNED: JAJ 4/4/15 DRAWN: JAJ 5/20/15 CHECKED: PK 6/1/15	<b>REFERENCE DRAWINGS</b> NUMBER TITLE DATE NUM DESCRIPTION	<b>REVISIONS</b> DATE NUM DESCRIPTION	<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> K07TB1 - OGDEN ST. TIE BREAKER STATION SUPERVISORY AND CONTROL DIAGRAM - NEW
			REVISION SUBMITTED DATE APPROVED DATE DEPUTY CHIEF ENGINEER	CONTRACT NO. FQ15237 SCALE NONE DRAWING NO. K07TB1-TB-401 SHEET NO. 27 OF 60

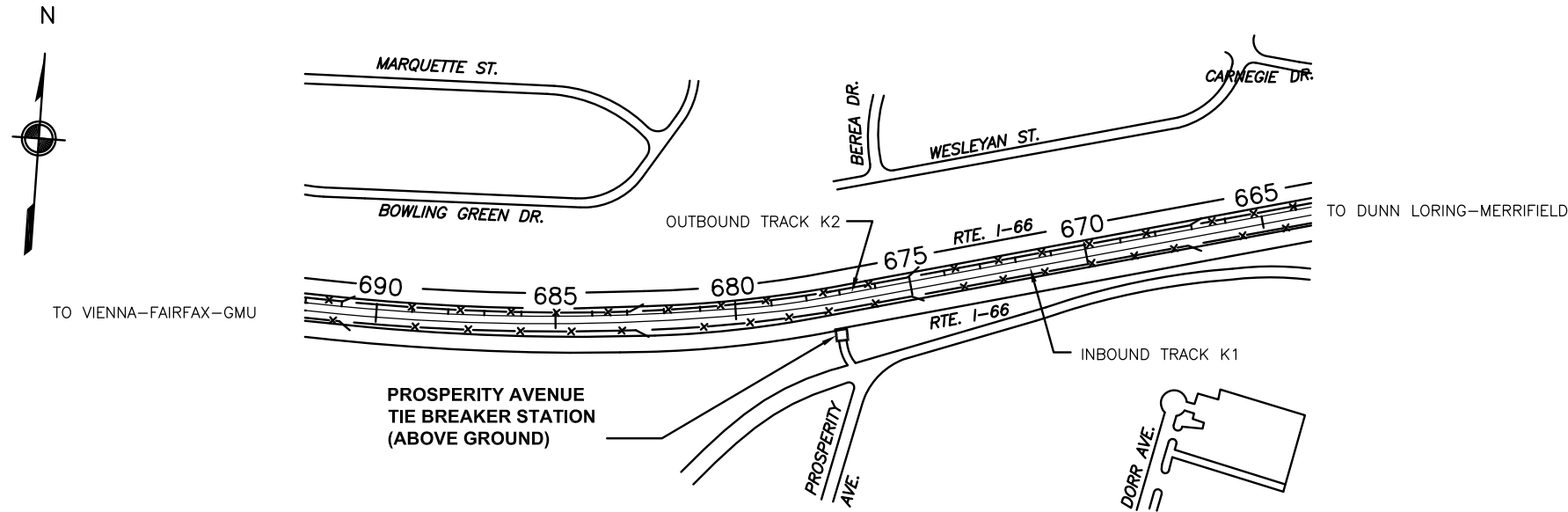
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**KESHAN**  
 PROFESSIONAL ENGINEER  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

<b>DESIGNED</b> JAJ 4/4/15 <b>DRAWN</b> JAJ 5/20/15 <b>CHECKED</b> PK 6/1/15	<b>REFERENCE DRAWINGS</b> NUMBER TITLE DATE NUM DESCRIPTION	<b>REVISIONS</b> NUMBER TITLE DATE NUM DESCRIPTION	<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> K07TB1 - OGDEN ST. TIE BREAKER STATION PANELBOARD SCHEDULES	<b>CONTRACT NO.</b> FQ15237 <b>SCALE</b> NONE <b>DRAWING NO.</b> K07TB1-TB-500 <b>SHEET NO.</b> 28 OF 60
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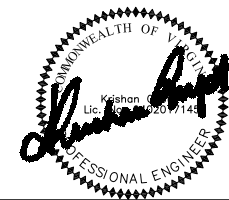
**SITE ACCESS**

1. CHAIN MARKER: Sta. 677+46.35.
2. ABOVE GROUND TIE BREAKER STATION.
3. PERSONAL ACCESS VIA DRIVE-UP.
4. EQUIPMENT ACCESS FROM DRIVEWAY.

**PROSPERITY AVENUE-K07-2**



**TIE BREAKER ACCESS**



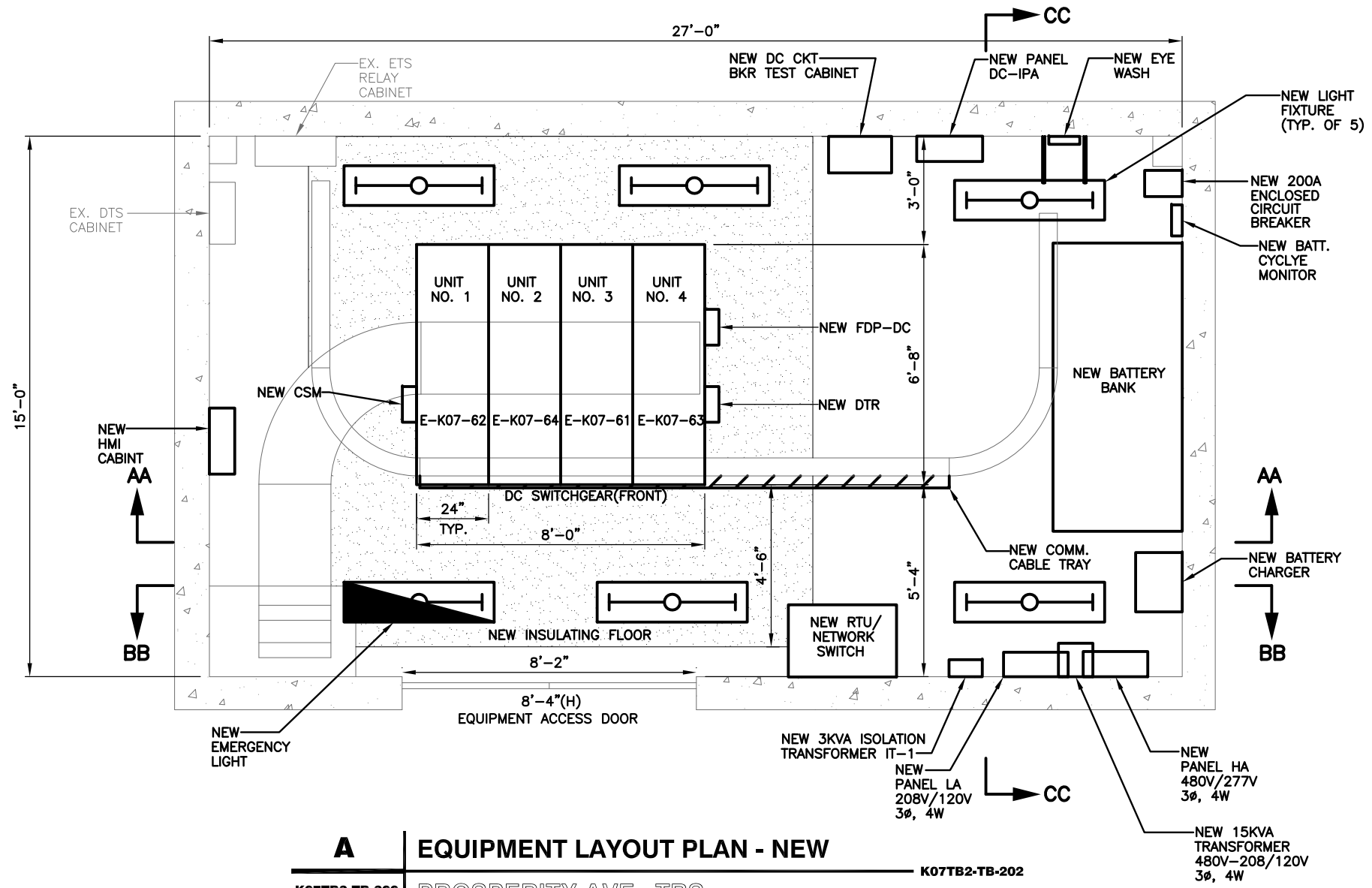
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LICENSE No. 04020117145  
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- VA Regulations 18VAC10-20-760

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**A** | **EQUIPMENT LAYOUT PLAN - NEW**  
 K07TB2-TB-200 | PROSPERITY AVE. TBS | K07TB2-TB-202 | SCALE: 1/2"=1'-0"

**DESCRIPTION OF MAJOR WORK**

1. REMOVE EXISTING DC SWITCHGEAR AND PROVIDE AND INSTALL NEW DC SWITCHGEAR.
2. REMOVE EXISTING BATTERY BANK AND PROVIDE AND INSTALL NEW BATTERY BANK.
3. PROVIDE AND INSTALL A NEW 3KVA ISOLATION TRANSFORMER IT1 WITH PANEL.
4. REMOVE EXISTING DC CIRCUIT BREAKER TEST CABINET AND PROVIDE AND INSTALL NEW DC CIRCUIT BREAKER TEST CABINET.
5. REMOVE EXISTING DC DISTRIBUTION PANEL AND PROVIDE AND INSTALL NEW DC DISTRIBUTION PANEL DC-IPA.
6. REMOVE EXISTING LIGHT FIXTURES AND PROVIDE AND INSTALL NEW LIGHT FIXTURES AND PROVIDE AND INSTALL NEW EMERGENCY LIGHT FIXTURE. SEE GENERAL NOTES FOR WIRING INFORMATION.
7. REMOVE EXISTING 15KVA TRANSFORMER AND PROVIDE AND INSTALL NEW 15KVA, 480V-208V/120V TRANSFORMER
8. REMOVE EXISTING PANEL HA AND PROVIDE AND INSTALL NEW 480V/277V, 3φ, 4W AC PANEL HA.
9. REMOVE EXISTING PANEL LA AND PROVIDE AND INSTALL NEW 208V/120V, 3φ, 4W AC PANEL LA.
10. REMOVE EXISTING EMERG. PANEL EAC-IPA.
11. REMOVE EXISTING DC TO AC INVERTER.
12. REMOVE EXISTING ANNUNCIATOR PANEL AND ALL ASSOCIATED CABLING.
13. REMOVE EXISTING EYE WASH AND PROVIDE AND INSTALL NEW EYE WASH EQUIPMENT.
14. REMOVE EXISTING INSULATING FLOOR AND PROVIDE AND INSTALL NEW INSULATING FLOOR.
15. REMOVE EXISTING BATTERY CHARGER AND PROVIDE AND INSTALL NEW BATTERY CHARGER.
16. CONTRACTOR SHALL PROVIDE AND INSTALL NEW BATTERY CYCLE MONITOR.
17. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 200A ENCLOSED CIRCUIT BREAKER.

**DESCRIPTION OF SCADA WORK:**

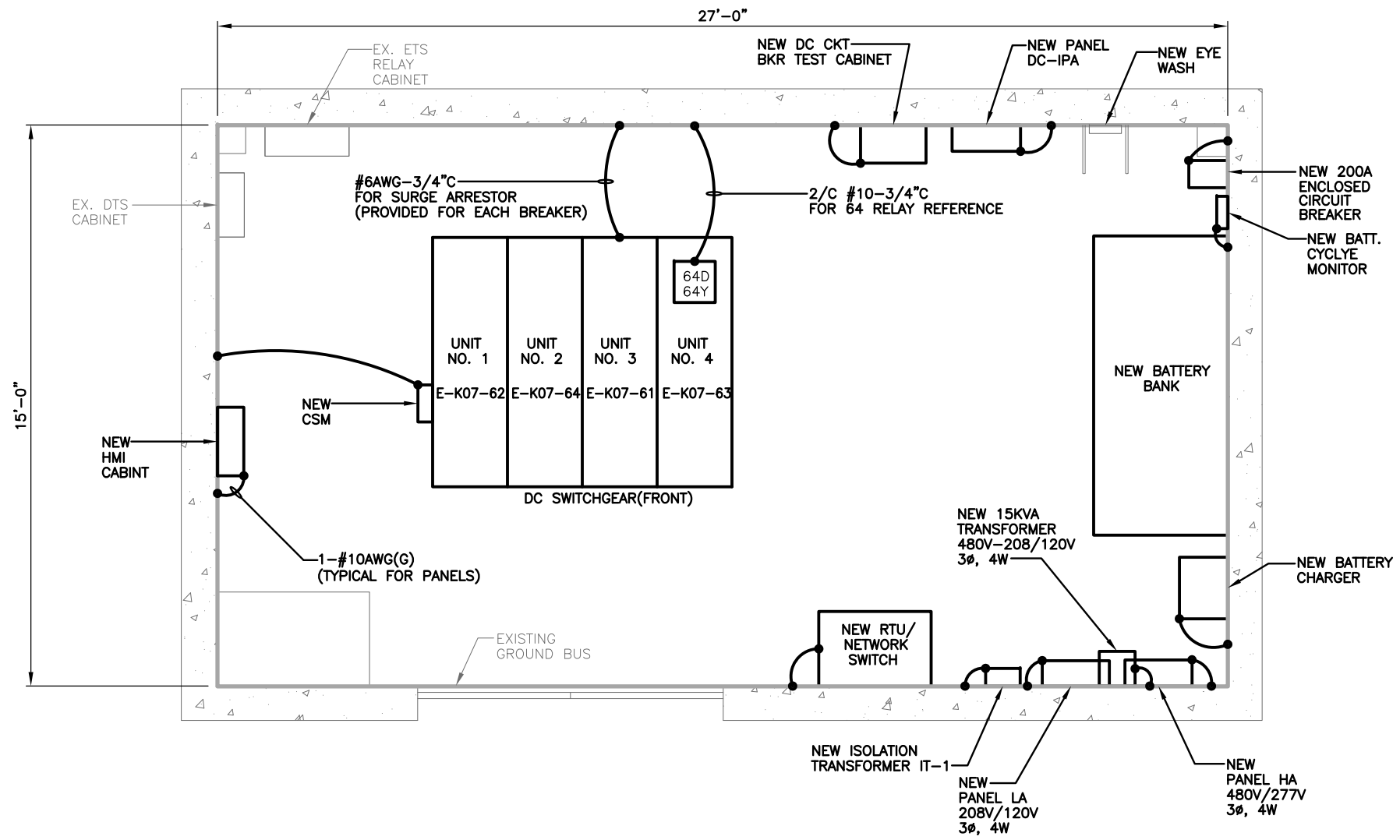
1. PROVIDE AND INSTALL NEW HMI CABINET.
2. PROVIDE AND INSTALL NEW CABLE SHIELD MONITOR(CSM).
3. PROVIDE AND INSTALL NEW RTU/NETWORK SWITCH CABINET.
4. PROVIDE AND INSTALL NEW DIGITAL TRACE RECORDER (DTR).
5. PROVIDE AND INSTALL NEW FIBER DISTRIBUTION PANEL FOR DC SWITCHGEAR (FDP-DC).
6. PROVIDE AND INSTALL A 8 INCH WIDE MINIMUM WIRE-MESH TYPE COMMUNICATION CABLE TRAY, ALONG WITH SUPPORTS, GROUNDING, ISOLATION AND FITTING REQUIREMENTS AS PER THE MANUFACTURER'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.



"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>			<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> <b>K07TB2 - PROSPERITY AVE. TIE BREAKER STATION</b> <b>EQUIPMENT LAYOUT PLAN - NEW</b>																															
DESIGNED	JAJ	4/4/15	DATE																															
DRAWN	JAJ	5/20/15	DATE																															
CHECKED	PK	6/1/15	DATE																															
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CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.																															
FQ15237	AS NOTED	K07TB2-TB-200	30 OF 60																															
DATE	DATE																																	

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- NOTES:**
- DRAWING SHOWS GROUNDING REQUIREMENTS FOR NEW OR REPLACEMENT EQUIPMENT. CONTRACTOR DOES NOT NEED TO MODIFY GROUNDING OF EXISTING EQUIPMENT THAT IS NOT BEING REPLACED.
  - ALL GROUND CONDUCTORS RUN BETWEEN EQUIPMENT AND SUBSTATION GROUND BUS SHALL BE 1-#6 BARE CU CONDUCTOR UNLESS OTHERWISE SHOWN.
  - THE NEW DTR MOUNTED ON THE DC SWITCHGEAR (NOT SHOWN ON THIS DRAWING) SHALL BE GROUND TO THE GROUND BUS BAR WITH #10AWG.

**A** | **EQUIPMENT GROUNDING PLAN - NEW**  
 K07TB2-TB-201 | PROSPERITY AVE. TBS | SCALE: 1/2"=1'-0"



"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
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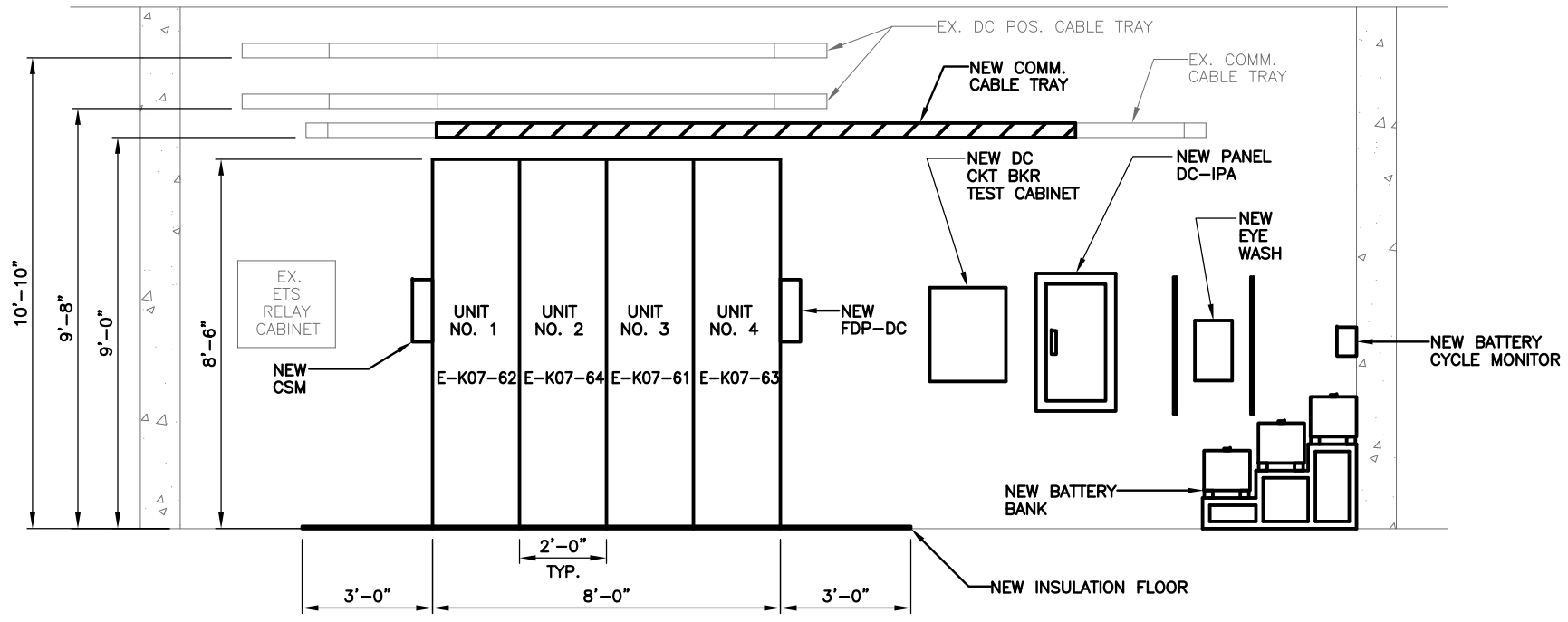
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NUMBER	TITLE	DATE	NUM	DESCRIPTION	DATE	NUM	DESCRIPTION	DATE
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JAJ		5/20/15						
PK		6/1/15						

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 metro  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**  
 REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

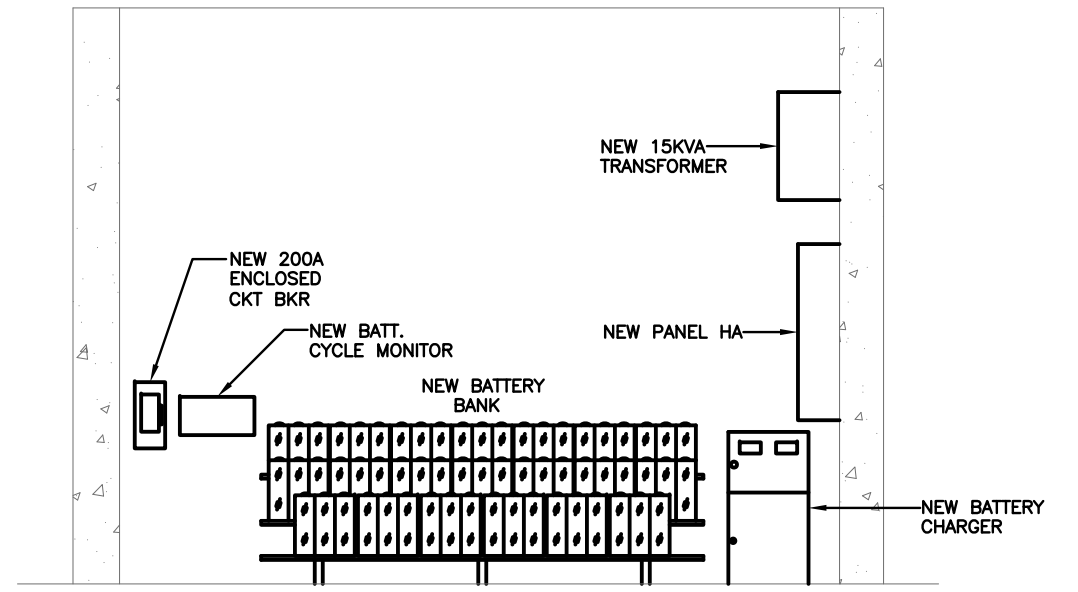
<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> K07TB2 - PROSPERITY AVE. TIE BREAKER STATION GROUNDING PLAN - NEW			
CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K07TB2-TB-201	SHEET NO. 31 OF 60



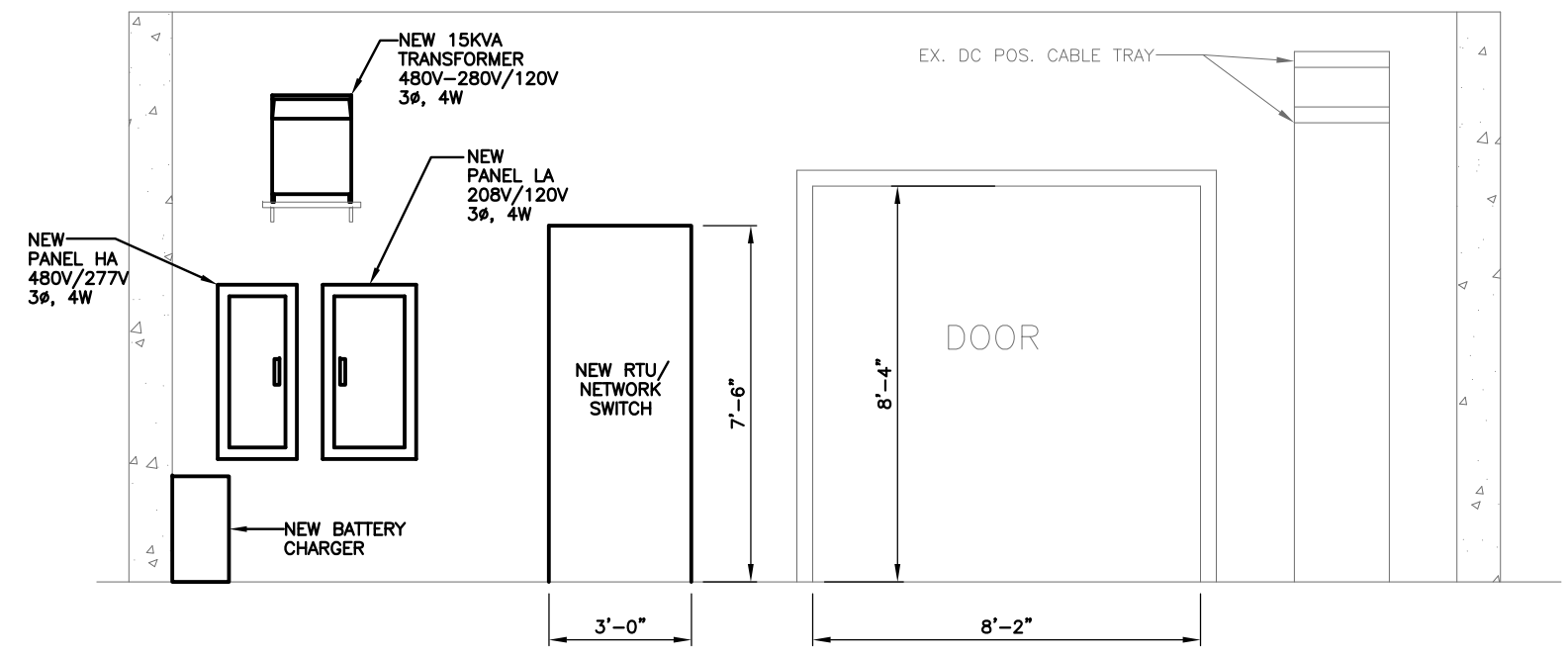
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**AA** | EQUIPMENT ELEVATIONS  
 K07TB2-TB-202 | PROSPERITY AVE. TBS | K07TB2-TB-200 | SCALE: 1/2"=1'-0"



**CC** | EQUIPMENT ELEVATIONS  
 K07TB2-TB-202 | PROSPERITY AVE. TBS | K07TB2-TB-200 | SCALE: 1/2"=1'-0"



**BB** | EQUIPMENT ELEVATIONS  
 K07TB2-TB-202 | PROSPERITY AVE. TBS | K07TB2-TB-200 | SCALE: 1/2"=1'-0"

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DESIGNED			DRAWN			CHECKED		
JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

REFERENCE DRAWINGS		REVISIONS	
NUMBER	TITLE	DATE	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_  
 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

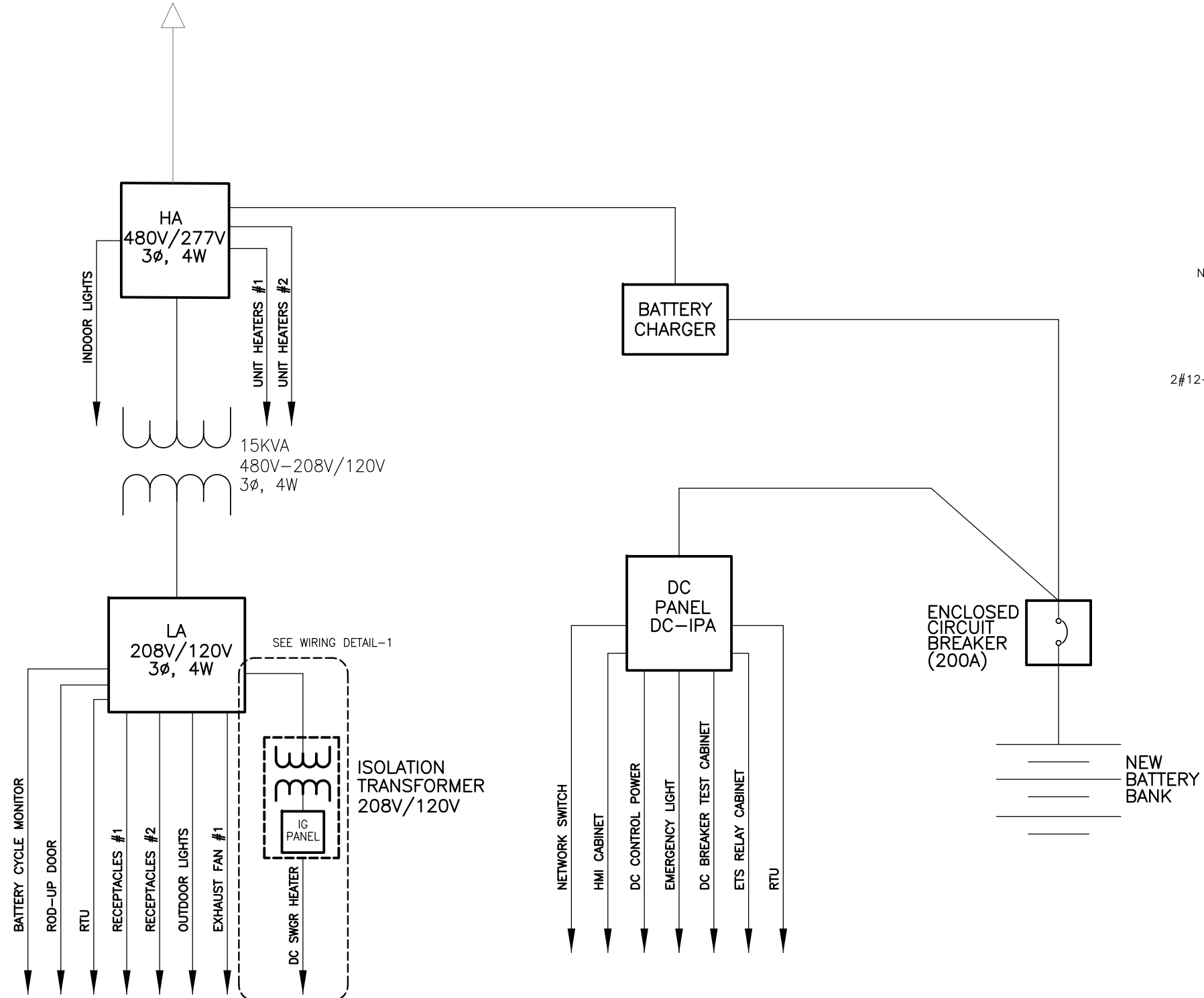
**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**  
**K07TB2 - PROSPERITY AVE. TIE BREAKER STATION**  
**EQUIPMENT ELEVATIONS**

CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. K07TB2-TB-202	SHEET NO. 32 OF 60
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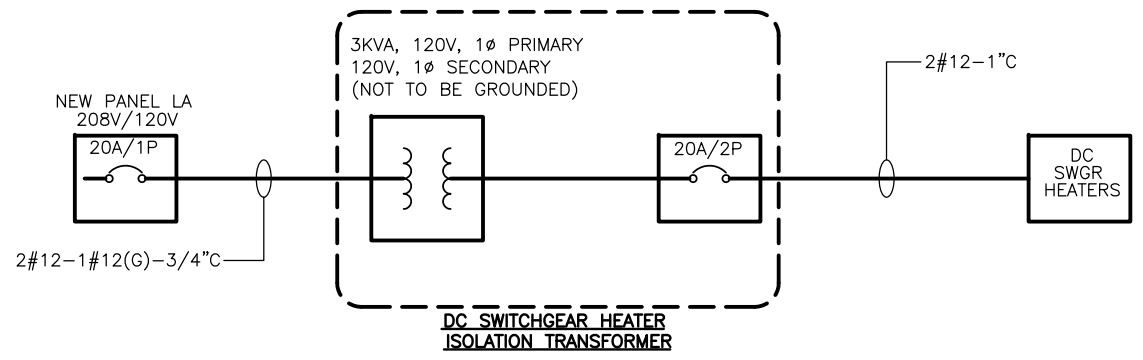


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ELECTRICAL ROOM SWITCHBOARD NO.2



**NOTE:**  
 1. ALL NEW CONDUITS TO BE INSTALLED ARE RGS TYPE CONDUITS CONNECTED TO THE DC SWITCHGEAR REQUIRED TO HAVE 1" MIN. OF FRE TYPE CONDUIT ENTERING DC SWITCHGEAR.



**1** | **DETAIL**  
 K07TB2-TB-400 | PROSPERITY AVE .TIE BREAKER STATION SCALE: N.T.S

*Keshan*  
 Keshan  
 Lic. No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 PROFESSIONAL ENGINEER  
 "PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
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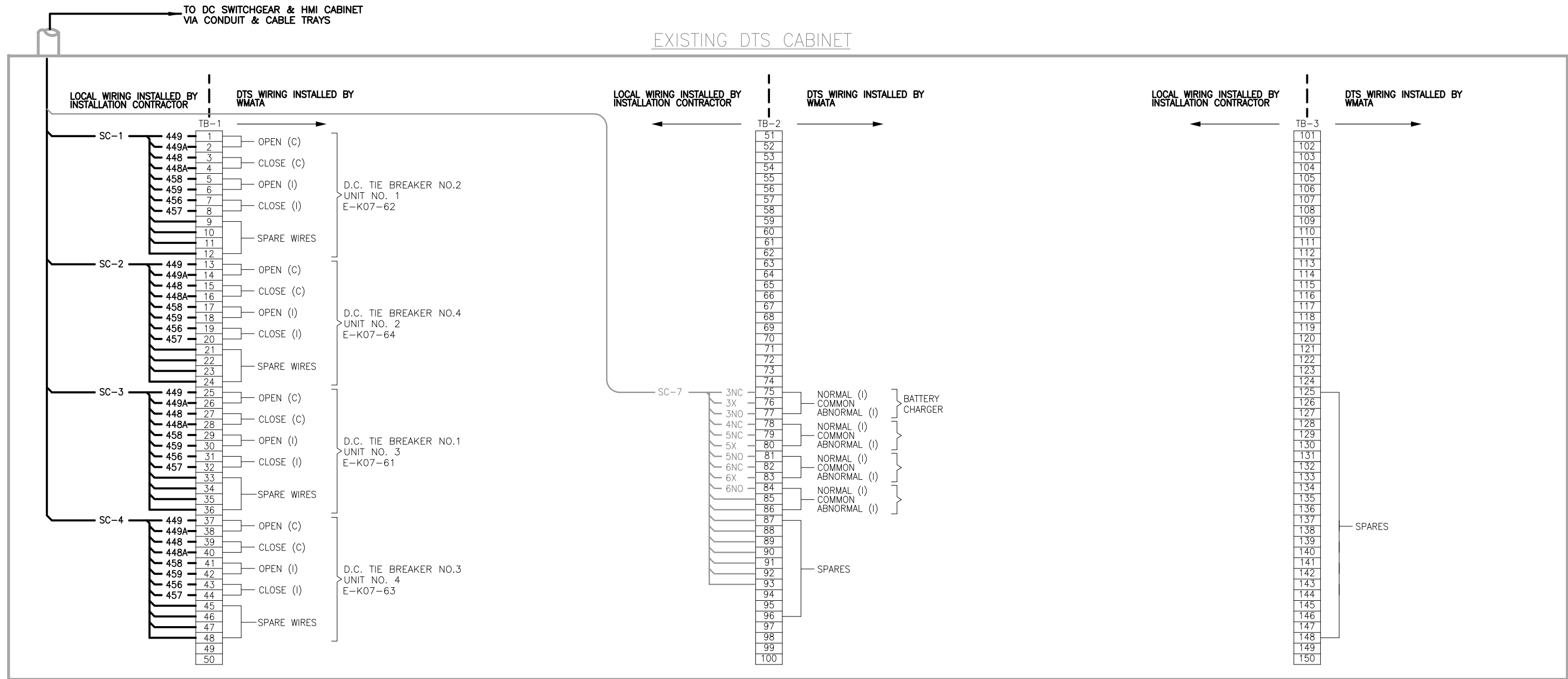
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PK	6/1/15													

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 metro  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>		K07TB2 - PROSPERITY AVE. TIE BREAKER STATION		480V SINGLE LINE DIAGRAM - NEW	
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. K07TB2-TB-400	SHEET NO. 34 OF 60		

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### TIE BREAKER STATION

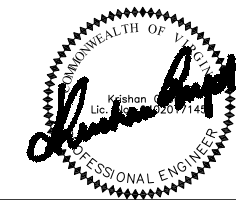
**NOTES:**

1. WIRING & TERMINATION FOR BATTERY CHARGER IS NOT REQUIRED WHEN D.C. POWER IS SUPPLIED FROM PASSENGER STATION. TERMINALS NOT USED WILL BECOME SPARES WITH JUMPER AT TERMINALS 76-75.
2. WHEN TWO TIE BREAKER STATIONS ARE IN THE SAME RTU CONTROL AREA, THE SECOND TIE BREAKER STATION WILL USE A DIFFERENT SERIES OF BREAKER NUMBERS. SEE TABLE AT LEFT.
3. FOR SECOND TIE BREAKER STATION, USE NUMERAL 6 INSTEAD OF 4.
4. SIX ADDITIONAL TRIP WIRES ARE BROUGHT TO DTS CABINET, THREE FOR ETS TRIP AND THREE SPARES. WMATA WILL CONNECT THEM TO TERMINAL BLOCKS AS REQUIRED.

**LEGEND:**

- (I) — DENOTES INDICATION
- (C) — DENOTES CONTROL
- \* — SEE NOTE 2

FUNCTION	BRK NO.	1 ST TBS BRK NO.	2 ND TBS BRK NO.	YARD AREA INTERFACE BRK NO.
DC TIE BRK NO.	1	41	61	81
	2	42	62	82
	3	43	63	83
	4	44	64	84
	5	45	65	85
	6	46	66	86
	7	47	67	87
	8	48	68	88

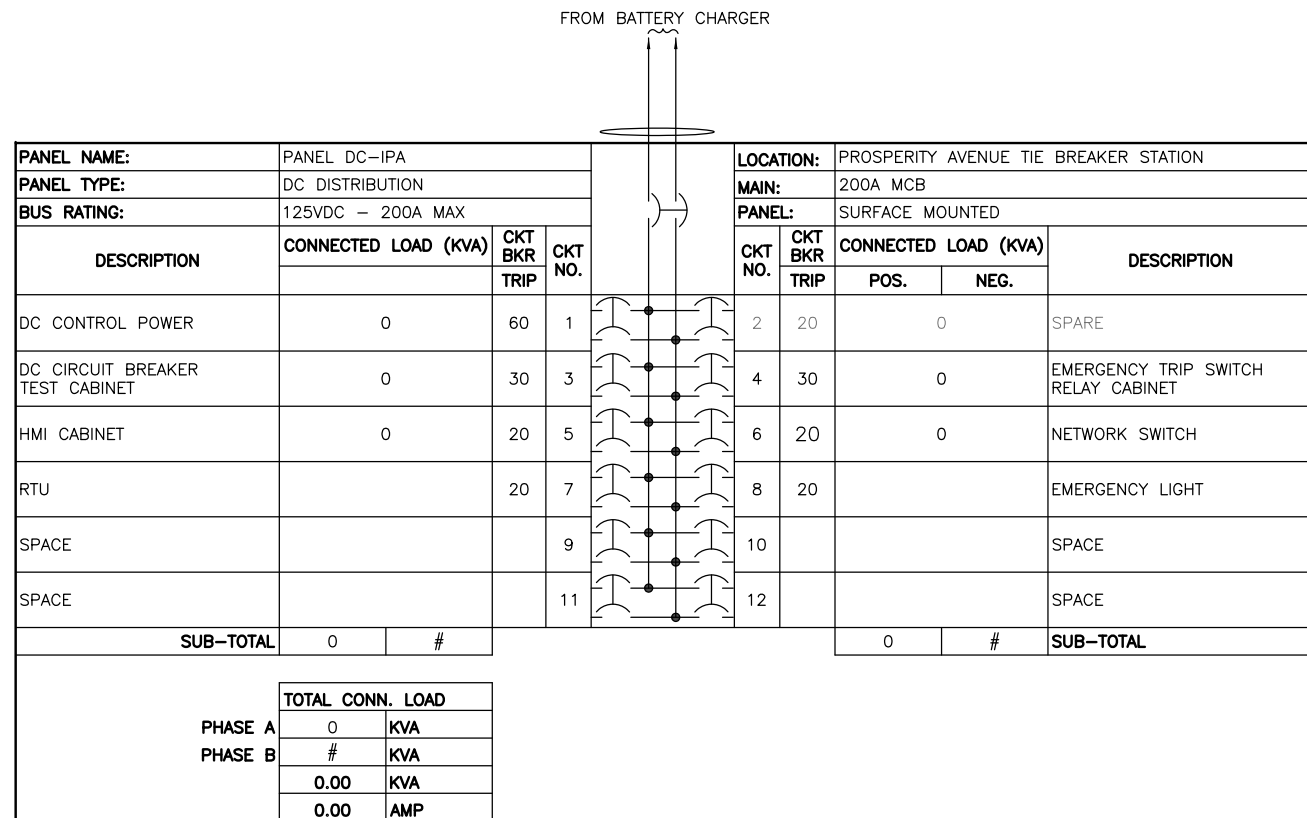
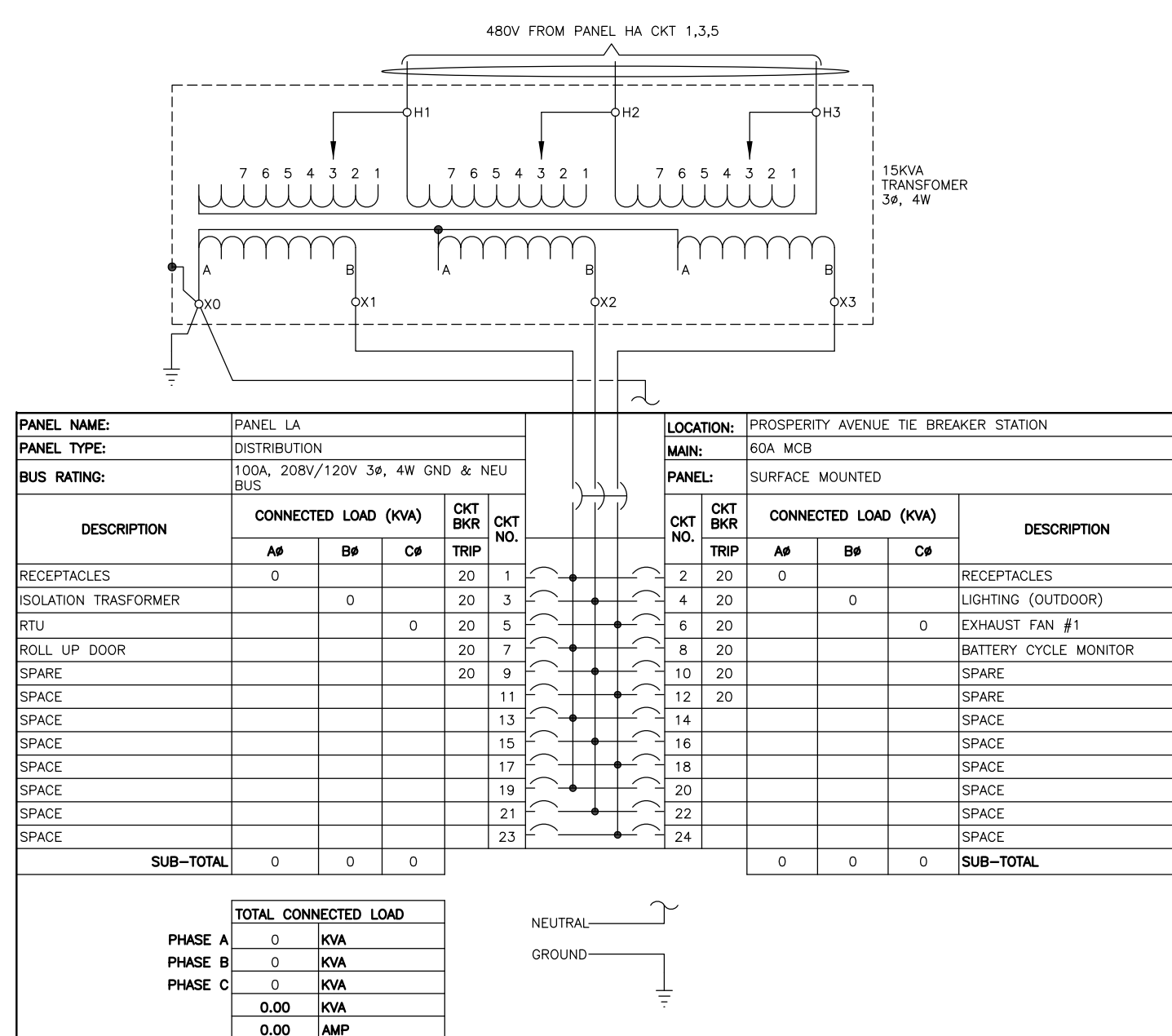
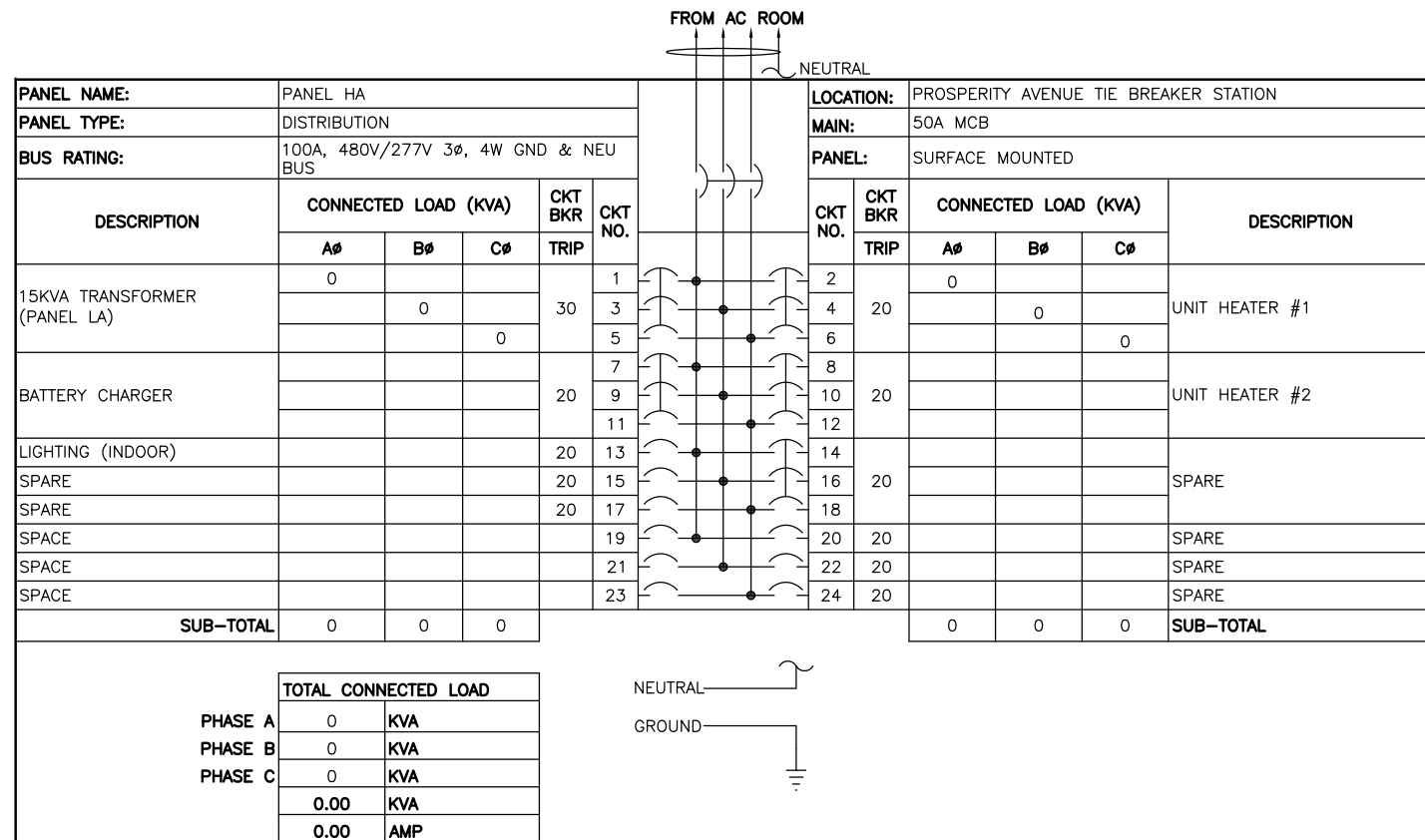


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 EXPIRATION DATE: 10/31/2015

-VA Regulations 18VAC10-20-760

DESIGNED JAJ 4/4/15 DATE DRAWN JAJ 5/20/15 DATE CHECKED PK 6/1/15 DATE			<b>REFERENCE DRAWINGS</b> NUMBER TITLE DATE NUM DESCRIPTION			<b>REVISIONS</b> NUMBER TITLE DATE NUM DESCRIPTION			<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>			<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> K07TB2 - PROSPERITY AVE. TIE BREAKER STATION SUPERVISORY AND CONTROL DIAGRAM - NEW		
REVISION SUBMITTED DATE APPROVED DEPUTY CHIEF ENGINEER DATE			CONTRACT NO. FQ15237			SCALE NONE			DRAWING NO. K07TB2-TB-401			SHEET NO. 35 OF 60		

Drawing File: H:\FQ15237\DRG\TBS\K07TB2 - PROSPERITY AVE TBS\K07TB2-TB-500.DWG  
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LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015

*Krishan*  
 Krishan  
 Lic. No. 04020117145  
 PROFESSIONAL ENGINEER

-VA Regulations 18VAC10-20-760

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

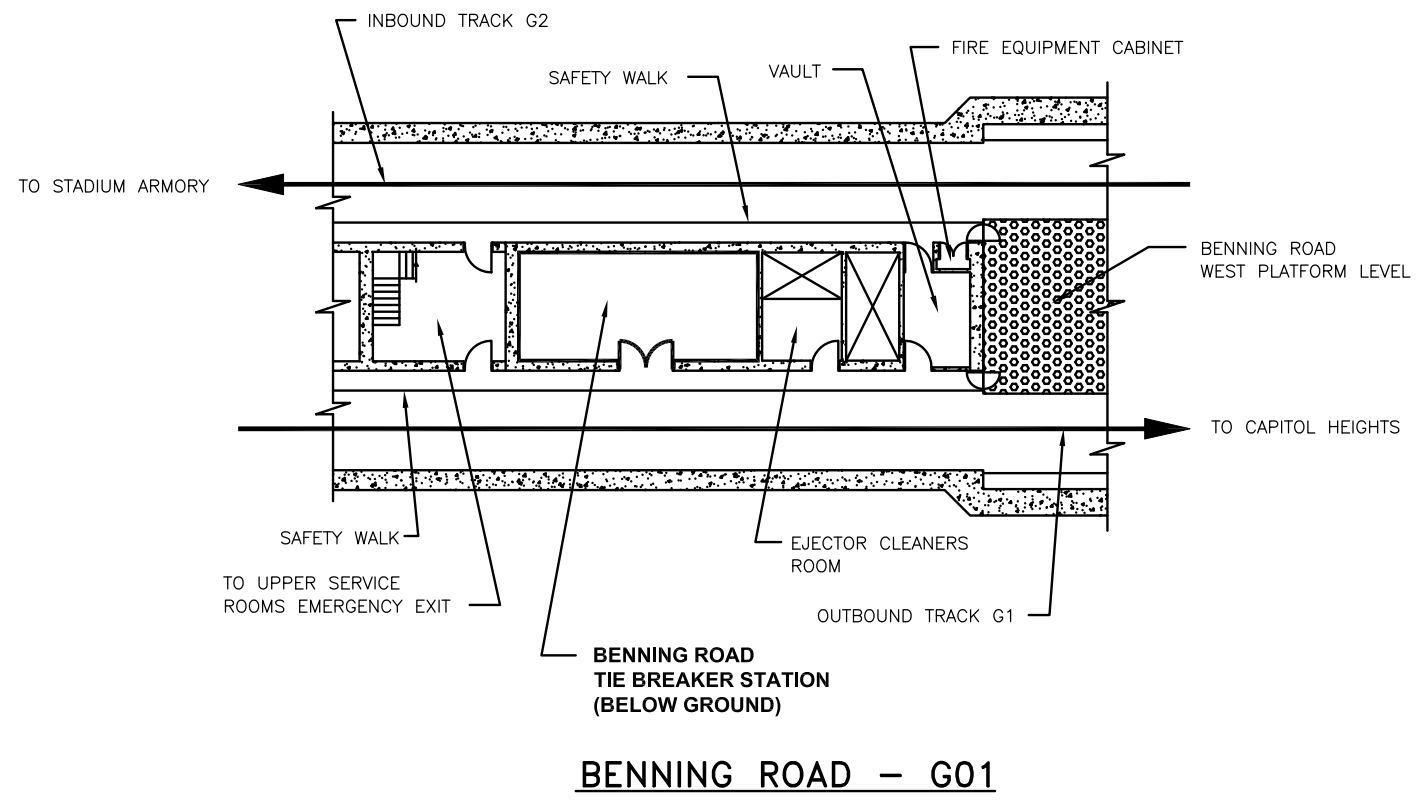
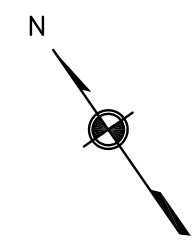
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 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

**SIX (6) TIE BREAKER STATIONS UPGRADES**  
**ORANGE AND BLUE LINES DC, MD AND VA**  
**K07TB2 - PROSPERITY AVE. TIE BREAKER STATION**  
**PANELBOARD SCHEDULES**

CONTRACT NO. FQ15237  
 SCALE NONE  
 DRAWING NO. K07TB2-TB-500  
 SHEET NO. 36 OF 60

REFERENCE DRAWINGS			REVISIONS		
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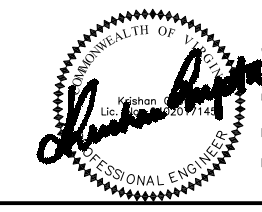


**SITE ACCESS**

1. CHAIN MARKER: Sta. 338+63.
2. BELOW GROUND TIE BREAKER STATION.
3. PERSONAL ACCESS VIA SAFETY WALK.
4. EQUIPMENT ACCESS FROM OUTBOUND TRACK SIDE.



**TIE BREAKER ACCESS**



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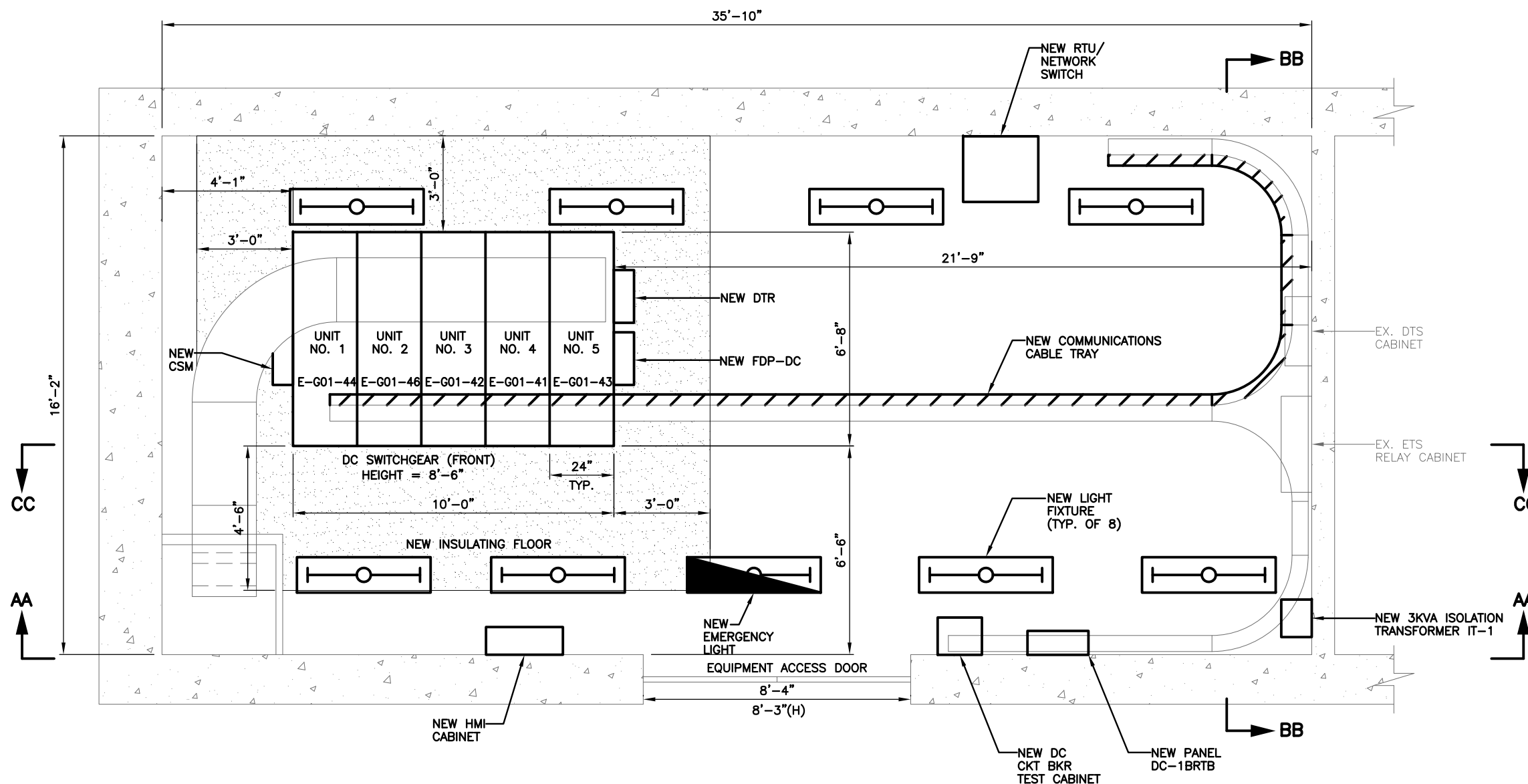
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		DATE												
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		DATE												

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED	DATE	APPROVED	DATE

<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G01 - BENNING RD. TIE BREAKER STATION VICINITY MAP			
CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G01TBS-TB-001	37 OF 60

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- DESCRIPTION OF MAJOR WORK**
1. REMOVE EXISTING DC SWITCHGEAR AND PROVIDE AND INSTALL NEW DC SWITCHGEAR.
  2. PROVIDE AND INSTALL A NEW 3KVA ISOLATION TRANSFORMER IT1 WITH PANEL.
  3. REMOVE EXISTING DC CIRCUIT BREAKER TEST CABINET AND PROVIDE AND INSTALL NEW DC CIRCUIT BREAKER TEST CABINET.
  4. REMOVE EXISTING DC DISTRIBUTION PANEL AND PROVIDE AND INSTALL NEW DC DISTRIBUTION PANEL DC-1BRTB.
  5. REMOVE EXISTING LIGHT FIXTURES AND PROVIDE AND INSTALL NEW LIGHT FIXTURES AND PROVIDE AND INSTALL NEW EMERGENCY LIGHT FIXTURE. SEE GENERAL NOTES FOR WIRING INFORMATION.
  6. REMOVE EXISTING DC TO AC INVERTER.
  7. REMOVE EXISTING INSULATING FLOOR AND PROVIDE AND INSTALL NEW INSULATING FLOOR.
  8. REMOVE EXISTING ANNUNCIATOR PANEL AND ALL ASSOCIATED CABLING.

- DESCRIPTION OF SCADA WORK:**
1. PROVIDE AND INSTALL NEW HMI CABINET.
  2. PROVIDE AND INSTALL NEW CABLE SHIELD MONITOR(CSM).
  3. PROVIDE AND INSTALL NEW RTU/NETWORK SWITCH CABINET.
  4. PROVIDE AND INSTALL NEW DIGITAL TRACE RECORDER (DTR).
  5. PROVIDE AND INSTALL NEW FIBER DISTRIBUTION PANEL FOR DC SWITCHGEAR (FDP-DC).
  6. PROVIDE AND INSTALL A 8 INCH WIDE MINIMUM WIRE-MESH TYPE COMMUNICATION CABLE TRAY, ALONG WITH SUPPORTS, GROUNDING, ISOLATION AND FITTING REQUIREMENTS AS PER THE MANUFACTURER'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.

**A** | **EQUIPMENT LAYOUT PLAN - NEW**  
 G01TBS-TB-200 | BENNING RD. TBS | G01TBS-TB-202 | SCALE: 1/2"=1'-0"

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		DATE
DRAWN	JAJ	5/20/15
		DATE
CHECKED	PK	6/1/15
		DATE

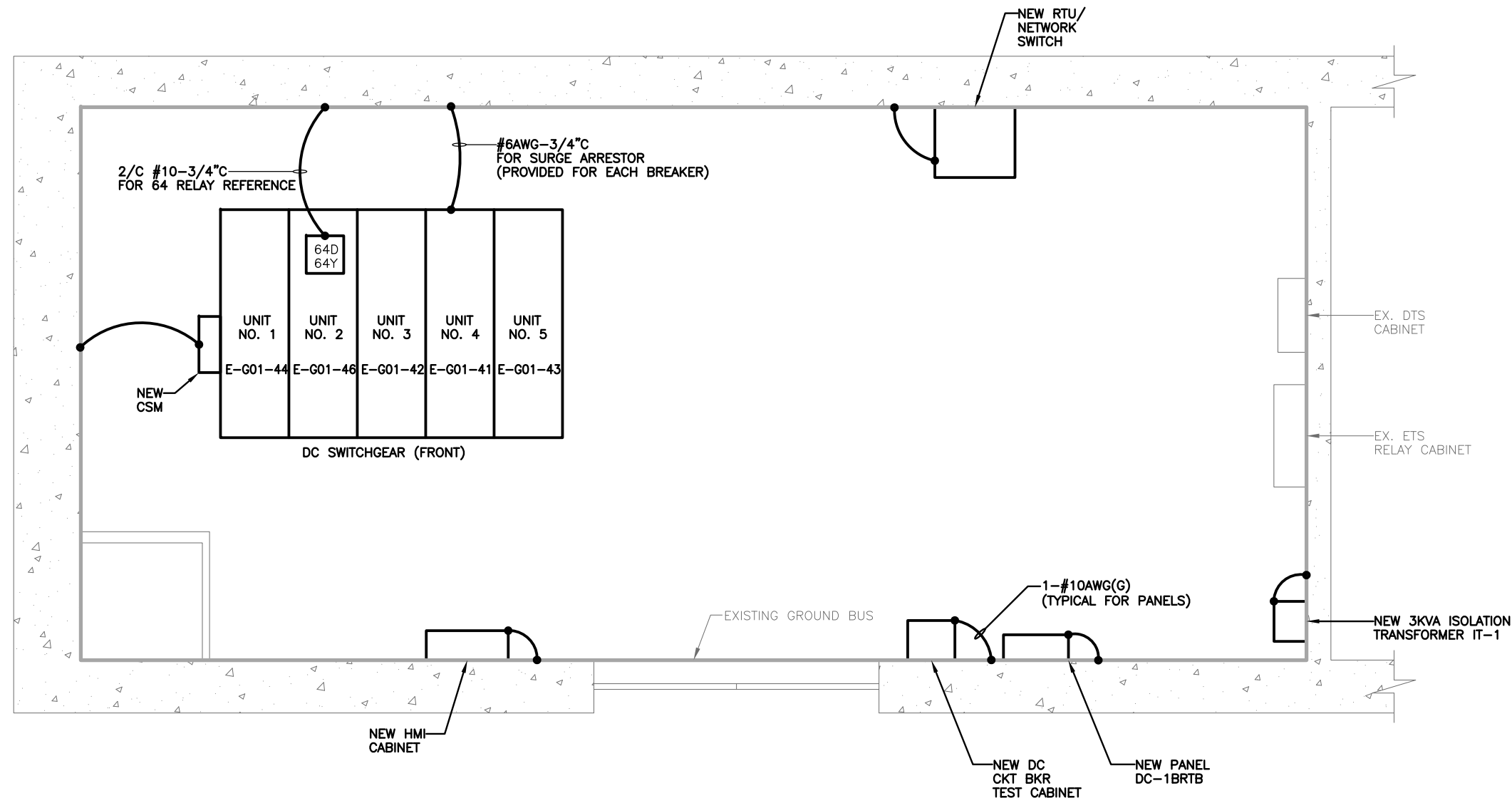
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NUMBER	TITLE	DATE	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
**DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES**  
**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_  
 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

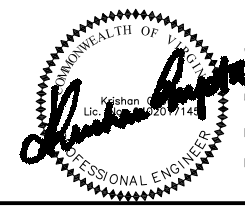
<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G01 - BENNING RD. TIE BREAKER STATION EQUIPMENT LAYOUT PLAN - NEW		CONTRACT NO. <b>FQ15237</b>	SCALE AS NOTED	DRAWING NO. G01TBS-TB-200	SHEET NO. 38 OF 60
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- NOTES:**
- DRAWING SHOWS GROUNDING REQUIREMENTS FOR NEW OR REPLACEMENT EQUIPMENT. CONTRACTOR DOES NOT NEED TO MODIFY GROUNDING OF EXISTING EQUIPMENT THAT IS NOT BEING REPLACED.
  - ALL GROUND CONDUCTORS RUN BETWEEN EQUIPMENT AND SUBSTATION GROUND BUS SHALL BE 1-#6 BARE CU CONDUCTOR UNLESS OTHERWISE SHOWN.
  - THE NEW DTR MOUNTED ON THE DC SWITCHGEAR (NOT SHOWN ON THIS DRAWING) SHALL BE GROUND TO THE GROUND BUS BAR WITH #10AWG.

**A** | **EQUIPMENT GROUNDING PLAN - NEW**  
 G01TBS-TB-201 | BENNING RD. TBS | SCALE: 1/2" = 1'-0"



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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

	DESIGNED	DATE
JAJ	4/4/15	
	DRAWN	DATE
JAJ	5/20/15	
	CHECKED	DATE
PK	6/1/15	

REFERENCE DRAWINGS		REVISIONS	
NUMBER	TITLE	DATE	DESCRIPTION

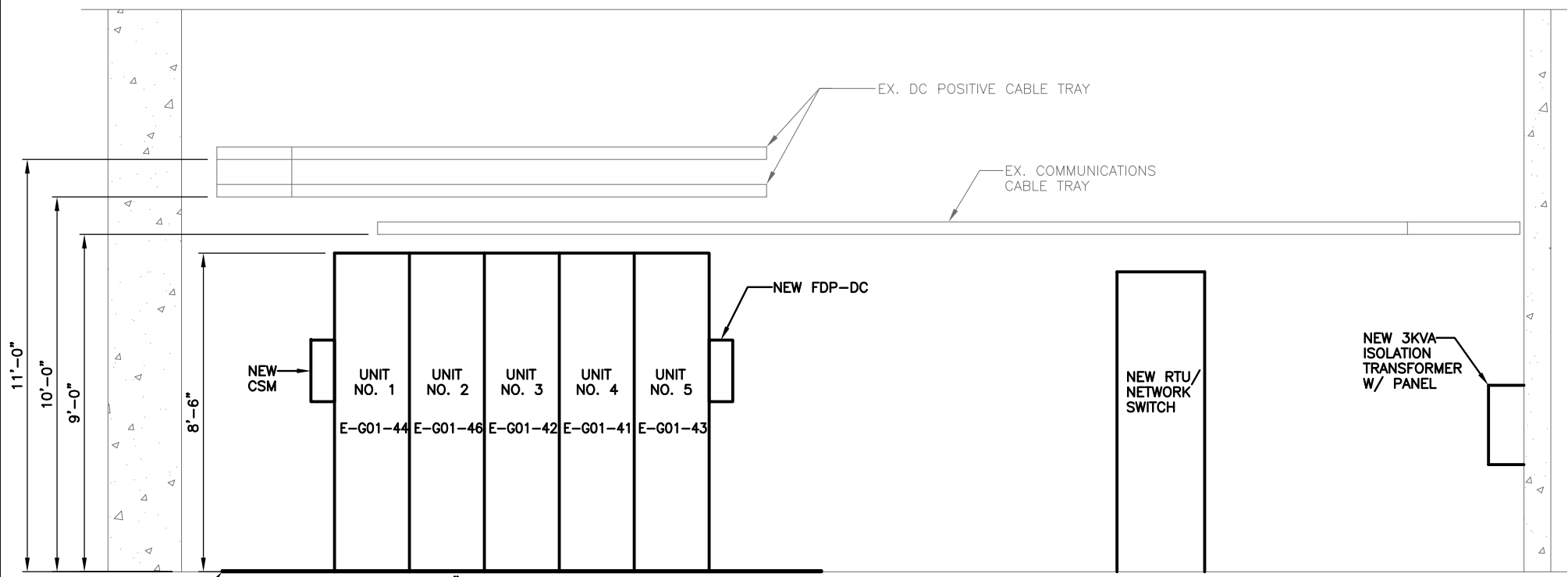
**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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**CENI - POWER SYSTEMS ENGINEERING**

REVISION SUBMITTED _____ DATE _____	APPROVED _____ DATE _____ DEPUTY CHIEF ENGINEER
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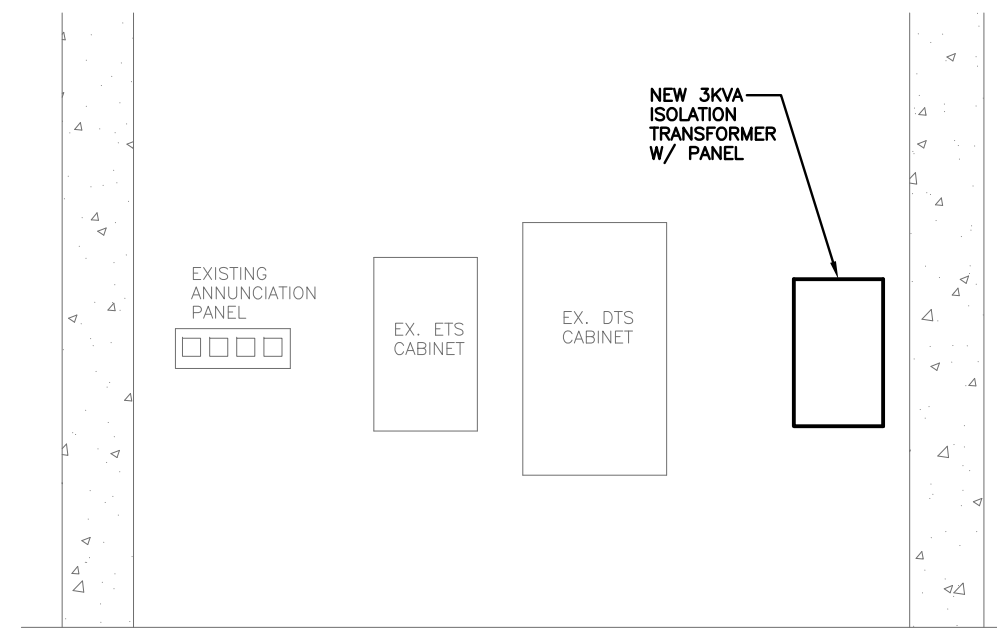
<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>	
G01 - BENNING RD. TIE BREAKER STATION EQUIPMENT GROUNDING PLAN - NEW	
CONTRACT NO. FQ15237	SCALE AS NOTED
DRAWING NO. G01TBS-TB-201	SHEET NO. 39 OF 60



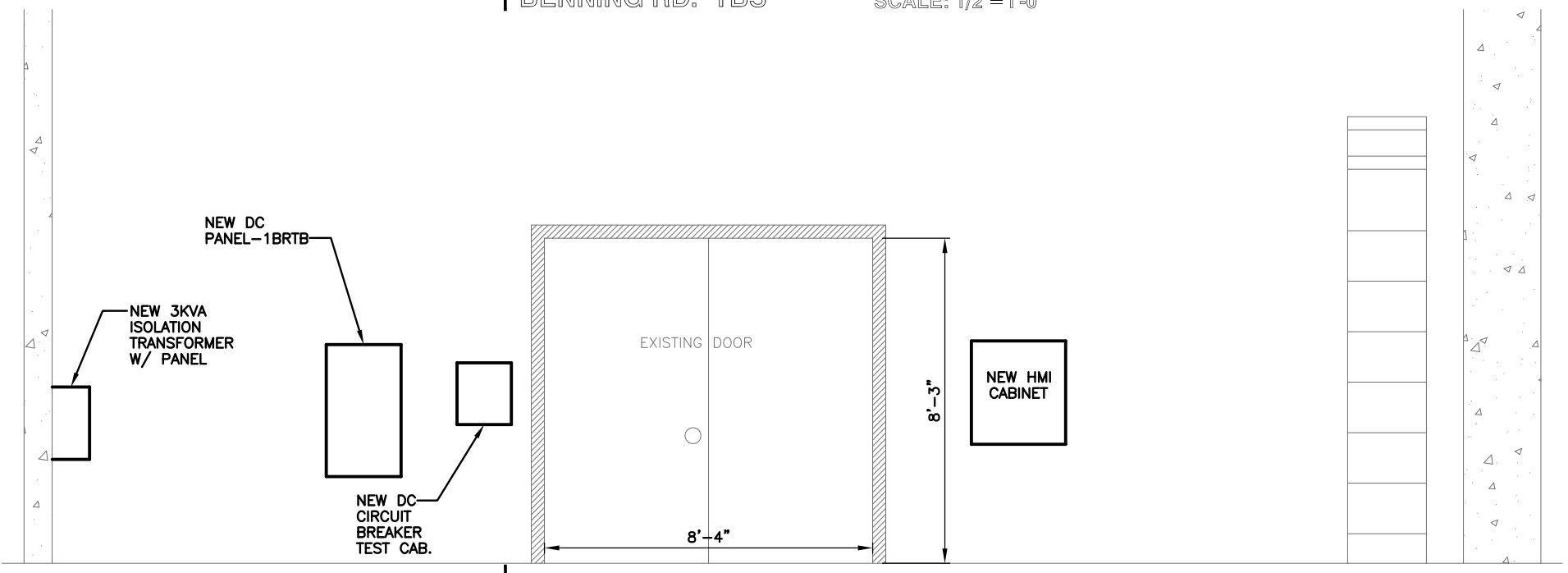
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**AA** EQUIPMENT ELEVATIONS  
 G01TBS-TB-202 BENNING RD. TBS SCALE: 1/2"=1'-0" G01TBS-TB-200



**BB** EQUIPMENT ELEVATIONS  
 G01TBS-TB-202 BENNING RD. TBS SCALE: 1/2"=1'-0" G01TBS-TB-200



**CC** EQUIPMENT ELEVATIONS  
 G01TBS-TB-202 BENNING RD. TBS SCALE: 1/2"=1'-0" G01TBS-TB-200



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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

DESIGNED	JAJ	4/4/15
		DATE
DRAWN	JAJ	5/20/15
		DATE
CHECKED	PK	6/1/15
		DATE

REFERENCE DRAWINGS	
NUMBER	TITLE

REVISIONS	
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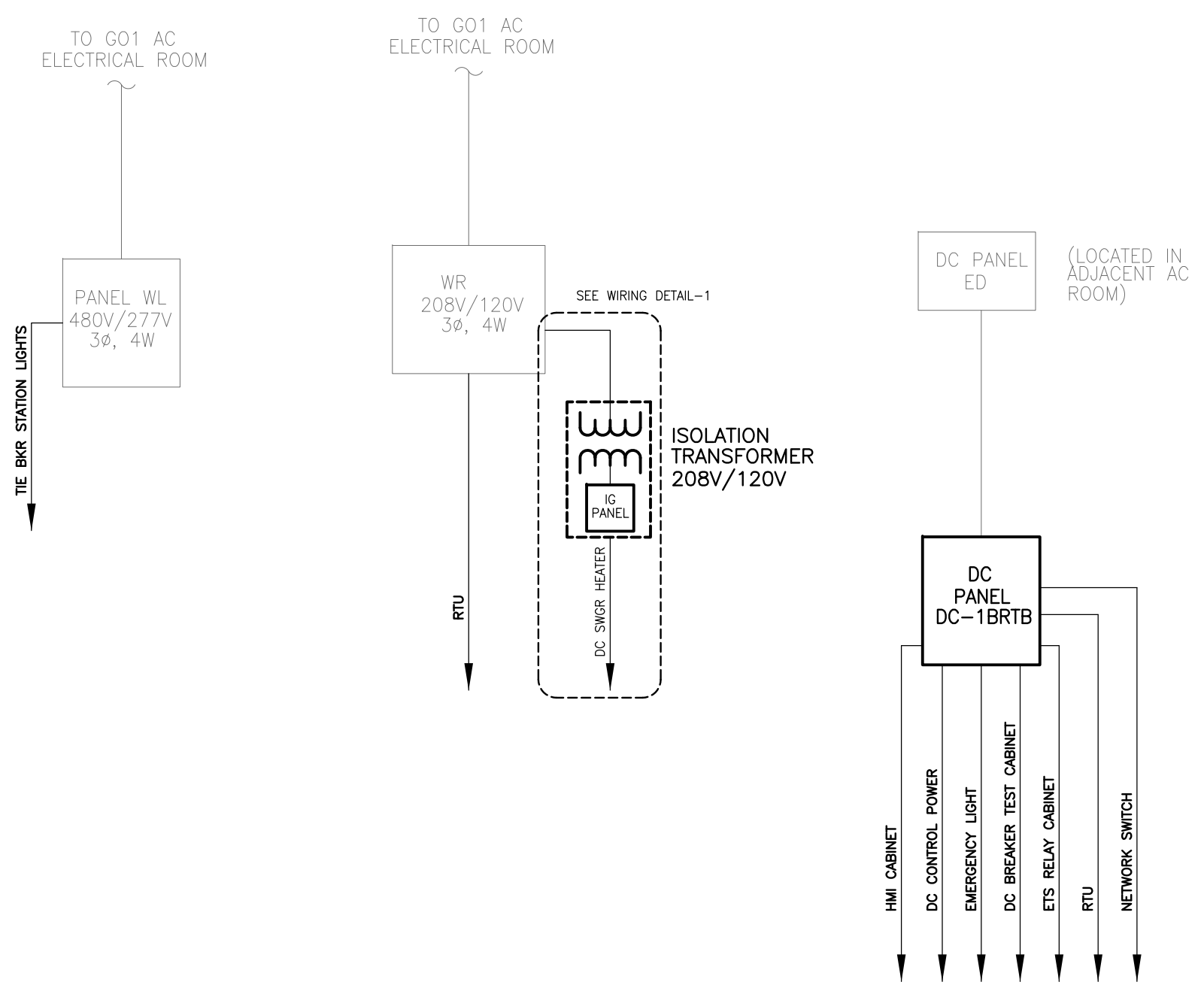
**M** WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED \_\_\_\_\_ APPROVED \_\_\_\_\_  
 DATE \_\_\_\_\_ DEPUTY CHIEF ENGINEER DATE \_\_\_\_\_

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>		G01 - BENNING RD. TIE BREAKER STATION EQUIPMENT ELEVATIONS	
CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. G01TBS-TB-202	SHEET NO. 40 OF 60

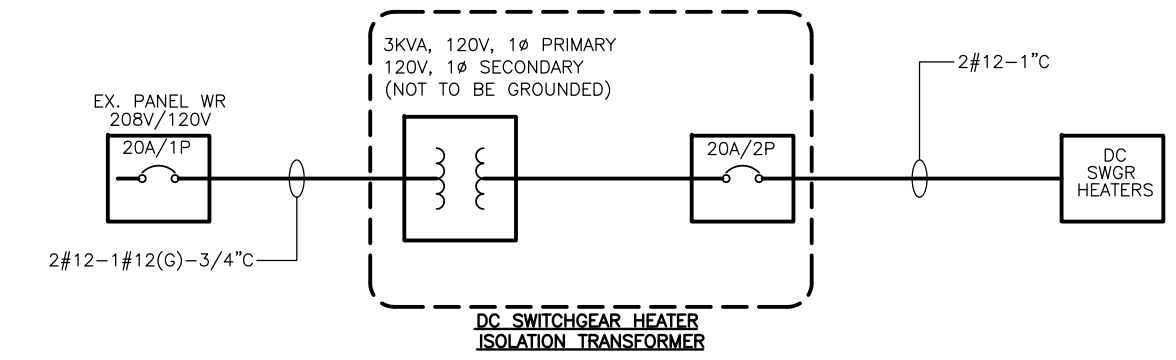


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**NOTE:**

1. ALL NEW CONDUITS TO BE INSTALLED ARE RGS TYPE CONDUITS CONNECTED TO THE DC SWITCHGEAR REQUIRED TO HAVE 1" MIN. OF FRE TYPE CONDUIT ENTERING DC SWITCHGEAR.



**1** | **DETAIL**

G01TBS-TB-400 | BENNING RD. TIE BREAKER STATION SCALE: N.T.S

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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**SIX (6) TIE BREAKER STATIONS UPGRADES  
 ORANGE AND BLUE LINES DC, MD AND VA**  
 G01 - BENNING RD. TIE BREAKER STATION  
 480V SINGLE LINE DIAGRAM - NEW

CONTRACT NO. FQ15237  
 SCALE NONE  
 DRAWING NO. G01TBS-TB-400  
 SHEET NO. 42 OF 60

REVISION SUBMITTED DATE APPROVED DATE  
 DEPUTY CHIEF ENGINEER

**PROFESSIONAL ENGINEER**  
 License No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

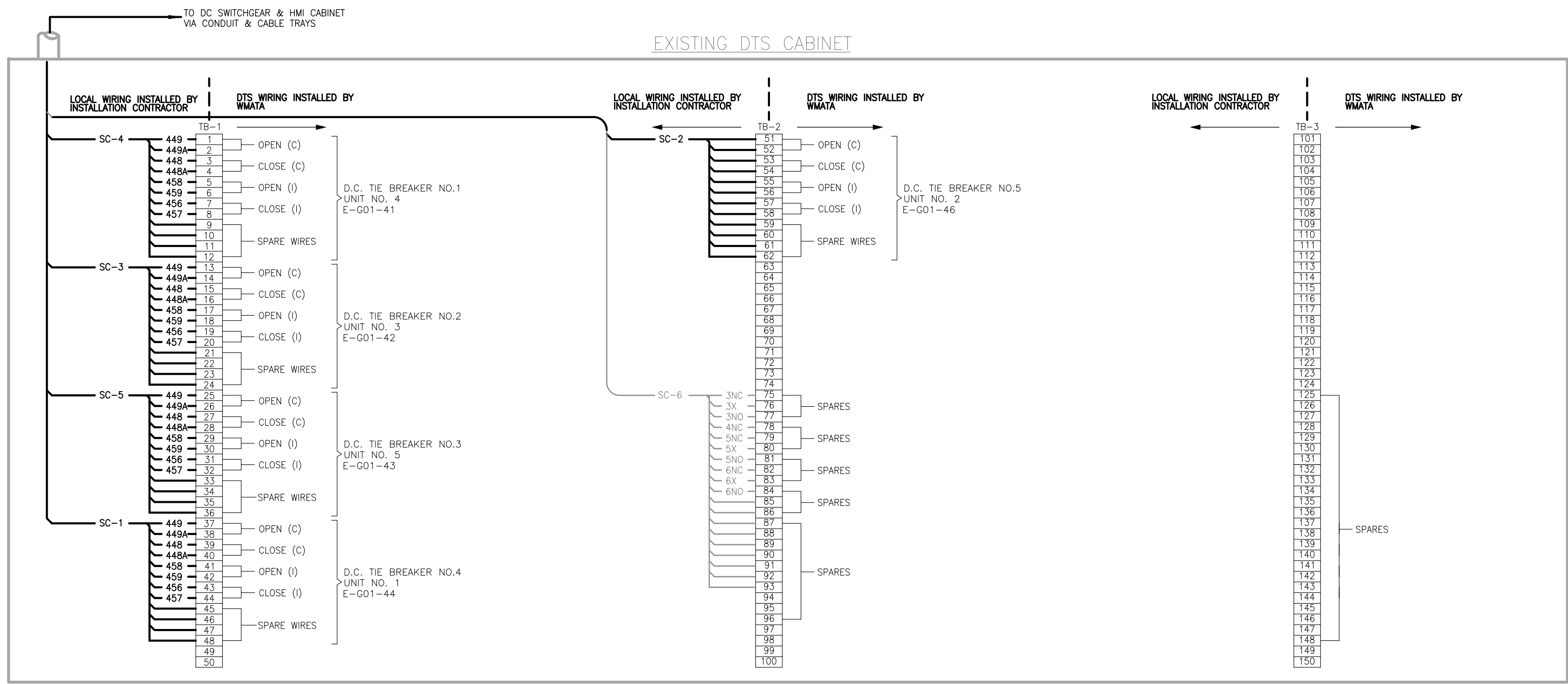
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NUMBER	TITLE	DATE	NUM	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED DATE APPROVED DATE  
 DEPUTY CHIEF ENGINEER

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**TIE BREAKER STATION**

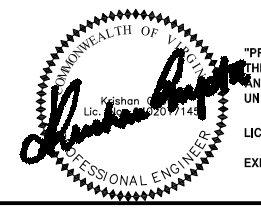
**NOTES:**

1. WIRING & TERMINATION FOR BATTERY CHARGER IS NOT REQUIRED WHEN D.C. POWER IS SUPPLIED FROM PASSENGER STATION. TERMINALS NOT USED WILL BECOME SPARES WITH JUMPER AT TERMINALS 76-75.
2. WHEN TWO TIE BREAKER STATIONS ARE IN THE SAME RTU CONTROL AREA, THE SECOND TIE BREAKER STATION WILL USE A DIFFERENT SERIES OF BREAKER NUMBERS. SEE TABLE AT LEFT.
3. FOR SECOND TIE BREAKER STATION, USE NUMERAL 6 INSTEAD OF 4.
4. SIX ADDITIONAL WIRES ARE BROUGHT TO DTS CABINET, THREE FOR ETS TRIP AND THREE SPARES. WMATA WILL CONNECT THEM TO TERMINAL BLOCKS AS REQUIRED.

**LEGEND:**

- (I) — DENOTES INDICATION
- (C) — DENOTES CONTROL
- \* — SEE NOTE 2

FUNCTION	BRK NO.	1 ST TBS BRK NO.	2 ND TBS BRK NO.	YARD AREA INTERFACE BRK NO.
DC TIE BRK NO.	1	41	61	81
	2	42	62	82
	3	43	63	83
	4	44	64	84
	5	45	65	85
	6	46	66	86
	7	47	67	87
	8	48	68	88



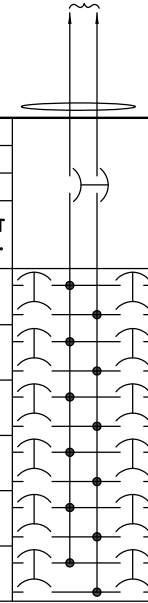
"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
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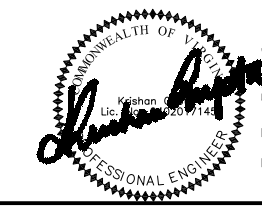
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REFERENCE DRAWINGS		REVISIONS																					
NUMBER	TITLE	DATE	DESCRIPTION																				
REVISION SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____ DEPUTY CHIEF ENGINEER		CONTRACT NO. FQ15237 SCALE NONE	DRAWING NO. G01TBS-TB-401 SHEET NO. 43 OF 60																				

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FROM DC PANEL IN AC ROOM



<b>PANEL NAME:</b> PANEL DC-1BRTB					<b>LOCATION:</b> BENING ROAD TIE BREAKER STATION														
<b>PANEL TYPE:</b> DC DISTRIBUTION					<b>MAIN:</b> 225A MCB														
<b>BUS RATING:</b> 125VDC - 225A MAX					<b>PANEL:</b> SURFACE MOUNTED														
DESCRIPTION	CONNECTED LOAD (KVA)		CKT BKR TRIP	CKT NO.	CKT BKR TRIP	CKT NO.	CONNECTED LOAD (KVA)		DESCRIPTION										
	AØ	BØ					AØ	BØ											
DC CONTROL POWER	0		60	1		2	20		SPARE										
DC CIRCUIT BREAKER TEST CABINET		0	30	3		4	30		EMERGENCY TRIP SWITCH RELAY CABINET										
HMI CABINET			20	5		6	20	0	EMERGENCY LIGHT FIXTURE										
RTU			20	7		8	20		NETWORK SWITCH										
SPACE				9		10			SPACE										
SPACE				11		12			SPACE										
<b>SUB-TOTAL</b>	0	0						0	0	<b>SUB-TOTAL</b>									
<table border="1"> <tr> <td colspan="2"><b>TOTAL CONN. LOAD</b></td> </tr> <tr> <td>PHASE A</td> <td>0 KVA</td> </tr> <tr> <td>PHASE B</td> <td>0 KVA</td> </tr> <tr> <td></td> <td>0.00 KVA</td> </tr> <tr> <td></td> <td>0.00 AMP</td> </tr> </table>										<b>TOTAL CONN. LOAD</b>		PHASE A	0 KVA	PHASE B	0 KVA		0.00 KVA		0.00 AMP
<b>TOTAL CONN. LOAD</b>																			
PHASE A	0 KVA																		
PHASE B	0 KVA																		
	0.00 KVA																		
	0.00 AMP																		

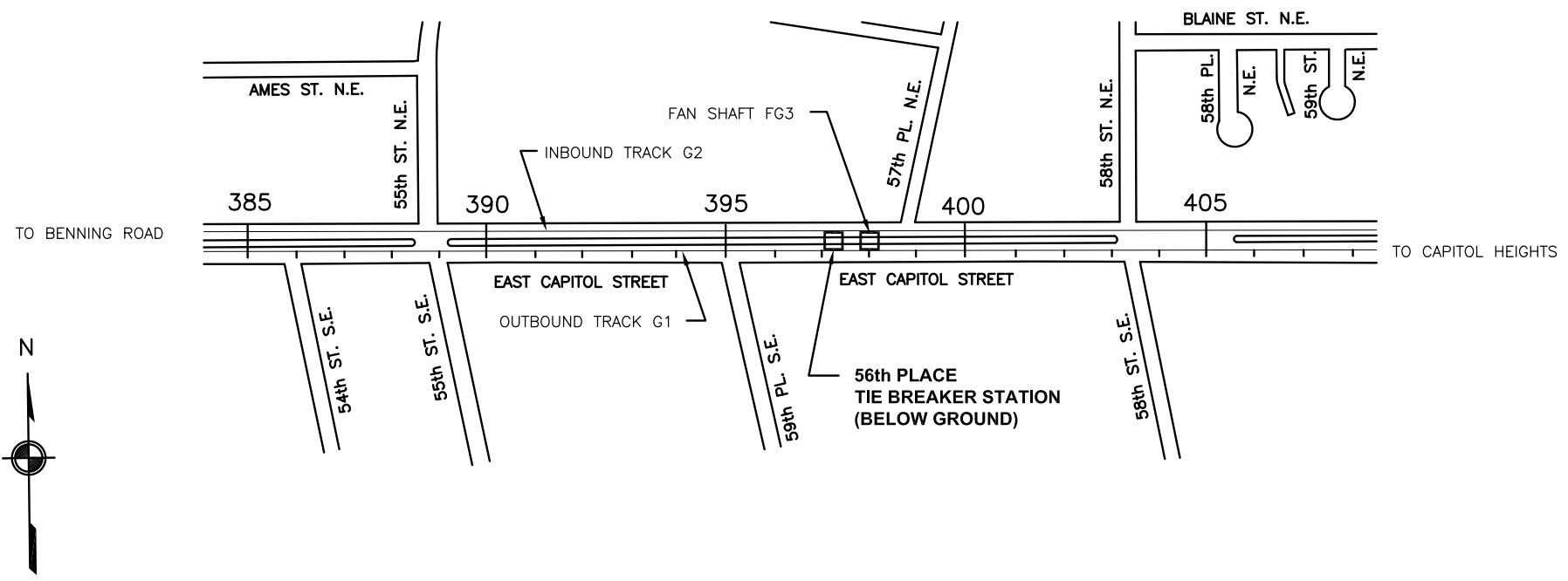


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 LICENSE No. 04020117145  
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DESIGNED	JAJ	4/4/15	<b>REFERENCE DRAWINGS</b>				<b>REVISIONS</b>				<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>				<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G01 - BENNING RD. TIE BREAKER STATION PANELBOARD SCHEDULE			
DRAWN	JAJ	5/20/15	NUMBER	TITLE	DATE	NUM	DESCRIPTION	REVISION SUBMITTED	DATE	APPROVED								
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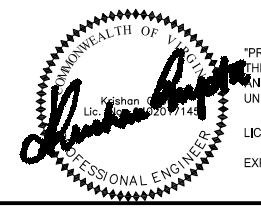
**SITE ACCESS**

1. CHAIN MARKER: Sta. 396+75.
2. BELOW GROUND TIE BREAKER STATION.
3. PERSONAL ACCESS VIA FAN SHAFT FG3 AND SAFETY WALK.
4. EQUIPMENT ACCESS FROM OUTBOUND TRACK SIDE.

**56th PLACE - G02-1**



**TIE BREAKER ACCESS**



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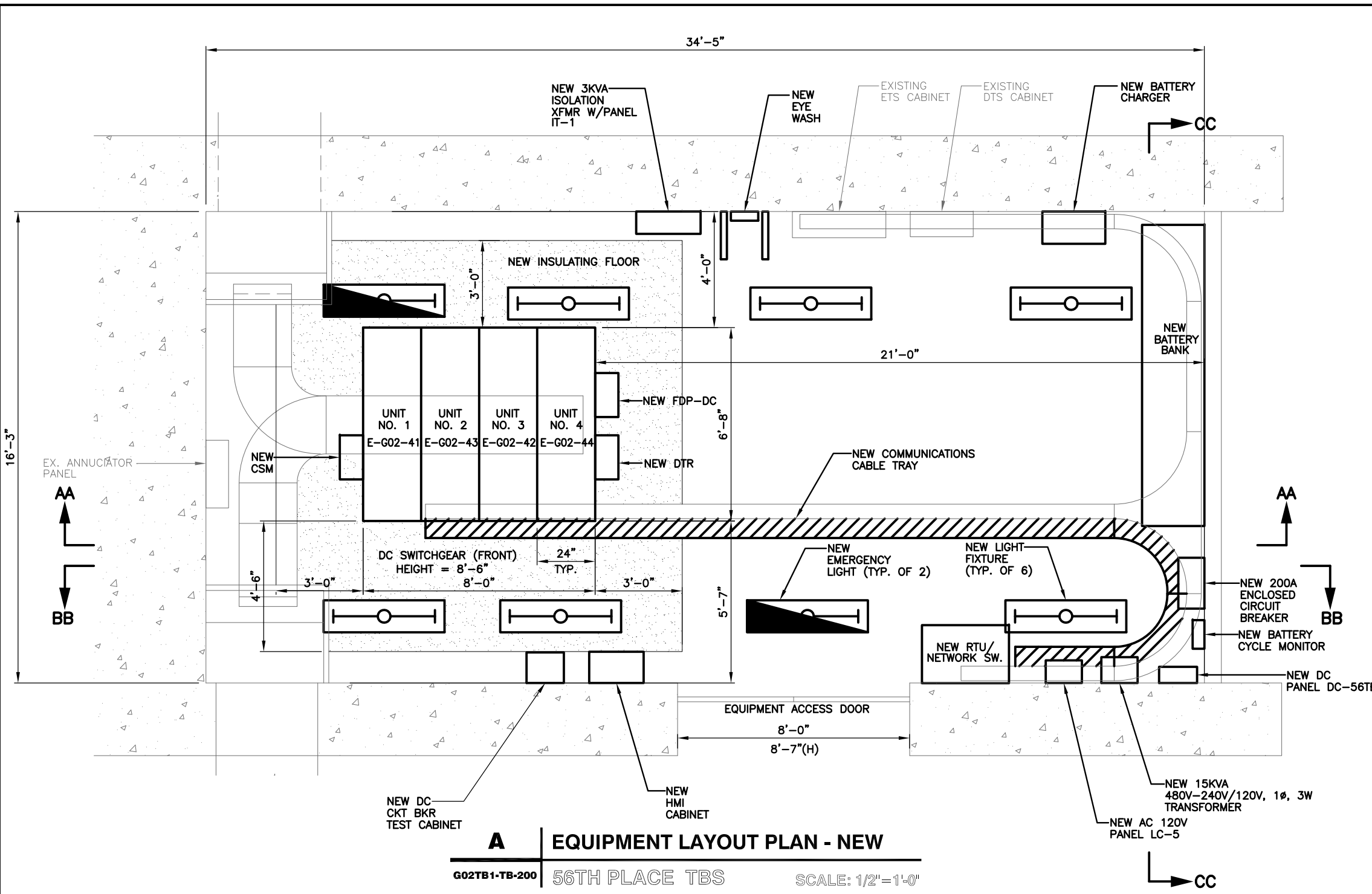
**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
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 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

**SIX (6) TIE BREAKER STATIONS UPGRADES  
 ORANGE AND BLUE LINES DC, MD AND VA**  
 G02TB1 - 56TH PLACE TIE BREAKER STATION  
 VICINITY MAP

CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. G02TB1-TB-001	SHEET NO. 45 OF 60
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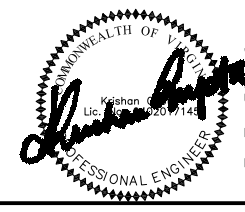
**A** | **EQUIPMENT LAYOUT PLAN - NEW**  
 G02TB1-TB-200 | 56TH PLACE TBS | SCALE: 1/2"=1'-0"

**DESCRIPTION OF MAJOR WORK**

1. REMOVE EXISTING DC SWITCHGEAR AND PROVIDE AND INSTALL NEW DC SWITCHGEAR.
2. REMOVE EXISTING BATTERY BANK AND PROVIDE AND INSTALL NEW BATTERY BANK.
3. PROVIDE AND INSTALL A NEW 3KVA ISOLATION TRANSFORMER IT1 WITH PANEL.
4. REMOVE EXISTING DC CIRCUIT BREAKER TEST CABINET AND PROVIDE AND INSTALL NEW DC CIRCUIT BREAKER TEST CABINET.
5. REMOVE EXISTING DC DISTRIBUTION PANEL AND PROVIDE AND INSTALL NEW DC DISTRIBUTION PANEL DC-56TB.
6. REMOVE EXISTING LIGHT FIXTURES AND PROVIDE AND INSTALL NEW LIGHT FIXTURES AND PROVIDE AND INSTALL NEW EMERGENCY LIGHT FIXTURE. SEE GENERAL NOTES FOR WIRING INFORMATION.
7. REMOVE EXISTING 10KVA TRANSFORMER/PANEL AND PROVIDE AND INSTALL NEW 15KVA, 480V-208V/120V, 3 $\phi$ , 4W TRANSFORMER.
8. PROVIDE AND INSTALL NEW 208V/120V AC PANEL "LC5".
9. REMOVE EXISTING ANNUNCIATOR PANEL AND ALL ASSOCIATED CABLING.
10. REMOVE EXISTING DC TO AC INVERTER.
11. REMOVE EXISTING EYE WASH AND PROVIDE AND INSTALL NEW EYE WASH EQUIPMENT.
12. REMOVE EXISTING INSULATING FLOOR AND PROVIDE AND INSTALL NEW INSULATING FLOOR.
13. CONTRACTOR SHALL PROVIDE AND INSTALL NEW BATTERY CYCLE MONITOR.
14. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 200A ENCLOSED CIRCUIT BREAKER.
15. REMOVE EXISTING BATTERY CHARGER AND PROVIDE AND INSTALL NEW BATTERY CHARGER.

**DESCRIPTION OF SCADA WORK:**

1. PROVIDE AND INSTALL NEW HMI CABINET.
2. PROVIDE AND INSTALL NEW CABLE SHIELD MONITOR(CSM).
3. PROVIDE AND INSTALL NEW RTU/NETWORK SWITCH CABINET.
4. PROVIDE AND INSTALL NEW DIGITAL TRACE RECORDER (DTR).
5. PROVIDE AND INSTALL NEW FIBER DISTRIBUTION PANEL FOR DC SWITCHGEAR (FDP-DC).
6. PROVIDE AND INSTALL A 8 INCH WIDE MINIMUM WIRE-MESH TYPE COMMUNICATION CABLE TRAY, ALONG WITH SUPPORTS, GROUNDING, ISOLATION AND FITTING REQUIREMENTS AS PER THE MANUFACTURE'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.



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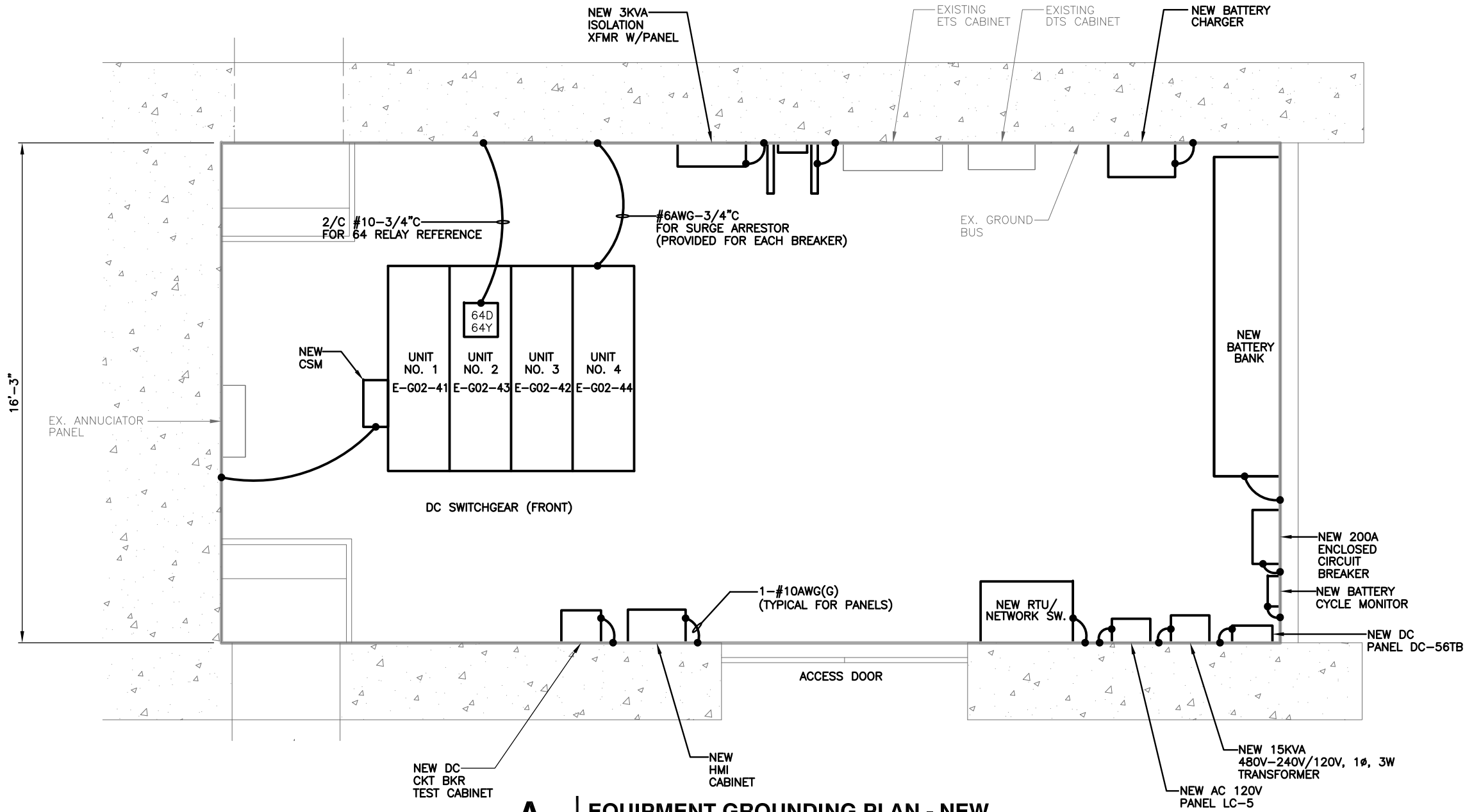
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**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
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REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER


<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB1 - 56TH PLACE TIE BREAKER STATION EQUIPMENT LAYOUT PLAN - NEW		CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. G02TB1-TB-200	SHEET NO. 46 OF 60
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1. DRAWING SHOWS GROUNDING REQUIREMENTS FOR NEW OR REPLACEMENT EQUIPMENT. CONTRACTOR DOES NOT NEED TO MODIFY GROUNDING OF EXISTING EQUIPMENT THAT IS NOT BEING REPLACED.
  2. ALL GROUND CONDUCTORS RUN BETWEEN EQUIPMENT AND SUBSTATION GROUND BUS SHALL BE 1-#6 BARE CU CONDUCTOR UNLESS OTHERWISE SHOWN.
  3. THE NEW DTR MOUNTED ON THE DC SWITCHGEAR (NOT SHOWN ON THIS DRAWING) SHALL BE GROUNDED TO THE GROUND BUS BAR WITH #10AWG.

**A** **EQUIPMENT GROUNDING PLAN - NEW**  
 G02TB1-TB-201 | 56TH PLACE TBS | SCALE: 1/2" = 1'-0"


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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

DESIGNED			DATE		
JAJ	4/4/15				
DRAWN			DATE		
JAJ	5/20/15				
CHECKED			DATE		
PK	6/1/15				

REFERENCE DRAWINGS		REVISIONS		
NUMBER	TITLE	DATE	NUM	DESCRIPTION

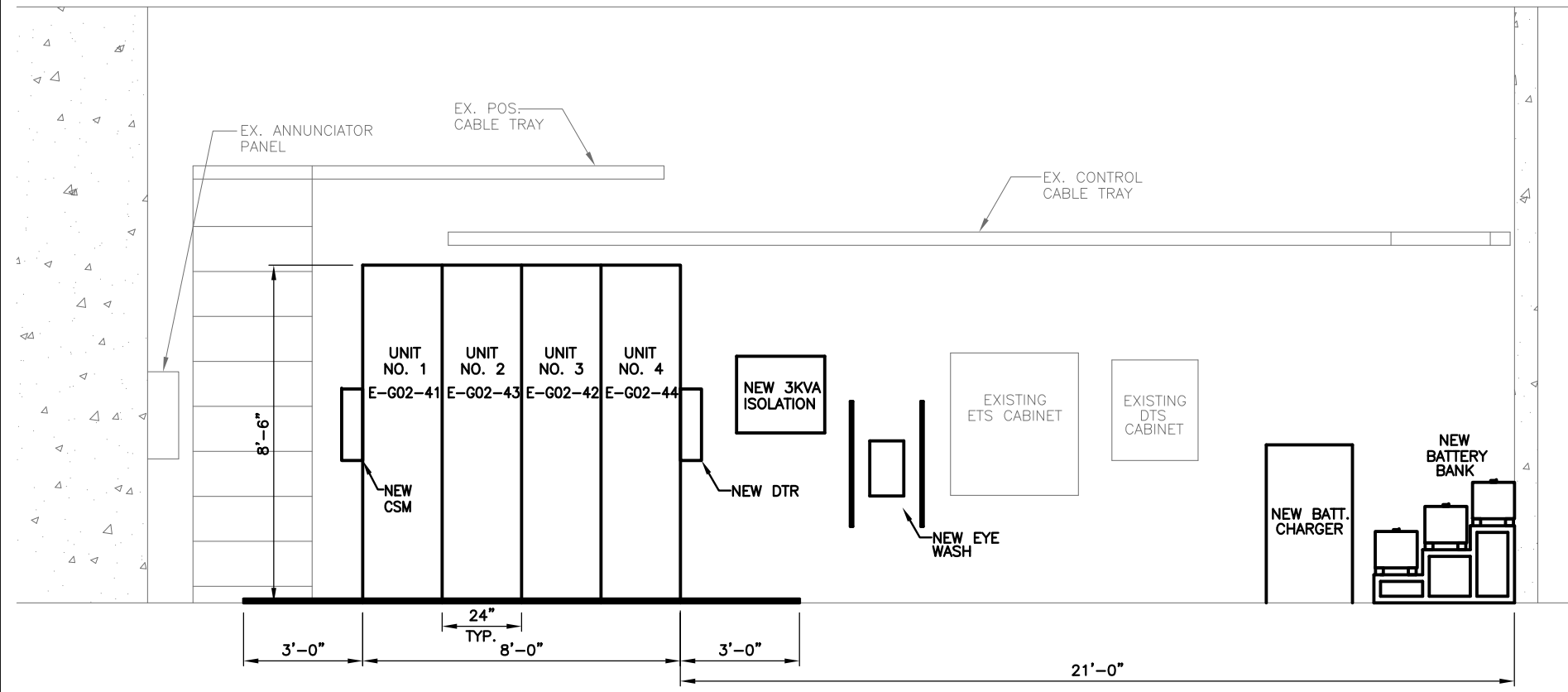

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_  
 APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

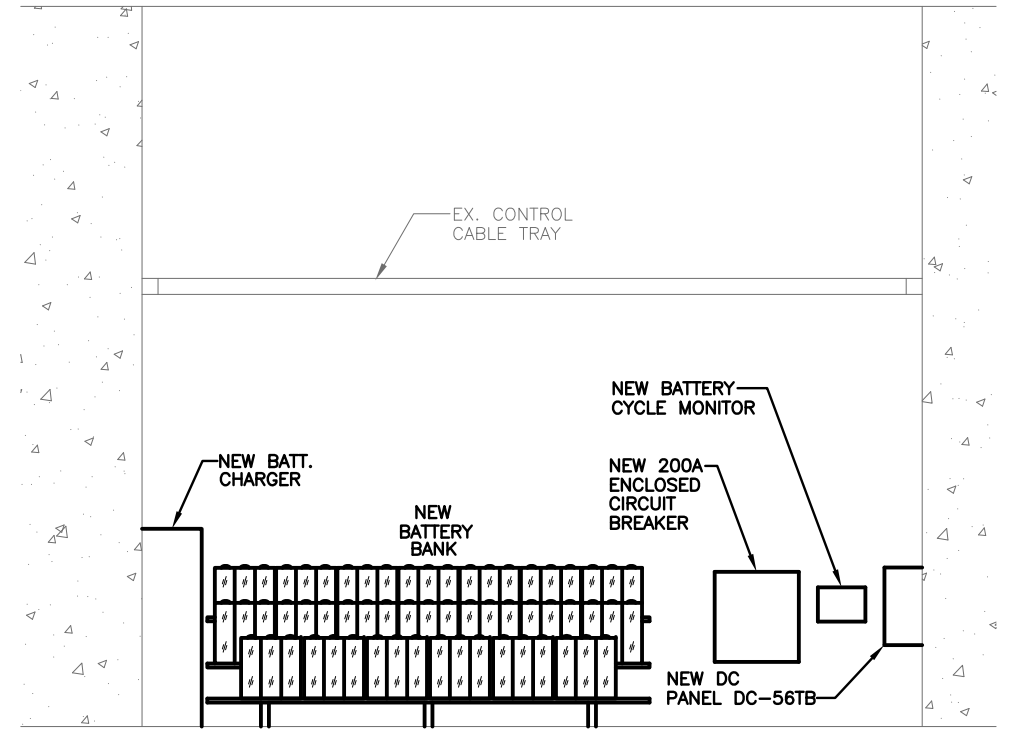
<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>		CONTRACT NO. FQ15237		SCALE AS NOTED	DRAWING NO. G02TB1-TB-201	SHEET NO. 47 OF 60
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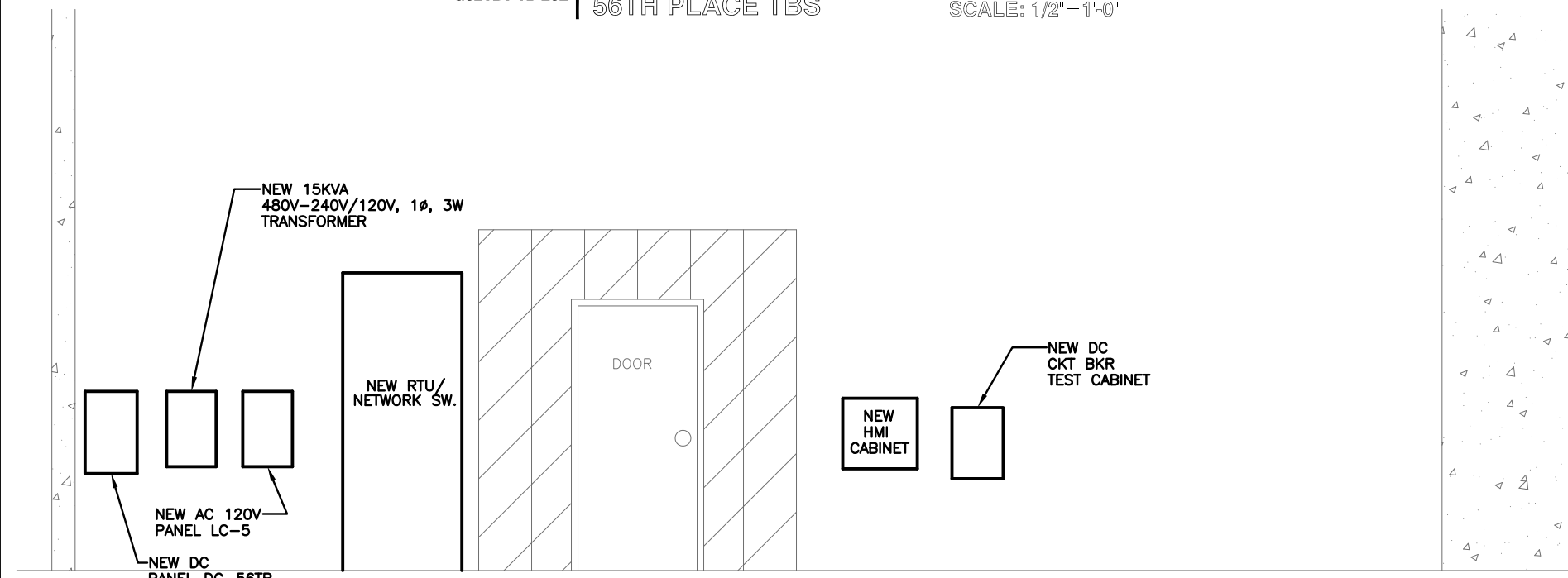
Drawing File: H:\FQ15237\DRG\TBS\56TH PLACE TBS\G02TB1 - 56TH PLACE TBS\G02TB1-TB-202.DWG  
 Plotted by: E013941 Date: Tue, 21 Jul 2015 Time: 10:00:53 am  
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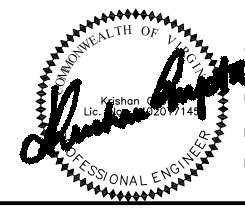
**AA** | EQUIPMENT ELEVATIONS  
 G02TB1-TB-202 | 56TH PLACE TBS | G02TB1-TB-200 | SCALE: 1/2"=1'-0"



**CC** | EQUIPMENT ELEVATIONS  
 G02TB1-TB-202 | 56TH PLACE TBS | G02TB1-TB-200 | SCALE: 1/2"=1'-0"



**BB** | EQUIPMENT ELEVATIONS  
 G02TB1-TB-202 | 56TH PLACE TBS | G02TB1-TB-200 | SCALE: 1/2"=1'-0"



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DESIGNED			REFERENCE DRAWINGS		REVISIONS		
DATE	BY	NO.	NUMBER	TITLE	DATE	NUM	DESCRIPTION
4/4/15	JAJ						
5/20/15	JAJ						
6/1/15	PK						

**M** WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER


**SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA**  
 G02TB1 - 56TH PLACE TIE BREAKER STATION EQUIPMENT ELEVATIONS

CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. G02TB1-TB-202	SHEET NO. 48 OF 60
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CABLE					CIRCUIT			ROUTING				CABLE					CIRCUIT			ROUTING						
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE TYPE		VOLTAGE	A.C. OR D.C.	SPARE COND.	FROM	VIA	TO	FOR	REV. NO.	NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE TYPE		VOLTAGE	A.C. OR D.C.	SPARE COND.	FROM	VIA	TO	FOR	REV. NO.	
DP-1	5-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.1 TBKR. NO.1	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 396+31	TRACTION POWER FEEDER	0	DC-1	2-1/C	#3/0	600V	90°C	125V	DC	0	BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	BATTERY CHARGING DC FEED	0	
DP-2	5-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 396+29	TRACTION POWER FEEDER	0	DC-2	2-1/C	#3/0	600V	90°C	125V	DC	0	BATTERY	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	DC POWER FEEDER	0	
DP-3	5-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.3 TBKR. NO.2	CABLE TRAY & CONDUIT	CONTACT RAIL I.B. END APPR. 396+31	TRACTION POWER FEEDER	0	DC-3	2-1/C	#3/0	600V	90°C	125V	DC	0	NEW 200A ENCLOSED CIRCUIT BREAKER	CONDUIT	DC DISTRIBUTION PANEL DC-56TB	DC POWER FEEDER	0	
DP-4	5-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.4 TBKR. NO.4	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 396+29	TRACTION POWER FEEDER	0	DC-4	2/C	#6	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.3 TBKR. NO.2	DC POWER	0	
													DC-5	2/C	#10	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	HMI CABINET	DC POWER	0	
													DC-6	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	DC CKT. BKR. TEST CABINET	DC POWER	0	
													DC-7	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	EMERG. TRIP SW. RELAY CABINET	DC POWER	0	
													DC-8	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	RTU	DC POWER	0	
AN-1	6/C	#14	600V	90°C	125V	DC	3	BATTERY CHARGER	CABLE TRAY & CONDUIT	HMI CABINET	BATT CHARGER FAILURE & FAIL. OF AC SPLY	0	DC-9	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	NETWORK SWITCH	DC POWER	0	
AN-2	12/C	#14	600V	90°C	125V	DC	4	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	HMI CABINET	ANNUNCIATION	0	DC-10	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	EMERGENCY LIGHT	DC POWER	0	
AN-3	NOT USED																									
AN-4	NOT USED																									
AN-5	4/C	#14	600V	90°C	125V	DC	2	EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	HMI CABINET	TES FAILURE ANNUNCIATION	0														
													AC-1	4/C	#8	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	EXIST. 480V AC PANEL WTT	CABLE TRAY & CONDUIT	BATTERY CHARGER POWER SUPPLY	0	
													AC-2	4/C	#8	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	EXIST. 480V AC PANEL WTP	CABLE TRAY & CONDUIT	NEW 15KVA TRANSFORMER	A.C. POWER	0
ET-1	4/C	#10	600V	90°C	125V	DC	2	EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.1 TBKR. NO.1	CONTACT RAIL EMERGENCY TRIP	0	AC-3	3/C	2/0	600V	90°C	208V	AC	0	1 GREEN GRD WIRE	NEW 15KVA TRANSFORMER	CONDUIT	NEW 120V AC PANEL "LC-5"	A.C. POWER	0
ET-2	4/C	#10	600V	90°C	125V	DC	2	EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.2 TBKR. NO.3	CONTACT RAIL EMERGENCY TRIP	0	AC-4	3/C	#10	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 120V AC PANEL "LC-5"	CONDUIT	RECEPTACLES #1	A.C. POWER	0
ET-3	4/C	#10	600V	90°C	125V	DC	2	EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.3 TBKR. NO.2	CONTACT RAIL EMERGENCY TRIP	0	AC-5	3/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 120V AC PANEL "LC-5"	CONDUIT	NEW ISOLATION TRANSFORMER IT1	IT1 FEED	0
ET-4	4/C	#10	600V	90°C	125V	DC	2	EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.4 TBKR. NO.4	CONTACT RAIL EMERGENCY TRIP	0	AC-6	2/C	#12	600V	90°C	120V	AC	0		NEW ISOLATION TRANSFORMER IT1	CONDUIT	DC SWGR. UNIT NO.1 TBKR. NO.1	HEATER POWER	0
													AC-7	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 120V AC PANEL "LC-5"	CONDUIT	RECEPTACLES #2	A.C. POWER	0
													AC-8	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 120V AC PANEL "LC-5"	CONDUIT	SHAFT LIGHTING	A.C. POWER	0
													AC-9	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 120V AC PANEL "LC-5"	CONDUIT	RTU	A.C. POWER	0
													AC-10	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 120V AC PANEL "LC-5"	CONDUIT	BATTERY CYCLE MONITOR	A.C. POWER	0
SC-1	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.1 TBKR. NO.1	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0														
SC-2	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0	MA-1	1-1/C	#6	2000V	90°C	GRD.		0	DC SWGR. UNIT NO.1 TBKR. NO.1	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0	
SC-3	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.3 TBKR. NO.2	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0	MA-2	1-1/C	#6	2000V	90°C	GRD.		0	DC SWGR. UNIT NO.2 TBKR. NO.3	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0	
SC-4	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.4 TBKR. NO.4	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0	MA-3	1-1/C	#6	2000V	90°C	GRD.		0	DC SWGR. UNIT NO.3 TBKR. NO.2	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0	
SC-5	NOT USED												MA-4	1-1/C	#6	2000V	90°C	GRD.		0	DC SWGR. UNIT NO.4 TBKR. NO.4	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0	
SC-6	12/C	#14	600V	90°C	24V	DC	1	HMI CABINET	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	ANNUNCIATION	0	MA-5	-												
													MA-6	2/C	#10	2000V	90°C	GRD.		0	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	STATION GROUND	GROUND RELAYING	0	
													MA-7	1-1/C	#10	2000V	90°C	700V		0	DC SWGR. UNIT NO.1 TBKR. NO.1	CONDUIT	JUNCTION BOX	NEG. POLARITY REFERENCE	0	
													MA-8	1-1/C	#10	2000V	90°C	700V		0	DC SWGR. UNIT NO.4 TBKR. NO.4	CONDUIT	JUNCTION BOX	NEGATIVE POLARITY REFERENCE	0	

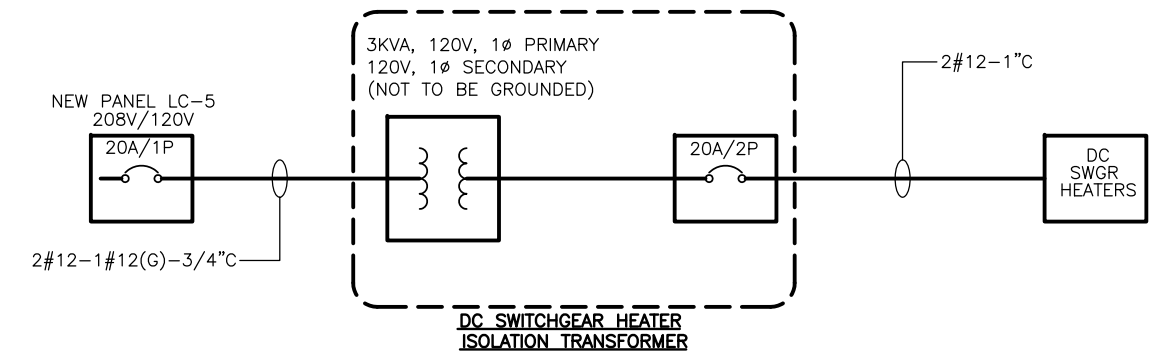
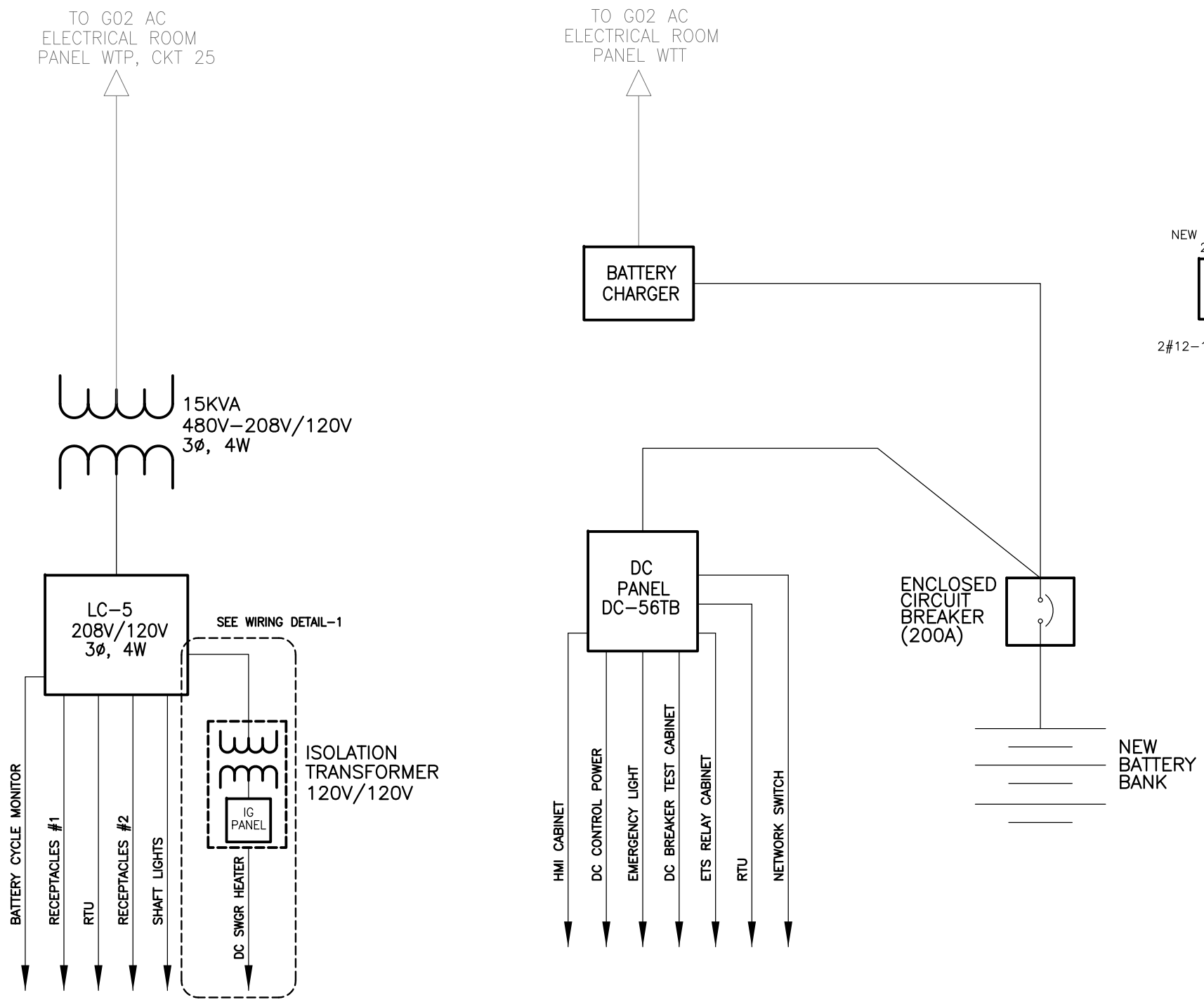
H - A.C. PRIMARY VOLTAGE CABLE AN - ANNUNCIATOR CABLE CN - OPERATING CONTROL CABLE END APPR - END APPROACH OF CONTACT RAIL  
 DP - D.C. POSITIVE POWER CABLE SC - SUPERVISORY CONTROL CABLE MA - MISCELLANEOUS CIRCUITS \*\*\* BOLD TEXT INDICATES NEW CABLES  
 DN - D.C. NEGATIVE POWER CABLE ET - EMERGENCY TRIP CABLE AC - A.C. LOW VOLTAGE POWER CIRCUITS \*\*\* SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES  
 DD - D.C. UTILITY DRAIN CABLE MT - METERING & INSTRUMENTATION CABLE DC - D.C. CONTROL POWER CIRCUITS

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 LICENSE NO. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

DESIGNED	___ JAJ ___	4/4/15	DATE	REFERENCES		REVISIONS		 <b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES CENI - POWER SYSTEMS ENGINEERING	<b>SIX (6) TIE BREAKER STATIONS UPGRADES          ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB1 - 56TH PLACE TIE BREAKER STATION CONDUIT AND CABLE SCHEDULE	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.	
DRAWN	___ JAJ ___	5/20/15	DATE	NUMBER	TITLE	DATE	NUM			DESCRIPTION	FQ15237	NONE	G02TB1-TB-300	49 OF 60
CHECKED	___ PK ___	6/1/15	DATE											
				REVISION SUBMITTED						APPROVED	DATE			

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 Xrefs: N:\ROBINSON-ELECT-MECH\ELEC-PWR AutoCAD Folder\WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

**NOTE:**  
 1. ALL NEW CONDUITS TO BE INSTALLED ARE RGS TYPE CONDUITS CONNECTED TO THE DC SWITCHGEAR REQUIRED TO HAVE 1" MIN. OF FRE TYPE CONDUIT ENTERING DC SWITCHGEAR.



**1** | **DETAIL**  
 G02TB1-TB-400 | 56TH PLACE TIE BREAKER STATION | SCALE: N.T.S

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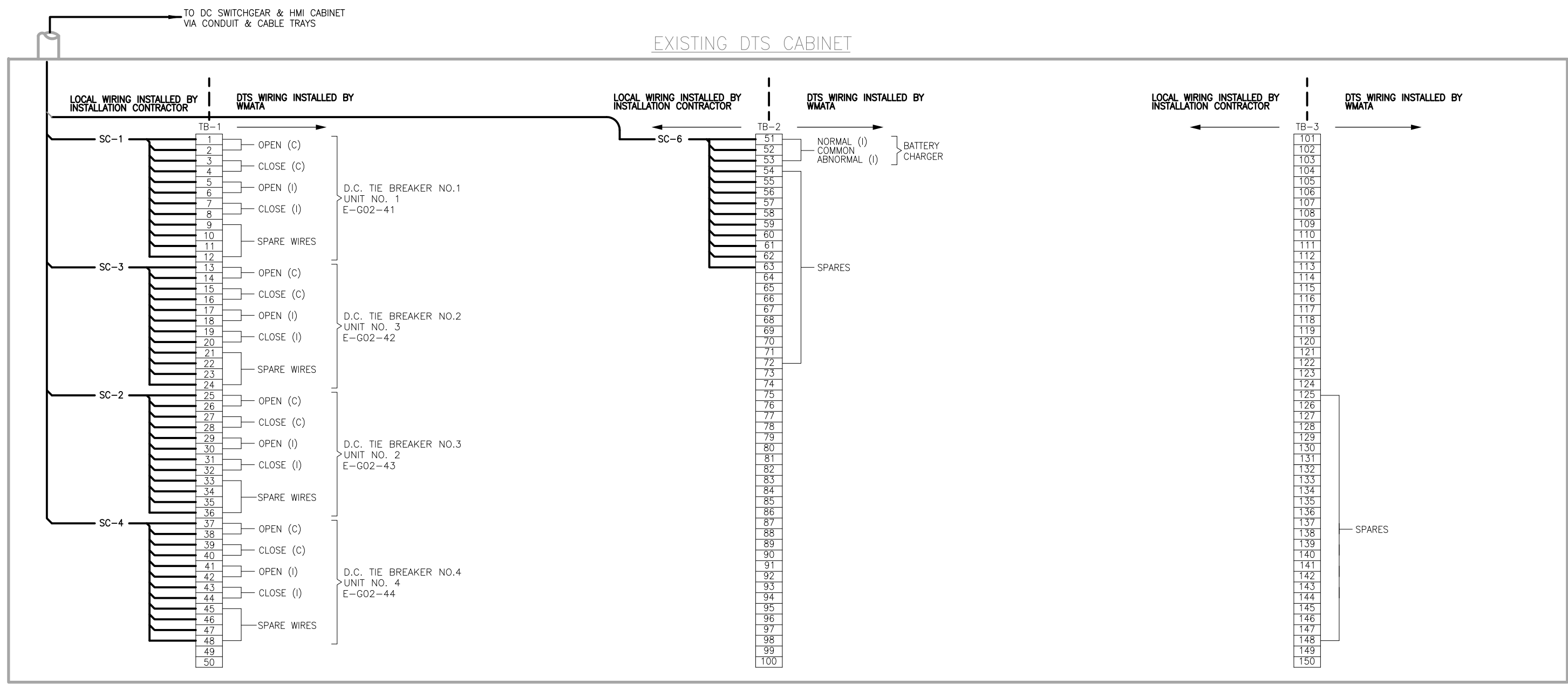
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JAJ	5/20/15													
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 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_ APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>			
G02TB1 - 56TH PLACE TIE BREAKER STATION			
480V SINGLE LINE DIAGRAM - NEW			
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. G02TB1-TB-400	SHEET NO. 50 OF 60

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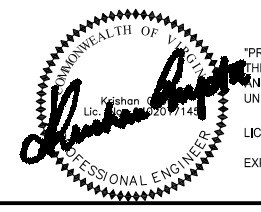
### G02TB1 TIE BREAKER STATION

#### NOTES:

1. WIRING & TERMINATION FOR BATTERY CHARGER IS NOT REQUIRED WHEN D.C. POWER IS SUPPLIED FROM PASSENGER STATION. TERMINALS NOT USED WILL BECOME SPARES WITH JUMPER AT TERMINALS 76-75.
2. WHEN TWO TIE BREAKER STATIONS ARE IN THE SAME RTU CONTROL AREA, THE SECOND TIE BREAKER STATION WILL USE A DIFFERENT SERIES OF BREAKER NUMBERS. SEE TABLE AT LEFT.
3. FOR SECOND TIE BREAKER STATION, USE NUMERAL 6 INSTEAD OF 4.
4. SIX ADDITIONAL WIRES ARE BROUGHT TO DTS CABINET, THREE FOR ETS TRIP AND THREE SPARES. WMATA WILL CONNECT THEM TO TERMINAL BLOCKS AS REQUIRED.

**LEGEND:**  
 (I) — DENOTES INDICATION  
 (C) — DENOTES CONTROL  
 \* — SEE NOTE 2

FUNCTION	BRK NO.	1 ST TBS BRK NO.	2 ND TBS BRK NO.	YARD AREA INTERFACE BRK NO.
DC TIE BRK NO.	1	41	61	81
	2	42	62	82
	3	43	63	83
	4	44	64	84
	5	45	65	85
	6	46	66	86
	7	47	67	87
	8	48	68	88



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 LICENSE No. 04020117145  
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DESIGNED			REFERENCE DRAWINGS		REVISIONS	
DATE	BY	NO.	NUMBER	TITLE	DATE	DESCRIPTION
4/4/15	NAJ					
5/20/15	NAJ					
6/1/15	PK					

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
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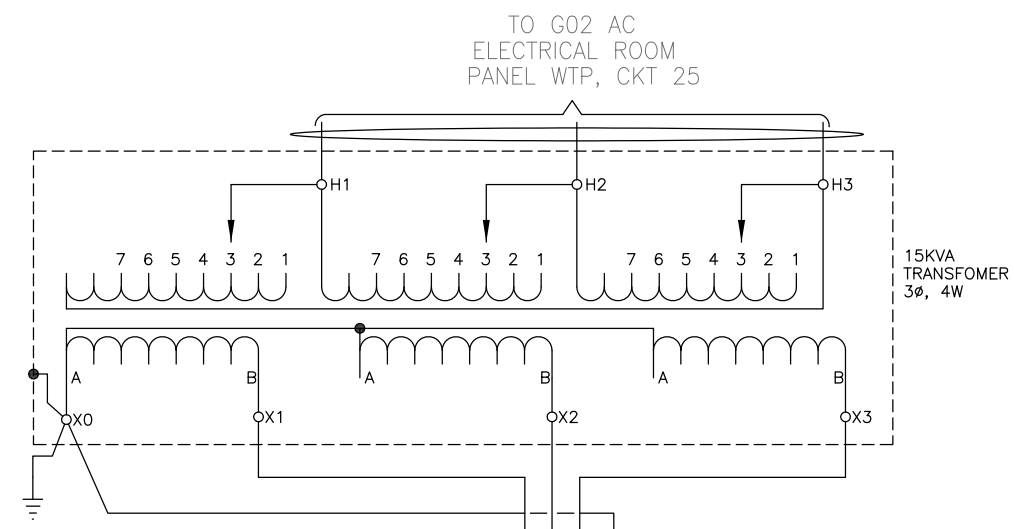
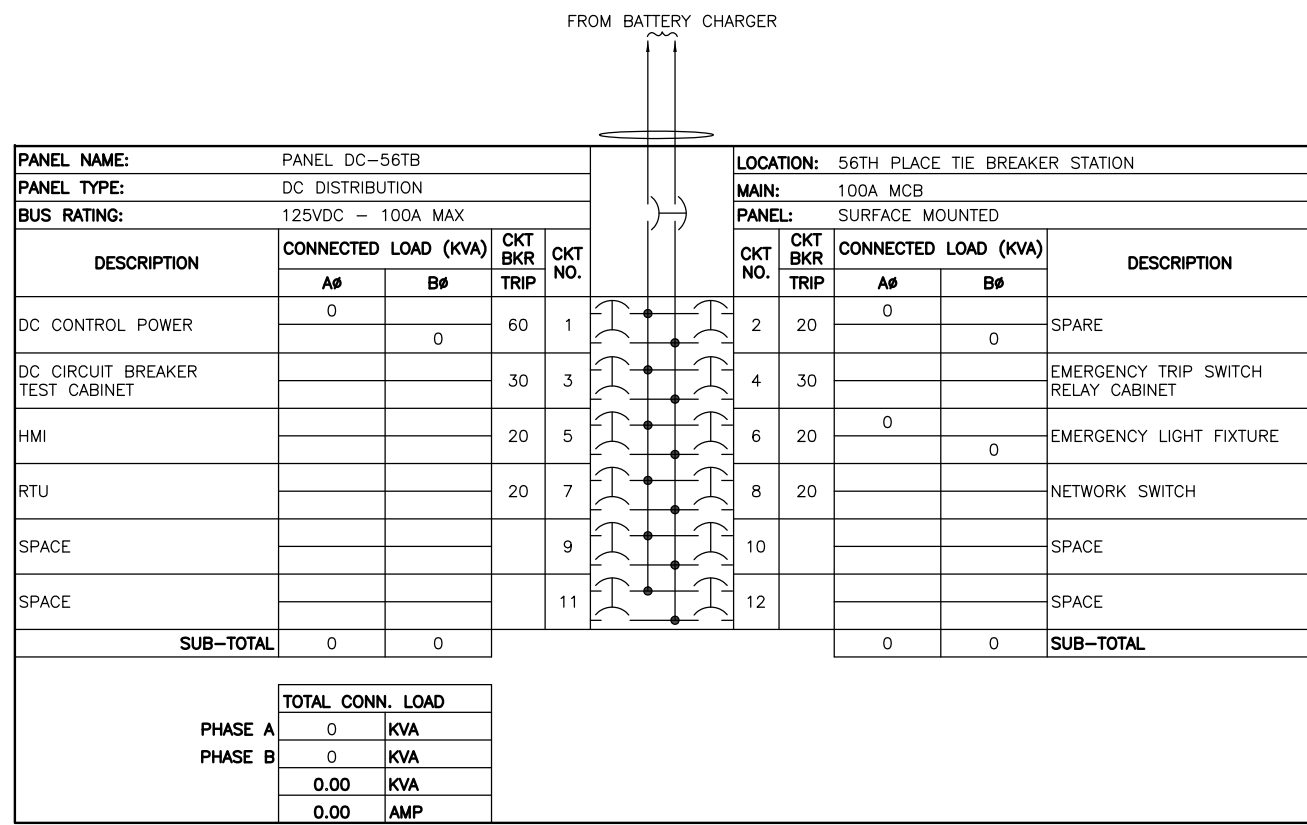
REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

**SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA**  
 G02TB1 - 56TH PLACE TIE BREAKER STATION  
 SUPERVISORY AND CONTROL DIAGRAM - NEW

CONTRACT NO. FQ15237  
 SCALE NONE  
 DRAWING NO. G02TB1-TB-401  
 SHEET NO. 51 OF 60

-VA Regulations 18VAC10-20-760

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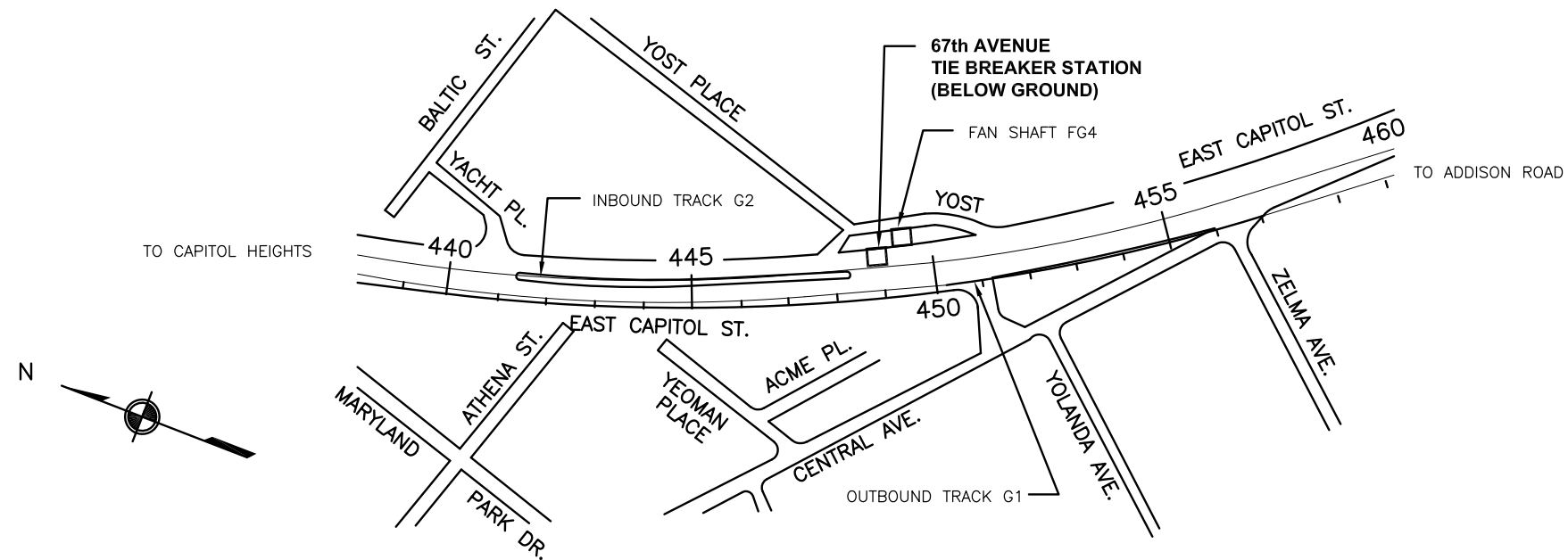
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LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015

-VA Regulations 18VAC10-20-760

DESIGNED: JAJ 4/4/15 DRAWN: JAJ 5/20/15 CHECKED: PK 6/1/15	<b>REFERENCE DRAWINGS</b> NUMBER TITLE DATE NUM DESCRIPTION	<b>REVISIONS</b> DATE NUM DESCRIPTION	<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES CENI - POWER SYSTEMS ENGINEERING	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB1 - 56TH PLACE TIE BREAKER STATION PANELBOARD SCHEDULES	CONTRACT NO. <b>FQ15237</b>	SCALE <b>NONE</b>	DRAWING NO. <b>G02TB1-TB-500</b>	SHEET NO. <b>52 OF 60</b>
	REVISION SUBMITTED DATE APPROVED DEPUTY CHIEF ENGINEER DATE				APPROVED _____ DATE _____ DEPUTY CHIEF ENGINEER	CONTRACT NO. <b>FQ15237</b>	SCALE <b>NONE</b>	DRAWING NO. <b>G02TB1-TB-500</b>

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 Xrefs: : T:\P2D JV\3.0 P2D IRP\3.30 IRP-30 (RS-3) SYSTEMWIDE ASSESS & DESIGN TBS-3.30.7 CAD\Tie Breaker Stations\G-Route\G02-2-67th Place TBS\G02-2 TBS-P1020213.JPG ; N:\ROBINSON-ELECT-



**67th AVENUE G02-2**

**SITE ACCESS**

1. CHAIN MARKER: Sta. 448+80.
2. BELOW GROUND TIE BREAKER STATION.
3. PERSONAL ACCESS VIA FAN SHAFT FG4 AND SAFETY WALK.
4. EQUIPMENT ACCESS FROM INBOUND TRACK SIDE.



**TIE BREAKER ACCESS**

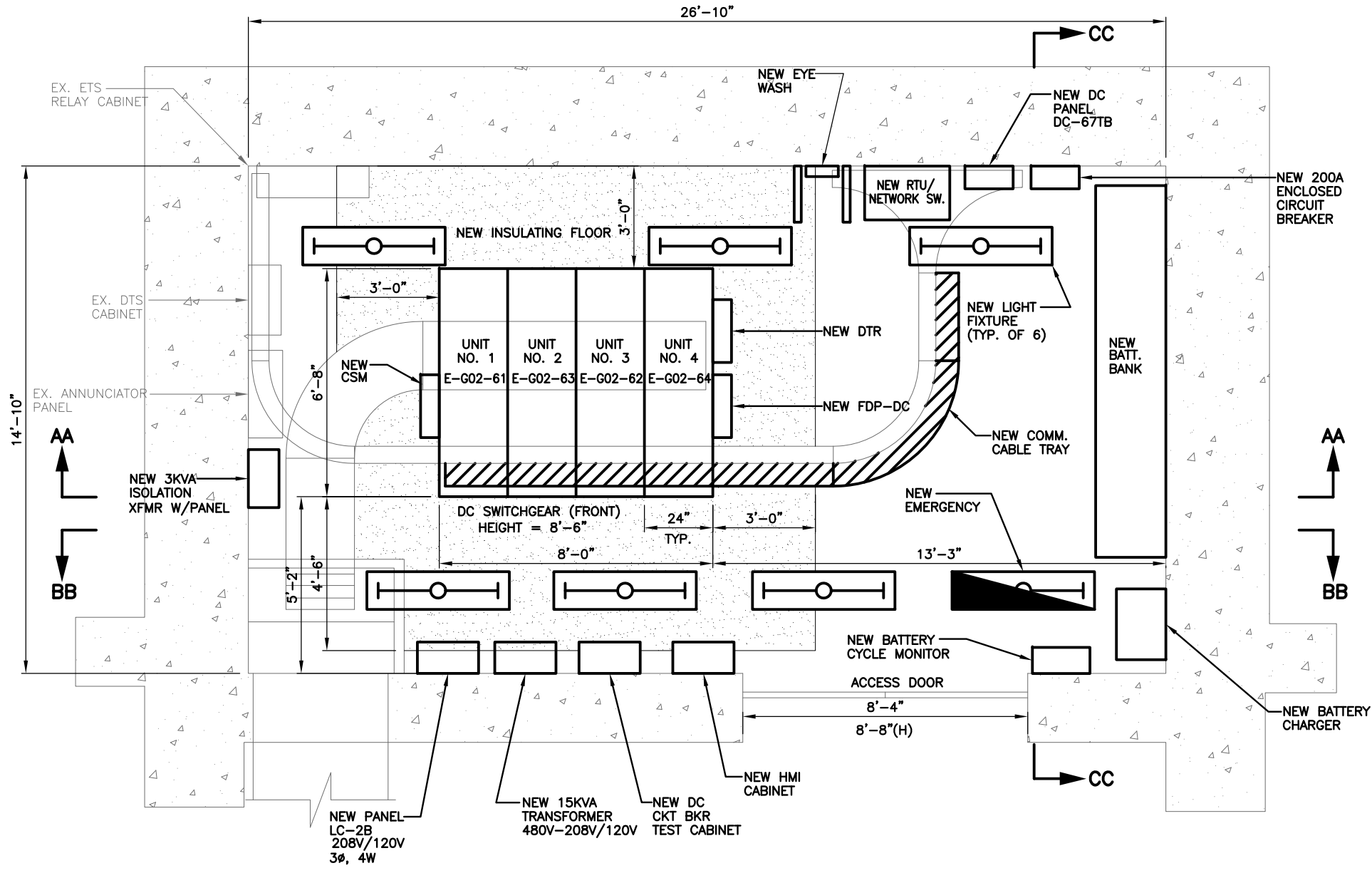


"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA."  
 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015

- VA Regulations 18VAC10-20-760

DESIGNED JAJ 4/4/15 DATE DRAWN JAJ 5/20/15 DATE CHECKED PK 6/1/15 DATE	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">REFERENCE DRAWINGS</th> </tr> <tr> <th>NUMBER</th> <th>TITLE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	REFERENCE DRAWINGS		NUMBER	TITLE													<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">REVISIONS</th> </tr> <tr> <th>DATE</th> <th>NUM</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISIONS		DATE	NUM	DESCRIPTION																			<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES CENI - POWER SYSTEMS ENGINEERING	<b>SIX (6) TIE BREAKER STATIONS UPGRADES          ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB2 - 67TH AVE. TIE BREAKER STATION VICINITY MAP
REFERENCE DRAWINGS																																											
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REVISION SUBMITTED _____ DATE _____ APPROVED _____ DATE _____ DEPUTY CHIEF ENGINEER				CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. G02TB2-TB-001	SHEET NO. 53 OF 60																																				

Drawing File: H:\FQ15237\DRG\TBS\G02TB2 - 67TH AVE TBS\G02TB2-TB-200.DWG  
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**A** | **EQUIPMENT LAYOUT PLAN - NEW**  
 G02TB2-TB-200 | 67TH AVE. TBS | SCALE: 1/2"=1'-0"

**DESCRIPTION OF MAJOR WORK**

1. REMOVE EXISTING DC SWITCHGEAR AND PROVIDE AND INSTALL NEW DC SWITCHGEAR.
2. REMOVE EXISTING BATTERY BANK AND PROVIDE AND INSTALL NEW BATTERY BANK.
3. PROVIDE AND INSTALL A NEW 3KVA ISOLATION TRANSFORMER WITH PANEL.
4. REMOVE EXISTING DC CIRCUIT BREAKER TEST CABINET AND PROVIDE AND INSTALL NEW DC CIRCUIT BREAKER TEST CABINET.
5. REMOVE EXISTING DC DISTRIBUTION PANEL AND PROVIDE AND INSTALL NEW DC DISTRIBUTION PANEL DC-67TB.
6. PROVIDE AND INSTALL NEW 15KVA, 480V-208V/120V TRANSFORMER.
7. PROVIDE AND INSTALL NEW 208V/120V, 3φ, 4W AC PANEL LC-2B.
8. REMOVE EXISTING LIGHT FIXTURES AND PROVIDE AND INSTALL NEW LIGHT FIXTURES AND PROVIDE AND INSTALL NEW EMERGENCY LIGHT FIXTURE. SEE GENERAL NOTES FOR WIRING INFORMATION.
9. REMOVE EXISTING ANNUNCIATOR PANEL AND ALL ASSOCIATED CABLING.
10. REMOVE EXISTING DC TO AC INVERTER.
11. REMOVE EXISTING EYE WASH AND PROVIDE AND INSTALL NEW EYE WASH EQUIPMENT.
12. REMOVE EXISTING INSULATING FLOOR AND PROVIDE AND INSTALL NEW INSULATING FLOOR.
13. CONTRACTOR SHALL PROVIDE AND INSTALL NEW BATTERY CYCLE MONITOR.
14. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 200A ENCLOSED CIRCUIT BREAKER.
15. REMOVE EXISTING BATTERY CHARGER AND PROVIDE AND INSTALL NEW BATTERY CHARGER.

**DESCRIPTION OF SCADA WORK:**

1. PROVIDE AND INSTALL NEW HMI CABINET.
2. PROVIDE AND INSTALL NEW CABLE SHIELD MONITOR(CSM).
3. PROVIDE AND INSTALL NEW RTU/NETWORK SWITCH CABINET.
4. PROVIDE AND INSTALL NEW DIGITAL TRACE RECORDER (DTR).
5. PROVIDE AND INSTALL NEW FIBER DISTRIBUTION PANEL FOR DC SWITCHGEAR (FDP-DC).
6. PROVIDE AND INSTALL A 8 INCH WIDE MINIMUM WIRE-MESH TYPE COMMUNICATION CABLE TRAY, ALONG WITH SUPPORTS, GROUNDING, ISOLATION AND FITTING REQUIREMENTS AS PER THE MANUFACTURER'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.



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DESIGNED			DRAWN			CHECKED		
JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

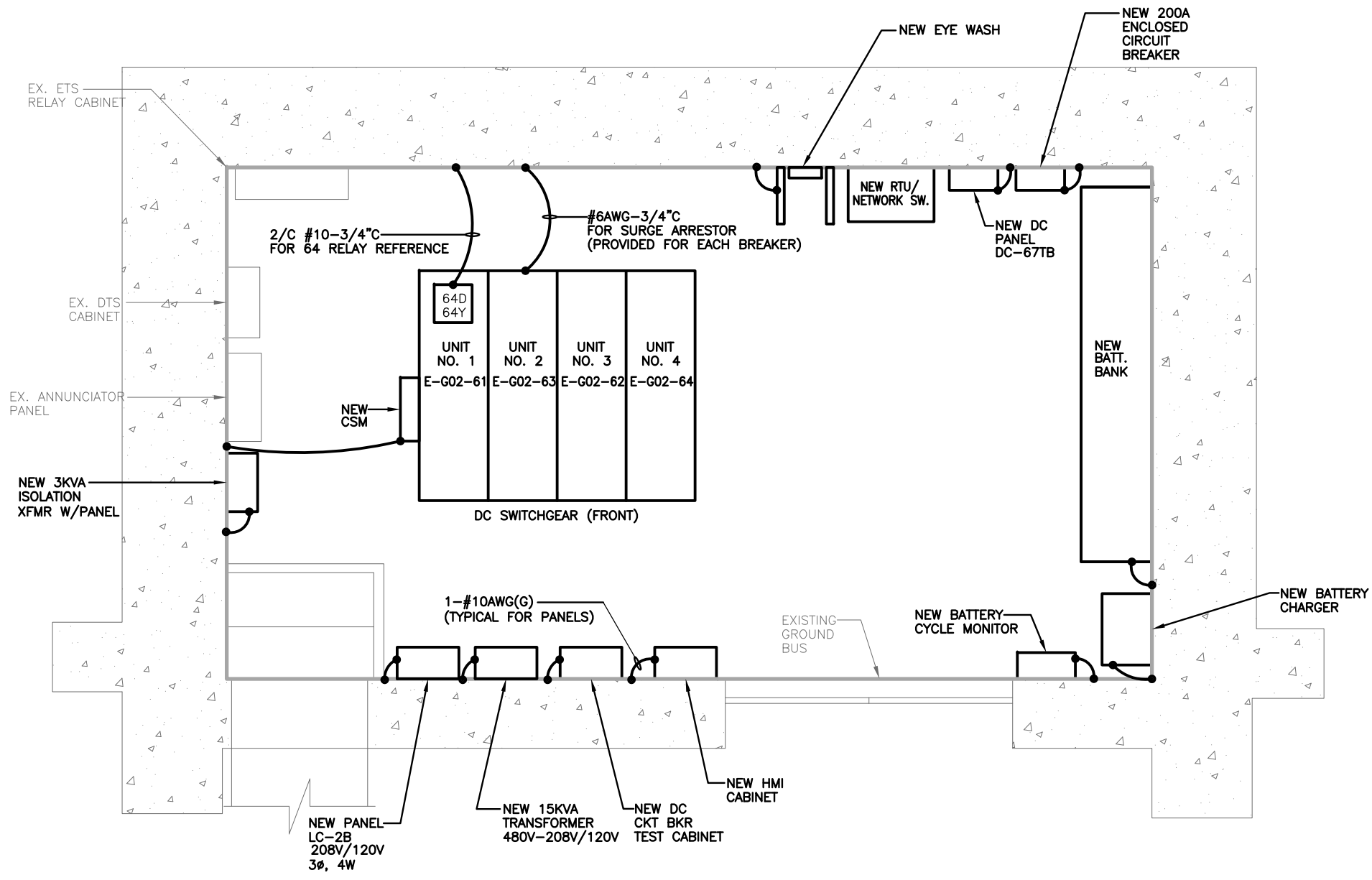
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NUMBER	TITLE	DATE	DESCRIPTION

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 metro  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER


<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>		CONTRACT NO. FQ15237	
G02TB2 - 67TH AVE. TIE BREAKER STATION EQUIPMENT LAYOUT PLAN - NEW		SCALE AS NOTED	DRAWING NO. G02TB2-TB-200
		SHEET NO. 54 OF 60	

Drawing File: H:\FQ15237\DRG\TBS\G02TB2 - 67TH AVE TBS\G02TB2-TB-201.DWG  
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- NOTES:**
- DRAWING SHOWS GROUNDING REQUIREMENTS FOR NEW OR REPLACEMENT EQUIPMENT. CONTRACTOR DOES NOT NEED TO MODIFY GROUNDING OF EXISTING EQUIPMENT THAT IS NOT BEING REPLACED.
  - ALL GROUND CONDUCTORS RUN BETWEEN EQUIPMENT AND SUBSTATION GROUND BUS SHALL BE 1-#6 BARE CU CONDUCTOR UNLESS OTHERWISE SHOWN.
  - THE NEW DTR MOUNTED ON THE DC SWITCHGEAR (NOT SHOWN ON THIS DRAWING) SHALL BE GROUNDED TO THE GROUND BUS BAR WITH #10AWG.

**A** | **EQUIPMENT GROUNDING PLAN - NEW**  
 G02TB2-TB-201 | 67TH AVE. TBS | SCALE: 1/2"=1'-0"


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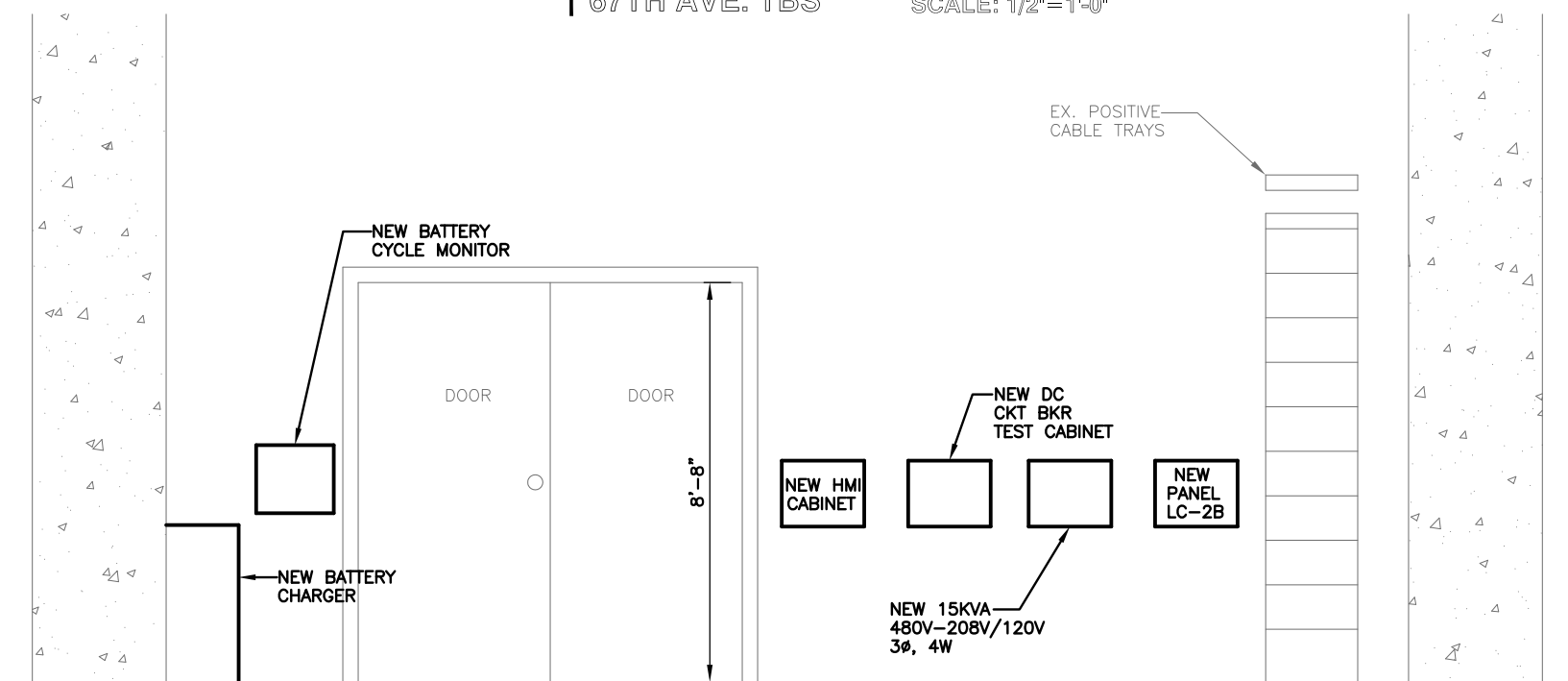
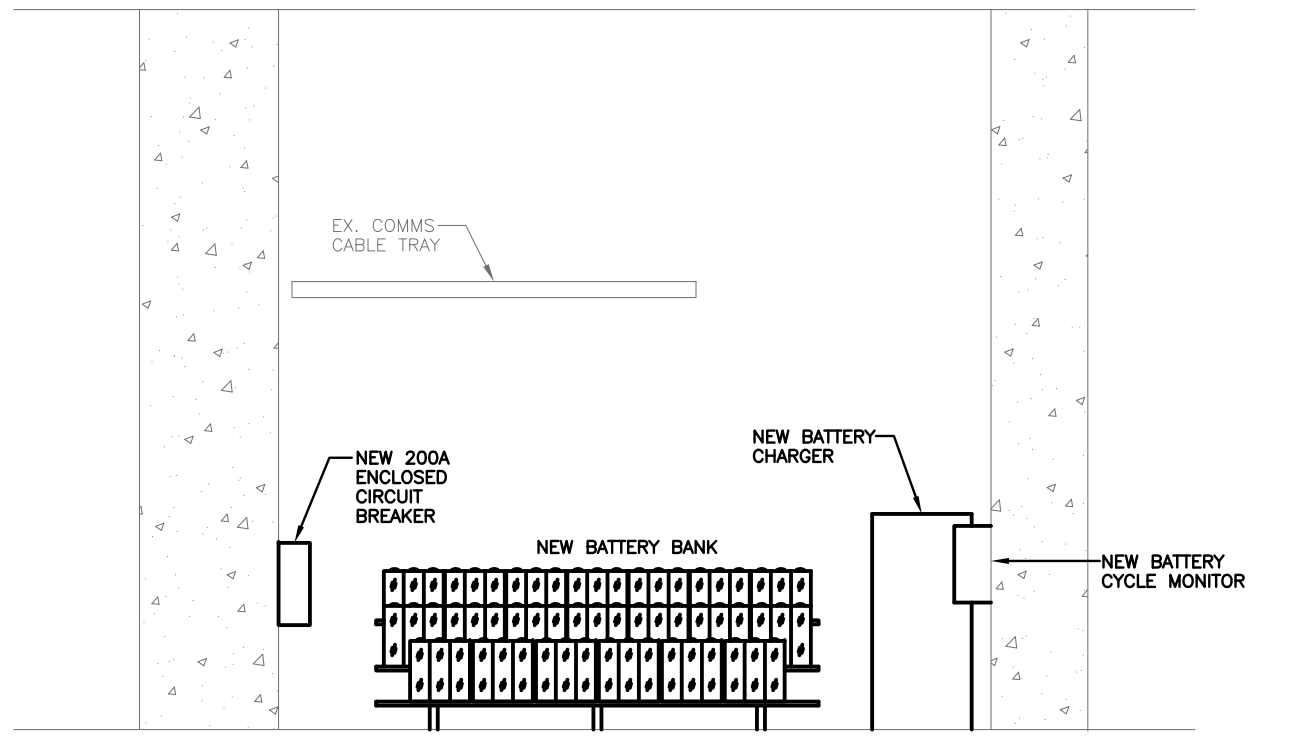
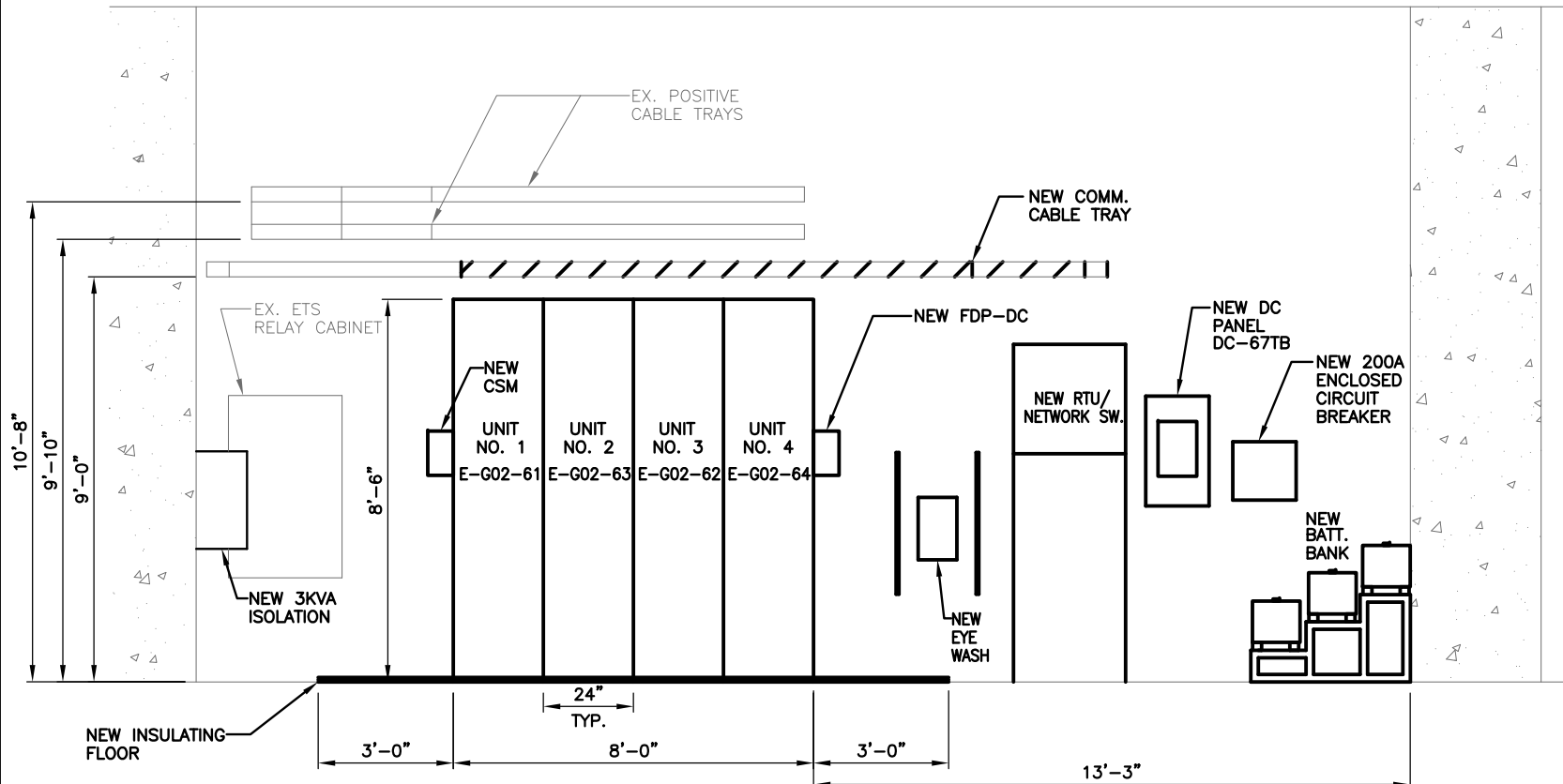

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB2 - 67TH AVE. TIE BREAKER STATION EQUIPMENT GROUNDING PLAN - NEW		CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. G02TB2-TB-201	SHEET NO. 55 OF 60
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Drawing File: H:\FQ15237\DRG\TBS\G02TB2 - 67TH AVE TBS\G02TB2-TB-202.DWG  
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		DATE			
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		DATE			
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		DATE			

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REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER


<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>			
G02TB2 - 67TH AVE. TIE BREAKER STATION EQUIPMENT ELEVATIONS			
CONTRACT NO. FQ15237	SCALE AS NOTED	DRAWING NO. G02TB2-TB-202	SHEET NO. 56 OF 60

Drawing File: H:\FQ15237\DRAW\TBS\G02TB2 - 67TH AVE TBS\G02TB2-TB-300.DWG  
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CABLE					CIRCUIT			ROUTING				CABLE					CIRCUIT			ROUTING						
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION		VOLTAGE	A.C. OR D.C.	SPARE COND.	FROM	VIA	TO	FOR	REV. NO.	NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION		VOLTAGE	A.C. OR D.C.	SPARE COND.	FROM	VIA	TO	FOR	REV. NO.	
			VOLTAGE	TYPE												VOLTAGE	TYPE									
DP-1	4-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.1 TBKR. NO.1	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 449+23	TRACTION POWER FEEDER	0	DC-5	2/C	#10	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	HMI CABINET	DC POWER	0	
DP-2	4-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 448+67	TRACTION POWER FEEDER	0	DC-6	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-67TB	CABLE TRAY & CONDUIT	DC CKT. BKR. TEST CABINET	DC POWER	0	
DP-3	4-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.3 TBKR. NO.2	CABLE TRAY & CONDUIT	CONTACT RAIL I.B. END APPR. 449+23	TRACTION POWER FEEDER	0	DC-7	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-67TB	CABLE TRAY & CONDUIT	EMERG. TRIP SW. RELAY CABINET	DC POWER	0	
DP-4	4-1/C	1000 MCM	1000V	90°C	700V	DC	0	DC SWGR. UNIT NO.4 TBKR. NO.4	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 448+67	TRACTION POWER FEEDER	0	DC-8	2/C	#12	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-67TB	CONDUIT	RTU	DC POWER	0	
													DC-9	2/C	#10	600V	90°C	125V	DC		DC DISTRIBUTION PANEL DC-67TB	CABLE TRAY & CONDUIT	NETWORK SWITCH	DC POWER	0	
													DC-10	2/C	#10	600V	90°C	125V	DC		DC DISTRIBUTION PANEL DC-67TB	CABLE TRAY & CONDUIT	EMERGENCY LIGHT	DC POWER	0	
AN-1	6/C	#14	600V	90°C	125V	DC	3	BATTERY CHARGER	CABLE TRAY & CONDUIT	HMI CABINET	BATT. CHARGER FAIL	0	AC-1	3-1/C	#12	600V	90°C	277V	AC	0	1 GREEN GRD WIRE	EXIST. 480V AC PANEL LC-2	CONDUIT	LIGHTING	TBS LIGHTING	0
AN-2	12/C	#14	600V	90°C	125V	DC	4	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	HMI CABINET	ANNUNCIATION	0	AC-2	4/C	#8	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	EXIST. 480V AC PANEL LC-2	CABLE TRAY & CONDUIT	BATTERY CHARGER	BATTERY CHARGER POWER SUPPLY	0
AN-3	NOT USED												AC-3	4/C	#10	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	EXIST. 480V AC PANEL LC-2	CABLE TRAY & CONDUIT	NEW 15KVA TRANSFORMER	A.C. POWER	0
AN-4	NOT USED												AC-4	4/C	#6	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	NEW 15KVA TRANSFORMER	CONDUIT	NEW AC 20/V120V PANEL "LC-2B"	A.C. POWER	0
AN-5	4/C	#14	600V	90°C	125V	DC	2	EMER. TRIP SWITCH RELAY CABINET	CONDUIT	HMI CABINET	ETS FAILURE ANNUNCIATION		AC-5	3/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW AC 20/V120V PANEL "LC-2B"	CONDUIT	NEW ISOLATION TRANSFORMER IT1	A.C. POWER	0
													AC-6	2/C	#12	600V	90°C	120V	AC	0		NEW ISOLATION TRANSFORMER IT1	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.3 TBKR. NO.2	HTR POWER SUPPLY	0
													AC-7	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW AC 20/V120V PANEL "LC-2B"	CONDUIT	RTU	A.C. POWER	0
													AC-8	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW AC 20/V120V PANEL "LC-2B"	CONDUIT	BATTERY CYCLE MONITOR	A.C. POWER	0
SC-1	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.1 TBKR. NO.1	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0														
SC-2	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0														
SC-3	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.3 TBKR. NO.2	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0	ET-1	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.1 TBKR. NO.1	CONTACT RAIL EMERGENCY TRIP	0
SC-4	12/C	#14	600V	90°C	24V	DC	5	DC SWGR. UNIT NO.4 TBKR. NO.4	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0	ET-2	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.2 TBKR. NO.3	CONTACT RAIL EMERGENCY TRIP	0
SC-5	NOT USED												ET-3	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.3 TBKR. NO.2	CONTACT RAIL EMERGENCY TRIP	0
SC-6	19/C	#14	600V	90°C	24V	DC	1	HMI CABINET	CABLE TRAY & CONDUIT	SUPERVISORY CONT. TERMINAL BOX	ANNUNCIATION	0	ET-4	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.4 TBKR. NO.4	CONTACT RAIL EMERGENCY TRIP	0
													MA-1	1-1/C	#6	2000V	90°C	GRD.	0			DC SWGR. UNIT NO.1 TBKR. NO.1	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
													MA-2	1-1/C	#6	2000V	90°C	GRD.	0			DC SWGR. UNIT NO.2	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
													MA-3	1-1/C	#6	2000V	90°C	GRD.	0			DC SWGR. UNIT NO.3	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
													MA-4	1-1/C	#6	2000V	90°C	GRD.	0			DC SWGR. UNIT NO.4 TBKR. NO.4	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
DC-1	2-1/C	#3/0	600V	90°C	125V	DC	0	BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	BATTERY CHARGING DC FEED	0	MA-5	NOT USED												
DC-2	2-1/C	#3/0	600V	90°C	125V	DC	0	BATTERY	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	DC POWER FEEDER	0	MA-6	2/C	#10	2000V	90°C	GRD.	0			DC SWGR. UNIT NO.2 TBKR. NO.3	CABLE TRAY & CONDUIT	STATION GROUND	GROUND RELAYING	0
DC-3	2-1/C	#3/0	600V	90°C	125V	DC	0	NEW 200A ENCLOSED CIRCUIT BREAKER	CONDUIT	DC DISTRIBUTION PANEL DC-67TB	DC POWER FEEDER	0	MA-7	1-1/C	#10	2000V	90°C	700V	0			DC SWGR. UNIT NO.5 TBKR. NO.2	CONDUIT	JUNCTION BOX	NEG. POLARITY REFERENCE	0
DC-4	2/C	#6	600V	90°C	125V	DC	0	DC DISTRIBUTION PANEL DC-67TB	CABLE TRAY & CONDUIT	DC SWGR. UNIT NO.3 TBKR. NO.2	DC POWER	0	MA-8	1-1/C	#10	2000V	90°C	700V	0			DC SWGR. UNIT NO.3 TBKR. NO.2	CONDUIT	JUNCTION BOX	NEGATIVE POLARITY REFERENCE	0

H - A.C. PRIMARY VOLTAGE CABLE      AN - ANNUNCIATOR CABLE      CN - OPERATING CONTROL CABLE      END APPR - END APPROACH OF CONTACT RAIL  
 DP - D.C. POSITIVE POWER CABLE      SC - SUPERVISORY CONTROL CABLE      MA - MISCELLANEOUS CIRCUITS      \*\*\* BOLD TEXT INDICATES NEW CABLES  
 DN - D.C. NEGATIVE POWER CABLE      ET - EMERGENCY TRIP CABLE      AC - A.C. LOW VOLTAGE POWER CIRCUITS      \*\*\* SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES  
 DD - D.C. UTILITY DRAIN CABLE      MT - METERING & INSTRUMENTATION CABLE      DC - D.C. CONTROL POWER CIRCUITS

  
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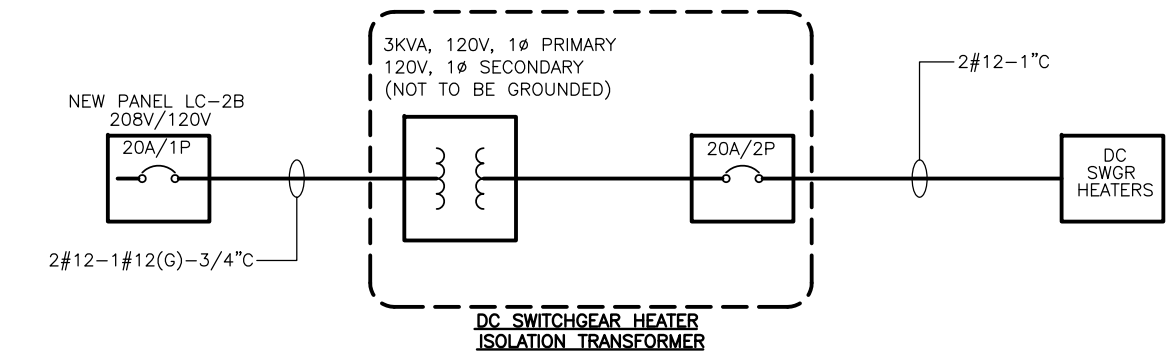
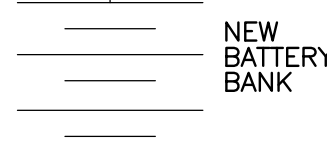
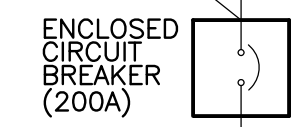
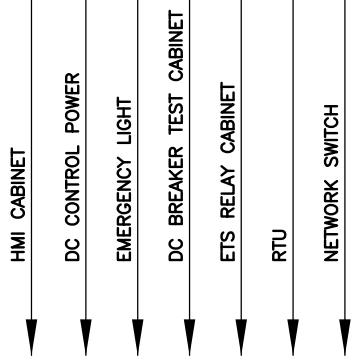
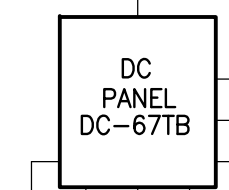
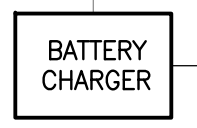
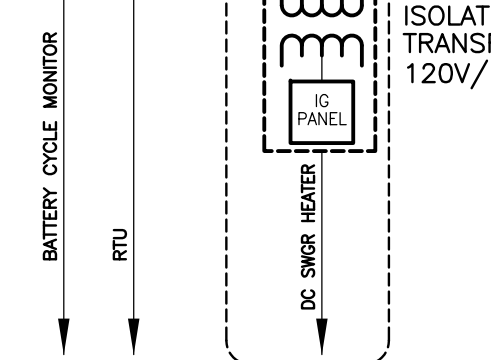
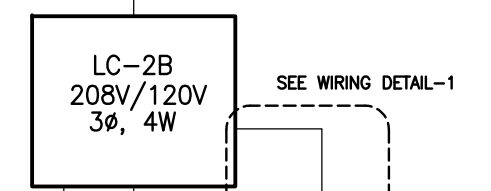
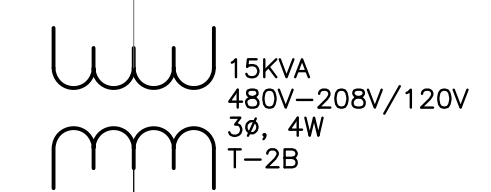
DESIGNED: JAJ 4/4/15 DRAWN: JAJ 5/20/15 CHECKED: PK 6/1/15	<b>REFERENCE DRAWINGS</b> NUMBER      TITLE	<b>REVISIONS</b> DATE      NUM      DESCRIPTION	 <b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES CENI - POWER SYSTEMS ENGINEERING	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB2 - 67TH AVE. TIE BREAKER STATION CONDUIT AND CABLE SCHEDULE
			REVISION SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____ <small>DEPUTY CHIEF ENGINEER</small>	CONTRACT NO. FQ15237      SCALE NONE      DRAWING NO. G02TB2-TB-300      SHEET NO. 57 OF 60

Drawing File: H:\FQ15237\DRAW\TBS\G02TB2 - 67TH AVE TBS\G02TB2-TB-400.DWG  
 Plotted by: E013941 Date: Tue, 21 Jul 2015 Time: 10:02:22 am  
 Xrefs: N:\ROBINSON-ELECT-MECH\ELEC-PWR AutoCAD Folder\WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

**NOTE:**  
 1. ALL NEW CONDUITS TO BE INSTALLED ARE RGS TYPE CONDUITS CONNECTED TO THE DC SWITCHGEAR REQUIRED TO HAVE 1" MIN. OF FRE TYPE CONDUIT ENTERING DC SWITCHGEAR.

TO FAN SHAFT G03FS01  
 ELECTRICAL ROOM  
 PANEL LC-2

TO FAN SHAFT G03FS01  
 ELECTRICAL ROOM  
 PANEL LC-2



**1** | **DETAIL**  
 G02TB1-TB-400 | 67TH AVE. TIE BREAKER STATION | SCALE: N.T.S

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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015  
 -VA Regulations 18VAC10-20-760

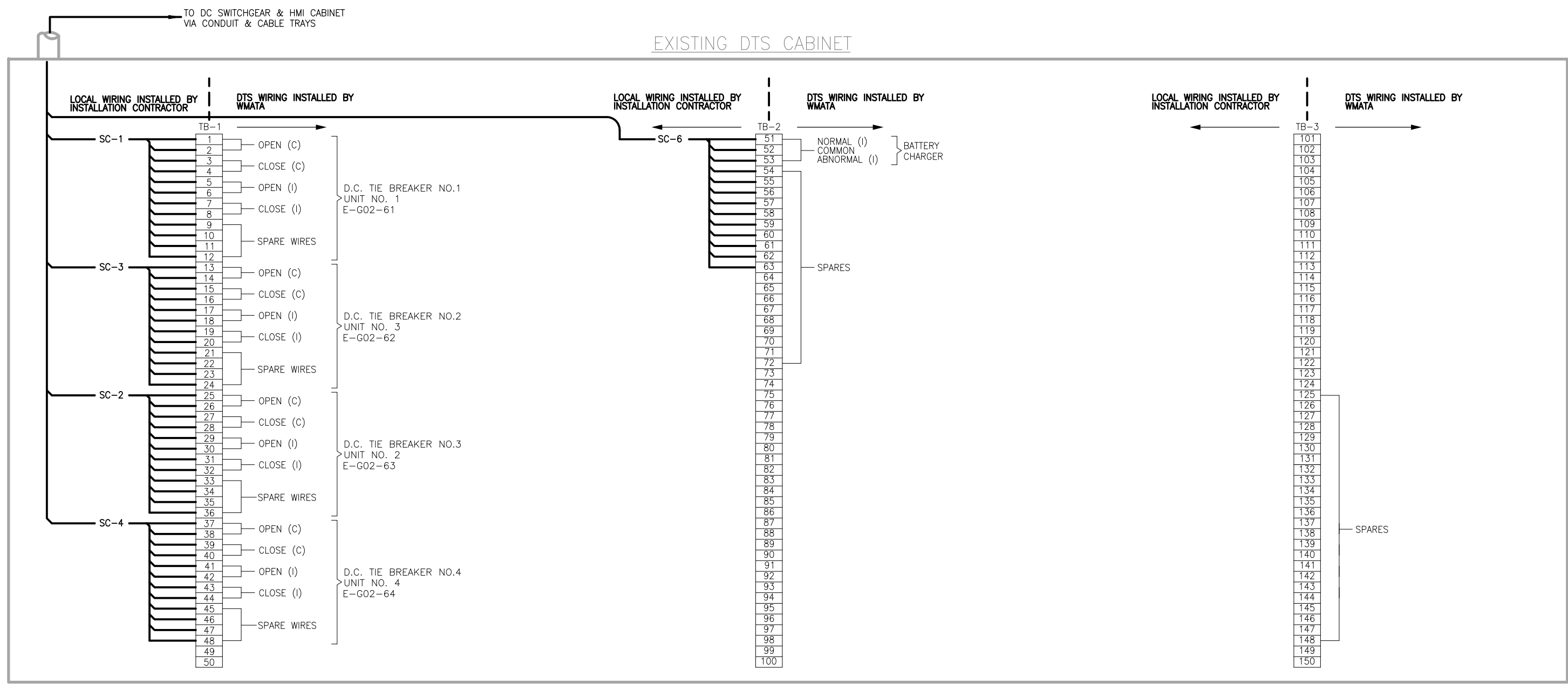
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JAJ	5/20/15													
PK	6/1/15													

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**  
 DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES  
 CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>			
G02TB2 - 67TH AVE. TIE BREAKER STATION			
480V SINGLE LINE DIAGRAM - NEW			
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. G02TB2-TB-400	SHEET NO. 58 OF 60

Drawing File: H:\FQ15237\DRAWING\G02TB2 - 67TH AVE TBS\G02TB2-TB-401.DWG  
 Plotted by: E013941 Date: Tue, 21 Jul 2015 Time: 10:02:31 am  
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### G02TB2 TIE BREAKER STATION

**NOTES:**

1. WIRING & TERMINATION FOR BATTERY CHARGER IS NOT REQUIRED WHEN D.C. POWER IS SUPPLIED FROM PASSENGER STATION. TERMINALS NOT USED WILL BECOME SPARES WITH JUMPER AT TERMINALS 76-75.
2. WHEN TWO TIE BREAKER STATIONS ARE IN THE SAME RTU CONTROL AREA, THE SECOND TIE BREAKER STATION WILL USE A DIFFERENT SERIES OF BREAKER NUMBERS. SEE TABLE AT LEFT.
3. FOR SECOND TIE BREAKER STATION, USE NUMERAL 6 INSTEAD OF 4.
4. SIX ADDITIONAL TRIP WIRES ARE BROUGHT TO DTS CABINET, THREE FOR ETS TRIP AND THREE SPARES. WMATA WILL CONNECT THEM TO TERMINAL BLOCKS AS REQUIRED.

**LEGEND:**  
 (I) — DENOTES INDICATION  
 (C) — DENOTES CONTROL  
 \* — SEE NOTE 2

FUNCTION	BRK NO.	1 ST TBS BRK NO.	2 ND TBS BRK NO.	YARD AREA INTERFACE BRK NO.
DC TIE BRK NO.	1	41	61	81
	2	42	62	82
	3	43	63	83
	4	44	64	84
	5	45	65	85
	6	46	66	86
	7	47	67	87
	8	48	68	88



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 LICENSE No. 04020117145  
 EXPIRATION DATE: 10/31/2015

DESIGNED			DRAWN			CHECKED		
JAJ	4/4/15	DATE	JAJ	5/20/15	DATE	PK	6/1/15	DATE

REFERENCE DRAWINGS		REVISIONS	
NUMBER	TITLE	DATE	DESCRIPTION

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 CENI - POWER SYSTEMS ENGINEERING

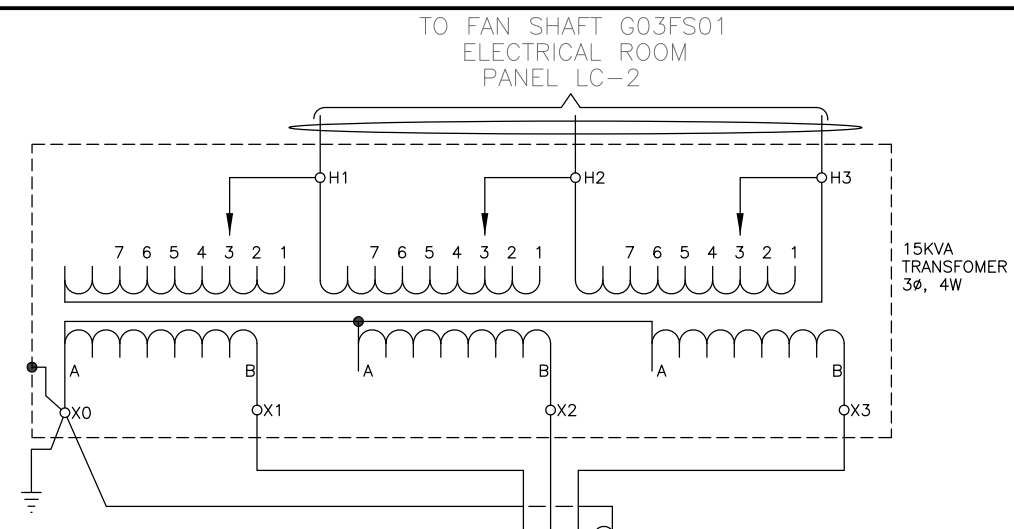
REVISION SUBMITTED \_\_\_\_\_ DATE \_\_\_\_\_ APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 DEPUTY CHIEF ENGINEER

<b>SIX (6) TIE BREAKER STATIONS UPGRADES ORANGE AND BLUE LINES DC, MD AND VA</b>		G02TB2 - 67TH AVE. TIE BREAKER STATION SUPERVISORY AND CONTROL DIAGRAM - NEW	
CONTRACT NO. FQ15237	SCALE NONE	DRAWING NO. G02TB2-TB-401	SHEET NO. 59 OF 60

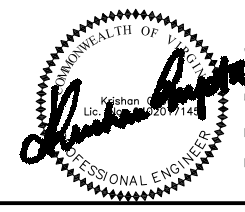
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<b>PANEL NAME:</b> PANEL DC-67TB		<b>LOCATION:</b> 67TH AVE. TIE BREAKER STATION										
<b>PANEL TYPE:</b> DC DISTRIBUTION		<b>MAIN:</b> 100A MCB										
<b>BUS RATING:</b> 125VDC - 100A MAX		<b>PANEL:</b> SURFACE MOUNTED										
DESCRIPTION	CONNECTED LOAD (KVA)		CKT BKR	CKT NO.	DESCRIPTION	CONNECTED LOAD (KVA)		CKT BKR	CKT NO.	DESCRIPTION		
	AØ	BØ				AØ	BØ					
DC CONTROL POWER	0	0	60	1		0	0	20	2	SPARE		
DC CIRCUIT BREAKER TEST CABINET			30	3				30	4	EMERGENCY TRIP SWITCH RELAY CABINET		
HMI			20	5		0	0	20	6	EMERGENCY LIGHT FIXTURE		
RTU			20	7				20	8	NETWORK SWITCH		
SPACE				9					10	SPACE		
SPACE				11					12	SPACE		
<b>SUB-TOTAL</b>		0	0			0	0			<b>SUB-TOTAL</b>		
		<b>TOTAL CONN. LOAD</b>										
PHASE A	0	KVA										
PHASE B	0	KVA										
	0.00	KVA										
	0.00	AMP										



<b>PANEL NAME:</b> PANEL LC-2B		<b>LOCATION:</b> 67TH AVE. TIE BREAKER STATION										
<b>PANEL TYPE:</b> DISTRIBUTION		<b>MAIN:</b> 60A MCB										
<b>BUS RATING:</b> 100A, 208V/120V 3Ø, 4W GND & NEU BUS		<b>PANEL:</b> SURFACE MOUNTED										
DESCRIPTION	CONNECTED LOAD (KVA)			CKT BKR	CKT NO.	DESCRIPTION	CONNECTED LOAD (KVA)			DESCRIPTION		
	AØ	BØ	CØ				AØ	BØ	CØ			
ISOLATION TRANSFORMER	0	0	0	20	1		0	0	0	BATTERY CYCLE MONITOR		
RTU		0		20	3			0		SPARE		
SPARE			0	20	5				0	SPARE		
SPARE				20	7					SPARE		
SPARE				20	9					SPARE		
SPACE					11					SPACE		
SPACE					13					SPACE		
SPACE					15					SPACE		
SPACE					17					SPACE		
SPACE					19					SPACE		
SPACE					21					SPACE		
SPACE					23					SPACE		
<b>SUB-TOTAL</b>		0	0	0			0	0	0	<b>SUB-TOTAL</b>		
		<b>TOTAL CONNECTED LOAD</b>										
PHASE A	0	KVA										
PHASE B	0	KVA										
PHASE C	0	KVA										
	0.00	KVA										
	0.00	AMP										



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DESIGNED: JAJ 4/4/15	DATE	NUMBER	TITLE	DATE	NUM	DESCRIPTION	<b>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</b> <b>DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES</b> <b>CENI - POWER SYSTEMS ENGINEERING</b>	<b>SIX (6) TIE BREAKER STATIONS UPGRADES</b> <b>ORANGE AND BLUE LINES DC, MD AND VA</b> G02TB2 - 67TH AVE. TIE BREAKER STATION PANELBOARD SCHEDULES	
DRAWN: JAJ 5/20/15	DATE							REVISION SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____ DEPUTY CHIEF ENGINEER	CONTRACT NO. FQ15237
CHECKED: PK 6/1/15	DATE							DRAWING NO. G02TB2-TB-500	SHEET NO. 60 OF 60