GENERAL NOTES FOR EQUIPMENT VENDOR:

1. THIS CONTRACT IS FOR INSTALLATION WORK OF FACILITIES.
2. 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.
3. FOR TYPICAL DETAILS SEE DRAWINGS TP-G-006 THROUGH TP-G-010.
4. INSTALL AND GROUND RACEWAYS, CONDUITS, AND EQUIPMENT PER NATIONAL ELECTRICAL CODE AND AS INDICATED (DC SWITCHGEAR AND POSITIVE CABLE TRAY ARE NOT GROUNDED).
5. 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.
6. 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.
7. 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.
8. 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

9. 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.
10. 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.
11. 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.
12. 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.
13. ALL DIMENSIONS SHOWN ARE APPROXIMATE. EXACT MEASUREMENTS SHALL BE MADE AT THE SITE BY CONTRACTOR/DESIGNER.
14. INSULATING TOPPING SHALL BE PROVIDED AS SHOWN WITH A MINIMUM OF 3'-0" AROUND DC SWITCHGEAR AND 4'-6" IN FRONT OF DC SWITCHGEAR.
15. REPLACED LIGHTING FIXTURES SHALL BE INSTALLED AS SHOWN ON CONTRACT DRAWINGS.
16. 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.
17. PROVIDE/REPLACE STATION SWITCHES FOR LIGHTING FIXTURES FOR ALL FACILITIES.
18. THE TEMPORARY JUMPER CONNECTION CONSISTS OF FOUR (4) 1000KCM UNSHIELDED CABLE AS STIPULATED IN SPECIFICATION SECTION 16128 UNLESS OTHERWISE NOTED.
19. ONE LINE DIAGRAMS SHOWN ARE FOR GUIDANCE ONLY.
20. FIELD VISIT AND TESTING INFORMATION IS REQUIRED PRIOR TO ANY MODIFICATIONS.
21. 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.
22. 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.
23. DIRECTORIES OF EXISTING PANELBOARDS MODIFIED BY THE CONTRACTOR SHALL BE REPLACED WITH NEW TYPED DIRECTORIES IDENTIFYING THE UPDATED CIRCUITS.
24. ALL NEW POSITIVE CABLE TRAY SHALL BE FIBERGLASS, AS MANUFACTURED BY ROBROY INDUSTRIES OR APPROVED EQUAL.
25. 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.
26. 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.
27. WHERE INSULATING TOPPING IS INSTALLED ON FINISHED FLOOR, FEATHER EDGES TO MEET THE UN-TOPPED FLOOR SURFACE WITHOUT PRESENTING A RIDGE ON THE FLOOR.
28. 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.
29. 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.
30. 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.
31. 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.
32. PROVIDE NEW CABLES AS INDICATED ON CABLE SCHEDULES.
33. 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).
34. PROVIDE AND INSTALL WIRING AS DEFINED IN CABLE SCHEDULE ALL EXISTING CIRCUITS IN CABLE SCHEDULE ARE TO REMAIN UNLESS OTHERWISE NOTED.
35. THE CONTRACTOR SHALL INSTALL ALL IDENTIFIED EQUIPMENT SHOWN ON CONTRACT DRAWINGS. THE WORK SHALL BE IN ACCORDANCE WITH DESIGN CRITERIA AND SPECIFICATION.
36. THE CONTRACTOR SHALL DEVELOPED DETAILED INSTALLATION DRAWINGS, INTERCONNECTION DRAWINGS, CABLE SCHEDULE, DTS INTERCONNECTION DIAGRAMS BASED ON CONTRACT DRAWINGS AND SUBMITTED TO WMATA FOR APPROVAL.
37. 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.
38. FOR 5 TBS LOCATIONS (EXCEPT G01TBS), REPLACE 5 RECEPTACLES AND BRANCH CIRCUIT WIRING. BRANCH CIRCUIT LENGTH IS 130FT AT EACH LOCATION. EXISTING CONDUIT MAY BE REUSED UNLESS RUSTED OR CORRODED.
39. THE BRANCH CIRCUIT WIRING LENGTH IS 80 FEET FOR EACH UNIT HEATERS AND EXHAUST FANS.
40. EXTERIOR LIGHT INDICATED ON PLANS IS THE EXTERIOR LIGHT ABOVE THE DOOR AT TBS ENTRANCE. (1)
41. PLANS AND ELEVATIONS ARE APPROX. ⅛"=1'-0" AND NOT EXACT DUE TO FITTING AND PRINTING ON 11"X17" PAPER. ALSO, ALL DIMENSIONS ON THE PLANS AND ELEVATIONS ARE APPROXIMATE.
42. THE NEGATIVE POLARITY JUNCTION BOXES ARE LOCATED WITHIN THE TBS ROOM AND THE BRANCH CIRCUIT LENGTH IS 60FT PER EACH OF 2 TRACK NEGATIVE REFERENCES.

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

ABBREVIATIONS

3PH	–	THREE PHASE
AEMS	–	AUTOMATED ENERGY MANAGEMENT SYSTEM
A.F.F.	–	INDICATES MOUNTING HEIGHT ABOVE FINISHED FLOOR TO BOTTOM OF EQUIPMENT
ATS	–	AUTOMATIC TRANSFER SWITCH
AUX,	–	AUXILIARY
AVR	–	AUTOMATIC VOLTAGE REGULATOR
BKR	–	BREAKER
CA. TRAY	–	CABLE TRAY
CAB	–	CABINET
CKT.	–	CIRCUIT
CB	–	CIRCUIT BREAKER
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 OR SUPERVISORY CONTROL TERMINAL BOX (1)
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
PT	–	POTENTIAL TRANSFORMER
PWR	–	POWER
RTU	–	REMOTE TERMINAL UNIT
SWGR.	–	SWITCHGEAR
SW.	–	SWITCH
TBS	–	TIE BREAKER STATION
TYP.	–	TYPICAL
UPS	–	UNINTERRUPTIBLE POWER SUPPLY
W	–	WIDTH
XDCR	–	TRANSDUCER
XFMR	–	TRANSFORMER

COMMONWEALTH OF VIRGINIA – Keshav Gupta – Lic. No. 020-0145 – 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."

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

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

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

GENERAL NOTES AND ABBREVIATIONS

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	TBS-G-003	3 OF 60

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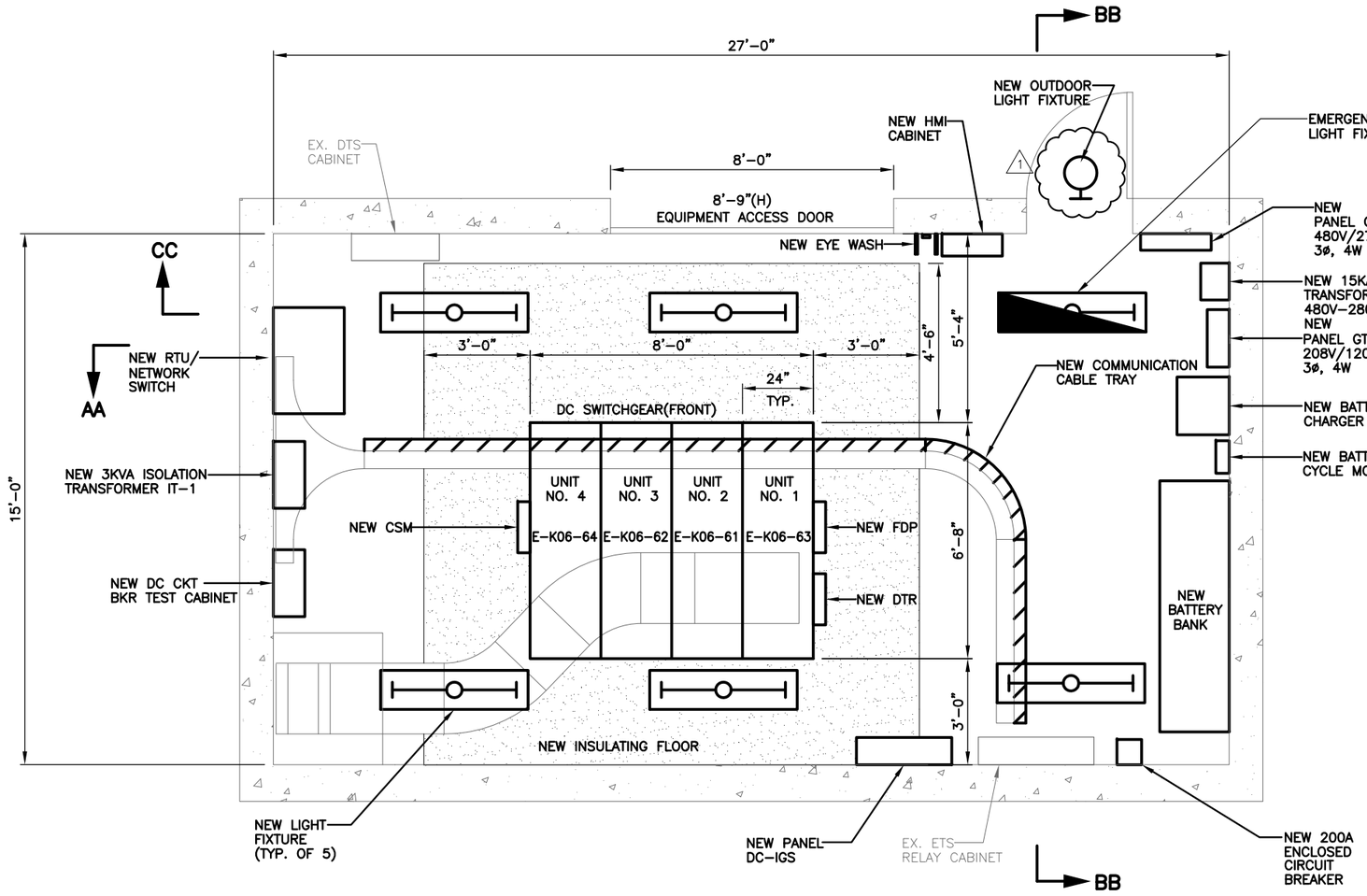

A **EQUIPMENT LAYOUT PLAN - NEW**

K06TB2-TB-200 GREENWICH ST. TBS SCALE: 1/2"=1'-0" K06TB2-TB-202

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, 3ø., 4W AC PANEL GT-H.
9. REMOVE EXISTING PANEL GT-L AND PROVIDE AND INSTALL NEW 208V/120V, 3ø, 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. NOT USED. (1)
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.

COMMONWEALTH OF VIRGINIA Keshan Gupta Lic. No. 020-0117145 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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REFERENCE DRAWINGS

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REVISIONS

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

metro **WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**

DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES
CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED DATE

APPROVED . 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 LAYOUT PLAN - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	AS NOTED	K06TB2-TB-200	14 OF 60

CABLE					CIRCUIT				ROUTING					REV. NO.
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR		
DP-1	5-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.1 BKR. #3	CABLE TRAY & CONDUIT	CONTACT RAIL I.B. END APPR. 509+00.25	TRACTION POWER FEEDER		0
DP-2	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.2 BKR. #1	CABLE TRAY & CONDUIT	CONTACT RAIL I.B. END APPR. 508+44.25	TRACTION POWER FEEDER	1	0
DP-3	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.3 BKR. #2	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 508+33.59	TRACTION POWER FEEDER		0
DP-4	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.4 BKR. #4	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 508+33.59	TRACTION POWER FEEDER		0
AN-1	4/C	#14	600V	90°C	125V	DC	2		BATTERY CHARGER	CABLE TRAY & CONDUIT	RTU	BATTERY CHARGER ANNUNCIATION		0
AN-2	NOT USED													
AN-3	12/C	#14	600V	90°C	125V	DC	3		ETS RELAY CABINET	CABLE TRAY & CONDUIT	RTU	ETS ANNUNCIATION		0
AN-4	NOT USED												1	
SC-1	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.1 BKR. #3	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONTROL & INDICATION		0
SC-2	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.2 BKR. #1	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONTROL & INDICATION		0
SC-3	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.3 BKR. #2	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONTROL & INDICATION		0
SC-4	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.4 BKR. #4	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONTROL & INDICATION		0
SC-5	NOT USED													
SC-6	NOT USED													
SC-7	19/C	#14	600V	90°C	24V	DC	7		RTU CABINET	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	ANNUNCIATION		0
													1	
AC-1	4/C	#10	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	NEW 480V/277V AC PANEL GT-H	CONDUIT	UNIT HEATER #1	A.C. POWER		0
AC-2	4/C	#10	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	NEW 480V/277V AC PANEL GT-H	CONDUIT	UNIT HEATER #2	A.C. POWER		0
AC-3	4/C	#10	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	NEW 480V/277V AC PANEL GT-H	CONDUIT	BATTERY CHARGER	BATTERY CHARGER POWER SUPPLY		0
AC-4	2/C	#12	600V	90°C	277V	AC	0	1 GREEN GRD WIRE	NEW 480V/277V AC PANEL GT-H	CONDUIT	INDOOR LIGHTING	A.C. POWER		0
AC-5	4/C	#10	600V	90°C	480V	AC	0	1 GREEN GRD WIRE	NEW 480V/277V AC PANEL GT-H	CONDUIT	NEW 15KVA TRANSFORMER	A.C. POWER		0
AC-6	4/C	#6	600V	90°C	208V	AC	0	1 GREEN GRD WIRE	NEW 15KVA TRANSFORMER	CONDUIT	NEW 208V/120V AC PANEL GT-L	A.C. POWER		0
AC-7	3/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	NEW 3KVA ISOLATION TRANSFORMER	A.C. POWER		0
AC-8	2/C	#12	600V	90°C	120V	AC	0		ISOLATION TRANSFORMER	CONDUIT	DC SWITCHGEAR UNIT NO.1	A.C. POWER D.C. SWGR HEATER		
AC-9	2/C	#10	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	EXHAUST FAN #1	A.C. POWER		0
AC-10	2/C	#10	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	EXHAUST FAN #2	A.C. POWER		0
AC-11	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	RECEPTACLES	A.C. POWER		0
AC-12	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	OUTDOOR LIGHTING	A.C. POWER		0
AC-13	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	RTU	A.C. POWER		0
AC-14	2/C	#12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V AC PANEL GT-L	CONDUIT	NEW BATTERY CYCLE MONITOR	A.C. POWER		0

CABLE					CIRCUIT				ROUTING					REV. NO.
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR		
DC-1	2-1/C	#4	600V	90°C	125V	DC	0		BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	BATTERY CHARGING DC FEEDER		0
DC-2	2-1/C	#3/0	600V	90°C	125V	DC	0		NEW 200A ENCLOSED CIRCUIT BREAKER	CONDUIT	BATTERY	DC 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-IGS	DC POWER FEEDER		0
DC-4	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CONDUIT	HMI CABINET	DC POWER		0
DC-5	2/C	#6	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.1 BKR. #3	DC POWER		0
DC-6	2/C	#10	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CABLE TRAY & CONDUIT	DC CKT. BKR. TEST CABINET	DC POWER		0
DC-7	2/C	#10	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CONDUIT	EMERT. TRIP SW. RELAY CABLE	DC POWER		0
DC-8	2/C	#10	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CABLE TRAY & CONDUIT	NETWORK SWITCH	DC POWER		0
DC-9	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CABLE TRAY & CONDUIT	EMERGENCY LIGHT	DC POWER		0
DC-10	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IGS	CABLE TRAY & CONDUIT	RTU	DC POWER		0
ET-1	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.1 BKR. #3	CONTACT RAIL EMER. TRIP		0
ET-2	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.2 BKR. #1	CONTACT RAIL EMER. TRIP		0
ET-3	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.3 BKR. #2	CONTACT RAIL EMER. TRIP		0
ET-4	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.4 BKR. #4	CONTACT RAIL EMER. TRIP		0
MA-1	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.1 BKR. #3	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND		0
MA-2	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.2 BKR. #1	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND		0
MA-3	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.3 BKR. #2	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND		0
MA-4	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.4 BKR. #4	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND		0
MA-5	2/C	#10	600V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.1 BKR. #3	CABLE TRAY & CONDUIT	STATION GROUND	GROUND RELAYING		0
MA-6	1/C	#10	2000V	90°C	700V		0		DC SWITCHGEAR UNIT NO.1 BKR. #3	CONDUIT	NEGATIVE POLARITY	NEG. POLARITY REFERENCE I.B.		0
MA-7	1/C	#10	2000V	90°C	700V		0		DC SWITCHGEAR UNIT NO.4 BKR. #4	CONDUIT	NEGATIVE POLARITY	NEG. POLARITY REFERENCE O.B.		0

H – A.C. PRIMARY VOLTAGE CABLE
DP – D.C. POSITIVE POWER CABLE
DN – D.C. NEGATIVE POWER CABLE
DD – D.C. UTILITY DRAIN CABLE

AN – ANNUNCIATOR CABLE
SC – SUPERVISORY CONTROL CABLE
ET – EMERGENCY TRIP CABLE
MT – METERING & INSTRUMENTATION CABLE

CN – OPERATING CONTROL CABLE
MA – MISCELLANEOUS CIRCUITS
AC – A.C. LOW VOLTAGE POWER CIRCUITS
DC – D.C. CONTROL POWER CIRCUITS

END APPR – END APPROACH OF CONTACT RAIL
CSM – CABLE SHIELD MONITORING CABLE
*** BOLD TEXT INDICATES NEW CABLES
*** SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES

1 NOTE:
AN-1, AN-3, SC-7,AC-13, AC-14, DC-4, DC-8, DC-10 ARE SHOWN ON SCADA DRAWINGS FOR REFERENCE.

"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

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

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

K06TB2 - GREENWICH ST. TIE BREAKER STATION
CONDUIT AND CABLE SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K06TB2-TB-300	17 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\K06TB2 - GREENWICH ST TBS\K06TB2-TB-300.DWG
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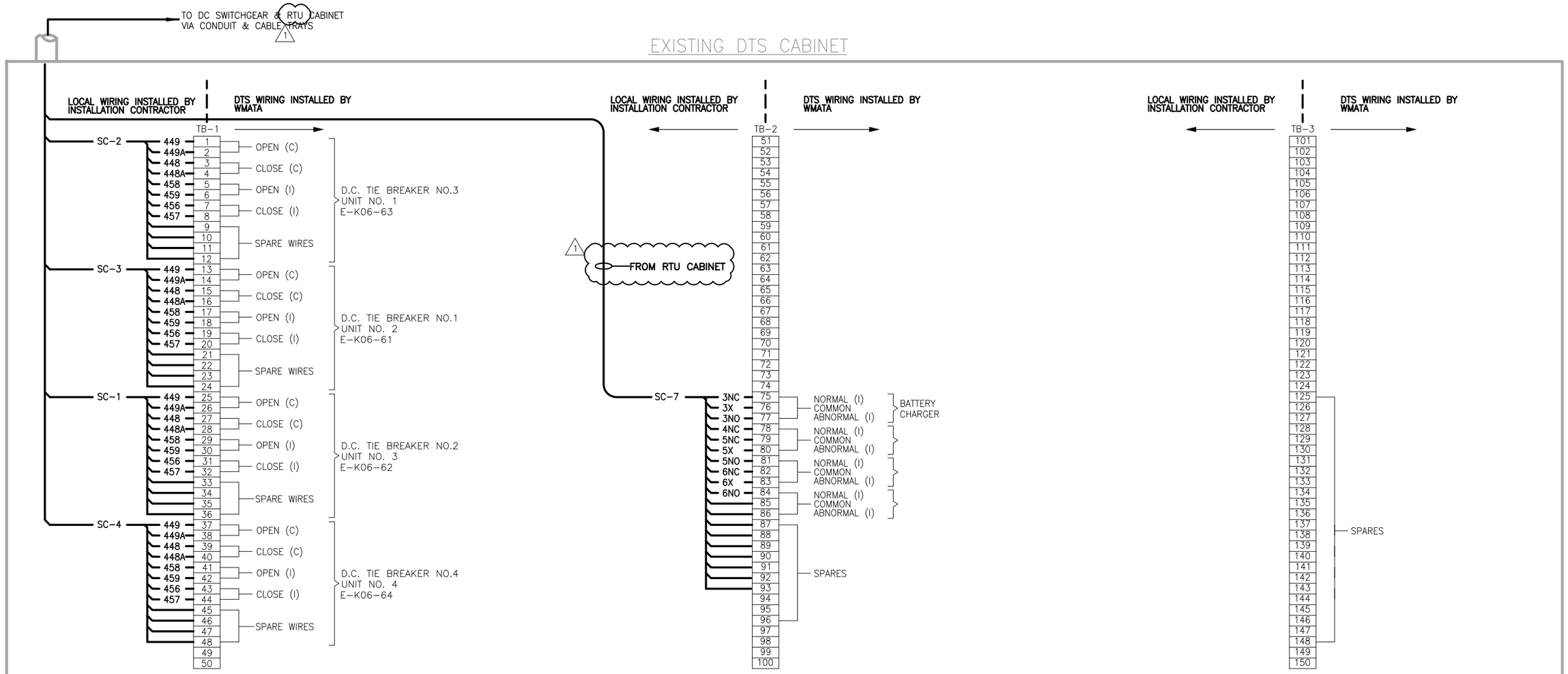

TIE BREAKER STATION

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

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LICENSE No. 04020117145

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- VA Regulations 18VAC10-20-760

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

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

DATE	NUM	DESCRIPTION
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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

SIX (6) TIE BREAKER STATIONS UPGRADES
ORANGE AND BLUE LINES DC, MD AND VA
K06TB2 - GREENWICH ST. TIE BREAKER STATION
SUPERVISORY AND CONTROL DIAGRAM - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K06TB2–TB–401	19 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\K06TB2 – GREENWICH ST TBS\K06TB2–TB–401.DWG
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CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.	GROUND	FROM	VIA	TO	FOR	REV. NO.
DP-1	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		D.C. SWITCHGEAR UNIT NO. 1, TBKR #4	CABLE TRAY AND CONDUIT	CONTRACT RAIL O.B. END APPR. 609+4.15	TRACTION POWER FEEDER	0
DP-2	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		D.C. SWITCHGEAR UNIT NO. 2, TBKR #2	CABLE TRAY AND CONDUIT	CONTRACT RAIL O.B. END APPR. 609+60.15	TRACTION POWER FEEDER	0
DP-3	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		D.C. SWITCHGEAR UNIT NO. 3, TBKR #3	CABLE TRAY AND CONDUIT	CONTRACT RAIL I.B. END APPR. 609+4.15	TRACTION POWER FEEDER	0
DP-4	5-1/C	1000 MCM	1000V	90°C	700V	DC	0		D.C. SWITCHGEAR UNIT NO. 4, TBKR #1	CABLE TRAY AND CONDUIT	CONTRACT RAIL I.B. END APPR. 609+60.15	TRACTION POWER FEEDER	0
AN-1	4/C	#14	600V	90°C	125V	D.C.	2		BATTERY CHARGER	CABLE TRAY AND CONDUIT	RTU CABINET	BATTERY CHARGER INDICATION	0
AN-2	NOT USED												
AN-3	NOT USED												0
AN-4	NOT USED												
AN-5	NOT USED												
AN-6	12/C	#14	600V	90°C	125V	D.C.	2		EMERG. TRIP SWITCH RELAY CABINET	CABLE TRAY AND CONDUIT	RTU CABINET	ETS FAILURE INDICATION	0
SC-1	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO. 1	CABLE TRAY AND CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONT. & INDICATION	0
SC-2	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO. 2	CABLE TRAY AND CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONT. & INDICATION	0
SC-3	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO. 3	CABLE TRAY AND CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONT. & INDICATION	0
SC-4	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO. 4	CABLE TRAY AND CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONT. & INDICATION	0
SC-7	19/C	#14	600V	90°C	24V	DC	1		RTU CABINET	CABLE TRAY AND CONDUIT	DTS CABINET	ANNUMCIATION	0
AC-1	4/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	VOLTAGE REGULATOR	CONDUIT	NEW 480/277 VAC PANEL TB	480 VAC POWER	0
AC-2	3/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL TB	CONDUIT	15 KVA TRANSFORMER	TRANSFORMER POWER	0
AC-3	3/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL TB	CONDUIT	UNIT HEATER #1	480 VAC POWER TO UNIT HEATER	0
AC-4	3/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL TB	CONDUIT	UNIT HEATER #2	480 VAC POWER TO UNIT HEATER	0
AC-5	2/C	#12	600V	90°C	277 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL TB	CONDUIT	TBS INDOOR LIGHTS	TBS LIGHTS A.C. FEED	0
AC-6	2/C	#12	600V	90°C	277 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL TB	CONDUIT	TBS OUTDOOR LIGHTS	TBS LIGHTS A.C. FEED	0
AC-7	4/C	#12	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL TB	CONDUIT	BATTERY CHARGER	480 VAC POWER TO BATT. CHARGER	0
AC-8	4/C	#12	600V	90°C	208 V	AC	0	1 GREEN GRD WIRE	NEW 15 KVA TRANSFORMER	CABLE TRAY AND CONDUIT	NEW 208V/120V A.C. PANEL TB-1	208/120 VAC POWER	0
AC-9	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL TB-1	CONDUIT	EXHAUST FAN #1	120 VAC POWER	0
AC-10	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL TB-1	CONDUIT	EXHAUST FAN #2	120 VAC POWER	0
AC-11	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL TB-1	CONDUIT	RTU	120 VAC POWER	0
AC-12	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL TB-1	CONDUIT	RECEPTACLES	120 VAC POWER	0
AC-13	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL TB-1	CONDUIT	ROLL-UP DOOR	120 VAC POWER	0
AC-14	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL TB-1	CONDUIT	OUTDOOR LIGHT	120 VAC POWER	0

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.	GROUND	FROM	VIA	TO	FOR	REV. NO.
AC-15	3/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PNL. TB-1	CABLE TRAY AND CONDUIT	3 KVA ISOLATION TRANSFORMER. IT-1	120 VAC ISOLATED POWER	0
AC-16	2/C	#12	600V	90°C	120 V	AC	0		3 KVA ISOLATION TRANSF. IT	CABLE TRAY AND CONDUIT	DC SWITCHGEAR UNIT NO. 1	120 VAC ISOLATED POWER	0
AC-17	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PNL. TB-1	CONDUIT	BATTERY CYCLE MONITOR	120 VAC POWER	0
DC-1	2-1/C	#4	600V	90°C	125V	DC	0		BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	DC POWER	0
DC-2	2-1/C	#3/0	600V	90°C	125V	DC	0		NEW 200A ENCLOSED CIRCUIT BREAKER	CONDUIT	BATTERY	DC POWER	0
DC-3	2-1/C	#3/0	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	DC POWER	0
DC-4	2/C	#8	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	D.C. SWITCHGEAR UNIT NO. 1	DC CNTRL POWER	0
DC-5	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	HMI CABINET	DC POWER	0
DC-6	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	D.C. CKT. BKR. TEST CABINET	DC POWER	0
DC-7	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	EMERG. TRIP SW. RELAY CABINET	DC POWER	0
DC-8	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CONDUIT	EMERGENCY LIGHT	DC POWER	0
DC-9	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	RTU	DC POWER	0
DC-10	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PNL DC-IOS	CABLE TRAY AND CONDUIT	NEW NETWORK SWITCH	DC POWER	0
ET-1	4/C	#10	600V	90°C	125V	DC	2		EMERGENCY TRIP SWITCH RELAY CABINET	CABLE TRAY AND CONDUIT	DC SWITCHGEAR UNIT NO. 1	CONTACT RAIL EMERGENCY TRIP	0
ET-2	4/C	#10	600V	90°C	125V	DC	2		EMERGENCY TRIP SWITCH RELAY CABINET	CABLE TRAY AND CONDUIT	DC SWITCHGEAR UNIT NO. 2	CONTACT RAIL EMERGENCY TRIP	0
ET-3	4/C	#10	600V	90°C	125V	DC	2		EMERGENCY TRIP SWITCH RELAY CABINET	CABLE TRAY AND CONDUIT	DC SWITCHGEAR UNIT NO. 3	CONTACT RAIL EMERGENCY TRIP	0
ET-4	4/C	#10	600V	90°C	125V	DC	2		EMERGENCY TRIP SWITCH RELAY CABINET	CABLE TRAY AND CONDUIT	DC SWITCHGEAR UNIT NO. 4	CONTACT RAIL EMERGENCY TRIP	0
MA-1	1/C	#6	2000V	90°C	GND		0		DC SWITCHGEAR UNIT NO. 1	CONDUIT	STATION GROUND	LIGHTNING ARRESTER GND.	0
MA-2	1/C	#6	2000V	90°C	GND		0		DC SWITCHGEAR UNIT NO. 2	CONDUIT	STATION GROUND	LIGHTNING ARRESTER GND.	0
MA-3	1/C	#6	2000V	90°C	GND		0		DC SWITCHGEAR UNIT NO. 3	CONDUIT	STATION GROUND	LIGHTNING ARRESTER GND.	0
MA-4	1/C	#6	2000V	90°C	GND		0		DC SWITCHGEAR UNIT NO. 4	CONDUIT	STATION GROUND	LIGHTNING ARRESTER GND.	0
MA-5	NOT USED												
MA-6	2/C	#10	600V	90°C	GRD		0		DC SWITCHGEAR UNIT NO. 1	CABLE TRAY AND CONDUIT	STATION GROUND	GROUND RELAY	0
MA-7	1/C	#10	1000V	90°C	700V		1		DC SWITCHGEAR UNIT NO. 1	CONDUIT	NEGATIVE POLARITY J-BOX	NEG. POLARITY REFERENCE O.B.	0
MA-8	1/C	#10	1000V	90°C	700V		1		DC SWITCHGEAR UNIT NO. 4	CONDUIT	NEGATIVE POLARITY J-BOX	NEG. POLARITY REFERENCE	0

H – A.C. PRIMARY VOLTAGE CABLE
DP – D.C. POSITIVE POWER CABLE
DN – D.C. NEGATIVE POWER CABLE
DD – D.C. UTILITY DRAIN CABLE

AN – ANNUNCIATOR CABLE
SC – SUPERVISORY CONTROL CABLE
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CN – OPERATING CONTROL CABLE
MA – MISCELLANEOUS CIRCUITS
AC – A.C. LOW VOLTAGE POWER CIRCUITS
DC – D.C. CONTROL POWER CIRCUITS

END APPR – END APPROACH OF CONTACT RAIL
BOLD TEXT INDICATES NEW CABLES
SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES

1 NOTE:
CABLES AN-1, AN-6, SC-7, AC-11 AC-17, DC-5, DC-9 AND DC-10 ARE SHOWN ON SCADA DRAWING ALSO FOR REFERENCE

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Lic. Keshan G... 020714E
COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER
LICENSE No. 04020117145
EXPIRATION DATE: 10/31/2015
- VA Regulations 18VAC10-20-760

DESIGNED	JAJ	4/4/15 DATE
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NUMBER	TITLE

REVISIONS

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

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

K07TB1 - OGDEN ST. TIE BREAKER STATION
CONDUIT AND CABLE SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K07TB1-TB-300	25 OF 60

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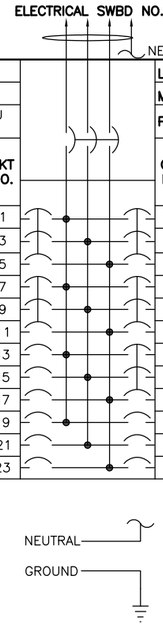
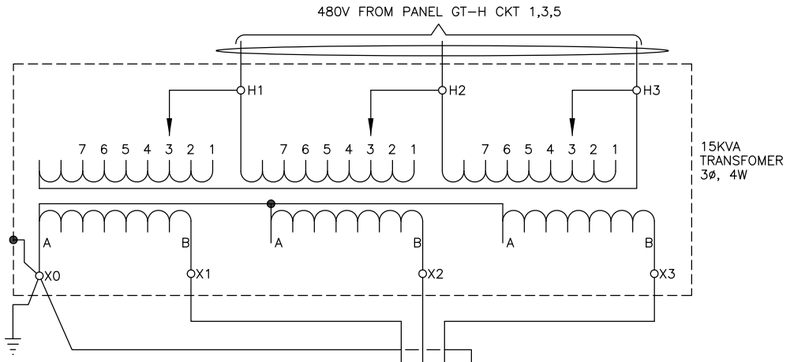


PANEL NAME:	PANEL GT–H						LOCATION:	GREENWICH ST. TIE BREAKER STATION					
PANEL TYPE:	DISTRIBUTION						MAIN:	50A MCB					
BUS RATING:	125A, 480V/277V 3ø, 4W GND & NEU BUS						PANEL:	SURFACE MOUNTED					
DESCRIPTION	CONNECTED LOAD (KVA)			CKT BKR	CKT NO.		CKT NO.	CKT BKR	CONNECTED LOAD (KVA)			DESCRIPTION
	Aø	Bø	Cø	TRIP				TRIP	Aø	Bø	Cø	
15KVA TRANSFORMER (PANEL GT–L)	0			30	1		2	20	0			UNIT HEATER #1
		0			3		4			0		
			0		5		6				0	
BATTERY CHARGER				20	7		8	20				UNIT HEATER #2
					9		10					
					11		12					
LIGHTING (INDOOR)				20	13		14	20				SPARE
SPARE				20	15		16					
SPARE				20	17		18					
SPACE					19		20	20				SPARE
SPACE					21		22	20				SPARE
SPACE					23		24	20				SPARE
SUB–TOTAL	0	0	0						0	0	0	SUB–TOTAL

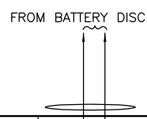
TOTAL CONNECTED LOAD		
PHASE A	0	KVA
PHASE B	0	KVA
PHASE C	0	KVA
	0.00	KVA
	0.00	AMP



PANEL NAME:	PANEL GT–L						LOCATION:	GREENWICH ST. TIE BREAKER STATION					
PANEL TYPE:	DISTRIBUTION						MAIN:	60A MCB					
BUS RATING:	125A, 208V/120V 3ø, 4W GND & NEU BUS						PANEL:	SURFACE MOUNTED					
DESCRIPTION	CONNECTED LOAD (KVA)			CKT BKR	CKT NO.		CKT NO.	CKT BKR	CONNECTED LOAD (KVA)			DESCRIPTION
	Aø	Bø	Cø	TRIP				TRIP	Aø	Bø	Cø	
RECEPTACLES	0			20	1		2	20	0			OUTDOOR LIGHTS
ISOLATION TRASFORMER		0		20	3		4	20		0		EXHAUST FAN #1
RTU			0	20	5		6	20	1		0	EXHAUST FAN #2
BATTERY CYCLE MONITOR				20	7		8	20				SPARE 1
SPARE				20	9		10	20				SPARE
SPACE					11		12					SPARE
SPACE					13		14					SPACE
SPACE					15		16					SPACE
SPACE					17		18					SPACE
SPACE					19		20					SPACE
SPACE					21		22					SPACE
SPACE					23		24					SPACE
SUB–TOTAL	0	0	0						0	0	0	SUB–TOTAL

TOTAL CONNECTED LOAD		
PHASE A	0	KVA
PHASE B	0	KVA
PHASE C	0	KVA
	0.00	KVA
	0.00	AMP

NEUTRAL
GROUND



PANEL NAME:	PANEL DC–IGS					LOCATION:	GREENWICH ST. TIE BREAKER STATION				
PANEL TYPE:	DC DISTRIBUTION					MAIN:	200A MCB				
BUS RATING:	125VDC – 200A MAX					PANEL:	SURFACE MOUNTED				
DESCRIPTION	CONNECTED LOAD (KVA)		CKT BKR	CKT NO.		CKT NO.	CKT BKR	CONNECTED LOAD (KVA)		DESCRIPTION
			TRIP				TRIP	POS.	NEG.	
DC CONTROL POWER	0		60	1		2	20	0		SPARE
DC CIRCUIT BREAKER TEST CABINET	0		30	3		4	30	0		EMERGENCY TRIP SWITCH RELAY CABINET
HMI CABINET	0		20	5		6	20	0		NETWORK SWITCH
RTU	0		20	7		8	20	0		EMERGENCY LIGHTS
SPACE				9		10	20			SPARE
SPACE				11		12	20			SPARE
SUB–TOTAL	0	#						0	#	SUB–TOTAL

TOTAL CONN. LOAD		
PHASE A	0	KVA
PHASE B	#	KVA
	0.00	KVA
	0.00	AMP

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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		
DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES
CENI - POWER SYSTEMS ENGINEERING

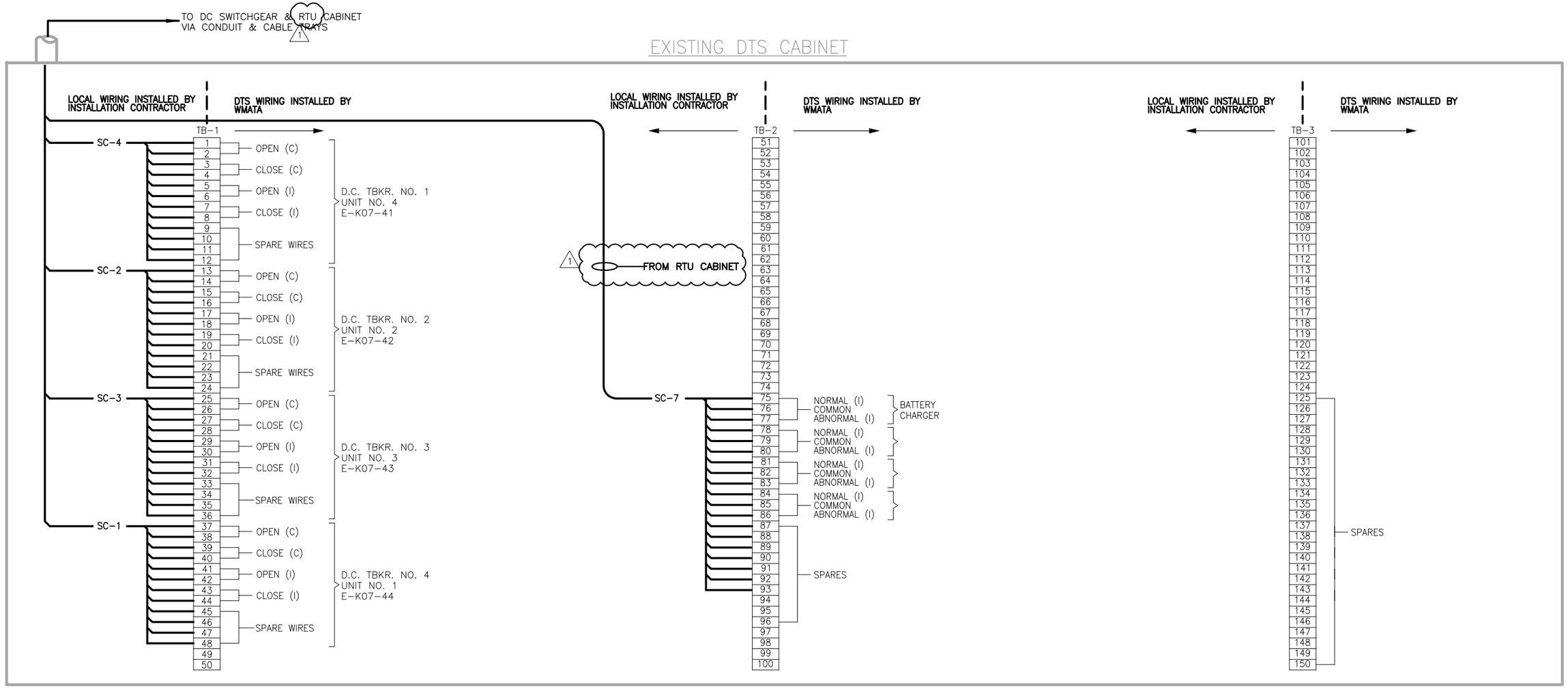
REVISION SUBMITTED DATE

APPROVED . DEPUTY CHIEF ENGINEER DATE

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

K06TB2 - GREENWICH ST. TIE BREAKER STATION
PANELBOARD SCHEDULES

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K06TB2–TB–500	20 OF 60



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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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
K07TB1 - OGDEN ST. TIE BREAKER STATION
SUPERVISORY AND CONTROL DIAGRAM - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K07TB1–TB–401	27 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\K07TB1 - OGDEN ST TBS\K07TB1-TB-401.DWG
Plotted by: E013941 Date: Fri, 30 Oct 2015 Time: 10:46:25 am
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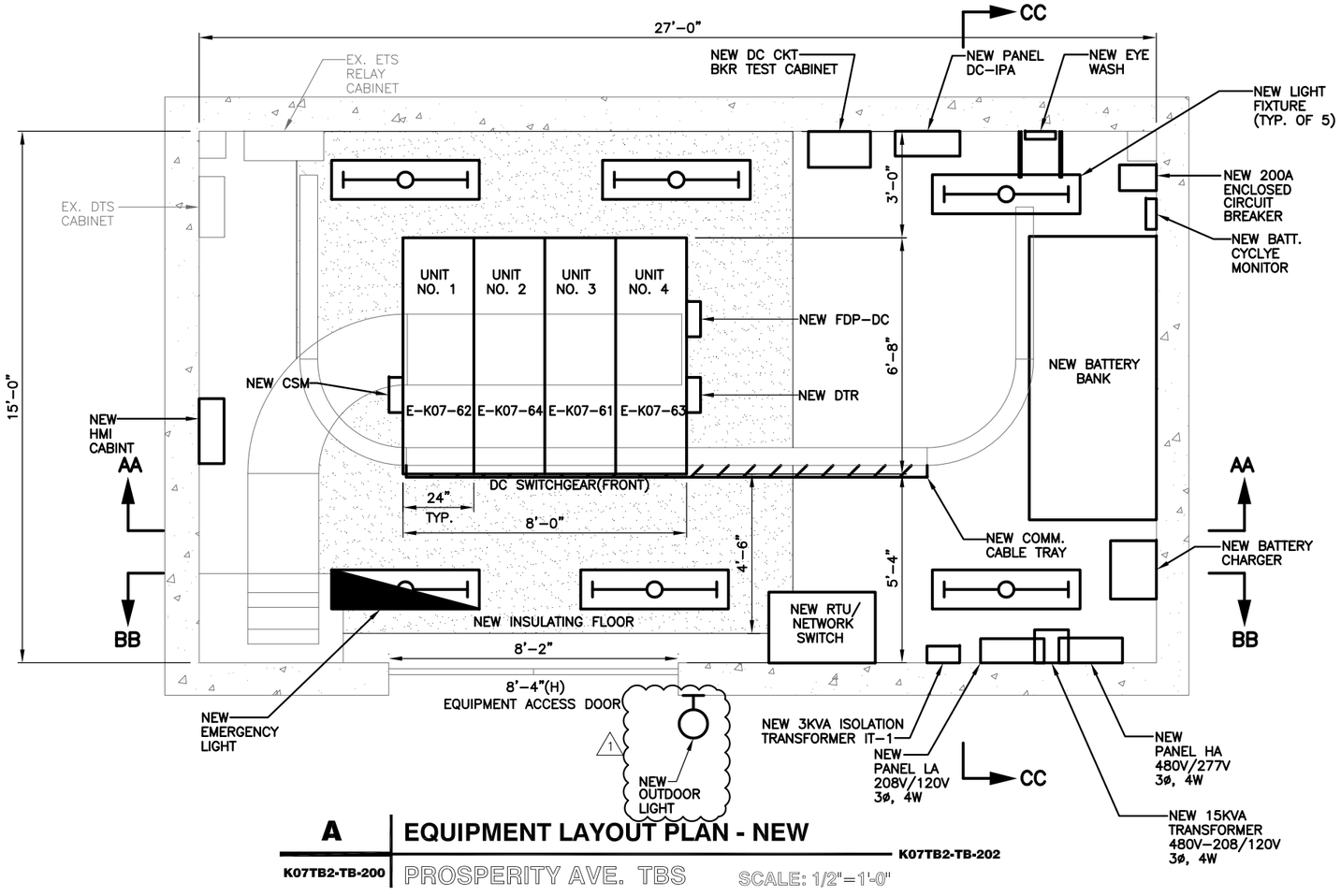

A | **EQUIPMENT LAYOUT PLAN - NEW**

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

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, 3ø., 4W AC PANEL HA.
9. REMOVE EXISTING PANEL LA AND PROVIDE AND INSTALL NEW 208V/120V, 3ø, 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 MANUFACTURES'S RECOMMENDATION, IN COMPLIANT WITH NEC'S FILL CRITERIA AND WMATA'S SPECIFICATION.

COMMONWEALTH OF VIRGINIA — Keshan Gupta — Lic. No. 040201171 — PROFESSIONAL ENGINEER

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. DEPUTY CHIEF ENGINEER

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
K07TB2 - PROSPERITY AVE. TIE BREAKER STATION
EQUIPMENT LAYOUT PLAN - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	AS NOTED	K07TB2-TB-200	30 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\K07TB2 - PROSPERITY AVE TBS\K07TB2-TB-200.DWG
Plotted by: E013941 Date: Fri, 30 Oct 2015 Time: 10:46:31 am
Xrefs: ; ..\..\DES\ARCH\K07TB2 - PROSPERITY AVENUE TBS FLOOR PLAN.dwg ; ..\..\..\DES\TBS\K07TB2 - PROSPERITY AVENUE TBS DESIGN FILE.dwg
Images: ; N:\ROBINSON-ELECT-MECH\ELEC-MECH-PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

CABLE					CIRCUIT				ROUTING					CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.	GRD COND. SIZE	FROM	VIA	TO	FOR	REV. NO.	NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR	REV. NO.
DP-1	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.1 BKR. #62	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 677+65.35	TRACTION POWER FEEDER	0	DC-1	2-1/C	#4	600V	90°C	125V	DC	0		BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	BATTERY CHARGING DC FEED	0
DP-2	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.2 BKR. #64	CABLE TRAY & CONDUIT	CONTACT RAIL O.B. END APPR. 677+09.35	TRACTION POWER FEEDER	0	DC-2	2-1/C	#3/0	600V	90°C	125V	DC	0		NEW 200A ENCLOSED CIRCUIT BREAKER	CONDUIT	BATTERY	DC POWER FEEDER	0
DP-3	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.3 BKR. #61	CABLE TRAY & CONDUIT	CONTACT RAIL I.B. END APPR. 677+65.35	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-IPA	DC POWER	0
DP-4	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.4 BKR. #63	CABLE TRAY & CONDUIT	CONTACT RAIL I.B. END APPR. 677+09.35	TRACTION POWER FEEDER	0	DC-4	2/C	#6	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.1 BKR. #62	DC POWER	0
														DC-5	2/C	#10	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CABLE TRAY & CONDUIT	DC CKT. BKR. TEST CABINET	DC POWER	0
AN-1	4/C	#14	600V	90°C	125V	DC	2		BATTERY CHARGER	CONDUIT	RTU CABINET	BATTERY CHARGER ANNUNCIATION	0	DC-6	2/C	#10	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CABLE TRAY & CONDUIT	EMERG. TRIP SWITCH RELAY CABINET	DC POWER	0
AN-2	NOT USED													DC-7	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CONDUIT	RTU	DC POWER	0
AN-3	12/C	#14	600V	90°C	125V	DC	2		ETS RELAY CABINET	CONDUIT	RTU CABINET	ETS ANNUCIATION	0	DC-8	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CONDUIT	NETWORK SWITCH	DC POWER	0
													1	DC-9	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CONDUIT	EMERGENCY LIGHT	DC POWER	0
SC-1	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.1 BKR. #62	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONTROL & INDICATION	0	DC-10	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-IPA	CONDUIT	HMI CABINET	DC POWER	0
SC-2	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.2 BKR. #64	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	CIRCUIT BREAKER CONTROL & INDICATION	0															
SC-3	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.3 BKR. #61	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	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 SWITCHGEAR UNIT NO.1 BKR. #62	CONTACT RAIL EMER. TRIP	0
SC-4	12/C	#14	600V	90°C	24V	DC	4		DC SWITCHGEAR UNIT NO.4 BKR. #63	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	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 SWITCHGEAR UNIT NO.2 BKR. #64	CONTACT RAIL EMER. 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 SWITCHGEAR UNIT NO.3 BKR. #61	CONTACT RAIL EMER. TRIP	0
SC-6	NOT USED													ET-4	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.4 BKR. #63	CONTACT RAIL EMER. TRIP	0
SC-7	19/C	#14	600V	90°C	24V	DC	7	1	RTU CABINET	CABLE TRAY & CONDUIT	DATA TRANSMISSION SYSTEM CABINET	ANNUNCIATION															
AC-1	3/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL HA	CONDUIT	NEW 15 KVA TRANSFORMER	TRANSFORMER POWER	0														
AC-2	3/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL HA	CONDUIT	UNIT HEATER #1	480 VAC POWER TO UNIT HEATER	0														
AC-3	3/C	#10	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL HA	CONDUIT	UNIT HEATER #2	480 VAC POWER TO UNIT HEATER	0														
AC-4	2/C	#12	600V	90°C	277 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL HA	CONDUIT	TBS INDOOR LIGHTS	LIGHTS A.C. FEED 1	0														
AC-5	4/C	#12	600V	90°C	480 V	AC	0	1 GREEN GRD WIRE	NEW 480/277 VAC PANEL HA	CONDUIT	BATTERY CHARGER	480 VAC POWER TO BATT. CHARGER	0														
AC-6	3/C	#12	600V	90°C	208 V	AC	0	1 GREEN GRD WIRE	NEW 15 KVA TRANSFORMER	CABLE TRAY AND CONDUIT	NEW 208V/120V A.C. PANEL LA	208/120 VAC POWER	0														
AC-7	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	EXHAUST FAN #1	120 VAC POWER	0														
AC-8	3/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CABLE TRAY AND CONDUIT	NEW 3KVA ISOLATION TRANSFORMER. IT-1	120 VAC ISOLATED POWER	0	MA-1	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.1 BKR. #62	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
AC-9	2/C	#12	600V	90°C	120 V	AC	0		NEW 3KVA ISOLATION TRANSFORMER. IT-1	CABLE TRAY AND CONDUIT	DC SWITCHGEAR UNIT NO.1 BKR. #62	120 VAC ISOLATED POWER	0	MA-2	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.2 BKR. #64	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
AC-10	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	RTU	120 VAC POWER	0	MA-3	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.3 BKR. #61	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
AC-11	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	RECEPTACLES	120 VAC POWER	0	MA-4	1-1/C	#6	2000V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.4 BKR. #63	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
AC-12	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	RECEPTACLES	120 VAC POWER	0	MA-5	NOT USED												
AC-13	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	ROLL-UP DOOR	120 VAC POWER	0	MA-6	2/C	#10	600V	90°C	GRD.		0		DC SWITCHGEAR UNIT NO.1 BKR. #62	CABLE TRAY & CONDUIT	STATION GROUND	STRUCTURE GROUND RELAY	0
AC-14	2/C	#10	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	OUTDOOR LIGHT	120 VAC POWER	0	MA-7	1-1/C	#10	2000V	90°C	700V		0		DC SWITCHGEAR UNIT NO.1 BKR. #62	CONDUIT	NEGATIVE POLARITY BOX	NEG. POLARITY REFERENCE O.B.	0
AC-15	2/C	#12	600V	90°C	120 V	AC	0	1 GREEN GRD WIRE	NEW 208V/120V A.C. PANEL LA	CONDUIT	BATTERY CYCLE MONITOR	120 VAC POWER	0	MA-8	1-1/C	#10	2000V	90°C	700V		0		DC SWITCHGEAR UNIT NO.4 BKR. #63	CONDUIT			

H – A.C. PRIMARY VOLTAGE CABLE
DP – D.C. POSITIVE POWER CABLE
DN – D.C. NEGATIVE POWER CABLE
DD – D.C. UTILITY DRAIN CABLE
AN – ANNUNCIATOR CABLE
SC – SUPERVISORY CONTROL CABLE
ET – EMERGENCY TRIP CABLE
MT – METERING & INSTRUMENTATION CABLE
CN – OPERATING CONTROL CABLE
MA – MISCELLANEOUS CIRCUITS
AC – A.C. LOW VOLTAGE POWER CIRCUITS
DC – D.C. CONTROL POWER CIRCUITS

END APPR – END APPROACH OF CONTACT RAIL
BOLD TEXT INDICATES NEW CABLES
SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES

1 NOTE:
CABLES AN-1, AN-2, SC-7, AC-10, AC-15, DC-7, DC-8 AND DC-10, ARE SHOWN IN SCADA DRAWINGS ALSO FOR REFERENCE.

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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

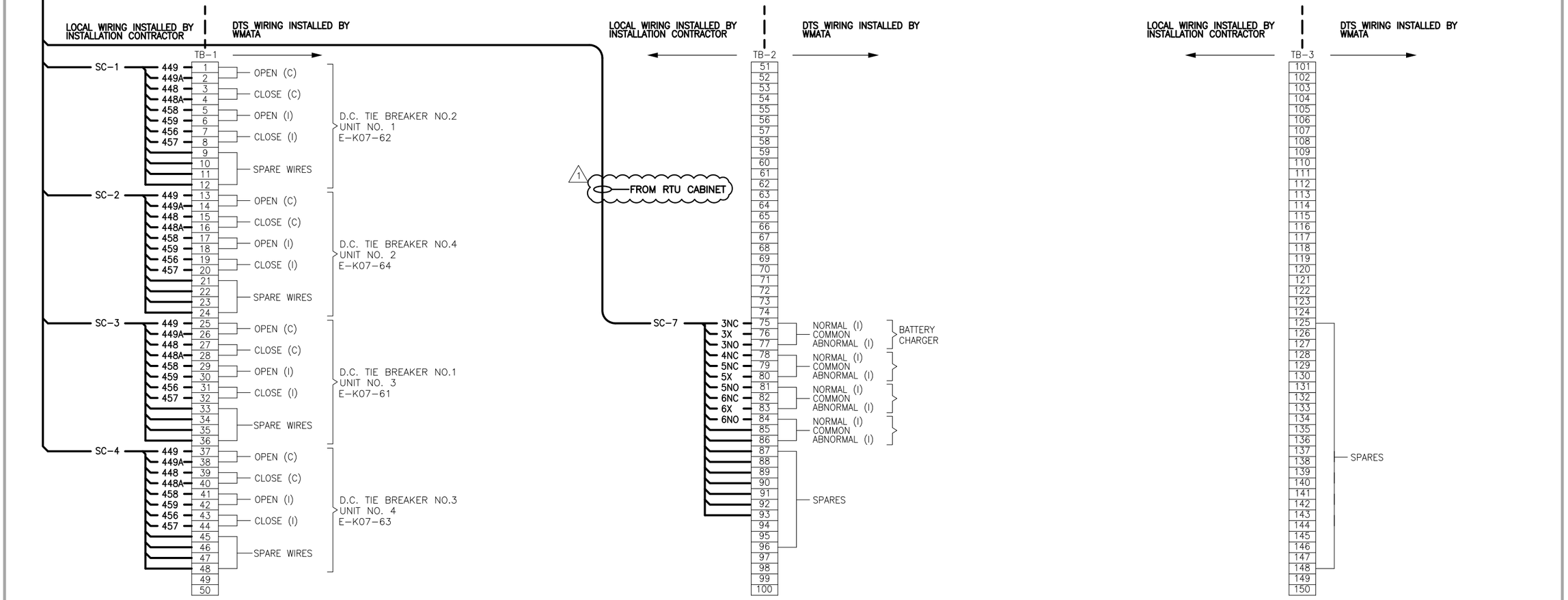
K07TB2 - PROSPERITY AVE. TIE BREAKER STATION
CONDUIT AND CABLE SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K07TB2-TB-300	33 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\K07TB2 - PROSPERITY AVE TBS\K07TB2-TB-300.DWG
Plotted by: E0713941 Date: Fri, 30 Oct 2015 Time: 10:46:40 am
Xrefs:
Images: ; N:\ROBINSON-ELECT-MECH\ELEC-MECH-PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

TO DC SWITCHGEAR & RTU CABINET
VIA CONDUIT & CABLE TRAYS
1

EXISTING DTS CABINET



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.
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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."

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

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES
CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED _____ DATE

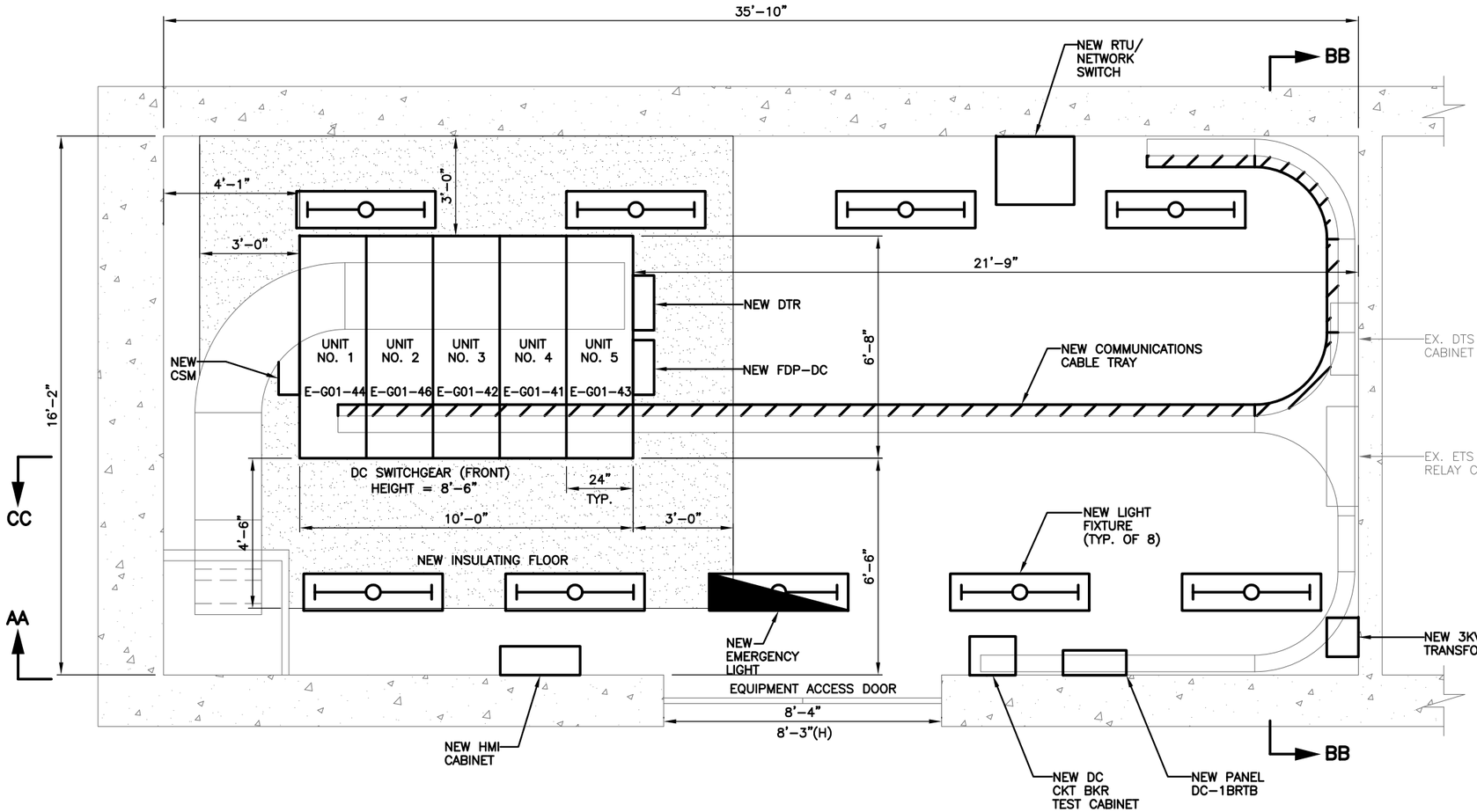
APPROVED _____ DATE
. DEPUTY CHIEF ENGINEER

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

K07TB2 - PROSPERITY AVE. TIE BREAKER STATION
SUPERVISORY AND CONTROL DIAGRAM - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	K07TB2–TB–401	35 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\K07TB2 – PROSPERITY AVE TBS\K07TB2–TB–401.DWG
Plotted by: E013941 Date: Fri, 30 Oct 2015 Time: 10:46:45 am
Xrefs:
Images: ; N:\ROBINSON–ELECT–MECH\ELEC–MECH–PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif



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.
9. REPLACE 5 RECEPTACLES IN THE ROOM. EXISTING BRANCH CIRCUIT WIRING SHALL BE REUSED. (1)

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.

A | **EQUIPMENT LAYOUT PLAN - NEW** | **G01TBS-TB-202**

G01TBS-TB-200 | BENNING RD. TBS | SCALE: 1/2"=1'-0"

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CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED _____ DATE

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. DEPUTY CHIEF ENGINEER

SIX (6) TIE BREAKER STATIONS UPGRADES
ORANGE AND BLUE LINES DC, MD AND VA
G01 - BENNING RD. TIE BREAKER STATION
EQUIPMENT LAYOUT PLAN - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	AS NOTED	G01TBS–TB–200	38 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G01TBS – BENNING RD TBS\G01TBS–TB–200.DWG
Plotted by: E013941 Time: 10:46:52 am
Date: Fri, 30 Oct 2015
Xrefs: ; ..\..\..\DES\ARCH\G01TBS – BENNING RD TBS FLOOR PLAN.dwg ; ..\..\..\DES\TBS\G01TBS – BENNING
Images: ; N:\ROBINSON–ELECT–MECH\ELEC–MECH–PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SI

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION 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 SWITCHGEAR UNIT NO.1 BKR. #4	CABLE TRENCH & CONDUIT	CONTACT RAIL I.B. END APPR. 337+55.36	TRACTION POWER FEEDER	0
DP-2	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.2 BKR. #5	CABLE TRENCH & CONDUIT	CONTACT RAIL I.B. END APPR. 338+63.36	TRACTION POWER FEEDER	0
DP-3	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.3 BKR. #2	CABLE TRENCH & CONDUIT	CONTACT RAIL I.B. END APPR. 338+91.36	TRACTION POWER FEEDER	0
DP-4	2-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.4 BKR. #1	CABLE TRENCH & CONDUIT	CONTACT RAIL O.B. END APPR. 338+91.36	TRACTION POWER FEEDER	0
DP-5	4-1/C	1000 MCM	1000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.5 BKR. #3	CABLE TRENCH & CONDUIT	CONTACT RAIL O.B. END APPR. 338+35.36	TRACTION POWER FEEDER	0
AN-1	NOT USED												
AN-2	NOT USED												
AN-3	NOT USED												
AN-4	NOT USED												
AN-5	12/C	#14	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CAB	CABLE TRAY & CONDUIT	RTU CABINET	ETS ANNUNCIATION	0
SC-1	12/C	#14	600V	90°C	24V	DC	5		DC SWITCHGEAR UNIT NO.1 BKR. #4	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-2	12/C	#14	600V	90°C	24V	DC	5		DC SWITCHGEAR UNIT NO.2 BKR. #5	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-3	12/C	#14	600V	90°C	24V	DC	5		DC SWITCHGEAR UNIT NO.3 BKR. #2	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-4	12/C	#14	600V	90°C	24V	DC	5		DC SWITCHGEAR UNIT NO.4 BKR. #1	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-5	12/C	#14	600V	90°C	24V	DC	5		DC SWITCHGEAR UNIT NO.5 BKR. #3	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-6	19/C	#14	600V	90°C	24V	DC	1		RTU CABNIET	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	ANNUNCIATION	0

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR	REV. NO.
DC-1	NOT USED												
DC-2	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CONDUIT	HMI CABINET	DC POWER	0
DC-3	2-1/C	#4/0	600V	90°C	125V	DC	0		225A, 2P 125V BKR. IN AC SWBD RM	CONDUIT	DC DISTRIBUTION PANEL DC-1BRTB	DC POWER FEEDER	0
DC-4	2/C	#6	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.3 BKR. #2	DC CNTRL POWER	0
DC-5	NOT USED												
DC-6	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CONDUIT	DC CKT. BKR. TEST CABINET	DC POWER	0
DC-7	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CABLE TRAY & CONDUIT	EMERG. TRIP SW. RELAY CAB	DC POWER	0
DC-8	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CONDUIT	NETWORK SWITCH	DC POWER	0
DC-9	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CABLE TRAY & CONDUIT	RTU	DC POWER	0
DC-10	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-1BRTB	CABLE TRAY & CONDUIT	EMERGENCY LIGHT	DC POWER	0
ET-1	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.1 BKR. #4	CONTACT RAIL EMER. TRIP	0
ET-2	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.2 BKR. #5	CONTACT RAIL EMER. TRIP	0
ET-3	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.3 BKR. #2	CONTACT RAIL EMER. TRIP	0
ET-4	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.4 BKR. #1	CONTACT RAIL EMER. TRIP	0
ET-5	4/C	#10	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	DC SWITCHGEAR UNIT NO.5 BKR. #3	CONTACT RAIL EMER. TRIP	0
AC-1	3/C	#12 #12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	EX. 208V/120V AC PANEL WR	CONDUIT	NEW 3KVA ISOLATION TRANSFORMER IT1	IT1 FEED	0
AC-2	2/C	#12	600V	90°C	120V	AC	0		NEW ISOLATION TRANSFORMER IT1	CONDUIT	DC SWITCHGEAR UNIT NO.1 BKR. #4	SWGR HEATER	0
AC-3	NOT USED												
AC-4	3/C	#12 #12	600V	90°C	120V	AC	0	1 GREEN GRD WIRE	EX. 208V/120V AC PANEL WR	CONDUIT	RTU	AC POWER	0
AC-7	3-1/C	#12	600V	90°C	277V	AC	0	1 GREEN GRD WIRE	EX. A.C. 480V/277V PANEL WL	CONDUIT	TBS LIGHTS	TBS LIGHTING	0
MA-1	1-1/C	#6	2000V	90°C	GRD.	DC	0		DC SWITCHGEAR UNIT NO.1 BKR. #4	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
MA-2	1-1/C	#6	2000V	90°C	GRD.	DC	0		DC SWITCHGEAR UNIT NO.2 BKR. #5	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
MA-3	1-1/C	#6	2000V	90°C	GRD.	DC	0		DC SWITCHGEAR UNIT NO.3 BKR. #2	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
MA-4	1-1/C	#6	2000V	90°C	GRD.	DC	0		DC SWITCHGEAR UNIT NO.4 BKR. #1	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
MA-5	1-1/C	#6	2000V	90°C	GRD.	DC	0		DC SWITCHGEAR UNIT NO.5 BKR. #3	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	0
MA-6	1-1/C	#10	2000V	90°C	GRD.	DC	0		DC SWITCHGEAR UNIT NO.5 BKR. #3	CABLE TRAY & CONDUIT	STATION GROUND	GROUND RELAYING	0
MA-7	1-1/C	#10	2000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.3 BKR. #2	CONDUIT	JUNCTION BOX	NEG. POLARITY REFERENCE	0
MA-8	1-1/C	#10	2000V	90°C	700V	DC	0		DC SWITCHGEAR UNIT NO.4 BKR. #1	CONDUIT			

H – A.C. PRIMARY VOLTAGE CABLE
DP – D.C. POSITIVE POWER CABLE
DN – D.C. NEGATIVE POWER CABLE
DD – D.C. UTILITY DRAIN CABLE

AN – ANNUNCIATOR CABLE
SC – SUPERVISORY CONTROL CABLE
ET – EMERGENCY TRIP CABLE
MT – METERING & INSTRUMENTATION CABLE

CN – OPERATING CONTROL CABLE
MA – MISCELLANEOUS CIRCUITS
AC – A.C. LOW VOLTAGE POWER CIRCUITS
DC – D.C. CONTROL POWER CIRCUITS

END APPR– END APPROACH OF CONTACT RAIL
CSM – CABLE SHIELD MONITORING CABLE
*** BOLD TEXT INDICATES NEW CABLES
*** SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES

1 NOTE:
CABLES AN-5, SC-6, AC-4, DC-2, DC-8 AND DC-9 ARE SHOWN ON SCADA DRAWINGS ALSO FOR REFERENCE

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

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NUMBER	TITLE

REVISIONS

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

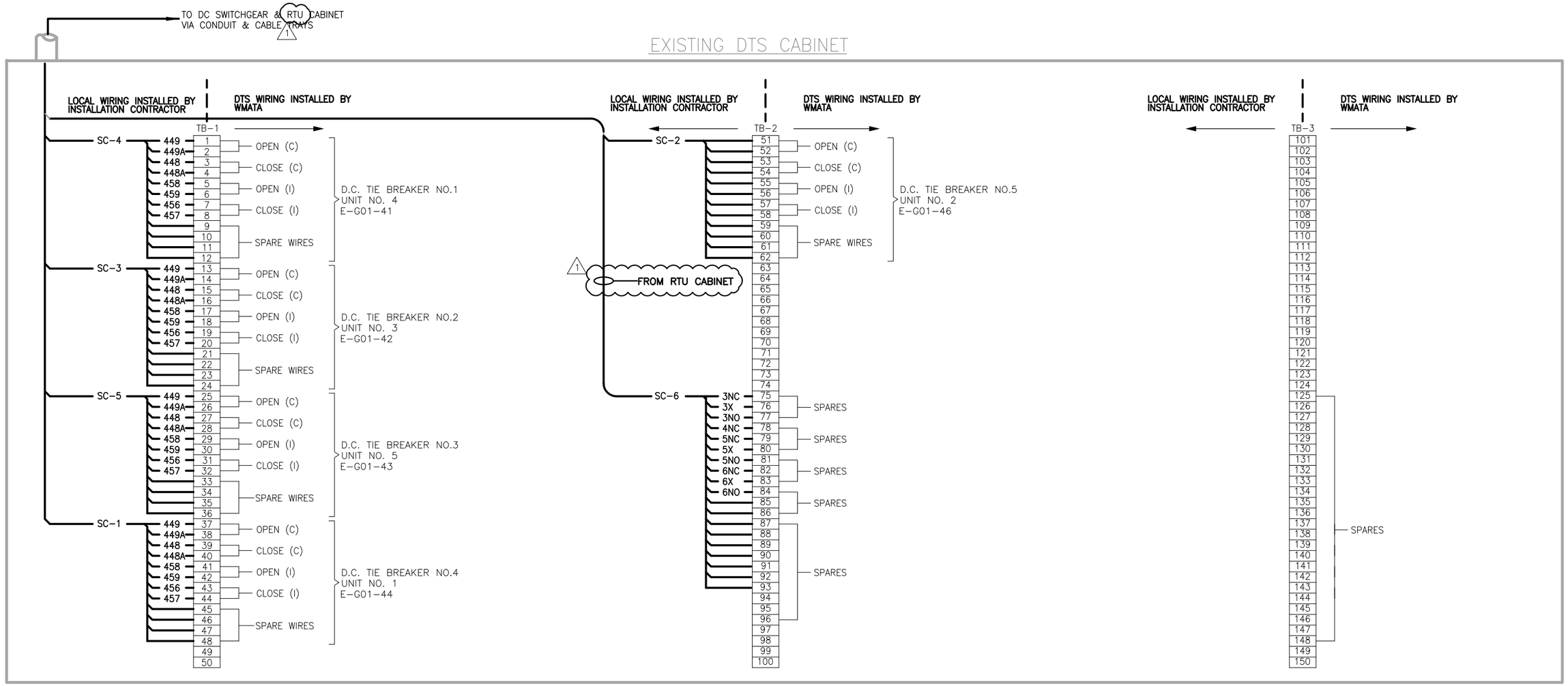
REVISION SUBMITTED ____ DATE
APPROVED ____ DATE
DEPUTY CHIEF ENGINEER

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

G01 - BENNING RD. TIE BREAKER STATION
CONDUIT AND CABLE SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G01TBS-TB-300	41 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G01TBS - BENNING RD TBS\G01TBS-TB-300.DWG
Plotted by: E013941 Date: Fri, 30 Oct 2015 Time: 10:47:05 am
Xrefs:
Images: ; N:\ROBINSON-ELECT-MECH\ELEC-MECH-PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif



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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REVISION SUBMITTED ____ DATE

APPROVED ____ DATE
. DEPUTY CHIEF ENGINEER

SIX (6) TIE BREAKER STATIONS UPGRADES
ORANGE AND BLUE LINES DC, MD AND VA
G01 - BENNING RD. TIE BREAKER STATION
SUPERVISORY AND CONTROL DIAGRAM - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G01TBS–TB–401	43 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G01TBS - BENNING RD TBS\G01TBS-TB-401.DWG
Plotted by: E013941 Date: Fri, 30 Oct 2015 Time: 10:47:10 am
Xrefs:
Images: ; N:\ROBINSON-ELECT-MECH\ELEC-MECH-PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

FROM DC PANEL IN AC ROOM

PANEL NAME:	PANEL DC–1BRTB				**LOCATION:**	BENNING ROAD TIE BREAKER STATION				
PANEL TYPE:	DC DISTRIBUTION				**MAIN:**	200A MCB (1)				
BUS RATING:	125VDC – 225A MAX				**PANEL:**	SURFACE MOUNTED				
DESCRIPTION	**CONNECTED LOAD (KVA)**		**CKT BKR TRIP**	**CKT NO.**		**CKT NO.**	**CKT BKR TRIP**	**CONNECTED LOAD (KVA)**		**DESCRIPTION**
	AØ	**BØ**						**AØ**	**BØ**	
DC CONTROL POWER	0	0	60	1		2	20	0	0	SPARE
DC CIRCUIT BREAKER TEST CABINET			30	3		4	30			EMERGENCY TRIP SWITCH RELAY CABINET
HMI CABINET			20	5		6	20	0	0	EMERGENCY LIGHT FIXTURE
RTU			20	7		8	20			NETWORK SWITCH
SPACE				9		10				SPACE
SPACE				11		12				SPACE
SUB–TOTAL	0	0						0	0	**SUB–TOTAL**

	TOTAL CONN. LOAD	
PHASE A	0	**KVA**
PHASE B	0	**KVA**
	0.00	**KVA**
	0.00	**AMP**

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

G01 - BENNING RD. TIE BREAKER STATION
PANELBOARD SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G01TBS–TB–500	44 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G01TBS – BENNING RD TBS\G01TBS–TB–500.DWG
Plotted by: E0113941 Date: Fri, 30 Oct 2015 Time: 10:47:20 am
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Images: ; N:\ROBINSON–ELECT–MECH\ELEC–MECH–PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION 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
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
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
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
											1		
AN-1	6/C	#14	600V	90°C	125V	DC	3		BATTERY CHARGER	CABLE TRAY & CONDUIT	RTU CABINET	BATT CHARGER FAILURE & FAIL. OF AC SPPLY	0
AN-2	NOT USED												
AN-3	NOT USED												
AN-4	NOT USED												
AN-5	12/C	#14	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CABLE TRAY & CONDUIT	RTU CABINET	ETS FAILURE ANNUNCIATION	0
	1											1	
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
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
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
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
SC-1	12/C	#14	600V	90°C	24V	DC	5		DC SWGR. UNIT NO.1 TBKR. NO.1	CABLE TRAY & CONDUIT	SUPERVISURY 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	SUPERVISURY 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	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-4	12/C	#14	600V	90°C	24V	DC	5		DC SWGR. UNIT NO.4 TBKR. NO.4	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-5	NOT USED												
SC-6	19/C	#14	600V	90°C	24V	DC	1		RTU CABINET	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	ANNUNCIATION	0
	1								1				

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR	REV. NO.
DC-1	2-1/C	#4	600V	90°C	125V	DC	0		BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	BATTERY CHARGING DC FEED	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
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
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
DC-9	2/C	#12	600V	90°C	125V	DC	0		DC DISTRIBUTION PANEL DC-56TB	CABLE TRAY & CONDUIT	NETWORK SWITCH	DC POWER	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
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	BATTERY CHARGER POWER SUPLY	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
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
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
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
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
1 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
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 TBKR. NO.3	CONDUIT	STATION GROUND	LIGHTING ARRESTER GROUND	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
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
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
DP - D.C. POSITIVE POWER CABLE
DN - D.C. NEGATIVE POWER CABLE
DD - D.C. UTILITY DRAIN CABLE

AN - ANNUNCIATOR CABLE
SC - SUPERVISORY CONTROL CABLE
ET - EMERGENCY TRIP CABLE
MT - METERING & INSTRUMENTATION CABLE

CN - OPERATING CONTROL CABLE
MA - MISCELLANEOUS CIRCUITS
AC - A.C. LOW VOLTAGE POWER CIRCUITS
DC - D.C. CONTROL POWER CIRCUITS

END APPR - END APPROACH OF CONTACT RAIL
*** BOLD TEXT INDICATES NEW CABLES
*** SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES

1 NOTE:
CABLES AN-1, AN-5, SC-6, AC-9, AC-10, DC-5, DC-8, AND DC-9 ARE SHOWN ON SCADA DRAWINGS ALSO FOR REFERENCE.

FOR CIRCUIT AC-8, CONNECT SHAFT LIGHTING TO NEW BREAKERS IN NEW PANEL. THE EXISTING BRANCH CIRCUIT WIRING SHALL REMAIN INSTALLED. CONTRACTOR TO MAKE SURE THAT NO NEW SPLICE IN BRANCH CIRCUIT ARE INSTALLED.

COMMONWEALTH OF VIRGINIA — Keshav Gupta — Lic. No. 040201171 — 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."

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

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G02TB1 - 56TH PLACE TBS\G02TB1-TB-300.DWG
Plotted by: E013941 Date: Fri, 30 Oct 2015 Time: 10:47:25 am
Xrefs:
Images: ; N:\ROBINSON-ELECT-MECH\ELEC-MECH-PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GUPTA SIGNATURE.tif

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

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

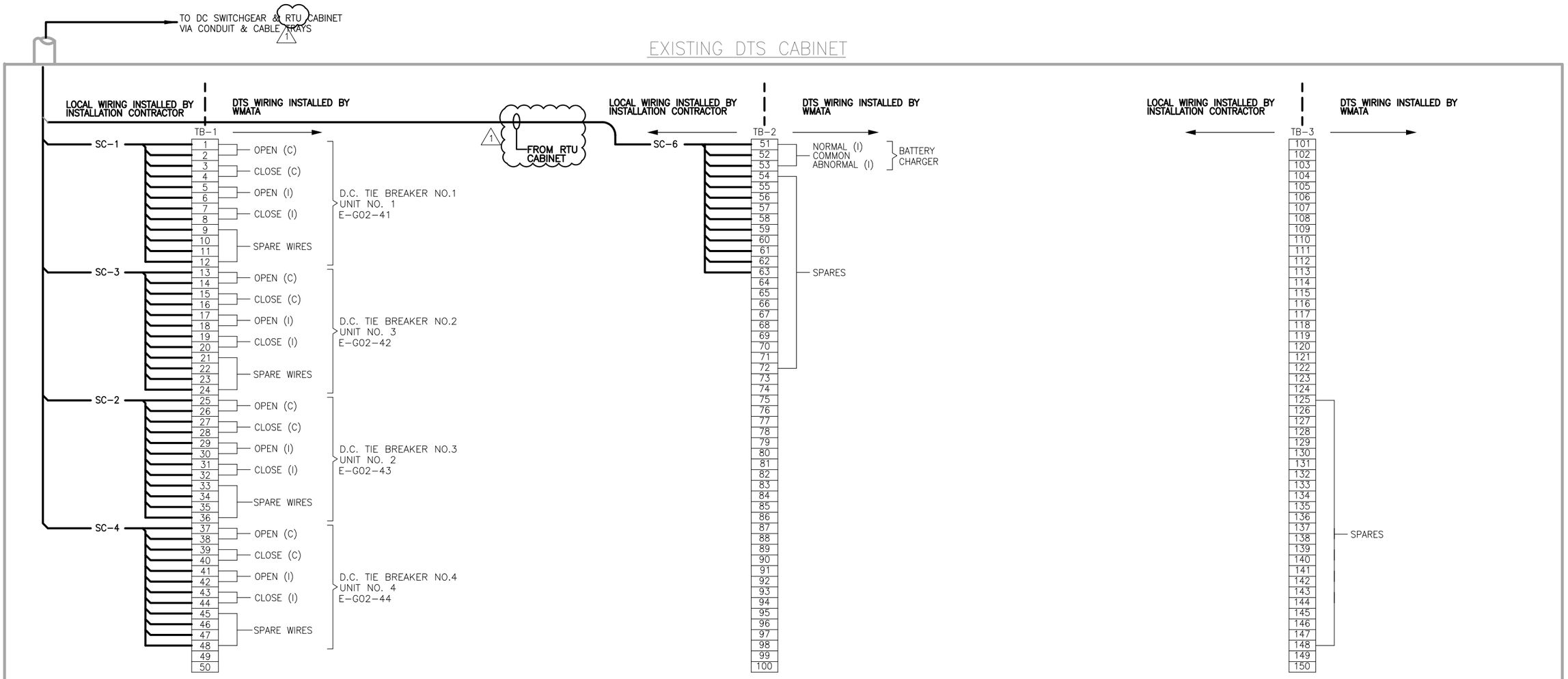
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES
CENI - POWER SYSTEMS ENGINEERING

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
CONDUIT AND CABLE SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G02TB1-TB-300	49 OF 60



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

G02TB1 TIE BREAKER STATION

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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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
SUPERVISORY AND CONTROL DIAGRAM - NEW

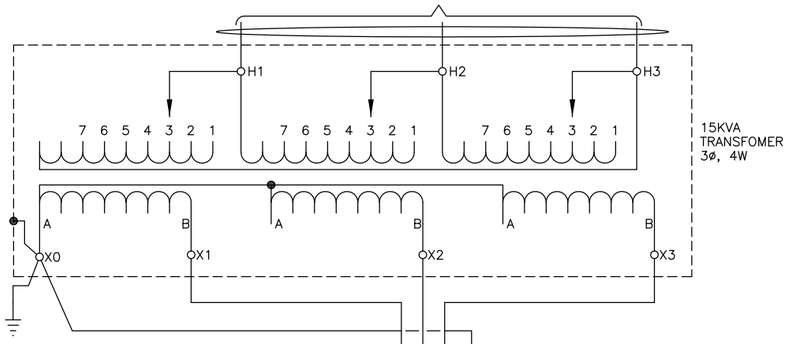
CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G02TB1–TB–401	51 OF 60

FROM BATTERY CHARGER

PANEL NAME:	PANEL DC–56TB					LOCATION:	56TH PLACE TIE BREAKER STATION		
PANEL TYPE:	DC DISTRIBUTION					MAIN:	200A MCB 1		
BUS RATING:	125VDC – 200A MAX					PANEL:	SURFACE MOUNTED		
DESCRIPTION	CONNECTED LOAD (KVA)		CKT BKR TRIP	CKT NO.		CKT NO.	CKT BKR TRIP	CONNECTED LOAD (KVA)		DESCRIPTION
	Aø	Bø						Aø	Bø	
DC CONTROL POWER	0		60	1		2	20	0		SPARE
		0							0	
DC CIRCUIT BREAKER TEST CABINET			30	3		4	30			EMERGENCY TRIP SWITCH RELAY CABINET
HMI			20	5		6	20	0		EMERGENCY LIGHT FIXTURE
									0	
RTU			20	7		8	20			NETWORK SWITCH
SPACE				9		10				SPACE
SPACE				11		12				SPACE
SUB–TOTAL	0	0						0	0	SUB–TOTAL

	TOTAL CONN. LOAD	
PHASE A	0	KVA
PHASE B	0	KVA
	0.00	KVA
	0.00	AMP

TO G02 AC
ELECTRICAL ROOM
PANEL WTP, CKT 25



PANEL NAME:	PANEL LC–5					LOCATION:	56TH PLACE TIE BREAKER STATION				
PANEL TYPE:	DISTRIBUTION					MAIN:	60A MCB 1				
BUS RATING:	100A, 208V/120V 3ø, 4W GND & NEU BUS					PANEL:	WALL MOUNTED				
DESCRIPTION	CONNECTED LOAD (KVA)			CKT BKR TRIP	CKT NO.	CKT NO.	CKT BKR TRIP	CONNECTED LOAD (KVA)			DESCRIPTION
	Aø	Bø	Cø					Aø	Bø	Cø	
RECEPTACLES #1	0			20	1	2	20	0			RECEPTACLE #2
ISOLATION TRASFORMER		0		20	3	4	20		0		SHAFT LIGHTING
RTU			0	20	5	6	20			0	SPARE
BATTERY CYCLE MONITOR				20	7	8	20				SPARE
SPARE				20	9	10	20				SPARE
SPACE					11	12	20				SPARE
SPACE					13	14					SPACE
SPACE					15	16					SPACE
SPACE					17	18					SPACE
SPACE					19	20					SPACE
SPACE					21	22					SPACE
SPACE					23	24					SPACE
SUB–TOTAL	0	0	0					0	0	0	SUB–TOTAL

	TOTAL CONNECTED LOAD	
PHASE A	0	KVA
PHASE B	0	KVA
PHASE C	0	KVA
	0.00	KVA
	0.00	AMP

NEUTRAL
GROUND

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LICENSE No. 04020117145

EXPIRATION DATE: 10/31/2015

-VA Regulations 18VAC10-20-760

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NUMBER	TITLE

REVISIONS		
DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

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
PANELBOARD SCHEDULES

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G02TB1–TB–500	52 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G02TB1 – 56TH PLACE TBS\G02TB1–TB–500.DWG
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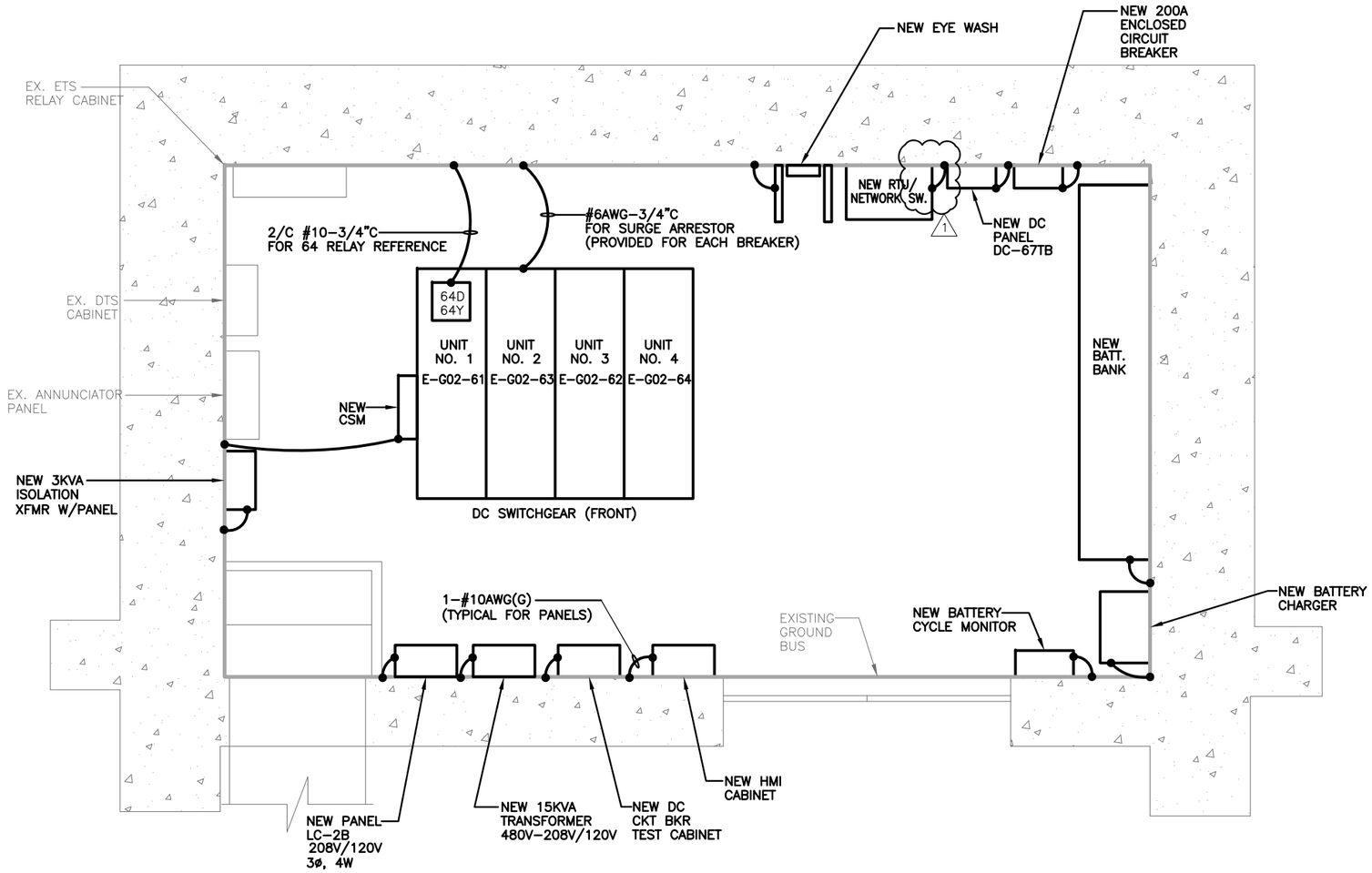

A EQUIPMENT GROUNDING PLAN - NEW

G02TB2-TB-201 67TH AVE. TBS SCALE: 1/2"=1'-0"

NOTES:

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.

COMMONWEALTH OF VIRGINIA Krishan Gupta Lic. No. 0402 011 45 PROFESSIONAL ENGINEER

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LICENSE No. 04020117145

EXPIRATION DATE: 10/31/2015

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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

SIX (6) TIE BREAKER STATIONS UPGRADES
ORANGE AND BLUE LINES DC, MD AND VA
G02TB2 - 67TH AVE. TIE BREAKER STATION
EQUIPMENT GROUNDING PLAN - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	AS NOTED	G02TB2-TB-201	55 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G02TB2 - 67TH AVE TBS\G02TB2-TB-201.DWG
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Images: ; ; N:\ROBINSON-ELECT-MECH\ELEC-MECH-PWR AutoCAD Folder_WMATA CAD TEMPLATE\Library\GU

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR	REV. NO.
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
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
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
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
AN-1	6/C	#14	600V	90°C	125V	DC	3		BATTERY CHARGER	CABLE TRAY & CONDUIT	RTU CABINET	BATT. CHARGER FAIL	0
AN-2	NOT USED												
AN-3	NOT USED												
AN-4	NOT USED												
AN-5	12/C	#14	600V	90°C	125V	DC	2		EMER. TRIP SWITCH RELAY CABINET	CONDUIT	RTU CABINET	ETS FAILURE ANNUNCIATION	
SC-1	12/C	#14	600V	90°C	24V	DC	5		DC SWGR. UNIT NO.1 TBKR. NO.1	CABLE TRAY & CONDUIT	SUPERVISURY 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	SUPERVISURY 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	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-4	12/C	#14	600V	90°C	24V	DC	5		DC SWGR. UNIT NO.4 TBKR. NO.4	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	CIRCUIT BREAKER CONTROL & INDICATION	0
SC-5	NOT USED												
SC-6	19/C	#14	600V	90°C	24V	DC	1		RTU CABINET	CABLE TRAY & CONDUIT	SUPERVISURY CONT. TERMINAL BOX	ANNUNCIATION	0
DC-1	2-1/C	#4	600V	90°C	125V	DC	0		BATTERY CHARGER	CONDUIT	NEW 200A ENCLOSED CIRCUIT BREAKER	BATTERY CHARGING DC FEED	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
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
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

CABLE					CIRCUIT				ROUTING				
NUMBER	CONSTRUCT.	SIZE AWG.	INSULATION VOLTAGE	INSULATION TYPE	VOLTAGE	A.C. OR D.C.	SPARE COND.		FROM	VIA	TO	FOR	REV. NO.
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-67TB	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-67TB	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-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
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
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 SUPLY	0
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
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
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 SUPLY	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
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
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
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
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
MA-5	NOT USED												
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.5 TBKR. NO.2	CONDUIT	JUNCTION BOX	NEG. POLARITY REFERENCE	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
DP – D.C. POSITIVE POWER CABLE
DN – D.C. NEGATIVE POWER CABLE
DD – D.C. UTILITY DRAIN CABLE

AN – ANNUNCIATOR CABLE
SC – SUPERVISORY CONTROL CABLE
ET – EMERGENCY TRIP CABLE
MT – METERING & INSTRUMENTATION CABLE

CN – OPERATING CONTROL CABLE
MA – MISCELLANEOUS CIRCUITS
AC – A.C. LOW VOLTAGE POWER CIRCUITS
DC – D.C. CONTROL POWER CIRCUITS

END APPR – END APPROACH OF CONTACT RAIL
*** BOLD TEXT INDICATES NEW CABLES
*** SCREENED TEXT INDICATES EXISTING TO REMAIN CABLES

1 NOTE:
CABLES AN-1, AN-5, AC-7, AC-8, DC-5, DC-8, SC-6 AND DC-9 ARE SHOWN ON SCADA DRAWINGS ALSO FOR REFERENCE

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COMMONWEALTH OF VIRGINIA — Keshav Gupta — Lic. No. 040201171 — PROFESSIONAL ENGINEER

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

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

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

REVISION SUBMITTED DATE
APPROVED . DEPUTY CHIEF ENGINEER DATE

SIX (6) TIE BREAKER STATIONS UPGRADES
ORANGE AND BLUE LINES DC, MD AND VA
G02TB2 - 67TH AVE. TIE BREAKER STATION
CONDUIT AND CABLE SCHEDULE

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G02TB2-TB-300	57 OF 60

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Date: Fri, 30 Oct 2015
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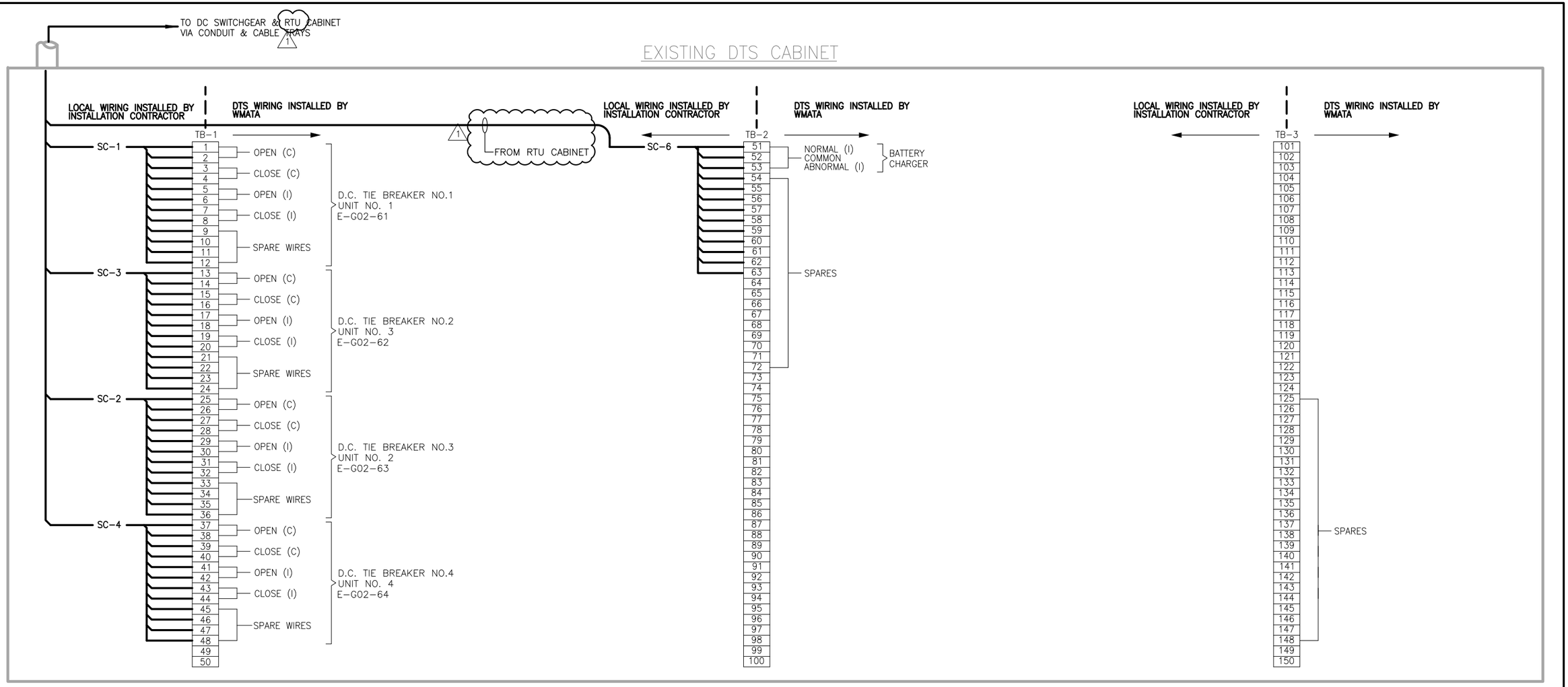

G02TB2 TIE BREAKER STATION

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 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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- VA Regulations 18VAC10-20-760

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

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

DATE	NUM	DESCRIPTION
11/2/15	1	AMENDMENT NO. 1

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

DEPARTMENT OF TRANSIT INFRASTRUCTURE AND ENGINEERING SERVICES
CENI - POWER SYSTEMS ENGINEERING

REVISION SUBMITTED DATE

APPROVED . DEPUTY CHIEF ENGINEER DATE

SIX (6) TIE BREAKER STATIONS UPGRADES
ORANGE AND BLUE LINES DC, MD AND VA
G02TB2 - 67TH AVE. TIE BREAKER STATION
SUPERVISORY AND CONTROL DIAGRAM - NEW

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G02TB2–TB–401	59 OF 60

Drawing File: H:\WMATA PROJECTS\FQ15237\DRA\TBS\G02TB2 - 67TH AVE TBS\G02TB2–TB–401.DWG
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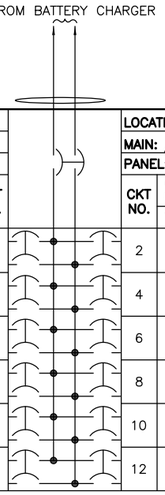
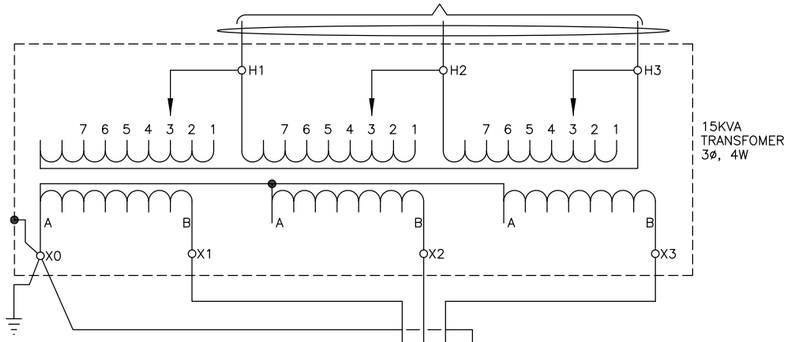


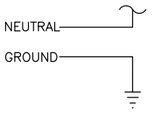
PANEL NAME:	PANEL DC–67TB					LOCATION:	67TH AVE. TIE BREAKER STATION			
PANEL TYPE:	DC DISTRIBUTION /1					MAIN: /1	200A MCB			
BUS RATING:	125VDC – 200A MAX					PANEL:	SURFACE MOUNTED			
DESCRIPTION	CONNECTED LOAD (KVA)		CKT BKR TRIP	CKT NO.		CKT NO.	CKT BKR TRIP	CONNECTED LOAD (KVA)		DESCRIPTION
	AØ	BØ						AØ	BØ	
DC CONTROL POWER	0		60	1		2	20	0		SPARE
		0							0	
DC CIRCUIT BREAKER TEST CABINET			30	3		4	30			EMERGENCY TRIP SWITCH RELAY CABINET
HMI			20	5		6	20	0		EMERGENCY LIGHT FIXTURE
									0	
RTU			20	7		8	20			NETWORK SWITCH
SPACE				9		10				SPACE
SPACE				11		12				SPACE
SUB–TOTAL	0	0						0	0	SUB–TOTAL

	TOTAL CONN. LOAD	
PHASE A	0	KVA
PHASE B	0	KVA
	0.00	KVA
	0.00	AMP



PANEL NAME:	PANEL LC–2B						LOCATION:	67TH AVE. TIE BREAKER STATION					
PANEL TYPE:	DISTRIBUTION						MAIN:	60A MCB					
BUS RATING:	100A, 208V/120V 3Ø, 4W GND & NEU BUS						PANEL:	SURFACE MOUNTED					
DESCRIPTION	CONNECTED LOAD (KVA)			CKT BKR TRIP	CKT NO.		CKT NO.	CKT BKR TRIP	CONNECTED LOAD (KVA)			DESCRIPTION
	AØ	BØ	CØ						AØ	BØ	CØ	
ISOLATION TRASFORMER	0			20	1		2	20	0			BATTERY CYCLE MONITOR
RTU		0		20	3		4	20		0		SPARE
SPARE			0	20	5		6	20			0	SPARE
SPARE				20	7		8	20				SPARE
SPARE				20	9		10	20				SPARE
SPACE					11		12	20				SPARE
SPACE					13		14					SPACE
SPACE					15		16					SPACE
SPACE					17		18					SPACE
SPACE					19		20					SPACE
SPACE					21		22					SPACE
SPACE					23		24					SPACE
SUB–TOTAL	0	0	0						0	0	0	SUB–TOTAL

	TOTAL CONNECTED LOAD	
PHASE A	0	KVA
PHASE B	0	KVA
PHASE C	0	KVA
	0.00	KVA
	0.00	AMP



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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

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

G02TB2 - 67TH AVE. TIE BREAKER STATION
PANELBOARD SCHEDULES

CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
FQ15237	NONE	G02TB2–TB–500	60 OF 60