METROLINX

GO ELECTRIFICATION

ENABLING WORKS ET STANDARDS

CONTRACT NO. QBS-2014-IEP-002

MX-ELEC TRAC EW-DW-2016-REV1 1

PETER M. ZUK - CHIEF CAPITAL OFFICER 1

METROLINX

CONTRACT No. QBS-2014-IEP-002

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TYPE OF WORK	ENABLING WORKS ET STANDARDS
LOCATION	SYSTEM WIDE
MUNICIPALITY	

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5 Nov 2018
DATE

D. WILLIAMS
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CAPITAL PROJECTS GROUP
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METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

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REFERENCE DRAWINGS		ISSUE			REVISIONS		
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SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
INDEX OF DRAWINGS

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0003	1	XX

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ABBREVIATIONS

AAR	ASSOCIATION OF AMERICAN RAILROAD	EGC	EQUIPMENT GROUNDING CONDUCTOR	MGB	MAIN GROUNDING BAR	SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
ac	ALTERNATING CURRENT	EL/ ELEV	ELEVATION	M/C	MONITOR AND CONTROL	SM	SINGLE MODE
ADJ	ADJUSTMENT	ET	ELECTRIC TRACTION	MIN	MINIMUM	SPD	SURGE PROTECTION DEVICE
AGWB	ALUMINUM GROUND WIRE (BARE)			mm	MILLIMETER	SQ	SQUARE
AGWC	ALUMINUM GROUND WIRE (COVERED)	FDN	FOUNDATION	MOD	MODIFIED	SS/SST	STAINLESS STEEL
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	FDRI	FEEDER WIRE (INSULATED)	MP	MILEPOST	STA	STATION DISTANCE
ATF	AUTOTRANSFORMER FEEDER	FRA	FEDERAL RAILROAD ADMINISTRATION	MPA	MID POINT ANCHOR	STD/(S)	STANDARD/STANDARDS
ATFZ	AUTOTRANSFORMER FEEDER ZONE	FRE	FIBERGLASS–REINFORCED EPOXY	MPT	MID POINT TIE WIRE	STN	PASSENGER STATION
ATM	ALONG TRACK MOVEMENT	FTA	FIXED TERMINATION ANCHOR	MV	MEDIUM VOLTAGE	SW	STATIC WIRE
AWG	AMERICAN WIRE GAGE	FW	FEEDER WIRE	MW	MESSENGER WIRE	SWS	SWITCHING STATION
BWA	BALANCE WEIGHT TERMINATION ANCHOR	GALV.	GALVANIZED	N	NEWTON	T/	TOP OF
		GBCW	GROUNDING AND BONDING WIRE	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION	TBD	TO BE DETERMINED
C	CELSIUS	GENL	GENERAL	N.O.	NORMALLY OPEN	TBS	TRANSMISSION BACKBONE SYSTEM
CCZ	CURRENT COLLECTOR ZONE	GTCC	GO TRANSIT CONTROL CENTER	NOM	NOMINAL	TOR	TOP OF RAIL
CGWC	COPPER GROUND WIRE (COVERED)			NTS	NOT TO SCALE	TPF	TRACTION POWER FACILITY
CL	CENTER LINE	H/HT	HEIGHT			TPSS	TRACTION POWER SUBSTATION
CLR	CLEARANCE	HORIZ	HORIZONTAL	O/LAP	OVERLAP	TRK	TRACK
CP	COUNTERPOISE	HRL	HIGH RAIL	OCLZ	OVERHEAD CONTACT LINE ZONE	TRKS	TRACKS
CW	CONTACT WIRE			OCS	OVERHEAD CONTACT SYSTEM	TVM	TICKET VENDING MACHINE
CWB	COUNTERPOISE WIRE (BURIED)	IN	INCH	OH	OVERHEAD	TWA	TIE WIRE ANCHOR
CWH	CONTACT WIRE HEIGHT	IR	IN RUNNING	OOR	OUT–OF–RUNNING	TWPC	TRACTION WAYSIDE POWER CONTROL CUBICLE
						TYP	TYPICAL
dc	DIRECT CURRENT	JW	JUMPER WIRE	Pa	PASCAL		
DEG, °	DEGREE			PITO	POINT OF INTERSECTION OF THE TURNOUT	UP	UNION PEARSON EXPRESS
DG	DOWN GUY	kg	KILOGRAM	PS	PARALLELING STATION		
DGW	DOWN GUY WIRE	kg/M	KILOGRAM PER METER	PSF	POUND PER SQUARE FOOT	V	VOLT
DIA	DIAMETER			PVC	POLYVINYL CHLORIDE	VERT	VERTICAL
DIST	DISTRIBUTION	LG	LONG	P.S.	POINT OF SWITCH	VLD	VOLTAGE LIMITING DEVICE
DRM	DESIGN REQUIREMENT MANUAL	LPS	LIGHTNING PROTECTION SYSTEM			VMS	VISUAL MESSAGE SIGN
DVP	DON VALLEY PARKWAY	LV	LOW VOLTAGE (120V NOMINAL VOLTAGE)	RC	RETURN CABLE		
DWG	DRAWING			REINF	REINFORCEMENT	W	WIDTH
		m/M	METER	ROW	RIGHT–OF–WAY	WP	WORKING POINT
EA	EMERGENCY ALARM	MF	MAINTENANCE FACILITY				
EB	EASTBOUND						

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ELECTRIFICATION IMPLEMENTATION
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METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

GENERAL NOTES:

1. THESE DRAWINGS PRESENT THE REQUIREMENTS FOR GROUNDING AND BONDING OF PASSENGER STATIONS FOR COORDINATION WITH THE FUTURE ELECTRIFICATION AND ITS TRACTION POWER RETURN SYSTEM (TPRS). THE TPRS CONSISTS OF VARIOUS COMPONENTS (SUCH AS RUNNING RAILS, RAIL BONDING CABLES, AERIAL STATIC WIRE, AND EARTH) TO ALLOW CURRENT FROM THE ELECTRIC TRAIN VEHICLE TO ULTIMATELY RETURN TO ITS SUPPLY SUBSTATION SOURCE UNDER BOTH NORMAL OPERATING CONDITIONS AND UNDER FAULT CONDITIONS.
2. THE GROUNDING AND BONDING SYSTEM SHALL PROVIDE THE MEANS TO CARRY TRACTION ELECTRIC CURRENTS INTO THE EARTH, UNDER BOTH NORMAL AND FAULT CONDITIONS, WITHOUT EXCEEDING OPERATING EQUIPMENT LIMITS, WITHOUT THERMAL DEGRADATION OR MECHANICAL BREAKDOWN, AND WITHOUT ADVERSELY AFFECTING CONTINUITY OF SERVICE OR PERSONNEL SAFETY.
3. THE GROUNDING ELECTRODES SHALL BE CONTAINED WITHIN THE RIGHT OF WAY CONFINES. THE BONDING MATERIAL SHALL BE CAPABLE OF SUSTAINING THE SHORT–CIRCUIT CURRENTS FOR UP TO THE TOTAL SWITCH–OFF (TRIP) TIME IMPOSED ON THE SYSTEM WITHOUT THERMAL DEGRADATION OR MECHANICAL BREAKDOWN. THE TRACTION EQUIPMENT BONDING SHALL BE CAPABLE OF DISCHARGING A 15kA FAULT FROM THE OCS WITHIN 0.5 SECONDS.
4. ADEQUATE BONDING SHALL BE DESIGNED AND INSTALLED THROUGHOUT THE STATION PLATFORM AREA TO PROVIDE PROPER RETURN CIRCUITS FOR THE NORMAL TRACTION POWER CURRENTS AND FAULT CURRENTS, WITH GROUNDING CONNECTIONS AS SPECIFIED HEREIN WITHOUT AFFECTING LIFE AND PROPERTY.
5. THE GROUNDING AND BONDING SYSTEM SHALL COMPLY WITH THE REQUIREMENTS OF THE LATEST REVISION OF THE CANADIAN ELECTRICAL CODE PART 1 AND PART 2, THE ONTARIO ELECTRICAL SAFETY CODE, THE NATIONAL ELECTRICAL CODE, METROLINX GUIDELINES AND THE TECHNICAL AND SAFETY RECOMMENDATIONS OF ANSI, IEEE, EN AND OTHER APPLICABLE LOCAL AND INTERNATIONAL CODES AND STANDARDS.
6. SUGGESTED MANUFACTURERS AND CATALOG NUMBERS FOR STANDARD PRODUCTS ARE PROVIDED HEREIN. ALTERNATIVE MATERIALS MAY BE SUPPLIED, WITH CUT SHEETS SUBMITTED FOR OWNERS APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION. ALL MATERIALS SHALL BE CSA APPROVED.
7. PRESCRIBED MATERIALS, CABLES AND APPURTENANCES SHALL BE COMPLIANT WITH APPLICABLE CSA AND ULC STANDARDS.
8. FOR LOCATIONS THAT ARE ACCESSIBLE TO THE PUBLIC, THE FOLLOWING CONSTRAINTS SHALL APPLY TO THE GROUNDING AND BONDING DESIGN:
   A. ANCHOR BOLTS AND GROUND LUGS SHALL NOT PROTRUDE IN A MANNER THAT COULD RESULT IN INJURY OR PROPERTY DAMAGE;
   B. MATERIALS SHALL BE CONCEALED WHEREVER POSSIBLE;
   C. LOCATION OF GROUNDING TESTING WELL STATIONS IN PUBLIC AREAS SHALL BE AVOIDED;
   D. TAMPER PROOF HARDWARE SHALL BE USED.
9. GROUND RESISTANCE MEASUREMENTS, GROUND POTENTIAL RISE STUDIES AND DETAILED DESIGN SHALL BE PERFORMED TO DETERMINE THE EXTENT OF GROUNDING AND/OR BONDING WITHIN GIVEN SPECIFIC SITE CONDITIONS. THE MINIMUM SIZED ELECTRIC TRACTION GROUNDING AND/OR BONDING CONDUCTOR SHALL BE #4/0 AWG IN SIZE.
10. CONTACT SURFACES OF EQUIPMENT OR MISCELLANEOUS STEEL SHALL BE SCRAPED CLEAN TO BRIGHT METAL AND "NO–OX–ID" GREASE OR EQUIVALENT SHALL BE APPLIED BEFORE BOLTING COPPER GROUND LUG OR USING EXOTHERMIC WELD CONNECTION.
11. ALL GROUNDING AND BONDING DESIGNS SHALL BE COORDINATED WITH THE VARIOUS DISCIPLINE DESIGNS, INCLUDING CIVIL, ARCHITECTURAL, ELECTRICAL AND ELECTRONIC, MECHANICAL, AND PLUMBING, TRACTION POWER SUPPLY AND DISTRIBUTION, COMMUNICATIONS, AND SIGNALING.
12. ALL GROUNDING AND BONDING DESIGNS SHALL BE COORDINATED WITH ELECTROMAGNETIC COMPATIBILITY (EMC) AND ELECTROMAGNETIC INTERFERENCE (EMI) REQUIREMENTS, SO THAT THE RESPECTIVE DESIGNS DO NOT CONFLICT AND RENDER OTHER SYSTEMS INEFFECTIVE.
13. ALL GROUNDING AND BONDING DESIGNS SHALL BE COORDINATED WITH ANY NEIGHBORING STRAY CURRENT AND CORROSION CONTROL MEASURES FOR ADJACENT SYSTEMS, AS WELL AS WHEN IN THE VICINITY OF DIRECT CURRENT (DC) TRACTION POWER TRANSIT SYSTEMS.
14. GROUNDING AND BONDING IS TO BE DESIGNED AND IMPLEMENTED PRIMARILY IN ACCORDANCE WITH THE FOLLOWING STANDARDS AS APPLICABLE:

    CAN/CSA C22.2 NO.0.4 – BONDING AND GROUNDING OF ELECTRICAL EQUIPMENT

    CAN/CSA C22.3 NO.2 – GENERAL GROUNDING REQUIREMENTS AND GROUNDING REQUIREMENTS FOR ELECTRICAL SUPPLY STATIONS

    CAN/CSA C22.2 NO.8 – M91 (REAFFIRMED 2003) RAILWAY ELECTRIFICATION GUIDELINE STANDARD

    EN 50122–1: RAILWAY APPLICATIONS, FIXED INSTALLATIONS – PROTECTIVE PROVISIONS RELATING TO ELECTRICAL SAFETY AND GROUNDING

    IEC 60479: EFFECTS OF CURRENT ON HUMAN BEINGS AND LIVESTOCK

    CSA B72 – M87 (REAFFIRMED 2008) – INSTALLATION CODE FOR LIGHTNING PROTECTION SYSTEMS

    NFPA 780: STANDARD FOR LIGHTNING PROTECTION SYSTEMS

    ONTARIO ELECTRICAL SAFETY CODE (OESC), LATEST EDITION

OVERHEAD CONTACT LINE ZONE (OCLZ):

1. METALLIC OBJECTS AND EQUIPMENT AT PASSENGER STATIONS ARE WITHIN THE OCLZ AND ARE TO BE PROPERLY GROUNDED AND BONDED. THE GROUNDING AND/OR BONDING CONFIGURATION TO BE EMPLOYED IS DEPENDENT UPON THE EQUIPMENT INVOLVED. SPECIAL CONSIDERATIONS ARE GIVEN TO RAILROAD SIGNAL, RAILROAD COMMUNICATIONS AND 3RD PARTY UTILITIES.

OVERHEAD CONTACT LINE ZONE (OCLZ)(CONTINUED):

2. THE OVERHEAD CONTACT LINE ZONE (OCLZ) REPRESENTS AN AREA WHERE A LIVE BROKEN CONTACT LINE, OR LIVE PARTS OF A BROKEN OR DE–WIRED PANTOGRAPH OR ENERGIZED FRAGMENTS, MAY ACCIDENTALLY COME INTO CONTACT WITH WAYSIDE STRUCTURES AND EQUIPMENT. AS DERIVED FROM EUROPEAN STANDARD EN 50122–1, THE OVERHEAD CONTACT LINE ZONE (OCLZ) IS USED TO DEFINE THE AREA IN WHICH NORMALLY NON–CURRENT–CARRYING METALLIC COMPONENTS IN THIS ZONE ARE TO BE EITHER DIRECTLY GROUNDED OR BONDED TO THE TRACTION POWER RETURN SYSTEM TO PROVIDE FOR PERSONNEL SAFETY.

STEP AND TOUCH POTENTIALS:

1. AN ELECTRICAL SAFETY ANALYSIS SHALL TAKE INTO ACCOUNT CRITERIA FOR THE GROUND POTENTIAL RISE. THE ANALYSIS SHALL BE UNDERTAKEN TO ASSESS WHICH NORMALLY NON–CURRENT CARRYING CONDUCTIVE PARTS NEED TO BE GROUNDED AND BONDED, AND THE APPROPRIATE METHOD OF IMPLEMENTATION SHALL BE IDENTIFIED TO ENSURE THAT THE STEP AND POTENTIALS ARE WITHIN PERMISSIBLE LIMITS.
2. THE GROUNDING AND BONDING OF OTHER NON–CURRENT CARRYING EQUIPMENT, ENCLOSURES AND ASSOCIATED STRUCTURE, INCLUDING THE OVERHEAD CONTACT SYSTEM (OCS) STRUCTURES, RAILS, STATION PLATFORM METALLIC OBJECTS, AND OTHER CONDUCTIVE TRACKSIDE EQUIPMENT, SHALL BE DESIGNED SUCH THAT TOUCH VOLTAGES DO NOT EXCEED THE VALUES INDICATED IN STANDARD EN 50122–1: 2011 SECTION 9.2.2.

GROUNDING AND BONDING AT STATION PLATFORMS:

1. STATION PLATFORM AREAS REQUIRE SPECIAL CONSIDERATION TO MITIGATE STEP AND TOUCH POTENTIALS WHERE PASSENGERS COULD SIMULTANEOUSLY COME IN CONTACT WITH ROLLING STOCK CAR BODIES AND METALLIC OBJECTS ON THE PLATFORM. IN ADDITION, THE NEED TO PROTECT PERSONNEL AND EQUIPMENT AGAINST TRACTION POWER FAULT CONDITIONS IF THE OCS OR AUTO–TRANSFORMER FEEDER WIRE WERE TO FALL/ENERGIZE THIS AREA. THE CONFIGURATION DEFINED IN AREMA, CHAPTER 33, SECTION 7.5.1.1 METHOD B, SHALL BE EMPLOYED AT PASSENGER STATION AREAS.
2. RETROFIT STATIONS: (1)
   A. FOR RETROFIT INSTALLATIONS OF EXISTING STATIONS PLATFORM GROUNDING, A COUNTERPOISE WIRE (#4/0 AWG COPPER, 37 STRAND) SHALL BE INSTALLED ALONG THE ENTIRE LENGTH OF EACH PLATFORM WITH THE CONDUCTOR BURIED IN EARTH AND EXTENDING A MINIMUM OF 15 METERS (50 FEET) BEYOND THE END OF EACH PLATFORM WITH A TESTED GROUND RESISTANCE VALUE OF 5 OHMS (MAXIMUM). IF NECESSARY, ADDITIONAL PROVISIONS FOR GROUNDING SHALL BE MADE TO ACHIEVE THE 5 OHM VALUE. THE BURIED COUNTERPOISE WIRE MAY BE INSTALLED ON THE TRACK SIDE OF THE PLATFORM AT A DEPTH (0.41 – 0.61 METERS) TO AVOID DAMAGE FROM TRACK MAINTENANCE OPERATIONS.
   B. A HAND–HOLE ENCLOSURE, WITH A COPPER BUS BAR, SHALL BE INSTALLED AT EACH END OF THE PLATFORM FOR THIS COUNTERPOISE TO SERVICE AS A TESTING LOCATION, AS WELL AS PERMIT THE CONNECTION TO THE RAILS VIA AN IMPEDANCE BOND. THE IMPEDANCE BOND CONNECTION LOCATION IS TO BE COORDINATED WITH THE SIGNAL SYSTEM DESIGN IN THE FUTURE. THE COUNTERPOISE SHALL BE CONNECTED TO THE RAILS AT ONE END ONLY SO AS NOT TO ADVERSELY AFFECT BROKEN RAIL DETECTION. THIS HAND–HOLE ENCLOSURE SHALL BE POLYMER CONCRETE UNLESS IN AREAS SUBJECTED TO VEHICULAR TRAFFIC ALONG THE RIGHT OF WAY, OTHERWISE IT SHALL BE PRECAST CONCRETE SUITABLE FOR PLACEMENT IN ROADWAYS. IF ENCLOSURE IS WITHIN 7.5m OF THE CENTERLINE OF TRACK, IT SHALL WITHSTAND COOPER E80 (MIN.) SOIL SURCHARGE LOADS. (1)
   C. ADDITIONAL RETROFIT CONSTRUCTION IS REQUIRED AT THE STATION TO INSTALL BONDING JUMPERS FROM THIS COUNTERPOISE TO PLATFORM METALLIC OBJECTS. THE BONDING JUMPERS SHALL BE #4/0 AWG (MINIMUM) COPPER IN SIZE (UNLESS OTHERWISE NOTED). ALL NORMALLY NON–CURRENT–CARRYING METALLIC STRUCTURES AND MISCELLANEOUS METALLIC ITEMS (EXCEPT FOR SMALL ITEMS 2X3m OR LESS) ON THE PLATFORM (INCLUDING PLATFORM REINFORCEMENT STEEL FOR CONCRETE PLATFORMS, ANY OCS POLES, STAIRWAYS, PLATFORM SHELTERS, ELEVATORS, OR OTHER FEATURES) SHALL BE BONDED DIRECTLY TO THE COUNTERPOISE.
   D. WHERE OCS POLES ARE PLANNED TO BE WITHIN STATION PLATFORM AREAS, THEIR STATIC WIRE IS TO BE ISOLATED FROM THE POLES, AND ITS FOUNDATION GROUNDED PER OCS REQUIREMENTS FOR A MAXIMUM OF 25 OHMS. THE FOUNDATION GROUNDING SHALL BE BONDED TO THE STATION COUNTERPOISE FURTHER REDUCING THE FOUNDATION GROUND RESISTANCE TO A MAXIMUM OF 5 OHMS. IN ADDITION, A PORTION OF THE STATION PLATFORM END, NEAR THE HAND–HOLE ENCLOSURE, SHALL HAVE ITS REBAR EXPOSED TO PERMIT A BOND BETWEEN THE REBAR AND THE COUNTERPOISE WIRE FOR CONCRETE PLATFORMS.
   E. IN AREAS WHERE PORTAL TYPE OCS STRUCTURES ARE LOCATED, AND HAVE THEIR FOUNDATIONS IN BOTH INBOUND AND OUTBOUND PLATFORMS, THE OCS POLES SHALL ONLY BE BONDED TO THE COUNTERPOISE ONLY AT ONE PLATFORM. THIS IS SO NOT TO CREATE A CROSS–BOND POINT. (1)
3. NEW STATIONS AND STATIONS WITH EXTENSIVE REHABILITATION:
   A. FOR NEWLY CONSTRUCTED STATIONS WITH CONCRETE PLATFORMS, THE TOP LAYER OF REBAR IN THE PLATFORM SHALL BE MADE ELECTRICALLY CONTINUOUS BY EXOTHERMICALLY WELDING THE LONGITUDINAL REBAR SPLICE/OVERLAPS ACROSS THE LENGTH OF THE PLATFORM, IN ADDITION TO EXOTHERMICALLY WELDING THE PERPENDICULAR REBAR CROSSINGS TO THE LONGITUDINAL BARS EVERY 15.25m ON CENTER.
   B. THE ELECTRICALLY CONTINUOUS TOP LAYER OF REBAR, IF CONCRETE PLATFORMS ARE TO BE CONSTRUCTED, AND A #4/0 AWG, 37 STRAND BARE COPPER WIRE (COUNTERPOISE) SHALL BE INSTALLED ALONG THE ENTIRE LENGTH OF THE PLATFORM TO FACILITATE BONDING OF STATION METALLIC OBJECTS TO THE TRACTION RETURN SYSTEM. THE COUNTERPOISE SHALL BE WITHIN THE SLAB, EXOTHERMICALLY CONNECTED TO THE REBAR APPROXIMATELY EVERY 30.5m, AND EXTENDED A MINIMUM OF 15 METERS (50 FEET) BEYOND THE ENDS OF THE PLATFORM WITH GROUND ROD CONNECTION. THE NETWORK OF REBAR AND COUNTERPOISE GROUND SHALL HAVE A TESTED GROUND RESISTANCE VALUE OF 5 OHMS (MAXIMUM). IF NECESSARY, ADDITIONAL PROVISIONS FOR GROUNDING SHALL BE MADE TO ACHIEVE THE 5 OHM VALUE.

GROUNDING AND BONDING AT STATION PLATFORMS (CONTINUED):

   C. A HAND–HOLE ENCLOSURE, WITH A COPPER BUS BAR, SHALL BE INSTALLED AT EACH END OF THE PLATFORM FOR THIS COUNTERPOISE TO SERVICE AS A TESTING LOCATION, AS WELL AS PERMIT THE CONNECTION TO THE RAILS VIA AN IMPEDANCE BOND. THE IMPEDANCE BOND CONNECTION LOCATION IS TO BE COORDINATED WITH THE SIGNAL SYSTEM DESIGN IN THE FUTURE, BY OTHERS. THE COUNTERPOISE SHALL BE CONNECTED TO THE RAILS AT ONE END ONLY SO AS NOT TO ADVERSELY AFFECT BROKEN RAIL DETECTION. THIS HAND–HOLE ENCLOSURE SHALL BE POLYMER CONCRETE UNLESS IN AREAS SUBJECTED TO VEHICULAR TRAFFIC ALONG THE RIGHT OF WAY, OTHERWISE IT SHALL BE PRECAST CONCRETE SUITABLE FOR PLACEMENT IN ROADWAYS OR COOPER E80 (MIN.) WHEN NEAR TRACKS. (1)
   D. ALL NORMALLY NON–CURRENT–CARRYING METALLIC STRUCTURES AND MISCELLANEOUS METALLIC ITEMS (EXCEPT FOR SMALL ITEMS LESS THAN 2X3m) ON THE PLATFORM (INCLUDING PLATFORM REINFORCEMENT STEEL FOR CONCRETE PLATFORMS, ANY OCS POLES, STAIRWAYS, PLATFORM SHELTERS, ELEVATORS, OR OTHER FEATURES) SHALL BE BONDED DIRECTLY TO THE COUNTERPOISE. THE BONDING JUMPERS SHALL BE #4/0 AWG (MINIMUM) COPPER IN SIZE (UNLESS OTHERWISE NOTED).
   E. WHERE OCS POLES ARE PLANNED TO BE WITHIN STATION PLATFORM AREAS, THEIR STATIC WIRE IS TO BE ISOLATED FROM THE POLES, AND ITS FOUNDATION GROUNDED PER OCS REQUIREMENTS FOR A MAXIMUM OF 25 OHMS. THE FOUNDATION GROUNDING SHALL BE BONDED TO THE STATION COUNTERPOISE FURTHER REDUCING THE FOUNDATION GROUND RESISTANCE TO A MAXIMUM OF 5 OHMS.
   F. IN AREAS WHERE PORTAL TYPE OCS STRUCTURES ARE LOCATED, AND HAVE THEIR FOUNDATIONS IN BOTH INBOUND AND OUTBOUND PLATFORMS, THE OCS POLES SHALL BE BONDED TO THE COUNTERPOISE ONLY AT ONE PLATFORM. THIS IS SO NOT TO CREATE A CROSS–BOND POINT.

STATION ELECTRICAL AND UTILITY SERVICES:

1. INSTALLATIONS FOR ELECTRICAL SERVICES SHALL CONFORM TO EN 50122–1:2011 SECTION 7.4.4.1, WHERE IT PERMITS THE EXPOSED CONDUCTIVE PARTS TO BE BONDED DIRECTLY TO THE RETURN CIRCUIT AND THEN DISCONNECTING THE CIRCUIT GROUND WIRE THAT ORIGINATES FROM THE ELECTRICAL PANELBOARD TO THE EXPOSED CONDUCTIVE PART OF THE EQUIPMENT WITHIN THE OCLZ. THE GROUND CONNECTION, WHICH ORIGINATES FROM THE ELECTRICAL PANELBOARD TO THE EXPOSED CONDUCTIVE PART OF THE EQUIPMENT WITHIN THE OCLZ, SHALL BE REMOVED ONLY AFTER THE ELECTRIFICATION IS READY FOR SERVICE. A CONNECTION SHALL ALSO BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY (A CROSS BOND SHALL NOT BE CREATED). (1)
2. NON–METALLIC RACEWAYS SHOULD ALSO BE USED TO ROUTE THESE INCOMING POWER CIRCUITS WHEN ENTERING THE STATION PLATFORM AREA AND OTHER LOCATIONS WITHIN THE OCLZ.
3. LOW VOLTAGE POWER DISTRIBUTION RACEWAYS WITHIN THE STATION SHALL BE NON–METALLIC.

3RD PARTY UTILITIES:

1. EXISTING UTILITIES:
   A. EXISTING BURIED 3RD PARTY UTILITIES WILL NOT REQUIRE ADDITIONAL BONDING TO THE TRACTION RETURN SYSTEM. EACH UTILITY OWNER SHOULD BE ADVISED OF THE FUTURE ELECTRIFICATION PROJECT.
   B. EXPOSED METALLIC UTILITY PIPING (WATER, SEWER, GAS, ELECTRIC) OUTSIDE THE OCLZ SHALL BE GROUNDED IN ACCORDANCE WITH THE UTILITY'S REQUIREMENTS.
   C. EXPOSED METALLIC UTILITY PIPING THAT IS WITHIN THE OCLZ REQUIRES BONDING TO THE TRACTION RETURN SYSTEM. IF CONTINUOUSLY RUNNING WITHIN THE OCLZ AREA, THEN ITS METALLIC PIPING SHALL BE BROKEN INTO SECTIONS OF APPROXIMATELY 305 METERS WITH APPROVED INSULATING COLLARS AND BE BONDED AT ITS MIDPOINT TO THE NEAREST OCS STRUCTURE VIA #4/0 AWG COPPER WIRE. ANY EXISTING EARTH–MADE GROUND CONNECTIONS FROM THESE UTILITIES MAY REMAIN. IF OTHER MECHANISMS WERE USED TO GROUND THESE FACILITIES, METROLINX IS TO BE ADVISED.
2. NEW UTILITIES: (1)
   A. NEW BURIED 3RD PARTY UTILITIES UNDER THE TRACKS ARE TO BE INSTALLED IN A STEEL CASING PIPE WITH ITS ENDS SEALED TO PREVENT LEAKAGE AND INGRESS OF MOISTURE AND SOIL. THIS IS TO FACILITATE ANY FUTURE UTILITY REPLACEMENT, IF NECESSARY, AND HELPS PROTECT THE RAILROAD TRACK BED INFRASTRUCTURE IF THE UTILITY CARRYING LIQUID OR PRESSURIZED SUBSTANCES WERE COMPROMISED.
   B. EXPOSED METALLIC UTILITY PIPING (WATER, SEWER, GAS, ELECTRIC) OUTSIDE THE OCLZ SHALL BE GROUNDED IN ACCORDANCE WITH THE UTILITY'S REQUIREMENTS.
   C. EVERY EFFORT MUST BE MADE TO KEEP NEW 3RD PARTY UTILITIES OUTSIDE THE OCLZ AREA. NEW EXPOSED 3RD PARTY UTILITIES INSIDE THE OCLZ ARE TO HAVE THEIR CARRIER PIPE ENCLOSED IN A STEEL CASING PIPE THAT IS ISOLATED FROM THE CARRIER PIPE BY APPROVED INSULATORS. THE STEEL CASING PIPE SHALL HAVE INSULATING COLLARS AT APPROXIMATELY 305 METERS WITH ITS MIDPOINT BONDED TO THE NEAREST OCS STRUCTURE VIA #4/0 AWG COPPER WIRE.
3. UTILITIES IN STATION AREA:
   A. INSULATING COUPLING SHALL BE INSTALLED ON INCOMING UTILITIES (WATER, SEWER AND GAS) ENTERING THE PASSENGER STATIONS INSIDE THE OCLZ. PORTION OF UTILITY INSIDE THE OCLZ IS TO BE BONDED TO THE STATION GROUND GRID.

OVERHEAD BRIDGE STRUCTURES:

1. FLASH PLATES SHALL BE PROVIDED AT OVERHEAD BRIDGE STRUCTURES. FLASH PLATES SHALL BE CONDUCTIVE MATERIAL AS STATED IN THE PERFORMANCE SPECIFICATION AND BONDED TO THE TRACTION RETURN SYSTEM.
2. OVERHEAD STEEL BRIDGES SHALL HAVE TWO CONNECTIONS ON BOTH SIDES OF THE BRIDGE TO THE STATIC WIRE FOR BONDING TO THE TRACTION RETURN SYSTEM.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: W. CARNEY 17/10/09
CHECKED BY: T. DOYLE 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

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METROLINX

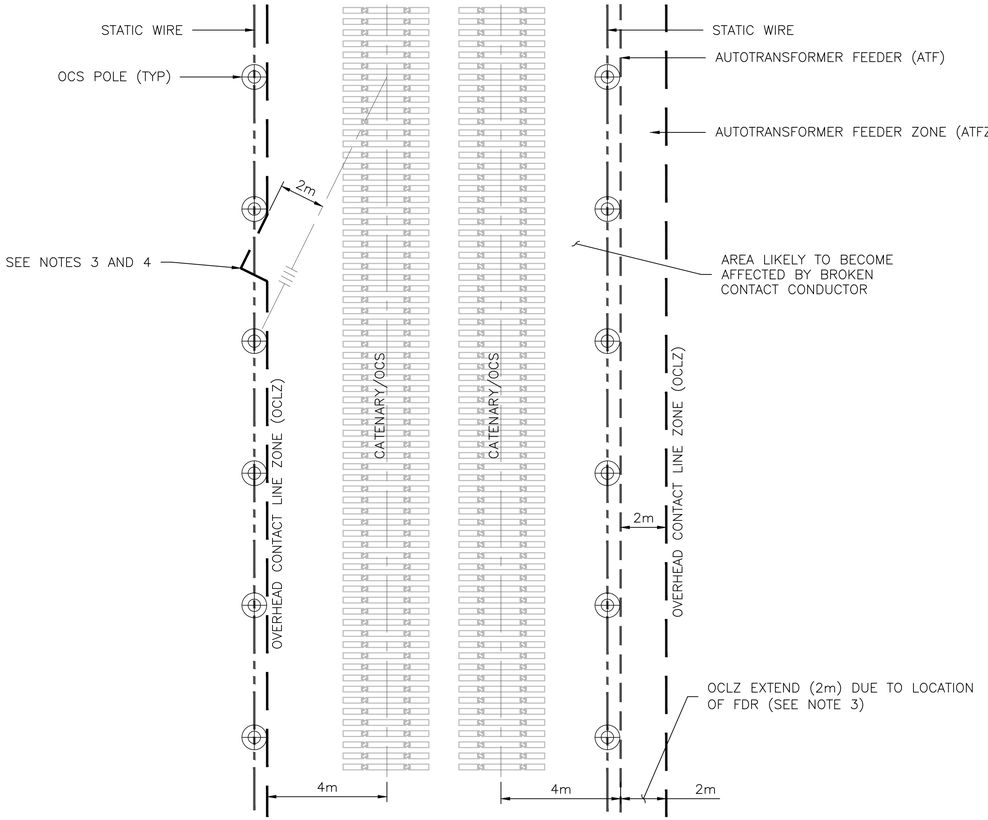
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING GENERAL NOTES

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0101	1	XX

GFTRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0101.dwg [LAYOUT] December 05, 2018 – 3:35pm svfidleris

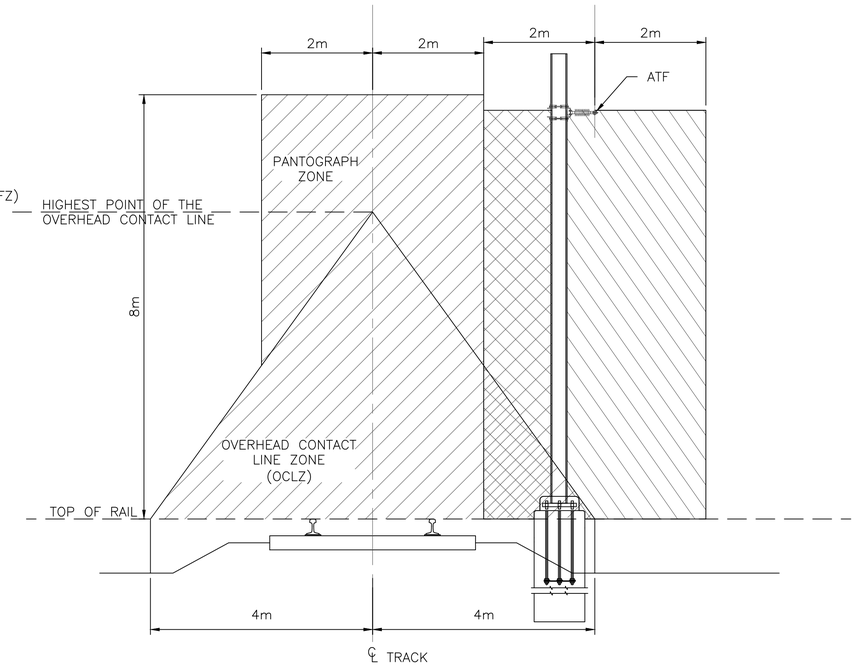
METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



OVERHEAD CONTACT LINE ZONE–PLAN VIEW

NOT TO SCALE



OVERHEAD CONTACT LINE ZONE AND PANTOGRAPH ZONE

NOT TO SCALE

NOTES:

1. SEE DRAWING EW–ET–0101 FOR GENERAL NOTES.
2. THE OVERHEAD CONTACT LINE ZONE (OCLZ) – A LIVE BROKEN CONTACT LINE, OR LIVE PARTS OF A BROKEN OR DE–WIRED PANTOGRAPH OR ENERGIZED FRAGMENTS, MAY ACCIDENTALLY COME INTO CONTACT WITH WAYSIDE STRUCTURES AND EQUIPMENT. AS DERIVED FROM EUROPEAN STANDARD EN 50122–1, THE OVERHEAD CONTACT LINE ZONE (OCLZ) IS USED TO DEFINE THE AREA IN WHICH NORMALLY NON–CURRENT–CARRYING METALLIC COMPONENTS IN THIS ZONE ARE TO BE EITHER DIRECTLY GROUNDED OR BONDED TO THE TRACTION POWER RETURN SYSTEM TO PROVIDE FOR PERSONNEL SAFETY. THE GROUNDING AND/OR BONDING CONFIGURATION TO BE EMPLOYED IS DEPENDENT UPON THE EQUIPMENT INVOLVED. SPECIAL CONSIDERATIONS ARE GIVEN TO RAILROAD SIGNAL, RAILROAD COMMUNICATIONS AND 3RD PARTY UTILITIES AS DESCRIBED HERE IN.
   A. THE LIMITS OF THE OVERHEAD CONTACT LINE ZONE BELOW THE TOP OF THE RAIL EXTEND VERTICALLY DOWN TO THE EARTH SURFACE, EXCEPT WHERE THE TRACKS ARE LOCATED ON AN AERIAL STRUCTURE WHERE THEY EXTEND DOWN TO THE AERIAL STRUCTURE DECK. IN THE CASE OF ENERGIZED OUT–OF–RUNNING OCS CONDUCTORS, THE OVERHEAD CONTACT LINE ZONE SHALL BE EXTENDED ACCORDINGLY. THE CLEARANCE ZONES ARE IDENTIFIED HERE IN.
3. THE OCLZ IS EXTENDED LATERALLY TO A DISTANCE OF 2m FROM OUTERMOST LIVE TERMINATION WIRE OR ATF.
4. WHERE THE FALL ZONE OF A TERMINATION WIRE OR ATF EXCEEDS THE 4m OF THE STANDARD OCLZ, THE ZONE SHALL BE EXTENDED UP TO A DISTANCE OF 2m FROM (AND NORMAL TO) THE TERMINATION WIRE OR ATF.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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SCALE:	

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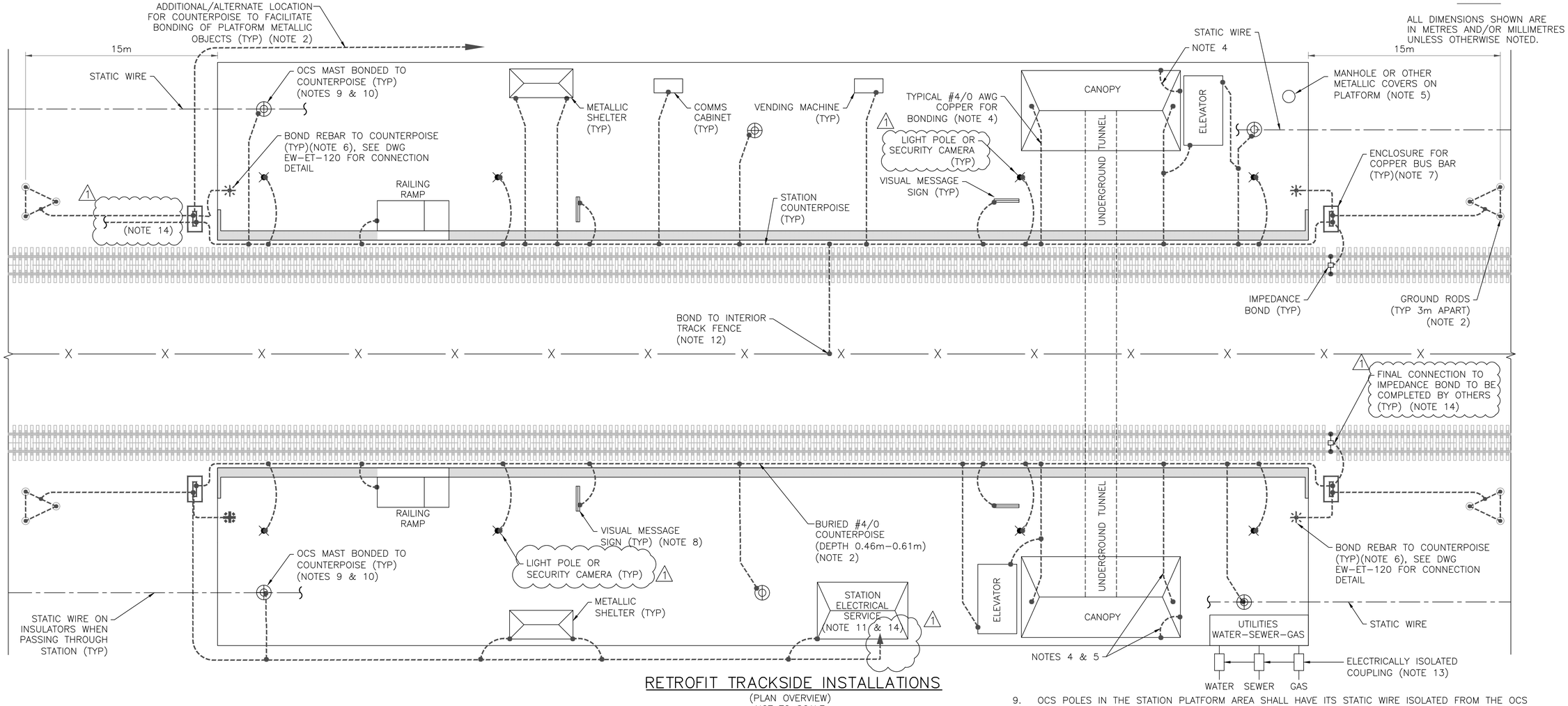
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING OVERHEAD CONTACT LINE ZONE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0102	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



RETROFIT TRACKSIDE INSTALLATIONS

(PLAN OVERVIEW)
NOT TO SCALE

NOTES:

1. SEE DRAWING EW–ET–0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR METALLIC OBJECTS IN A TYPICAL EXISTING STATION.
2. A #4/0 AWG, 37 STRAND BARE COPPER WIRE SHALL SERVE AS A COUNTERPOISE TO FACILITATE BONDING OF STATION METALLIC OBJECTS TO THE ELECTRICAL TRACTION RETURN SYSTEM. INSTALLATION LOCATIONS FOR COUNTERPOISE MAY VARY DUE TO ABILITY TO BOND TO METALLIC OBJECTS ON THE PLATFORM. COUNTERPOISE BURIAL DEPTH 0.46m–0.61m. EXTEND EACH END OF COUNTERPOISE 15m BEYOND END OF EACH PLATFORM AND INSTALL GROUND RODS AT 3m SPACING TO ACHIEVE 5 OHMS MAXIMUM RESISTANCE TO GROUND.
3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE (UNLESS OTHERWISE NOTED). 1 MODIFICATION OF PLATFORM IS REQUIRED TO ACCOMMODATE THE BONDING CONDUCTOR. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL.
4. THE METALLIC CANOPY SHALL BE BONDED TO ITS SUPPORTING STEEL WITH #4/0 AWG CONDUCTORS, ADDITIONAL BONDING IS REQUIRED ON SUPPORT STEEL TO ITS COLUMN MEMBERS TO FACILITATE BONDING TO THE COUNTERPOISE CONDUCTOR.
5. EXPOSED CONDUCTIVE PARTS IN THE OCLZ REQUIRE BONDING TO WITHSTAND 15KA FAULT LEVEL. SMALL EXPOSED CONDUCTIVE PARTS (LESS THAN 2000mmX3000mm) ARE NOT REQUIRED TO BE BONDED, INCLUDING MANHOLE COVERS, PLATFORM HEATING MANIFOLD COVER, TRASH RECEPTACLES AND INFORMATION DISPLAY CASES. LARGE CONDUCTIVE PARTS (2000mmX3000mm OR LARGER) SHALL BE BONDED, INCLUDING ALL METALLIC FURNITURE AND AMENITIES SUCH AS SHELTERS, LIGHTING POLES, CANOPIES, FENCES AND GATES AND MINI–HIGH PLATFORMS (UNLESS THEY ARE PHYSICALLY SHIELDED FROM LIVE WIRE EXPOSURE, SUCH AS UNDER A CANOPY. HOWEVER, THESE MUST BE BONDED TO THE CANOPY.)
6. EXPOSE AREA OF PLATFORM REBAR AND BOND TO COUNTERPOISE. REPAIR CONCRETE AFTER CONNECTION. (THIS REQUIREMENT APPLIES TO CONCRETE PLATFORMS, BUT NOT TO ASPHALT PLATFORMS).
7. ENCLOSURES WITH COPPER BUS TO BE INSTALLED AT EACH END OF PLATFORM TO SERVE AS A TESTING WELL AND TO FACILITATE FUTURE CONNECTION TO IMPEDANCE BOND.
8. THE OCLZ IS THE BONDING ZONE THROUGHOUT ALL STATIONS. ON THE STATION PLATFORMS, EXPOSED CONDUCTIVE PARTS, EXCEPT FOR SMALL PARTS (LESS THAN 2000mm x 3000mm), WITHIN THE OCLZ SHALL BE BONDED TO THE COUNTERPOISE WITH #4/0 AWG SIZED CONDUCTORS (UNLESS OTHERWISE NOTED).
9. OCS POLES IN THE STATION PLATFORM AREA SHALL HAVE ITS STATIC WIRE ISOLATED FROM THE OCS STRUCTURE. OCS POLES SHALL BE BONDED TO THE COUNTERPOISE ON EACH PLATFORM, EXCEPT IF PORTAL TYPE CATENARY STRUCTURES ARE USED, THEN THE COUNTERPOISE CONNECTION SHALL BE AT ONE PLATFORM ONLY.
10. BONDING OF OCS STRUCTURE TO COUNTERPOISE IS IN ADDITION TO TYPICAL OCS FOUNDATION GROUNDING.
11. FOR EXISTING STATION ELECTRICAL SERVICES SEE DWG EW–ET–0115.
12. METALLIC RIGHT–OF–WAY FENCE LESS THAN 305m LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 305m IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 305m SECTIONS WITH INSULATED INSERTS. BONDING OF FENCE TO STATIC OR COUNTERPOISE SHALL OCCUR ONCE AND AT THE APPROXIMATE MIDPOINT OF EACH FENCE SECTION.
13. INSULATING COUPLING SHALL BE INSTALLED ON INCOMING UTILITIES (WATER, SEWER AND GAS) ENTERING THE PASSENGER STATIONS INSIDE THE OCLZ. PORTION OF UTILITY INSIDE THE OCLZ IS TO BE BONDED TO THE STATION GROUND GRID.
14. A CONNECTION SHALL BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY. IF THERE IS ONLY ONE POWER SUPPLY FOR SEPARATE PLATFORMS (WITH SEPARATE COUNTERPOISES) ON EACH SIDE OF THE TRACKS, UNDERGROUND CONNECTION SHALL BE MADE BETWEEN COUNTERPOISES, WHILE ONLY ONE CONNECTION IS TO BE MADE FROM ONE COUNTERPOISE TO ONE IMPEDANCE BOND SO AS NOT TO CREATE A CROSS–BOND. 1

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S. BARKOVICH 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: W. J. CARNEY 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
RETROFIT TRACKSIDE PLATFORM (SHEET 1 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0103	1	XX

GFTRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0103.dwg [layout] December 05, 2018 – 3:37pm svfidleris

NOTES:

1. SEE DRAWING EW–ET–0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR METALLIC OBJECTS IN A TYPICAL EXISTING STATION.

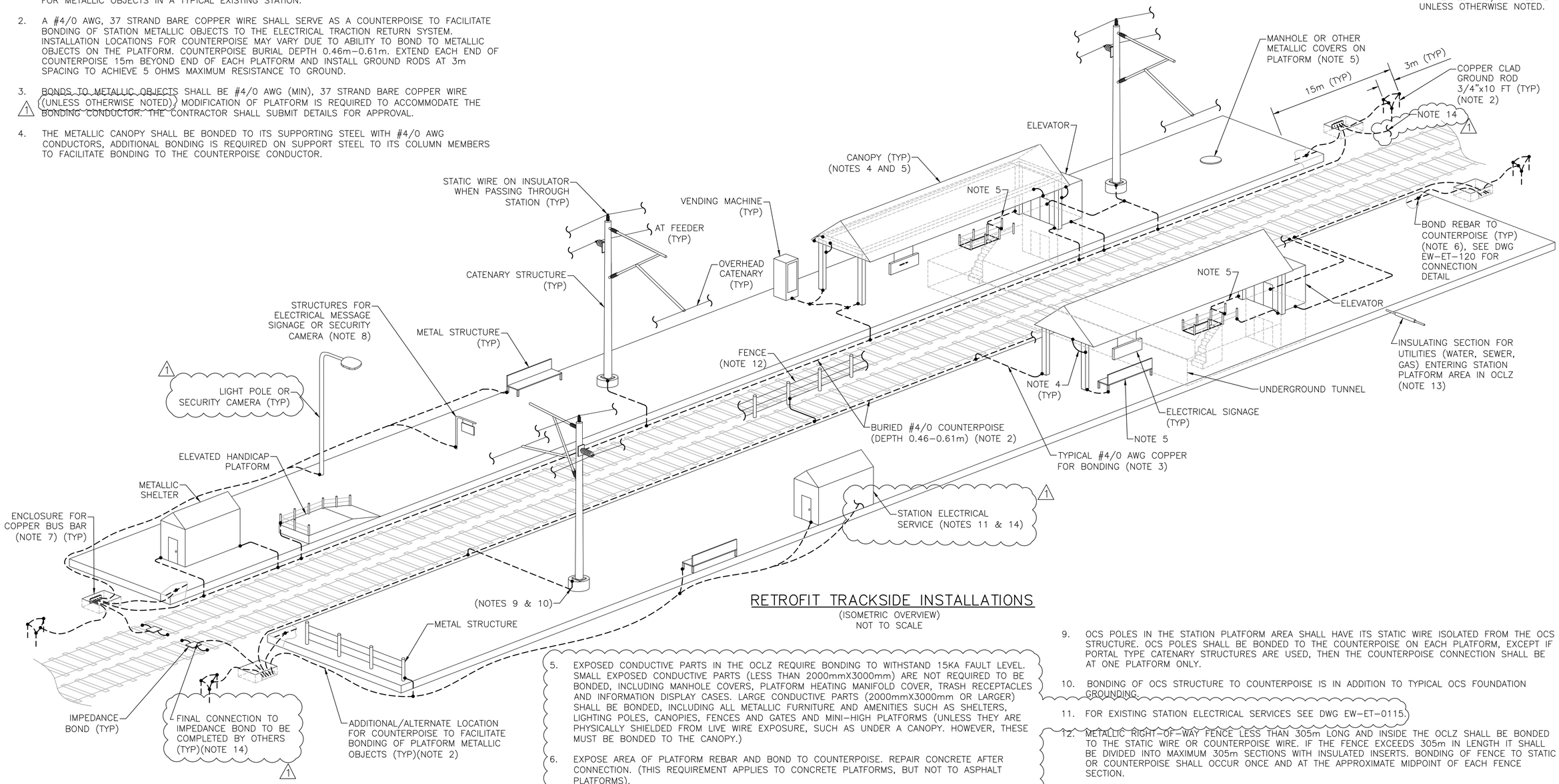
2. A #4/0 AWG, 37 STRAND BARE COPPER WIRE SHALL SERVE AS A COUNTERPOISE TO FACILITATE BONDING OF STATION METALLIC OBJECTS TO THE ELECTRICAL TRACTION RETURN SYSTEM. INSTALLATION LOCATIONS FOR COUNTERPOISE MAY VARY DUE TO ABILITY TO BOND TO METALLIC OBJECTS ON THE PLATFORM. COUNTERPOISE BURIAL DEPTH 0.46m–0.61m. EXTEND EACH END OF COUNTERPOISE 15m BEYOND END OF EACH PLATFORM AND INSTALL GROUND RODS AT 3m SPACING TO ACHIEVE 5 OHMS MAXIMUM RESISTANCE TO GROUND.

3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE ((UNLESS OTHERWISE NOTED)) MODIFICATION OF PLATFORM IS REQUIRED TO ACCOMMODATE THE BONDING CONDUCTOR. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL. 1

4. THE METALLIC CANOPY SHALL BE BONDED TO ITS SUPPORTING STEEL WITH #4/0 AWG CONDUCTORS, ADDITIONAL BONDING IS REQUIRED ON SUPPORT STEEL TO ITS COLUMN MEMBERS TO FACILITATE BONDING TO THE COUNTERPOISE CONDUCTOR.

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



RETROFIT TRACKSIDE INSTALLATIONS

(ISOMETRIC OVERVIEW)
NOT TO SCALE

5. EXPOSED CONDUCTIVE PARTS IN THE OCLZ REQUIRE BONDING TO WITHSTAND 15KA FAULT LEVEL. SMALL EXPOSED CONDUCTIVE PARTS (LESS THAN 2000mmX3000mm) ARE NOT REQUIRED TO BE BONDED, INCLUDING MANHOLE COVERS, PLATFORM HEATING MANIFOLD COVER, TRASH RECEPTACLES AND INFORMATION DISPLAY CASES. LARGE CONDUCTIVE PARTS (2000mmX3000mm OR LARGER) SHALL BE BONDED, INCLUDING ALL METALLIC FURNITURE AND AMENITIES SUCH AS SHELTERS, LIGHTING POLES, CANOPIES, FENCES AND GATES AND MINI–HIGH PLATFORMS (UNLESS THEY ARE PHYSICALLY SHIELDED FROM LIVE WIRE EXPOSURE, SUCH AS UNDER A CANOPY. HOWEVER, THESE MUST BE BONDED TO THE CANOPY.)

6. EXPOSE AREA OF PLATFORM REBAR AND BOND TO COUNTERPOISE. REPAIR CONCRETE AFTER CONNECTION. (THIS REQUIREMENT APPLIES TO CONCRETE PLATFORMS, BUT NOT TO ASPHALT PLATFORMS).

7. ENCLOSURES WITH COPPER BUS TO BE INSTALLED AT EACH END OF PLATFORM TO SERVE AS A TESTING WELL AND TO FACILITATE FUTURE CONNECTION TO IMPEDANCE BOND.

8. THE OCLZ IS THE BONDING ZONE THROUGHOUT ALL STATIONS. ON THE STATION PLATFORMS, EXPOSED CONDUCTIVE PARTS, EXCEPT FOR SMALL PARTS (LESS THAN 2000mm x 3000mm), WITHIN THE OCLZ SHALL BE BONDED TO THE COUNTERPOISE WITH #4/0 AWG SIZED CONDUCTORS (UNLESS OTHERWISE NOTED).

9. OCS POLES IN THE STATION PLATFORM AREA SHALL HAVE ITS STATIC WIRE ISOLATED FROM THE OCS STRUCTURE. OCS POLES SHALL BE BONDED TO THE COUNTERPOISE ON EACH PLATFORM, EXCEPT IF PORTAL TYPE CATENARY STRUCTURES ARE USED, THEN THE COUNTERPOISE CONNECTION SHALL BE AT ONE PLATFORM ONLY.

10. BONDING OF OCS STRUCTURE TO COUNTERPOISE IS IN ADDITION TO TYPICAL OCS FOUNDATION GROUNDING.

11. FOR EXISTING STATION ELECTRICAL SERVICES SEE DWG EW–ET–0115.

12. METALLIC RIGHT–OF–WAY FENCE LESS THAN 305m LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 305m IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 305m SECTIONS WITH INSULATED INSERTS. BONDING OF FENCE TO STATIC OR COUNTERPOISE SHALL OCCUR ONCE AND AT THE APPROXIMATE MIDPOINT OF EACH FENCE SECTION.

13. INSULATING COUPLING SHALL BE INSTALLED ON INCOMING UTILITIES (WATER, SEWER AND GAS) ENTERING THE PASSENGER STATIONS INSIDE THE OCLZ. PORTION OF UTILITY INSIDE THE OCLZ IS TO BE BONDED TO THE STATION GROUND GRID.

14. A CONNECTION SHALL BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY. IF THERE IS ONLY ONE POWER SUPPLY FOR SEPARATE PLATFORMS (WITH SEPARATE COUNTERPOISES) ON EACH SIDE OF THE TRACKS, UNDERGROUND CONNECTION SHALL BE MADE BETWEEN COUNTERPOISES, WHILE ONLY ONE CONNECTION IS TO BE MADE FROM ONE COUNTERPOISE TO ONE IMPEDANCE BOND SO AS NOT TO CREATE A CROSS–BOND. 1

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: W. CARNEY 17/10/09
CHECKED BY: T. DOYLE 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
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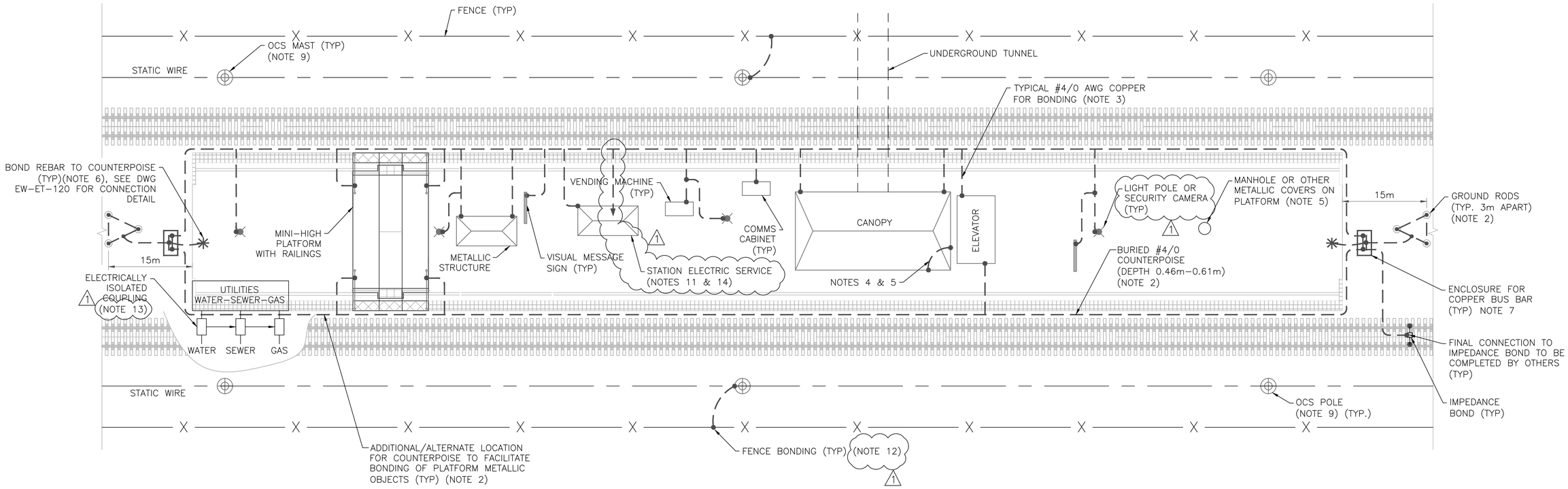
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
RETROFIT TRACKSIDE PLATFORM (SHEET 2 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0104	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



RETROFIT CENTER ISLAND INSTALLATIONS

(PLAN OVERVIEW)
NOT TO SCALE

NOTES:

1. SEE DRAWING EW-ET-0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR METALLIC OBJECTS IN A TYPICAL EXISTING STATION.
2. A #4/0 AWG, 37 STRAND BARE COPPER WIRE SHALL SERVE AS A COUNTERPOISE TO FACILITATE BONDING OF STATION METALLIC OBJECTS TO THE ELECTRICAL TRACTION RETURN SYSTEM. INSTALLATION LOCATIONS FOR COUNTERPOISE MAY VARY DUE TO ABILITY TO BOND TO METALLIC OBJECTS ON THE PLATFORM. COUNTERPOISE BURIAL DEPTH 0.46m-0.61m. EXTEND EACH END OF COUNTERPOISE 15m BEYOND END OF EACH PLATFORM AND INSTALL GROUND RODS AT 3m SPACING TO ACHIEVE 5 OHMS MAXIMUM RESISTANCE TO GROUND.
3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE (UNLESS OTHERWISE NOTED). MODIFICATION OF PLATFORM IS REQUIRED TO ACCOMMODATE THE BONDING CONDUCTOR. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL. (1)
4. THE METALLIC CANOPY SHALL BE BONDED TO ITS SUPPORTING STEEL WITH #4/0 AWG CONDUCTORS, ADDITIONAL BONDING IS REQUIRED ON SUPPORT STEEL TO ITS COLUMN MEMBERS TO FACILITATE BONDING TO THE COUNTERPOISE CONDUCTOR.
5. EXPOSED CONDUCTIVE PARTS IN THE OCLZ REQUIRE BONDING TO WITHSTAND 15KA FAULT LEVEL. SMALL EXPOSED CONDUCTIVE PARTS (LESS THAN 2000mmX3000mm) ARE NOT REQUIRED TO BE BONDED, INCLUDING MANHOLE COVERS, PLATFORM HEATING MANIFOLD COVER, TRASH RECEPTACLES AND INFORMATION DISPLAY CASES. LARGE CONDUCTIVE PARTS (2000mmX3000mm OR LARGER) SHALL BE BONDED, INCLUDING ALL METALLIC FURNITURE AND AMENITIES SUCH AS SHELTERS, LIGHTING POLES, CANOPIES, FENCES AND GATES AND MINI-HIGH PLATFORMS (UNLESS THEY ARE PHYSICALLY SHIELDED FROM LIVE WIRE EXPOSURE, SUCH AS UNDER A CANOPY. HOWEVER, THESE MUST BE BONDED TO THE CANOPY.)
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11. FOR EXISTING STATION ELECTRICAL SERVICES SEE DWG EW-ET-0115.
12. METALLIC RIGHT-OF-WAY FENCE LESS THAN 305m LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 305m IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 305m SECTIONS WITH INSULATED INSERTS. BONDING OF FENCE TO STATIC OR COUNTERPOISE SHALL OCCUR ONCE AND AT THE APPROXIMATE MIDPOINT OF EACH FENCE SECTION.
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14. A CONNECTION SHALL BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: W. CARNEY 17/10/09
CHECKED BY: T. DOYLE 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming — Excellence Delivered As Promised

METROLINX

ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

ET GROUNDING & BONDING
RETROFIT CENTER ISLAND PLATFORM (SHEET 1 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0105	1	XX

NOTES:

1. SEE DRAWING EW–ET–0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR METALLIC OBJECTS IN A TYPICAL EXISTING STATION.

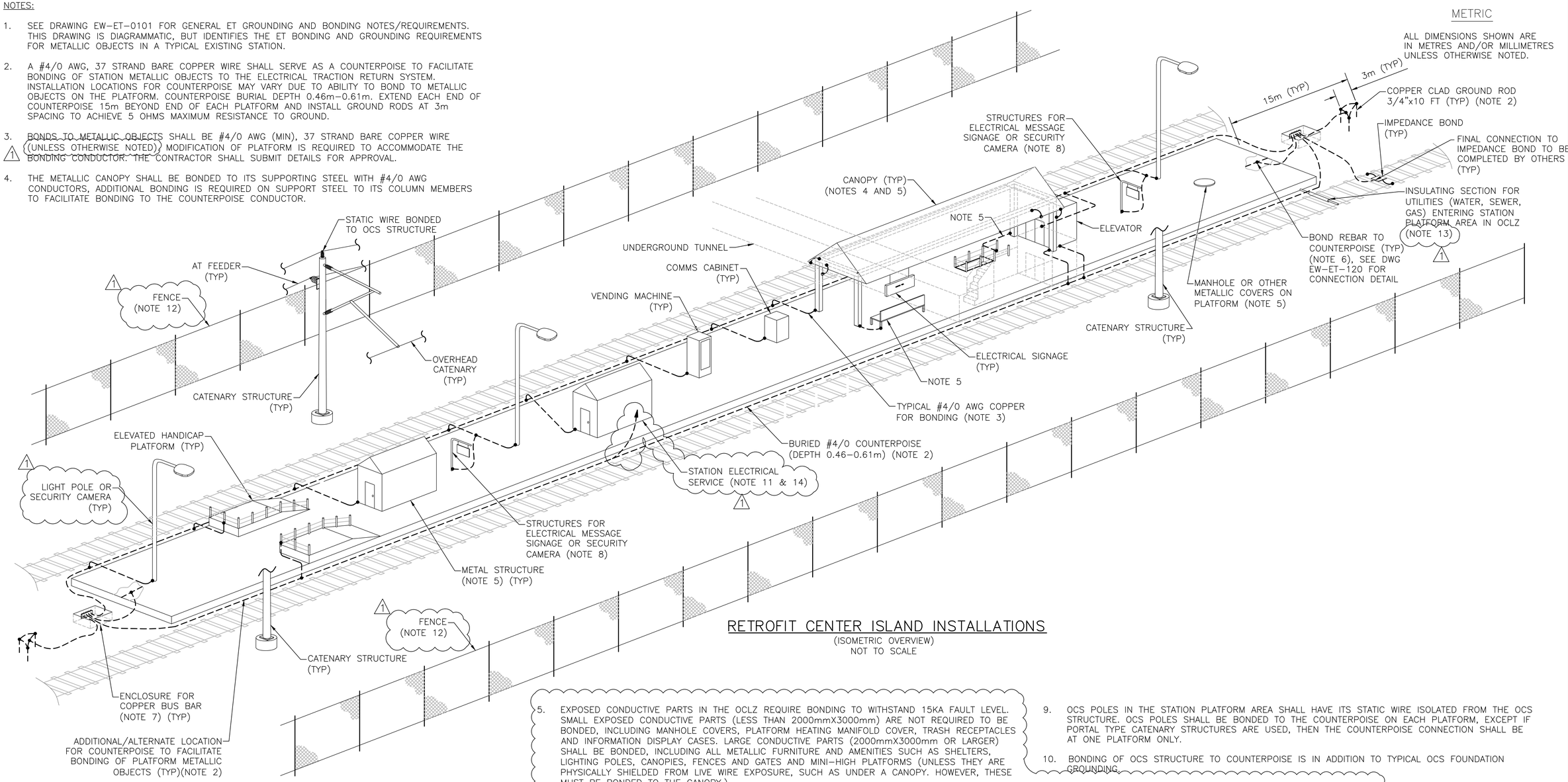
2. A #4/0 AWG, 37 STRAND BARE COPPER WIRE SHALL SERVE AS A COUNTERPOISE TO FACILITATE BONDING OF STATION METALLIC OBJECTS TO THE ELECTRICAL TRACTION RETURN SYSTEM. INSTALLATION LOCATIONS FOR COUNTERPOISE MAY VARY DUE TO ABILITY TO BOND TO METALLIC OBJECTS ON THE PLATFORM. COUNTERPOISE BURIAL DEPTH 0.46m–0.61m. EXTEND EACH END OF COUNTERPOISE 15m BEYOND END OF EACH PLATFORM AND INSTALL GROUND RODS AT 3m SPACING TO ACHIEVE 5 OHMS MAXIMUM RESISTANCE TO GROUND.

3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE (UNLESS OTHERWISE NOTED). MODIFICATION OF PLATFORM IS REQUIRED TO ACCOMMODATE THE BONDING CONDUCTOR. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL. 1

4. THE METALLIC CANOPY SHALL BE BONDED TO ITS SUPPORTING STEEL WITH #4/0 AWG CONDUCTORS, ADDITIONAL BONDING IS REQUIRED ON SUPPORT STEEL TO ITS COLUMN MEMBERS TO FACILITATE BONDING TO THE COUNTERPOISE CONDUCTOR.

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



RETROFIT CENTER ISLAND INSTALLATIONS

(ISOMETRIC OVERVIEW)
NOT TO SCALE

5. EXPOSED CONDUCTIVE PARTS IN THE OCLZ REQUIRE BONDING TO WITHSTAND 15KA FAULT LEVEL. SMALL EXPOSED CONDUCTIVE PARTS (LESS THAN 2000mmX3000mm) ARE NOT REQUIRED TO BE BONDED, INCLUDING MANHOLE COVERS, PLATFORM HEATING MANIFOLD COVER, TRASH RECEPTACLES AND INFORMATION DISPLAY CASES. LARGE CONDUCTIVE PARTS (2000mmX3000mm OR LARGER) SHALL BE BONDED, INCLUDING ALL METALLIC FURNITURE AND AMENITIES SUCH AS SHELTERS, LIGHTING POLES, CANOPIES, FENCES AND GATES AND MINI–HIGH PLATFORMS (UNLESS THEY ARE PHYSICALLY SHIELDED FROM LIVE WIRE EXPOSURE, SUCH AS UNDER A CANOPY. HOWEVER, THESE MUST BE BONDED TO THE CANOPY.)

6. EXPOSE AREA OF PLATFORM REBAR AND BOND TO COUNTERPOISE. REPAIR CONCRETE AFTER CONNECTION. (THIS REQUIREMENT APPLIES TO CONCRETE PLATFORMS, BUT NOT TO ASPHALT PLATFORMS).

7. ENCLOSURES WITH COPPER BUS TO BE INSTALLED AT EACH END OF PLATFORM TO SERVE AS A TESTING WELL AND TO FACILITATE FUTURE CONNECTION TO IMPEDANCE BOND.

8. THE OCLZ IS THE BONDING ZONE THROUGHOUT ALL STATIONS. ON THE STATION PLATFORMS, EXPOSED CONDUCTIVE PARTS, EXCEPT FOR SMALL PARTS (LESS THAN 2000mm x 3000mm), WITHIN THE OCLZ SHALL BE BONDED TO THE COUNTERPOISE WITH #4/0 AWG SIZED CONDUCTORS (UNLESS OTHERWISE NOTED).

9. OCS POLES IN THE STATION PLATFORM AREA SHALL HAVE ITS STATIC WIRE ISOLATED FROM THE OCS STRUCTURE. OCS POLES SHALL BE BONDED TO THE COUNTERPOISE ON EACH PLATFORM, EXCEPT IF PORTAL TYPE CATENARY STRUCTURES ARE USED, THEN THE COUNTERPOISE CONNECTION SHALL BE AT ONE PLATFORM ONLY.

10. BONDING OF OCS STRUCTURE TO COUNTERPOISE IS IN ADDITION TO TYPICAL OCS FOUNDATION GROUNDING.

11. FOR EXISTING STATION ELECTRICAL SERVICES SEE DWG EW–ET–0115.

12. METALLIC RIGHT–OF–WAY FENCE LESS THAN 305m LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 305m IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 305m SECTIONS WITH INSULATED INSERTS. BONDING OF FENCE TO STATIC OR COUNTERPOISE SHALL OCCUR ONCE AND AT THE APPROXIMATE MIDPOINT OF EACH FENCE SECTION.

13. INSULATING COUPLING SHALL BE INSTALLED ON INCOMING UTILITIES (WATER, SEWER AND GAS) ENTERING THE PASSENGER STATIONS INSIDE THE OCLZ. PORTION OF UTILITY INSIDE THE OCLZ IS TO BE BONDED TO THE STATION GROUND GRID. 1

14. A CONNECTION SHALL BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: W. CARNEY 17/10/09
CHECKED BY: T. DOYLE 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
RETROFIT CENTER ISLAND PLATFORM (SHEET 2 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0106	1	XX

METRIC

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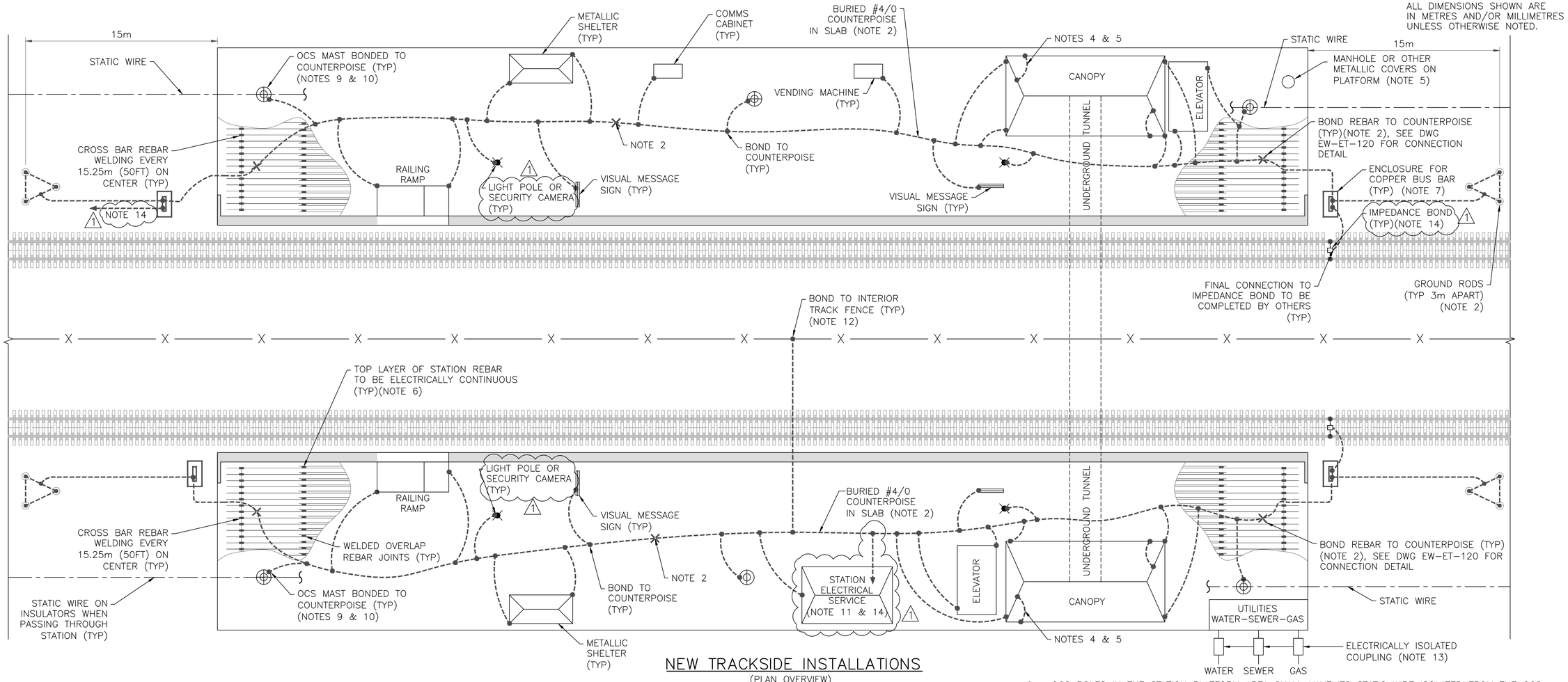

NEW TRACKSIDE INSTALLATIONS

(PLAN OVERVIEW)
NOT TO SCALE

NOTES:

1. SEE DRAWING EW-ET-0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR METALLIC OBJECTS IN A TYPICAL NEW OR REHABILITATED STATION.
2. THE TOP LAYER OF STATION PLATFORM REBAR (SEE NOTE 6), IF CONCRETE PLATFORMS ARE TO BE CONSTRUCTED, AND A #4/0 AWG, 37 STRAND BARE COPPER WIRE (COUNTERPOISE) SHALL BE INSTALLED TO FACILITATE BONDING OF STATION METALLIC OBJECTS TO THE ELECTRICAL TRACTION RETURN SYSTEM. THE COUNTERPOISE SHALL BE WITHIN THE SLAB WHEN POURED AND EXOTHERMICALLY CONNECTED TO THE REBAR APPROXIMATELY EVERY 30.5m (100 FT). EXTEND EACH END OF COUNTERPOISE 15m BEYOND END OF EACH PLATFORM AND INSTALL GROUND RODS AT 3m SPACING TO ACHIEVE 5 OHMS MAXIMUM RESISTANCE TO GROUND.
3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE (UNLESS OTHERWISE NOTED) WITH CONNECTIONS TO THE COUNTERPOISE. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL.
4. THE METALLIC CANOPY SHALL BE BONDED TO ITS SUPPORTING STEEL WITH #4/0 AWG CONDUCTORS, ADDITIONAL BONDING IS REQUIRED ON SUPPORT STEEL TO ITS COLUMN MEMBERS TO FACILITATE BONDING TO THE COUNTERPOISE CONDUCTOR.
5. EXPOSED CONDUCTIVE PARTS IN THE OCLZ REQUIRE BONDING TO WITHSTAND 15KA FAULT LEVEL. SMALL EXPOSED CONDUCTIVE PARTS (LESS THAN 2000mmX3000mm) ARE NOT REQUIRED TO BE BONDED, INCLUDING MANHOLE COVERS, PLATFORM HEATING MANIFOLD COVER, TRASH RECEPTACLES AND INFORMATION DISPLAY CASES. LARGE CONDUCTIVE PARTS (2000mmX3000mm OR LARGER) SHALL BE BONDED, INCLUDING ALL METALLIC FURNITURE AND AMENITIES SUCH AS SHELTERS, LIGHTING POLES, CANOPIES, FENCES AND GATES AND MINI-HIGH PLATFORMS (UNLESS THEY ARE PHYSICALLY SHIELDED FROM LIVE WIRE EXPOSURE, SUCH AS UNDER A CANOPY. HOWEVER, THESE MUST BE BONDED TO THE CANOPY.)
6. FOR CONCRETE PLATFORMS, THE TOP LAYER REBAR SHALL BE MADE ELECTRICALLY CONTINUOUS BY WELDING LONGITUDINAL REBAR SPLICES ACROSS THE LENGTH OF THE PLATFORM, IN ADDITION TO PERPENDICULAR REBAR CROSSINGS TO THE LONGITUDINAL BARS EVERY 15.25m (50FT).
7. ENCLOSURES WITH COPPER BUS TO BE INSTALLED AT EACH END OF PLATFORM TO SERVE AS A TESTING WELL AND TO FACILITATE FUTURE CONNECTION TO IMPEDANCE BOND.
8. THE OCLZ IS THE BONDING ZONE THROUGHOUT ALL STATIONS. ON THE STATION PLATFORMS, EXPOSED CONDUCTIVE PARTS, EXCEPT FOR SMALL PARTS (LESS THAN 2000mm x 3000mm), WITHIN THE OCLZ SHALL BE BONDED TO THE COUNTERPOISE WITH #4/0 AWG SIZED CONDUCTORS (UNLESS OTHERWISE NOTED).
9. OCS POLES IN THE STATION PLATFORM AREA SHALL HAVE ITS STATIC WIRE ISOLATED FROM THE OCS STRUCTURE. OCS POLES SHALL BE BONDED TO THE COUNTERPOISE ON EACH PLATFORM, EXCEPT IF PORTAL TYPE CATENARY STRUCTURES ARE USED, THEN THE COUNTERPOISE CONNECTION SHALL BE AT ONE PLATFORM ONLY.
10. BONDING OF OCS STRUCTURE TO COUNTERPOISE IS IN ADDITION TO TYPICAL OCS FOUNDATION GROUNDING.
11. FOR EXISTING STATION ELECTRICAL SERVICES SEE DWG EW-ET-0115.
12. METALLIC RIGHT-OF-WAY FENCE LESS THAN 305m LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 305m IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 305m SECTIONS WITH INSULATED INSERTS. BONDING OF FENCE TO STATIC OR COUNTERPOISE SHALL OCCUR ONCE AND AT THE APPROXIMATE MIDPOINT OF EACH FENCE SECTION.
13. INSULATING COUPLING SHALL BE INSTALLED ON INCOMING UTILITIES (WATER, SEWER AND GAS) ENTERING THE PASSENGER STATIONS INSIDE THE OCLZ. PORTION OF UTILITY INSIDE THE OCLZ IS TO BE BONDED TO THE STATION GROUND GRID.
14. A CONNECTION SHALL BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY. IF THERE IS ONLY ONE POWER SUPPLY FOR SEPARATE PLATFORMS (WITH SEPARATE COUNTERPOISES) ON EACH SIDE OF THE TRACKS, UNDERGROUND CONNECTION SHALL BE MADE BETWEEN COUNTERPOISES, WHILE ONLY ONE CONNECTION IS TO BE MADE FROM ONE COUNTERPOISE TO ONE IMPEDANCE BOND SO AS NOT TO CREATE A CROSS-BOND. 1

METROLINX PROJECT NO. 149724

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		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
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CHECKED BY: C. GAO 18/05/01	APPROVED BY: J. YCAS 18/05/01
SCALE:	

Gannett Fleming
Excellence Delivered As Promised

METROLINX

ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

ET GROUNDING AND BONDING
NEW TRACKSIDE PLATFORM (SHEET 1 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0107	1	XX

GFTRS - C:\pwworking\gfpw01\svfidleris\d0630010\149724-EW-ET-0107.dwg [layout] December 05, 2018 - 3:43pm svfidleris

NOTES:

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3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE (UNLESS OTHERWISE NOTED) WITH CONNECTIONS TO THE COUNTERPOISE. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL. 1

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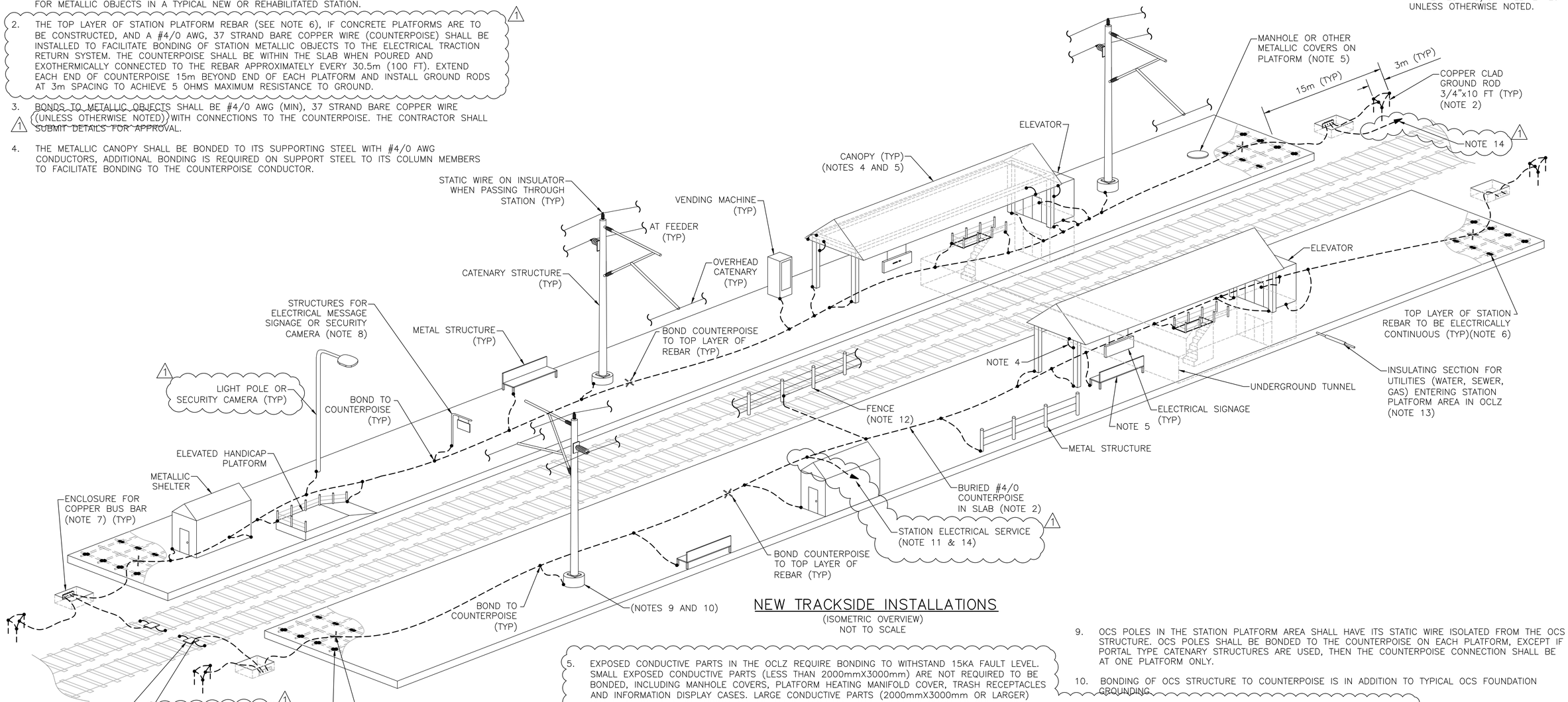

NEW TRACKSIDE INSTALLATIONS

(ISOMETRIC OVERVIEW)
NOT TO SCALE

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METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
NEW TRACKSIDE PLATFORM (SHEET 2 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0108	1	XX

GFTRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0108.dwg [layout] December 05, 2018 – 3:44pm svfidleris

METRIC

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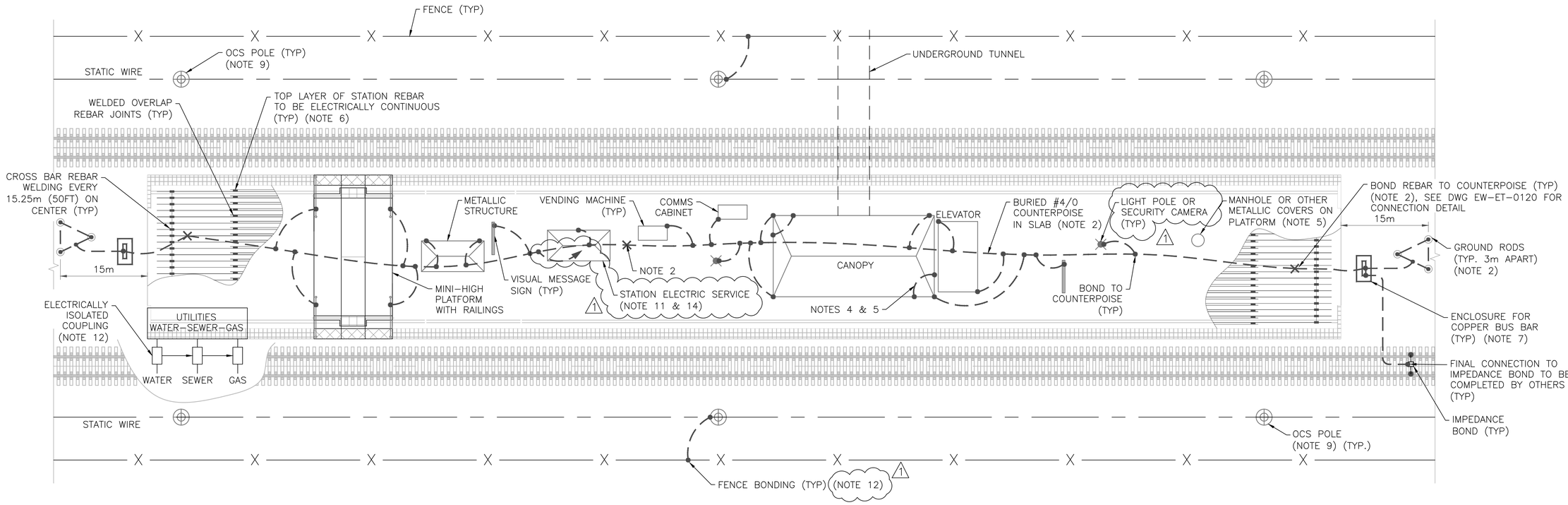

NEW CENTER ISLAND INSTALLATIONS

(PLAN OVERVIEW)
NOT TO SCALE

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3. BONDS TO METALLIC OBJECTS SHALL BE #4/0 AWG (MIN), 37 STRAND BARE COPPER WIRE (UNLESS OTHERWISE NOTED) WITH CONNECTIONS TO THE COUNTERPOISE. THE CONTRACTOR SHALL SUBMIT DETAILS FOR APPROVAL. (1)
4. THE METALLIC CANOPY SHALL BE BONDED TO ITS SUPPORTING STEEL WITH #4/0 AWG CONDUCTORS, ADDITIONAL BONDING IS REQUIRED ON SUPPORT STEEL TO ITS COLUMN MEMBERS TO FACILITATE BONDING TO THE COUNTERPOISE CONDUCTOR.
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(1)

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METROLINX

ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

ET GROUNDING AND BONDING
NEW CENTER ISLAND PLATFORM (SHEET 1 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0109	1	XX

METRIC

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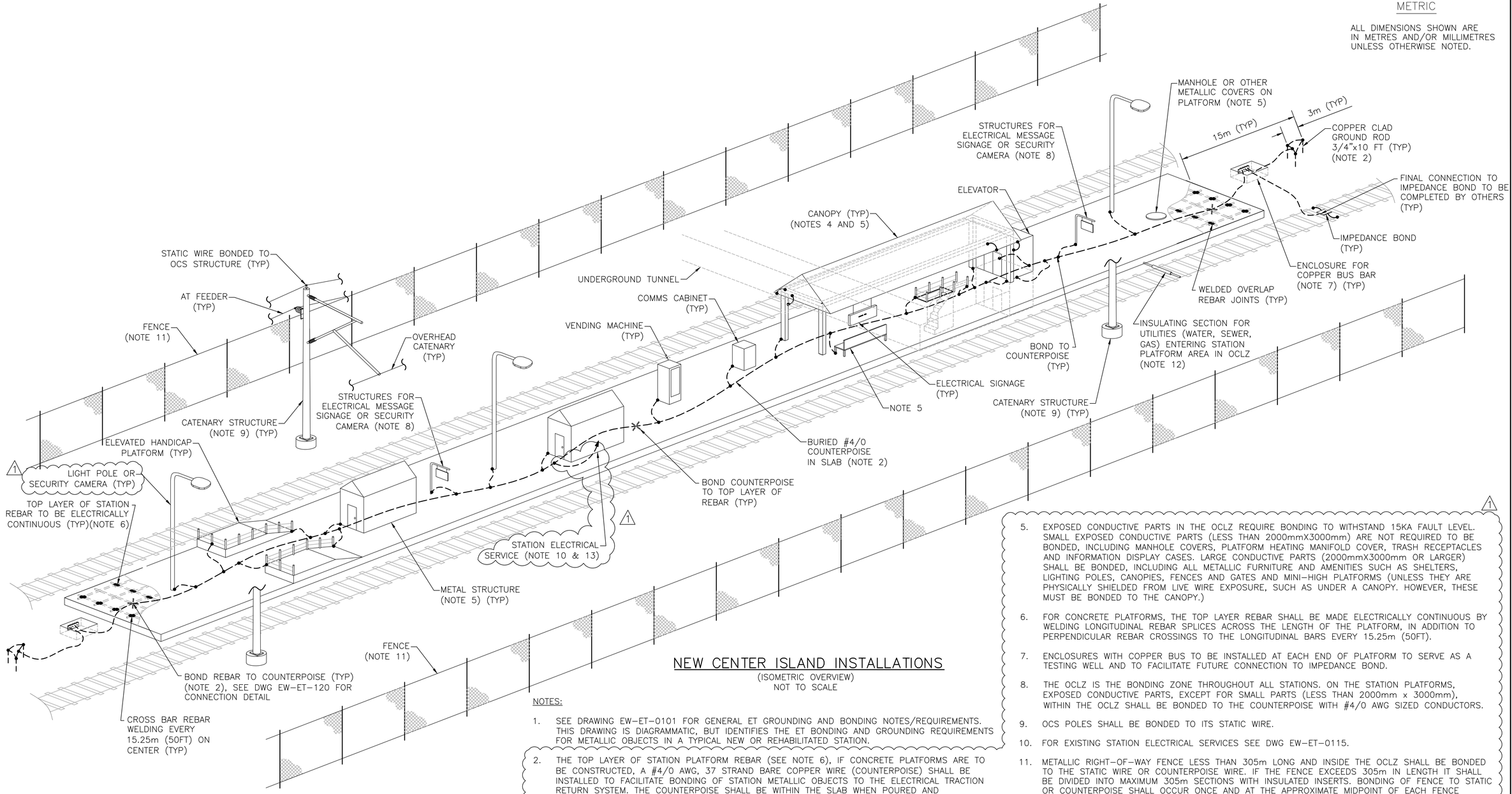

NEW CENTER ISLAND INSTALLATIONS

(ISOMETRIC OVERVIEW)
NOT TO SCALE

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5. EXPOSED CONDUCTIVE PARTS IN THE OCLZ REQUIRE BONDING TO WITHSTAND 15KA FAULT LEVEL. SMALL EXPOSED CONDUCTIVE PARTS (LESS THAN 2000mmX3000mm) ARE NOT REQUIRED TO BE BONDED, INCLUDING MANHOLE COVERS, PLATFORM HEATING MANIFOLD COVER, TRASH RECEPTACLES AND INFORMATION DISPLAY CASES. LARGE CONDUCTIVE PARTS (2000mmX3000mm OR LARGER) SHALL BE BONDED, INCLUDING ALL METALLIC FURNITURE AND AMENITIES SUCH AS SHELTERS, LIGHTING POLES, CANOPIES, FENCES AND GATES AND MINI-HIGH PLATFORMS (UNLESS THEY ARE PHYSICALLY SHIELDED FROM LIVE WIRE EXPOSURE, SUCH AS UNDER A CANOPY. HOWEVER, THESE MUST BE BONDED TO THE CANOPY.)
6. FOR CONCRETE PLATFORMS, THE TOP LAYER REBAR SHALL BE MADE ELECTRICALLY CONTINUOUS BY WELDING LONGITUDINAL REBAR SPLICES ACROSS THE LENGTH OF THE PLATFORM, IN ADDITION TO PERPENDICULAR REBAR CROSSINGS TO THE LONGITUDINAL BARS EVERY 15.25m (50FT).
7. ENCLOSURES WITH COPPER BUS TO BE INSTALLED AT EACH END OF PLATFORM TO SERVE AS A TESTING WELL AND TO FACILITATE FUTURE CONNECTION TO IMPEDANCE BOND.
8. THE OCLZ IS THE BONDING ZONE THROUGHOUT ALL STATIONS. ON THE STATION PLATFORMS, EXPOSED CONDUCTIVE PARTS, EXCEPT FOR SMALL PARTS (LESS THAN 2000mm x 3000mm), WITHIN THE OCLZ SHALL BE BONDED TO THE COUNTERPOISE WITH #4/0 AWG SIZED CONDUCTORS.
9. OCS POLES SHALL BE BONDED TO ITS STATIC WIRE.
10. FOR EXISTING STATION ELECTRICAL SERVICES SEE DWG EW-ET-0115.
11. METALLIC RIGHT-OF-WAY FENCE LESS THAN 305m LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 305m IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 305m SECTIONS WITH INSULATED INSERTS. BONDING OF FENCE TO STATIC OR COUNTERPOISE SHALL OCCUR ONCE AND AT THE APPROXIMATE MIDPOINT OF EACH FENCE SECTION. IF FENCE IS OUTSIDE THE OCLZ IT DOES NOT REQUIRE ADDITIONAL BONDING OR GROUNDING.
12. INSULATING COUPLING SHALL BE INSTALLED ON INCOMING UTILITIES (WATER, SEWER AND GAS) ENTERING THE PASSENGER STATIONS INSIDE THE OCLZ. PORTION OF UTILITY INSIDE THE OCLZ IS TO BE BONDED TO THE STATION GROUND GRID.
13. A CONNECTION SHALL BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS OF THE STATION POWER SUPPLY.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: W. CARNEY 17/10/09
CHECKED BY: C. GAO 18/05/01	APPROVED BY: J. YCAS 18/05/01
SCALE:	

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METROLINX

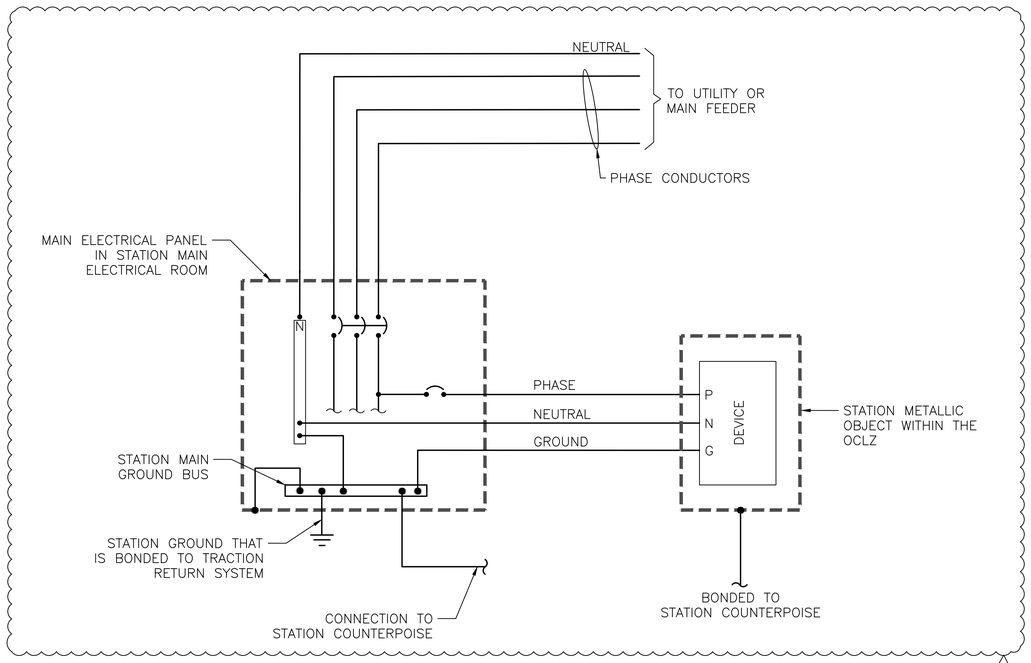
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
NEW CENTER ISLAND PLATFORM (SHEET 2 OF 2)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0110	1	XX

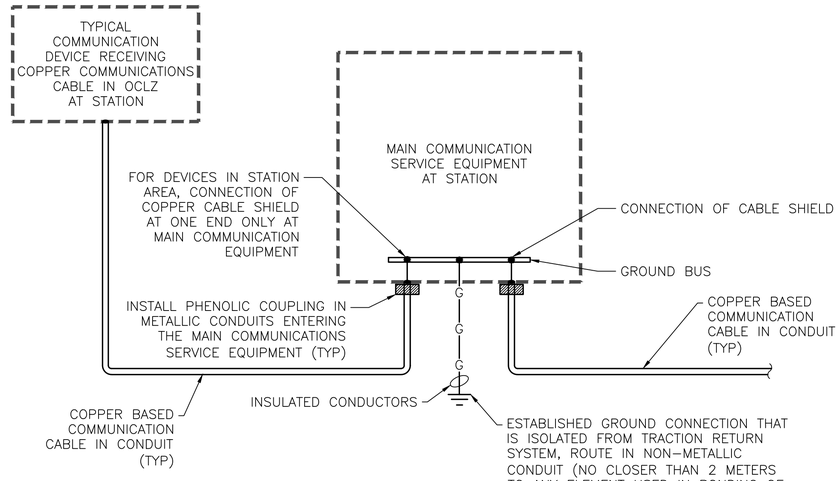
GFTRS - C:\pwworking\gfpw01\svfidleris\d0630010\149724-EW-ET-0110.dwg [layout] November 08, 2018 - 12:06pm svfidleris

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



INCOMING ELECTRIC FEEDER AT PASSENGER STATIONS



COMMUNICATION SERVER EQUIPMENT AT STATIONS

1

NOTES:

1. INSTALLATIONS FOR ELECTRICAL SERVICES SHALL CONFORM TO EN 50122-1 2011 SECTION 7.4.4.1, WHERE IT PERMITS THE EXPOSED CONDUCTIVE PARTS TO BE BONDED DIRECTLY TO THE RETURN CIRCUIT AND THEN DISCONNECTING THE CIRCUIT GROUND WIRE THAT ORIGINATES FROM THE ELECTRICAL PANELBOARD TO THE EXPOSED CONDUCTIVE PART OF THE EQUIPMENT WITHIN THE OCLZ. THE GROUND CONNECTION, WHICH ORIGINATES FROM THE ELECTRICAL PANELBOARD TO THE EXPOSED CONDUCTIVE PART OF THE EQUIPMENT WITHIN THE OCLZ, SHALL BE REMOVED ONLY AFTER THE ELECTRIFICATION IS READY FOR SERVICE. A CONNECTION SHALL ALSO BE MADE FROM THE COUNTERPOISE TO THE MAIN GROUND BUS BAR OF THE STATION POWER SUPPLY. (A CROSS BOND SHALL NOT BE CREATED).
2. THIS DRAWING PROVIDES A GENERAL OVERVIEW OF THE TRACTION RETURN FROM UTILITY AND STATION POWER NETWORKS.
3. COMMUNICATIONS NETWORK EQUIPMENT GROUND SHALL NOT INTERCONNECT WITH THE TRACTION RETURN SYSTEM.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: W.J. CARNEY 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
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METROLINX

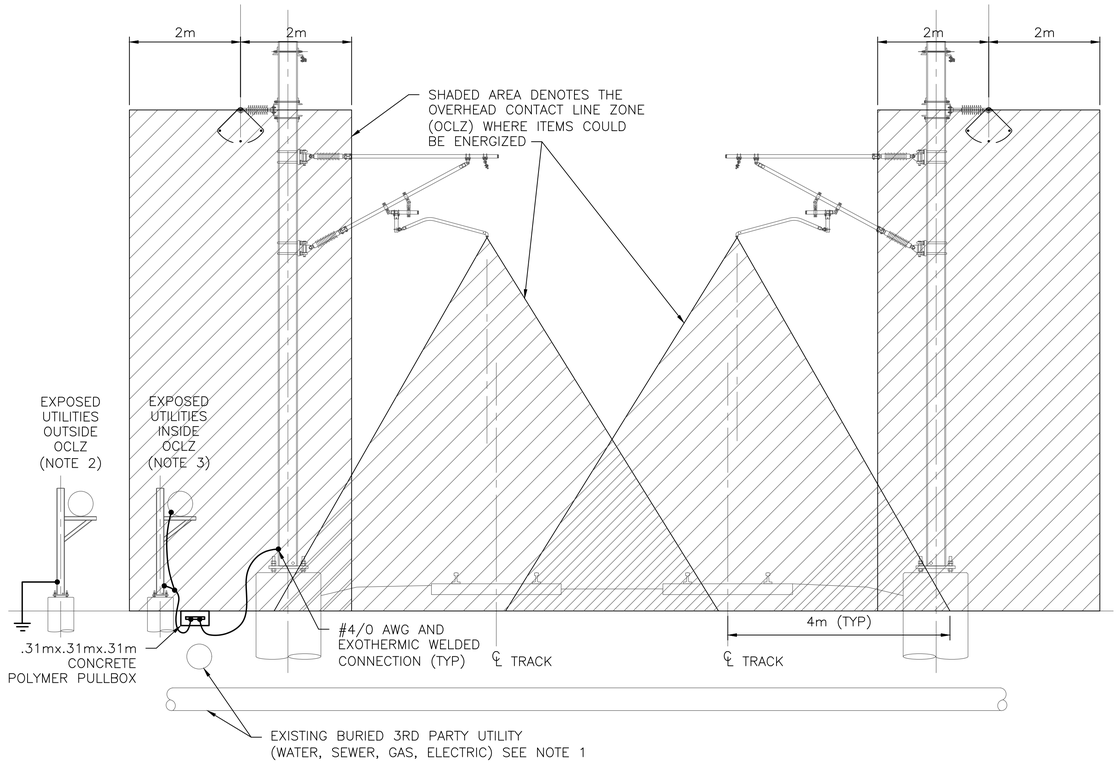
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDNG AND BONDING
STATION ELECTRICAL AND COMMUNICATION SERVICE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0115	1	XX

GFTRS - C:\pwworking\gfpw01\svfidleris\d06330010\149724-EW-ET-0115.dwg [layout] November 08, 2018 - 12:07pm svfidleris

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

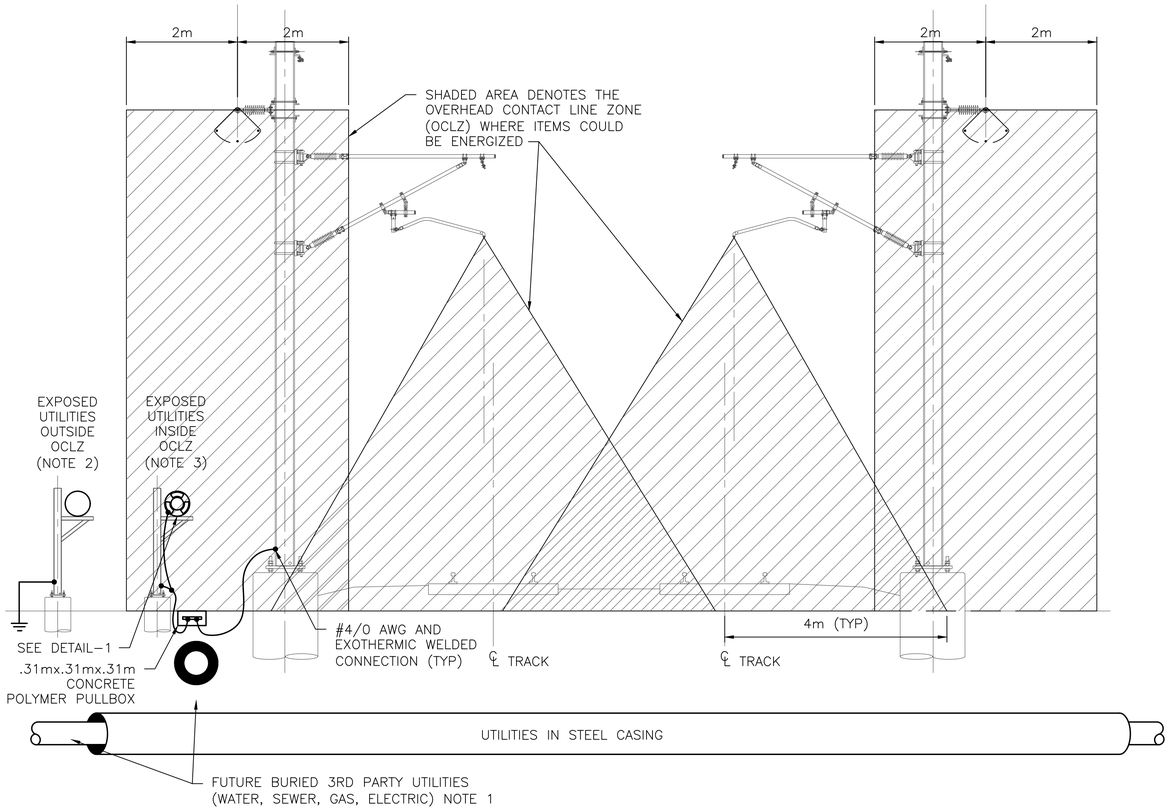


ET BONDING AND GROUNDING OF EXISTING 3RD PARTY UTILITIES

NOT TO SCALE

NOTES FOR EXISTING 3RD PARTY UTILITIES:

1. EXISTING BURIED FACILITIES OF 3RD PARTY UTILITIES WILL NOT REQUIRE ADDITIONAL BONDING TO THE TRACTION RETURN SYSTEM. EACH UTILITY OWNER SHOULD BE ADVISED OF THE FUTURE ELECTRIFICATION PROJECT.
2. EXPOSED METALLIC UTILITY PIPING (WATER, SEWER, GAS, ELECTRIC) OUTSIDE THE OCLZ SHALL BE GROUNDED IN ACCORDANCE WITH THE UTILITIES REQUIREMENTS.
3. EXPOSED METALLIC UTILITY PIPING WITHIN THE OCLZ REQUIRES BONDING TO THE TRACTION RETURN SYSTEM. IF CONTINUOUSLY RUNNING WITHIN THE OCLZ AREA, THEN ITS METALLIC PIPING SHALL BE BROKEN INTO SECTIONS OF APPROXIMATELY 305 METERS WITH APPROVED INSULATING COLLARS AND BE BONDED AT ITS MIDPOINT TO THE NEAREST OCS STRUCTURE. ANY EXISTING EARTH-MADE GROUND CONNECTIONS FROM THESE UTILITIES MAY REMAIN. IF OTHER MECHANISMS WERE USED TO GROUND THESE FACILITIES METROLINX IS TO BE ADVISED.

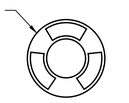


ET BONDING AND GROUNDING OF FUTURE 3RD PARTY UTILITIES

NOT TO SCALE

NOTES FOR FUTURE 3RD PARTY UTILITIES: (1)

1. NEW BURIED 3RD PARTY UTILITIES UNDER TRACKS ARE TO BE INSTALLED IN A STEEL CASING PIPE WITH ITS ENDS SEALED TO PREVENT LEAKAGE AND INGRESS OF MOISTURE AND SOIL. THIS IS TO FACILITATE ANY FUTURE UTILITY REPLACEMENT, IF NECESSARY, AND HELPS PROTECT THE RAILROAD TRACK BED INFRASTRUCTURE IF THE UTILITY CARRYING LIQUID OR PRESSURIZED SUBSTANCES WERE COMPROMISED. CASING PIPE SHALL BE BEYOND OCLZ LIMITS.
2. EXPOSED METALLIC UTILITY PIPING (WATER, SEWER, GAS, ELECTRIC) OUTSIDE THE OCLZ SHALL BE GROUNDED IN ACCORDANCE WITH THE UTILITY'S REQUIREMENTS.
3. EVERY EFFORT MUST BE MADE TO KEEP NEW 3RD PARTY UTILITIES OUTSIDE THE OCLZ AREA. NEW EXPOSED 3RD PARTY UTILITIES INSIDE THE OCLZ ARE TO HAVE THEIR CARRIER PIPE ENCLOSED IN A STEEL CASING PIPE THAT IS ISOLATED FROM THE CARRIER PIPE BY APPROVED INSULATORS. THE STEEL CASING PIPE SHALL HAVE INSULATING COLLARS AT APPROXIMATELY 305 METERS WITH ITS MIDPOINT BONDED TO THE NEAREST OCS STRUCTURE.



DETAIL-1

NOT TO SCALE

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S. BARKOVICH 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: S. FIDLERIS 18/05/01	APPROVED BY: S. MARZI 18/05/01
SCALE:	

Gannett Fleming

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METROLINX

ELECTRIFICATION IMPLEMENTATION

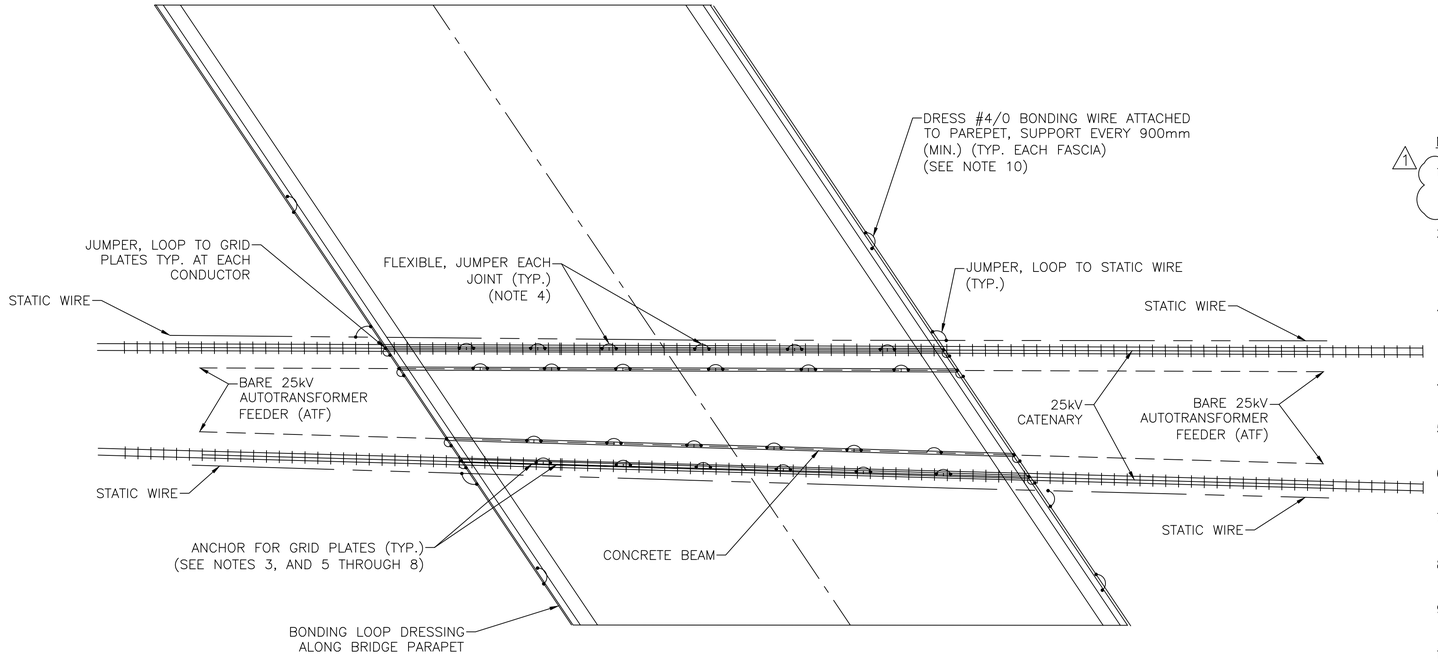
ENABLING WORKS ET STANDARDS

ET GROUNDING AND BONDING FOR OCLZ 3RD PARTY UTILITIES

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0116	1	XX

METRIC

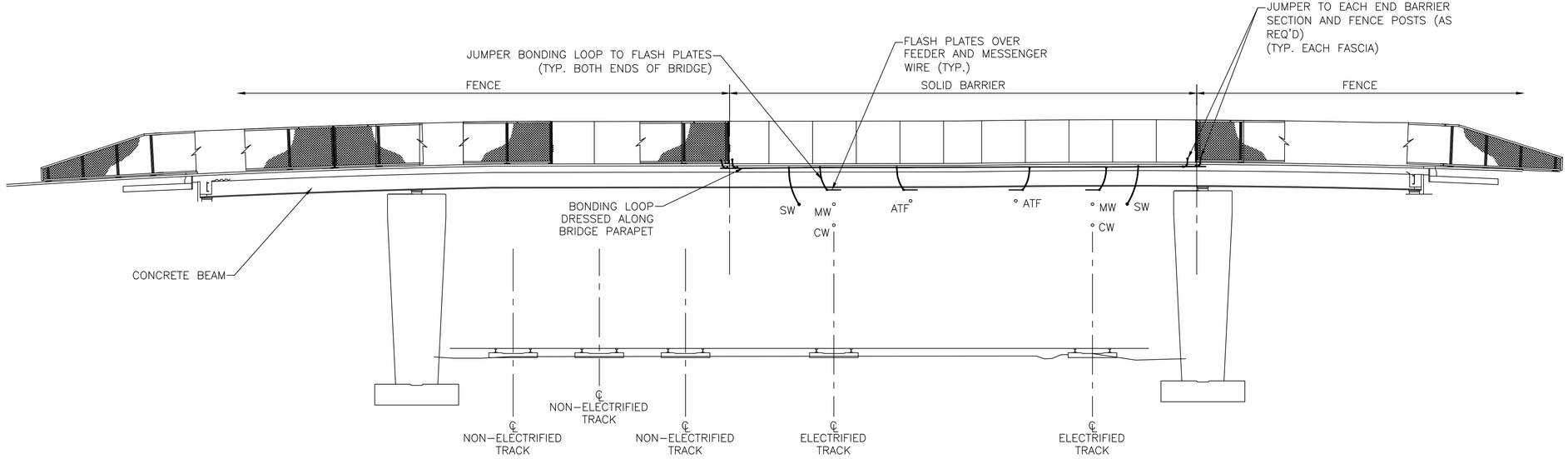
ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



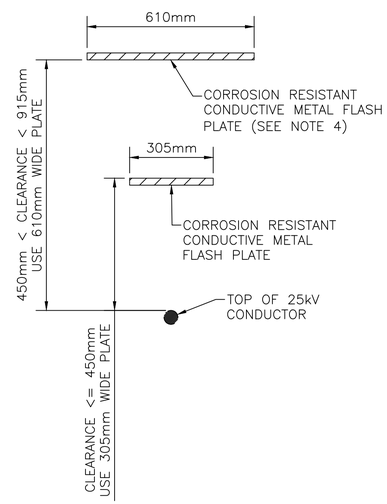
PLAN VIEW

NOTES:

1. SEE DRAWING EW–ET–0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR TYPICAL CONCRETE BRIDGE.
2. FLASH PLATES TO BE INSTALLED CENTERED OVER CATENARY AND FEEDER WIRES. BUTT JOINT BETWEEN PLATES TO BE ALIGNED WITH JOINT BETWEEN BRIDGE BEAMS. FLASH PLATES ONLY REQUIRED WHERE CLEARANCE TO 25KV <= 915mm, SEE FLASH PLATE DETAIL THIS SHEET.
3. STRUT INSERTS SHALL BE CAST IN PLACE TO SUPPORT FLASH PLATES FOR ALL NEW CONCRETE BRIDGES. FOR EXISTING CONCRETE BRIDGE, MECHANICAL INSERT SHALL BE DRILLED IN. SPECIAL CONSIDERATION SHALL BE TAKEN WHEN DRILLING PRE–STRESSED CONCRETE BRIDGES (SEE NOTES 5 THROUGH 7).
4. EACH PLATE TO BE JUMPERED TO THE NEXT. EACH END PLATE TO BE TAPPED TO THE BONDING LOOP.
5. ALL ANCHORS INSTALLED IN PRE–STRESSED CONCRETE TO BE IN LINE WITH VOID DRAIN HOLES WHERE POSSIBLE.
6. ALL STRANDS TO BE LOCATED BY USE OF A PACHYMETER BEFORE ANY DRILLING OF PRE–STRESSED CONCRETE IS TO BEGIN.
7. JIG TO BE USED WHEN DRILLING IN PRE–STRESSED CONCRETE BOX BEAMS TO PREVENT BIT FROM PENETRATING ANY PRE–STRESSED STRAND.
8. PROVIDE (4) ANCHORS MINIMUM PER PLATE ALONG THE ENTIRE LENGTH OF THE GRID PLATES.
9. ALTERNATE MATERIAL FOR SOLID BARRIERS MAY BE PROPOSED FOR APPROVAL BY THE FINAL DESIGN.
10. BONDING WIRE SHALL BE COPPER, COPPERWELD OR OTHER CORROSION RESISTANT CONDUCTOR SUITABLE FOR EXPOSURE TO ROAD SALT.



ELEVATION VIEW



FLASH PLATE DETAIL
NOT TO SCALE

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: M. INSOGNA 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
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METROLINX

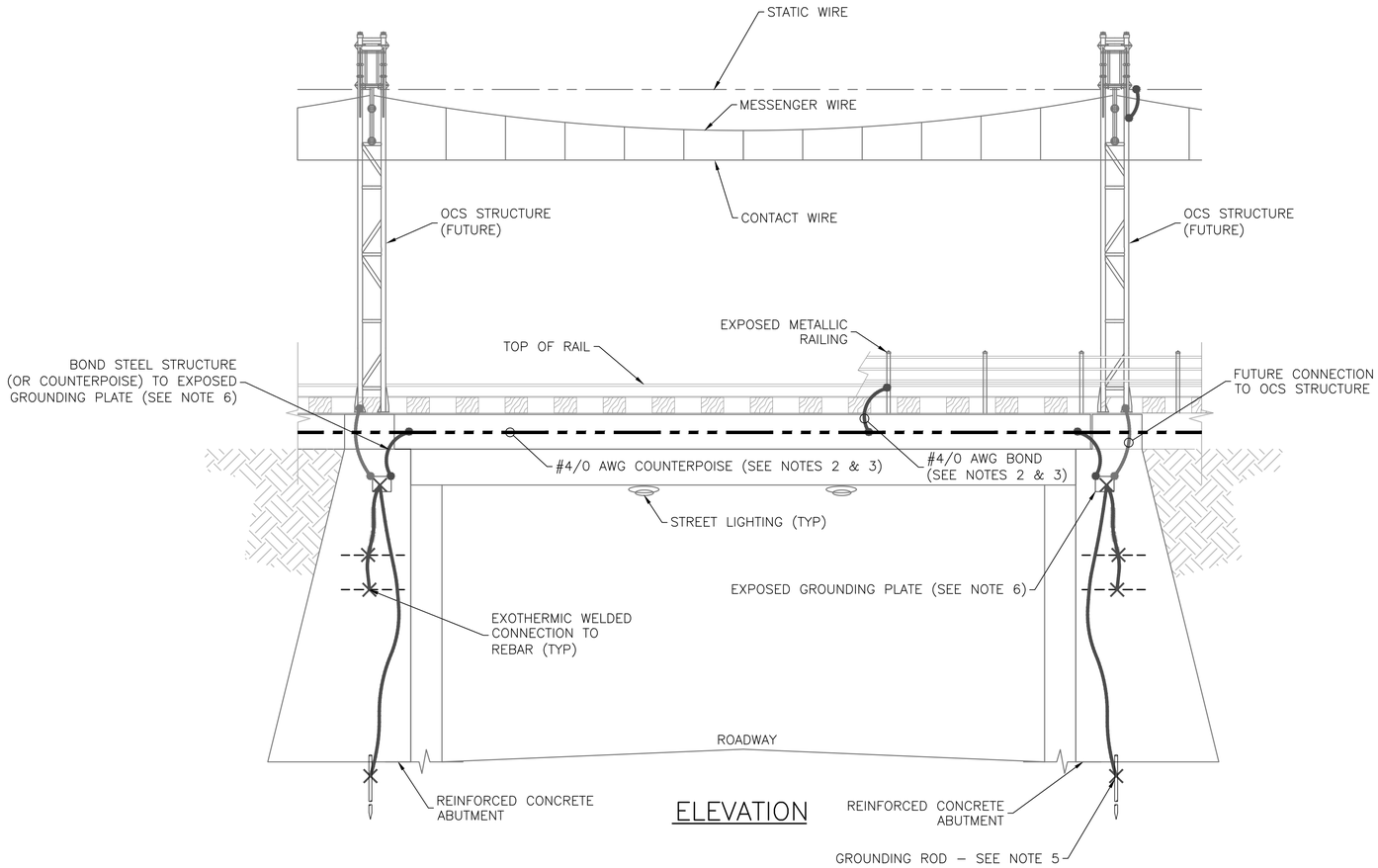
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET BONDING AND GROUNDING TYPICAL CONCRETE BRIDGE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0117	1	XX

1

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



ELEVATION

NOTES:

1. FOR ADDITIONAL NOTES SEE DRAWING EW–ET–0101.
2. EXPOSED METALLIC OBJECTS, SUCH AS HANDRAILS, ON A STEEL BRIDGE STRUCTURE ARE ASSUMED TO BE STRUCTURALLY CONNECTED SO THAT ADDITIONAL BONDING IS NOT REQUIRED. THESE METALLIC OBJECTS ON THE STEEL BRIDGE ARE TO BE VISUALLY INSPECTED TO VERIFY CONTINUITY WITH BRIDGE STRUCTURE. BOND STEEL BRIDGE TO OCS POLE AT EACH END OF THE BRIDGE. IF UNABLE TO VERIFY CONTINUITY OF EXPOSED METALLIC OBJECTS TO BRIDGE STEEL SUPPORTS, FOLLOW GUIDELINES FOR CONCRETE BRIDGES. (SEE NOTE 3)
3. IF BRIDGE IS CONCRETE, THE USE OF A #4/0 AWG COUNTERPOISE AND BONDING CONNECTIONS FROM THE RAILING OR OTHER METALLIC OBJECT IS TO BE EMPLOYED ALONG THE LENGTH OF THE BRIDGE. THE COUNTERPOISE SHALL BE CONNECTED TO EXPOSED GROUNDING PLATES (MINIMUM OF TWO) FOR FUTURE CONNECTION TO THE TRACTION POWER RETURN SYSTEM. (SEE NOTE 6)
4. OTHER BRIDGE METALLIC STRUCTURES THAT MUST BE BONDED INCLUDE:
   STEEL PARAPET
   STEEL HANDRAILS
   STEEL DECK AND WALKWAYS
   STEEL BRIDGE SUPPORT
5. IF OCS STRUCTURE IS BEING INCORPORATED INTO THE PIER OF A NEW BRIDGE FOUNDATION SUPPORT, THEN BOND TO STEEL REINFORCING BAR OF THAT SUPPORT SIMILAR TO THAT OF THE OCS STRUCTURE (SEE DRAWINGS EW–ET–0250 AND EW–ET–0251). IF BRIDGE FOUNDATION IS NOT USING TRADITIONAL STEEL REBAR REINFORCEMENT (RESIN OR EPOXY COATED BARS THAT CANNOT BE BONDED), THEN INSTALL A COPPER GROUND ROD (20mmx3000mm) IN ORDER TO REACH THE REQUIRED MINIMUM GROUND RESISTANCE. THIS ROD SHALL BE DRIVEN IN ORDER TO MAINTAIN GOOD CONTACT WITH THE SURROUNDING EARTH.
6. PROVIDE A FOUR (4) HOLE GROUNDING PLATE (ERICO: B1642Q OR EQUIVALENT) AT EACH SIDE FACE OF EACH ABUTMENT FOR THE CONNECTION TO THE FUTURE OCS STRUCTURES. THESE PLATES SHALL BE BONDED TO THE ABUTMENT REINFORCEMENT OR TO THE GROUNDING PLATE (SEE NOTE 5). LOCATION OF THIS EXPOSED PLATE TO BE DETERMINED BY BRIDGE DESIGNER AND SHALL BE CLOSE TO THE FUTURE OCS STRUCTURES TO FACILITATE FUTURE BONDING CONNECTION.
7. UTILITIES (GAS, WATER, SEWER) WHICH ARE CARRIED ON THE BRIDGE STRUCTURE SHALL HAVE THEIR CARRIER PIPE ENCLOSED IN A STEEL CASING PIPE THAT IS ISOLATED FROM THE CARRIER PIPE BY APPROVED INSULATORS. THE STEEL CASING PIPE SHALL BE SEALED AT EACH END OF THE BRIDGE AFTER TRANSITIONING INTO THE GROUND AT EACH END OF THE BRIDGE. THE STEEL CASING PIPE SHALL THEN BE BONDED TO THE STEEL STRUCTURE (OR COUNTERPOISE)

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	NEW SHEET ISSUED WITH REVISION 1 SET			
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CHECKED BY: M. INSOGNA 17/04/11	APPROVED BY: T. BANDY 17/04/11	
SCALE:		

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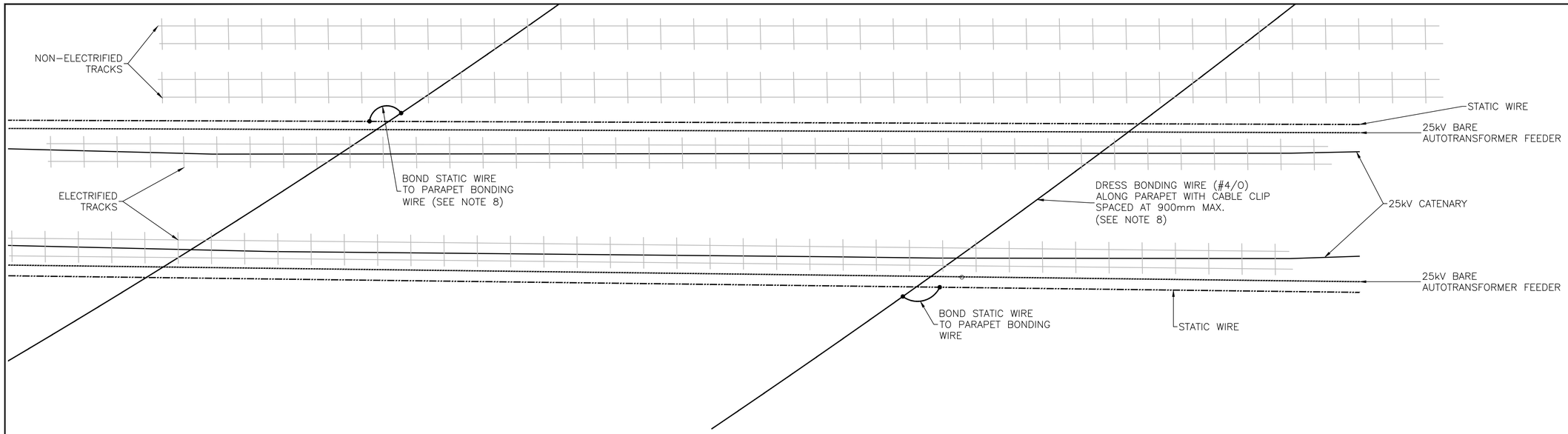
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
TYPICAL UNDERPASS STRUCTURE (SUBWAY BRIDGE)

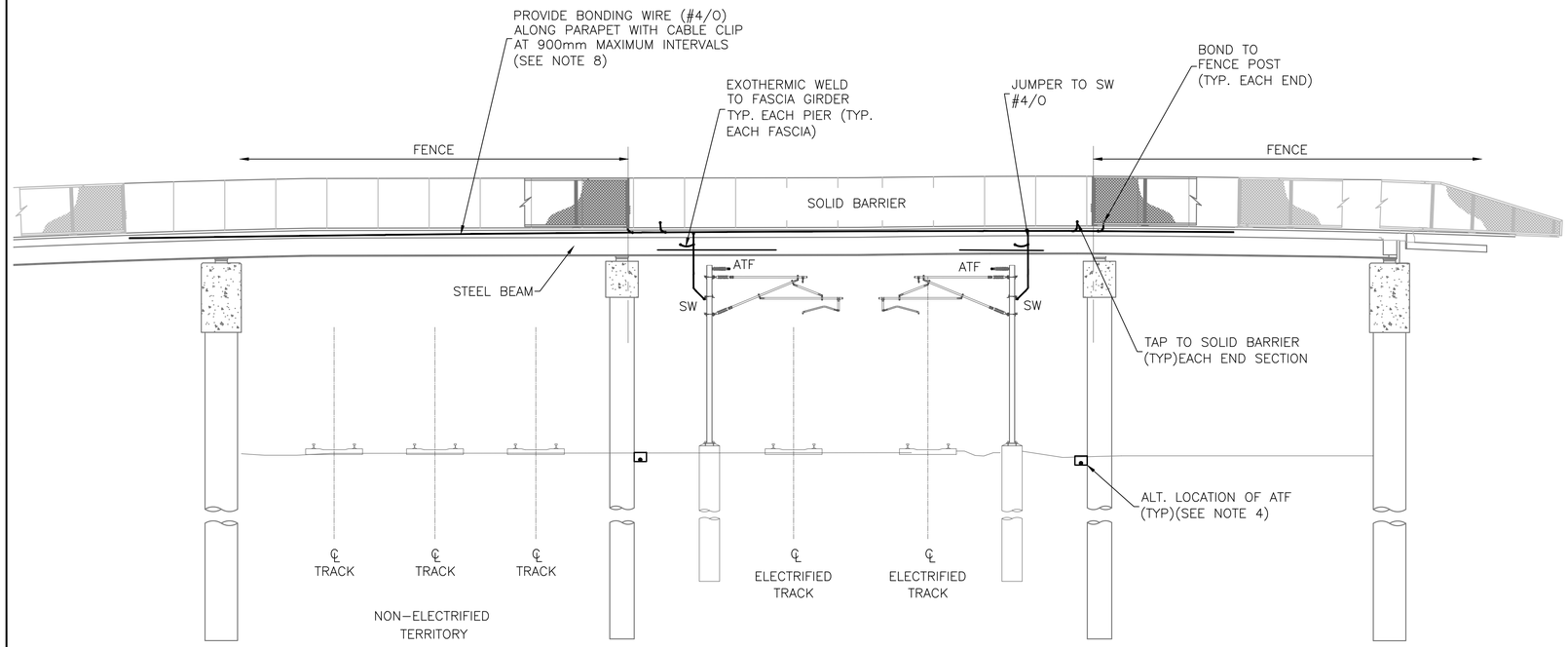
CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0117A	1	XX

GFTRS – C:\pwworking\gfpw01\svfidleris\d06300101\149724–EW–ET–0117A.dwg [layout] October 25, 2018 – 9:06am svfidleris



PLAN VIEW

NOT TO SCALE



SQUARE LONGITUDINAL SECTION

NOT TO SCALE

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

NOTES:

1. SEE DRAWING EW-ET-0101 FOR GENERAL ET GROUNDING AND BONDING NOTES/REQUIREMENTS. THIS DRAWING IS DIAGRAMMATIC, BUT IDENTIFIES THE ET BONDING AND GROUNDING REQUIREMENTS FOR TYPICAL STEEL BRIDGE.
2. BRIDGE AND OCS STRUCTURES ARE SCHEMATIC IN NATURE TO SHOW GROUNDING AND BONDING, AND DO NOT PORTRAY EXISTING BRIDGE CONDITIONS OR PROPOSED OCS STRUCTURE ASSEMBLY.
3. EXPOSED METALLIC FENCE SHALL BE BONDED VIA BONDING WIRE.
4. WHERE INSUFFICIENT CLEARANCE DOES NOT ALLOW THE AUTOTRANSFORMER FEEDER TO BE PLACED IN ITS NORMAL LOCATION, THE CONDUCTOR SHALL BE CABLED AND ROUTED IN TROUGHS ADJACENT TO THE TRACKS, OR AERIALLY ON OCS STRUCTURES.
5. FOR NEW CONSTRUCTION, UNINSULATED METALLIC UTILITIES RUNNING WITHIN THE BRIDGE SHALL BE BONDED TO THE BONDING WIRE.
6. IF THIRD PARTY ELECTRICAL SERVICE POWER EQUIPMENT IS LESS THAN 2438mm FROM EXPOSED METALLIC PARTS OF THE BRIDGE, THIRD PARTY GROUNDS SHALL EITHER BE BONDED OR INSULATED FROM EXPOSED METALLIC PARTS THAT ARE BONDED TO THE TRACTION RETURN.
7. BONDING CABLES TO EXPOSED CONDUCTIVE PARTS, UTILITIES AND ELECTRICAL SERVICES SHALL BE MINIMUM #4/0 AWG CU XLPE JACKET OR APPROVED EQUAL.
8. BONDING WIRE SHALL BE COPPER, COPPERWELD OR OTHER CORROSION RESISTANT CONDUCTOR SUITABLE FOR EXPOSURE TO ROAD SALT.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: C. GAO 18/05/01	APPROVED BY: J. YCAS 18/05/01
SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

ET GROUNDING AND BONDING TYPICAL STEEL BRIDGE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0118	1	XX

METRIC

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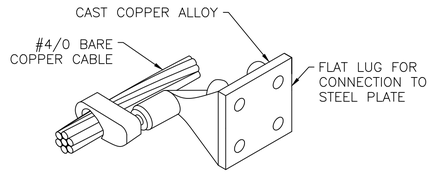

STEEL PLATE CONNECTION
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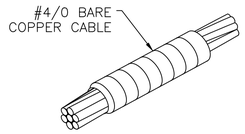

GROUND CABLE SPLICING CONNECTION
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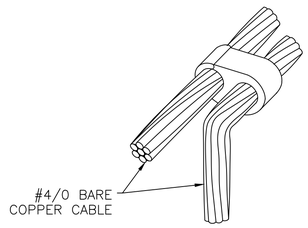

GROUND CABLE TEE CONNECTION
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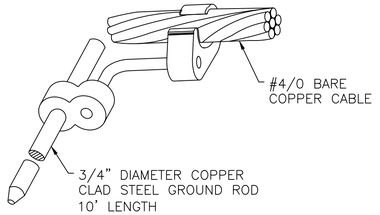
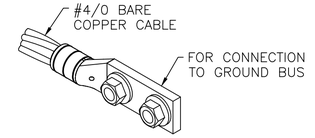


GROUND ROD CONNECTION
NOT TO SCALE



GROUND CABLE TO 2-HOLE TERMINAL CONNECTION
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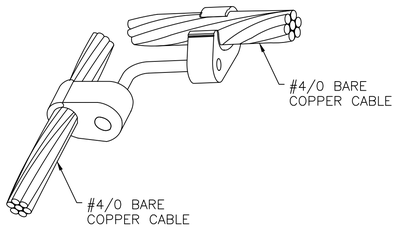
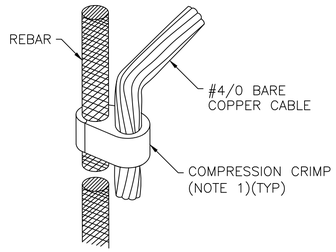
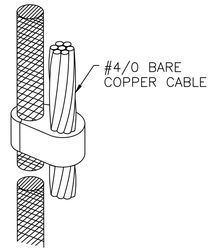


GROUND CABLE CROSS CONNECTION
NOT TO SCALE



GROUND CABLE TO REBAR CONNECTION/HORIZONTAL/VERTICAL
NOT TO SCALE



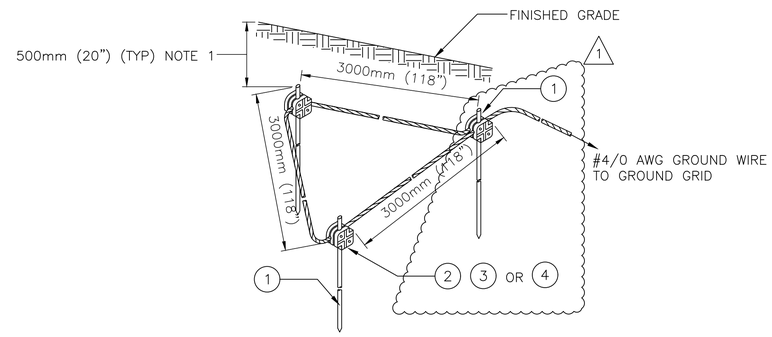
CONNECTOR, COMPRESSION GROUND TAP-GROUND CABLE TO REBAR CONNECTION
NOT TO SCALE

NOTE:

1. CUL LISTED IRREVERSIBLE COMPRESSION CRIMPING SYSTEM COMPONENTS (BURNDY HY-LUG OR EQUAL) MAY BE SUBSTITUTED WITH EXOTHERMIC WELDED CONNECTIONS

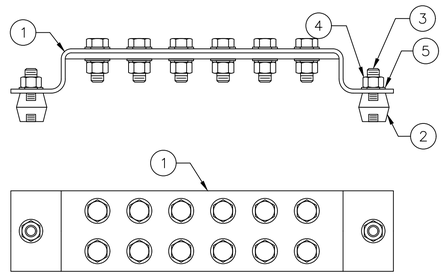
NOTE:

1. THE DEPTH OF THE GROUNDING GRID WILL DEPEND ON LOCAL SITE CONDITIONS AND MUST BE DETERMINED BY THE CONTRACTOR BEFORE INSTALLATION. 500mm IS A TYPICAL VALUE THAT HAS BEEN PROVIDED FOR REFERENCE.



REMOTE GROUNDING ASSEMBLY
NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	3	EA	COPPER CLAD STEEL GROUND ROD 3M X 20MM (10' X 3/4")	(GENERIC)
2	2	EA	THROUGH GROUND WIRE TO GROUND ROD EXOTHERMIC CONNECTION	BURNDY: B-1596 OR EQUIVALENT
3	1	EA	THROUGH GROUND WIRE TO GROUND ROD EXOTHERMIC CONNECTION	BURNDY: B-2566 OR EQUIVALENT
4	3	EA	THROUGH GROUND WIRE TO GROUND ROD MECHANICAL CONNECTION	BURNDY: GP6429 OR EQUIVALENT



GROUNDING COPPER BAR ASSEMBLY
NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	COPPER GROUND BUS BAR 6mm x 50mm x 300mm (¼" x 2" x 12") MIN	(GENERIC)
2	2	EA	FIBERGLASS REINFORCED POLYESTER INSULATOR W/12mm (1/2") - 13 THREADED HOLES	ERICO: 559686 OR EQUIVALENT
3	2	EA	BRONZE BOLT 12MM - 13x25mm (1"- 13x1")	(GENERIC)
4	2	EA	INSULATED WASHER, 1/2" (1)	
5	2	EA	LOCK WASHER, BRONZE, 1/2"	

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	181116	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: W. J. CARNEY 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
Excellence Delivered As Promised

METROLINX

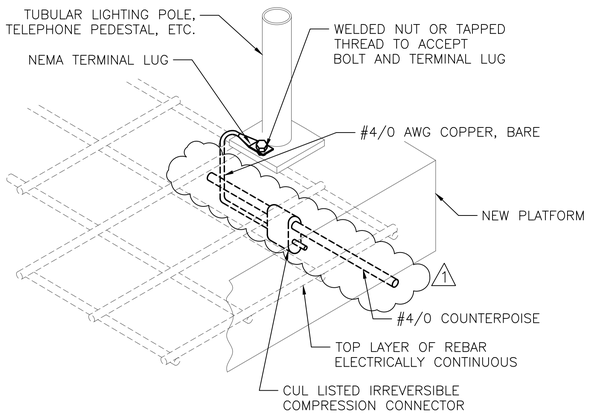
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING CONNECTION DETAILS (SHEET 1 OF 6)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0119	1	XX

GFTRS - C:\pwworking\gfpw01\svfidleris\d06300101\149724-EW-ET-0119.dwg [layout] November 21, 2018 - 2:14pm svfidleris

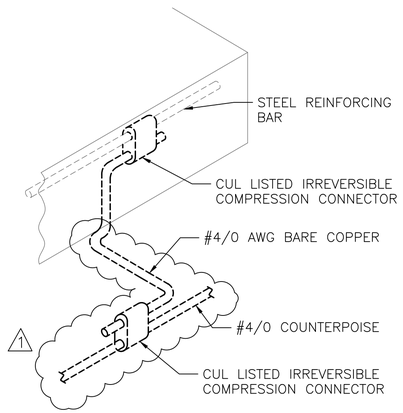
METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



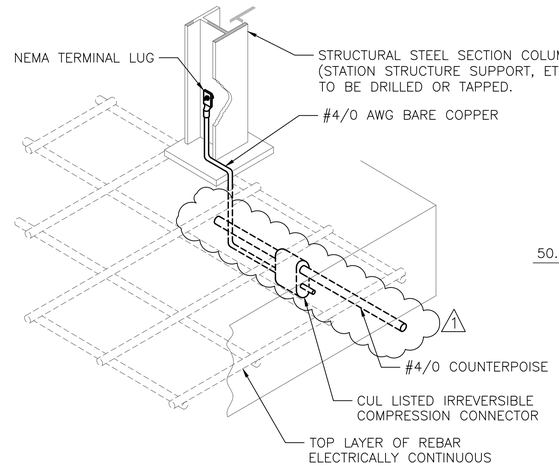
MISC. TUBULAR SUPPORT TO REBAR

NOT TO SCALE



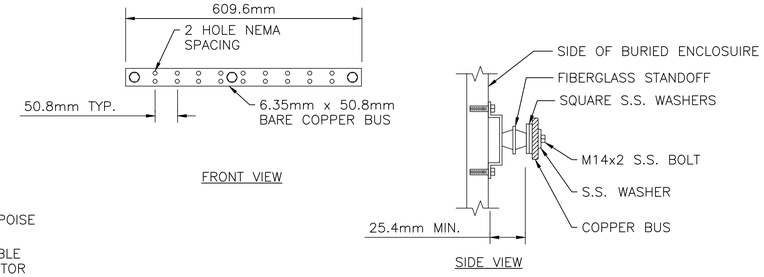
REBAR TO COUNTERPOISE

NOT TO SCALE

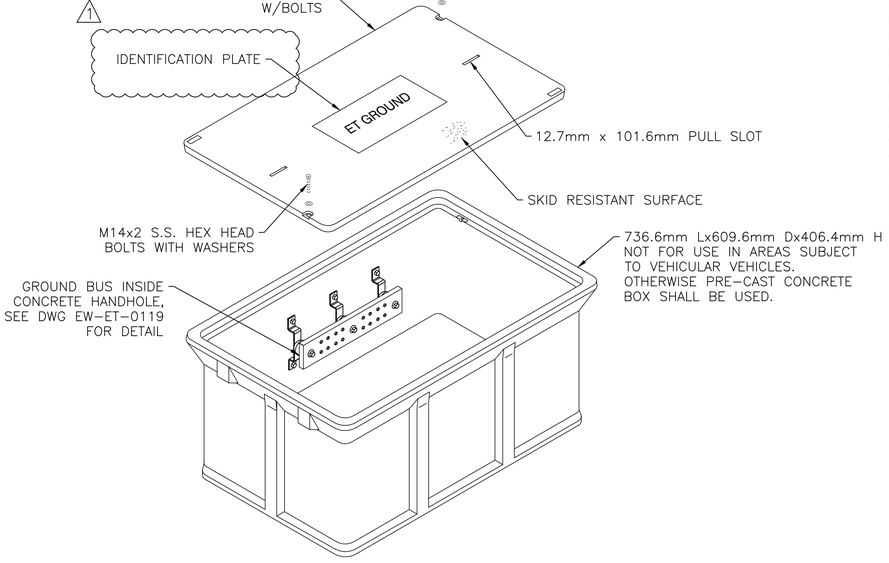


SUPPORT COLUMN TO CONNECTION

NOT TO SCALE

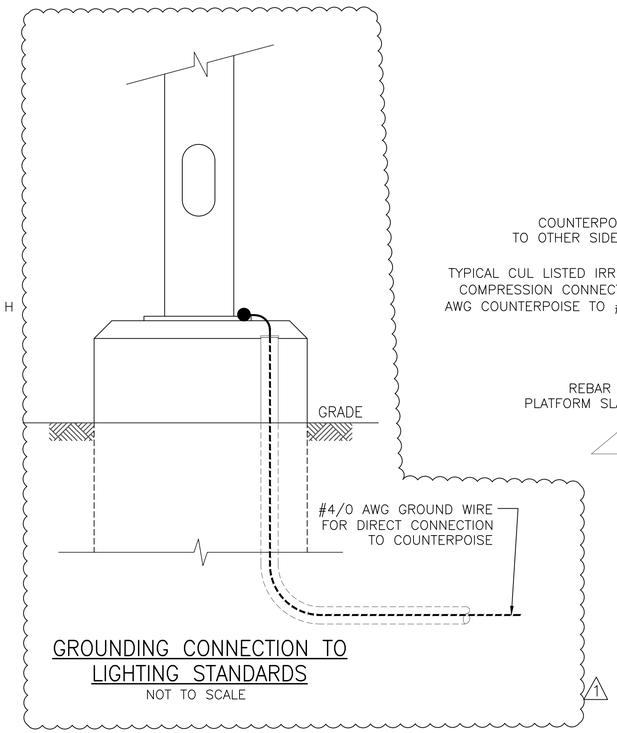


TYPICAL GROUND BUS MOUNTING FOR STATION ALL AND EQUIPMENT FOUNDATION



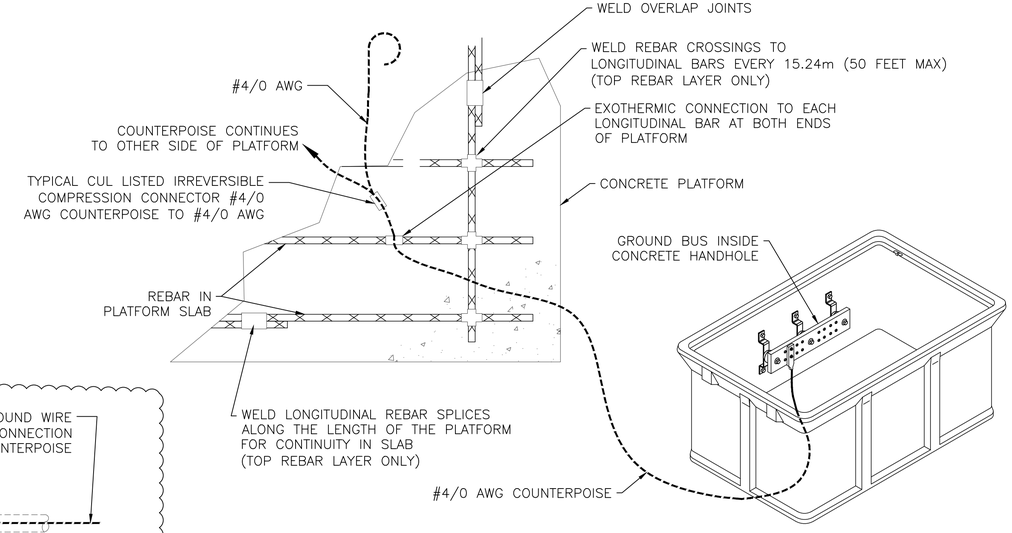
TYPICAL HEAVY DUTY POLYMER CONCRETE HANDHOLE

NOT TO SCALE



GROUNDING CONNECTION TO LIGHTING STANDARDS

NOT TO SCALE



TYPICAL REBAR WELDING CONNECTIONS

NOT TO SCALE

(TO CREATE ELECTRICAL CONTINUITY IN ENTIRE PORTION OF STATION PLATFORM TOP SLAB)

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: C. GAO 18/05/01	APPROVED BY: J. YCAS 18/05/01
SCALE:	

Gannett Fleming — Excellence Delivered As Promised

METROLINX

ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

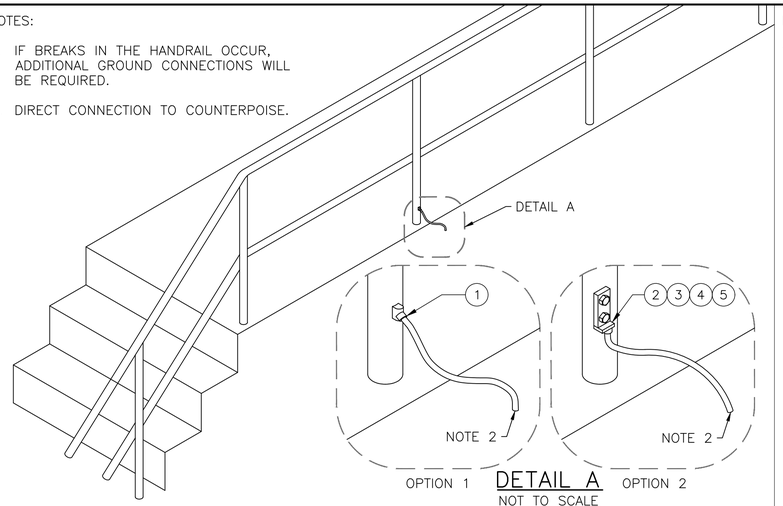
ET GROUNDING AND BONDING CONNECTION DETAILS (SHEET 2 OF 6)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0120	1	XX

GFTRS - C:\pwworking\gfpw01\svfidleris\d0630010\149724-EW-ET-0120.dwg [layout] November 05, 2018 - 4:59pm svfidleris

NOTES:

1. IF BREAKS IN THE HANDRAIL OCCUR, ADDITIONAL GROUND CONNECTIONS WILL BE REQUIRED.
2. DIRECT CONNECTION TO COUNTERPOISE.



DETAIL A
NOT TO SCALE

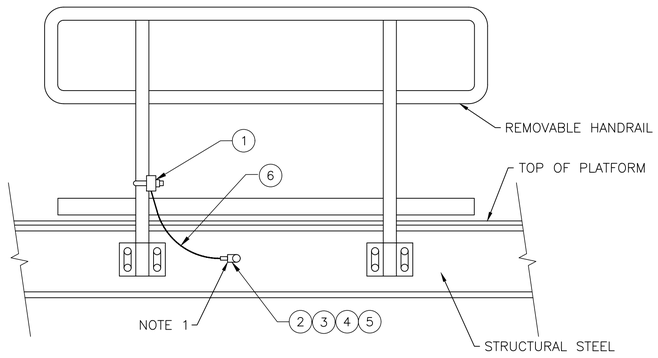
GROUNDING CONNECTION TO FIXED METALLIC HANDRAILS

NOT TO SCALE

ITEM	QTY	UNIT	DESCRIPTION (SEE GENERAL NOTE)	MANUFACTURER & CAT. NO.
1	1	EA	VERTICAL WIRE TO VERTICAL STEEL SURFACE EXOTHERMIC CONNECTION	BURNDY: B-2781 OR BURNDZ: EQUIVALENT
2	6	EA	BRONZE BOLT 12 MM – 13X25mm (1" – 13x1")	(GENERIC)
3	6	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	
4	6	EA	WASHER, FLAT, SS, 1/2", A304/A316	
5	1	EA	TWO HOLE LUG FOR #2 AWG WIRE	BURNDY: YGA2C-2N OR EQUIVALENT

NOTE:

1. THE STEEL STRUCTURE MUST BE CONNECTED TO THE GROUNDING (COUNTERPOISE) SYSTEM. THIS CONNECTION WILL BE MADE IN A CONVENIENT LOCATION AS DETERMINED BY THE CONTRACTOR ON SITE.



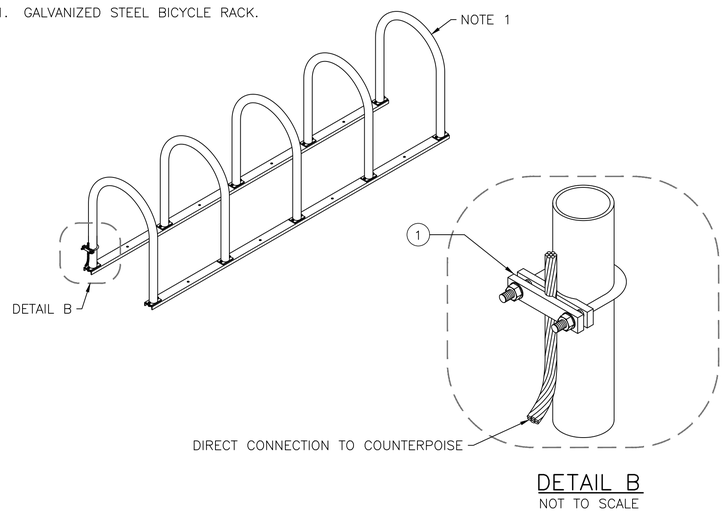
GROUNDING CONNECTION TO REMOVABLE METALLIC HANDRAILS

NOT TO SCALE

ITEM	QTY	UNIT	DESCRIPTION (SEE GENERAL NOTE)	MANUFACTURER & CAT. NO.
1	1	EA	CONNECTOR, GROUND, CABLE TO PIPE, #4-2/0, IPS:1-1/2", PIPE	BURNDY: GAR1726 OR EQUIVALENT
2	1	EA	TERMINAL 1 HOLE FOR #2 WIRE	BURNDY: YA26L6-BOX OR EQUIVALENT
3	1	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	(GENERIC)
4	2	EA	WASHER, FLAT, SS, 1/2", A304/A316	
5	1	EA	BOLT, HEX, SS, 1/2"-13 NC x 1", A304/A316)	
6	3	FT	#2 GROUND WIRE	

NOTE:

1. GALVANIZED STEEL BICYCLE RACK.



DETAIL B
NOT TO SCALE

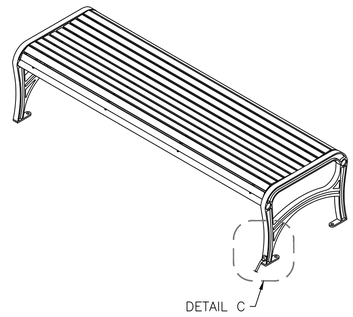
GROUNDING CONNECTION TO FIXED METALLIC BIKE RACKS

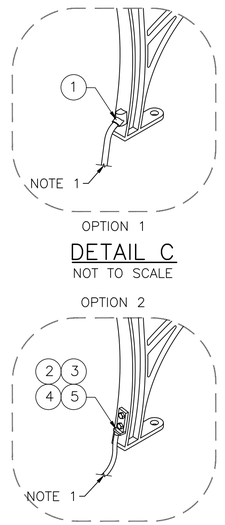
NOT TO SCALE

ITEM	QTY	UNIT	DESCRIPTION (SEE GENERAL NOTE)	MANUFACTURER & CAT. NO.
1	1	EA	CONNECTOR, GROUND, CABLE TO PIPE, #4-2/0, IPS:1-1/2", PIPE	BURNDY: GAR1729 OR BURNDZ: EQUIVALENT

NOTE:

1. DIRECT CONNECTION TO COUNTERPOISE.



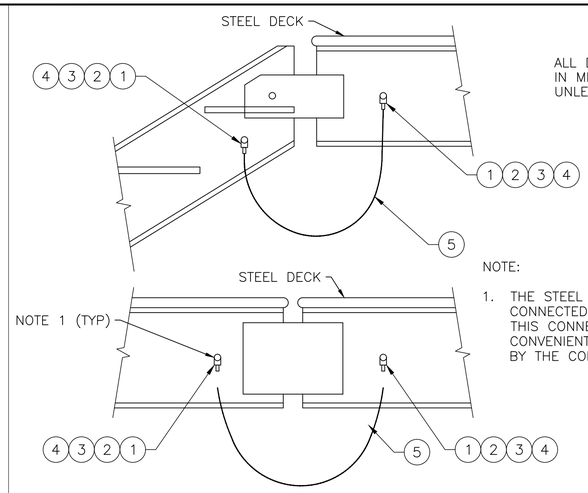


DETAIL C
NOT TO SCALE

GROUNDING CONNECTION TO FIXED METALLIC BENCH

NOT TO SCALE

ITEM	QTY	UNIT	DESCRIPTION (SEE GENERAL NOTE)	MANUFACTURER & CAT. NO.
1	1	EA	VERTICAL WIRE TO VERTICAL STEEL SURFACE EXOTHERMIC CONNECTION	BURNDY: B-2741 OR BURNDZ: EQUIVALENT
2	6	EA	BRONZE BOLT 12MM – 13X25mm (1" – 13X1")	(GENERIC)
3	6	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	
4	6	EA	WASHER, FLAT, SS, 1/2", A304/A316	
5	1	EA	TWO HOLE LUG FOR #2 WIRE	BURNDY: YGA2C-2N OR EQUIVALENT



METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

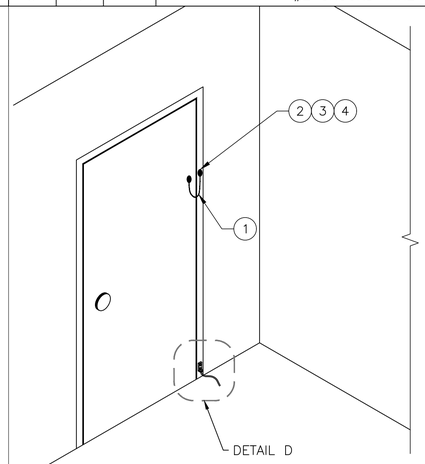
NOTE:

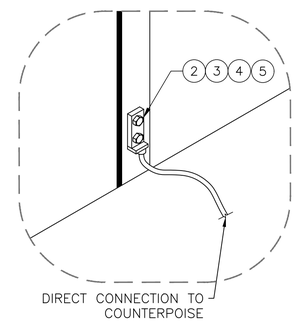
1. THE STEEL STRUCTURE MUST BE CONNECTED TO THE GROUNDING SYSTEM. THIS CONNECTION WILL BE MADE IN A CONVENIENT LOCATION AS DETERMINED BY THE CONTRACTOR ON SITE.

GROUNDING CONNECTION TO FIXED METALLIC STAIRS

NOT TO SCALE

ITEM	QTY	UNIT	DESCRIPTION (SEE GENERAL NOTE)	MANUFACTURER & CAT. NO.
1	2	EA	TERMINAL 1 HOLE FOR #2 WIRE	BURNDY: YA26L6-BOX OR EQUIVALENT
2	2	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	(GENERIC)
3	4	EA	WASHER, FLAT, SS, 1/2", A304/A316	
4	2	EA	BOLT, HEX, SS, 1/2"-13 NC x 1", A304/A316	
5	3	FT	#2 GROUND WIRE	





DETAIL D
NOT TO SCALE

GROUNDING CONNECTION TO METALLIC SWING DOORS

NOT TO SCALE

ITEM	QTY	UNIT	DESCRIPTION (SEE GENERAL NOTE)	MANUFACTURER
1	1	EA	FLEXIBLE COPPER BRAID	BURNDY: BD18 OR EQUIVALENT
2	8	EA	BRONZE BOLT 12MM – 13X25mm (1"–13X1")	(GENERIC)
3	6	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	
4	6	EA	WASHER, FLAT, SS, 1/2", A304/A316	
5	1	EA	TWO HOLE LUG FOR #2 WIRE	BURNDY: YGA2C-2N OR EQUIVALENT

GENERAL NOTE: THE GROUNDING WIRE AND RELATED HARDWARE SHOWN ARE FOR INFORMATION ONLY. DESIGNER SHALL VERIFY THE SIZE OF BONDING CONDUCTOR AND HARDWARE ACCORDING TO SAFE STEP AND TOUCH VOLTAGE LEVELS. 1

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: W. J. CARNEY 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming
Excellence Delivered As Promised

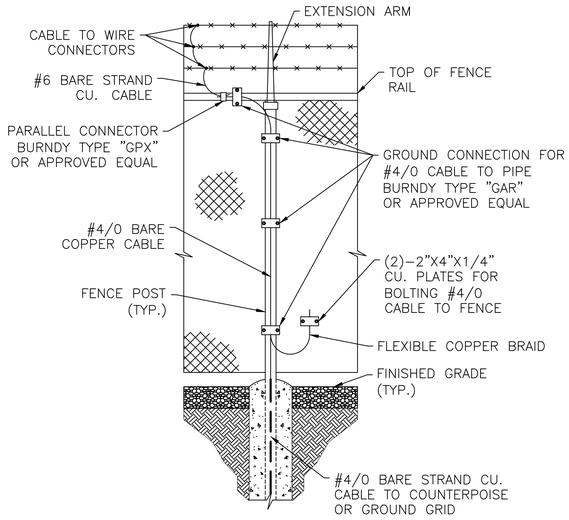
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING CONNECTION DETAILS (SHEET 3 OF 6)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0121	1	XX

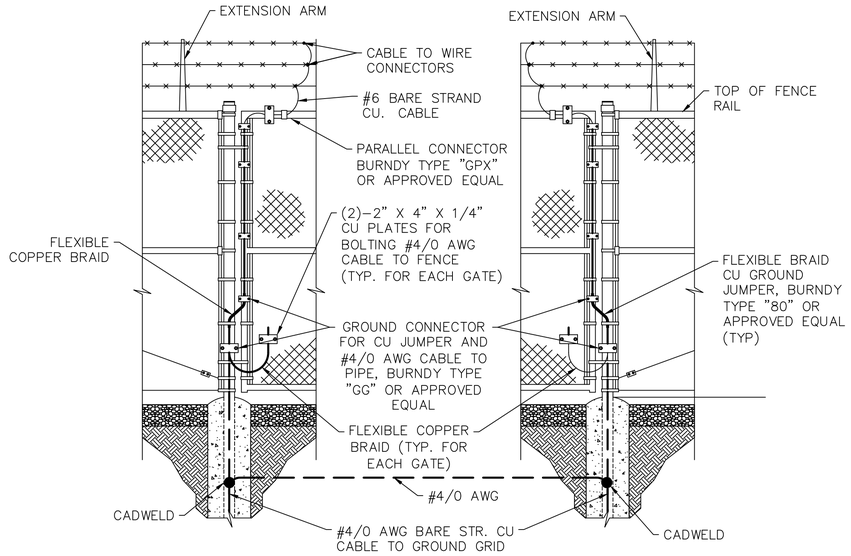
METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



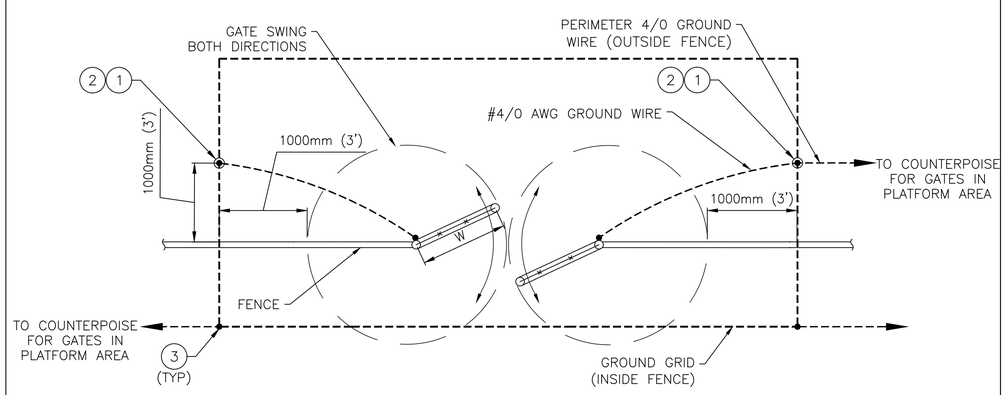
TYPICAL GROUNDING OF FENCE PANELS AND POSTS

NOT TO SCALE



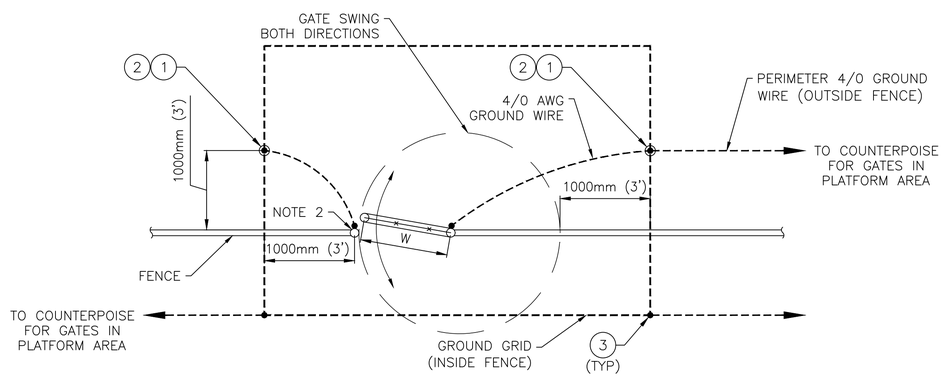
TYPICAL BONDING OF FENCE GATES

NOT TO SCALE



GROUND GRID AT SWING GATE (DOUBLE)

NOT TO SCALE



GROUND GRID AT SWING GATE (SINGLE)

NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	2	EA	COPPER CLAD STEEL GROUND ROD 3MX20MM	(GENERIC)
2	2	EA	HORIZONTAL PARALLEL RUN #4/0 WIRE TO GROUND ROD	BURNDY: B–5677 OR EQUIVALENT
3	2	EA	HORIZONTAL 4/0 WIRE TAP TO HORIZONTAL #4/0 WIRE RUN EXOTHERMIC CONNECTION	BURNDY: B–241 OR EQUIVALENT

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	2	EA	COPPER CLAD STEEL GROUND ROD 3MX20MM	(GENERIC)
2	2	EA	HORIZONTAL PARALLEL RUN #4/0 WIRE TO GROUND ROD	BURNDY: B–5677 OR EQUIVALENT
3	2	EA	HORIZONTAL #4/0 WIRE TAP TO HORIZONTAL #4/0 WIRE RUN EXOTHERMIC CONNECTION	BURNDY: B–241 OR EQUIVALENT

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: W. J. CARNEY 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

Gannett Fleming — Excellence Delivered As Promised

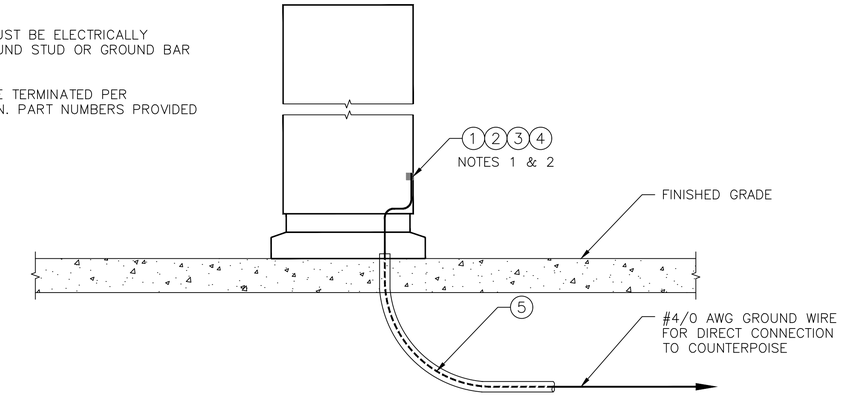
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING CONNECTION DETAILS (SHEET 4 OF 6)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0122	1	XX

NOTES:

1. ALL METALLIC COMPONENTS MUST BE ELECTRICALLY CONNECTED TO INTERNAL GROUND STUD OR GROUND BAR BY MANUFACTURER.
2. GROUND CONDUCTOR SHALL BE TERMINATED PER MANUFACTURERS SPECIFICATION. PART NUMBERS PROVIDED FOR REFERENCE ONLY.



GROUNDING CONNECTION TO METALLIC ENCLOSURE (GARBAGE BIN, NEWSPAPER BOX ETC.)

NOT TO SCALE

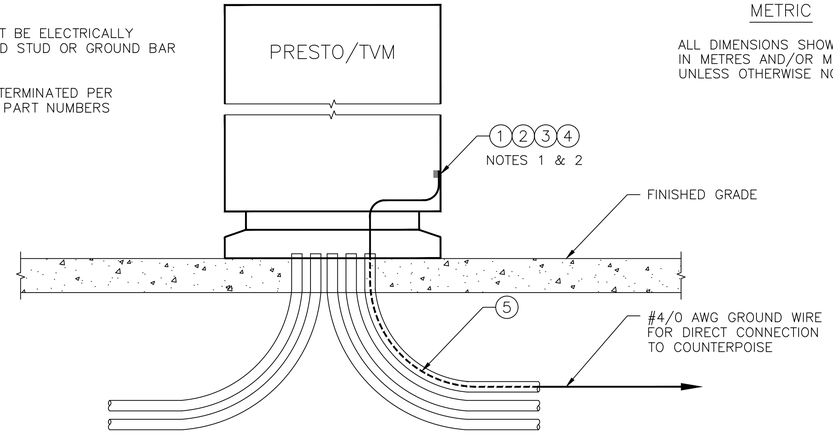
ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	BOLT, HEX, SS, 1/2"–13 NC x 1", A304/A316	(GENERIC)
2	1	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	
3	2	EA	WASHER, FLAT, SS, 1/2", A304/A316	
4	1	EA	TERMINAL 1 HOLE FOR #4/0 WIRE	BURNDY: YA28L–BOX OR EQUIVALENT
5	PER DESIGN	FEET	27mm CONDUIT	GENERIC

NOTES:

1. ALL METALLIC COMPONENTS MUST BE ELECTRICALLY CONNECTED TO INTERNAL GROUND STUD OR GROUND BAR BY MANUFACTURER.
2. GROUND CONDUCTOR SHALL BE TERMINATED PER MANUFACTURERS SPECIFICATION. PART NUMBERS PROVIDED FOR REFERENCE ONLY.

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



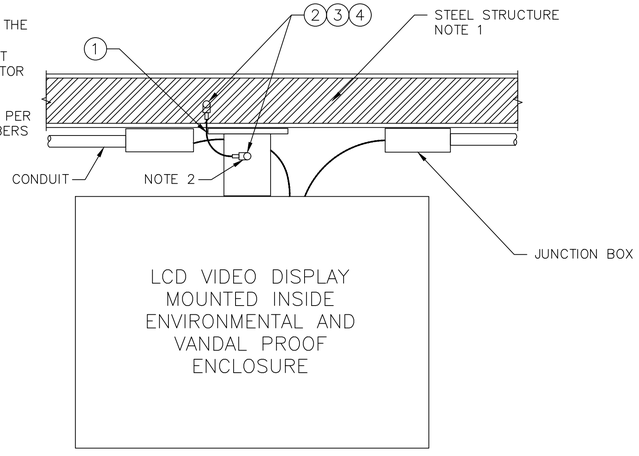
GROUNDING CONNECTION TO PRESTO AND TICKET VENDING MACHINES

NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	BOLT, HEX, SS, 1/2"–13 NC x 1", A304/A316	(GENERIC)
2	1	EA	WASHER, SPRING (LOCK), STAINLESS, 1/2", A304/A316	
3	2	EA	WASHER, FLAT, SS, 1/2", A304/A316	
4	1	EA	TERMINAL 1 HOLE FOR #4/0 WIRE	BURNDY: YA28L–BOX OR EQUIVALENT
5	PER DESIGN	FEET	27mm CONDUIT	GENERIC

NOTES:

1. STEEL STRUCTURE MUST BE CONNECTED TO THE GROUNDING (COUNTERPOISE) SYSTEM. THIS CONNECTION WILL BE MADE IN A CONVENIENT LOCATION AS DETERMINED BY THE CONTRACTOR ON SITE.
2. GROUND CONDUCTOR SHALL BE TERMINATED PER MANUFACTURERS SPECIFICATION. PART NUMBERS PROVIDED FOR REFERENCE ONLY.



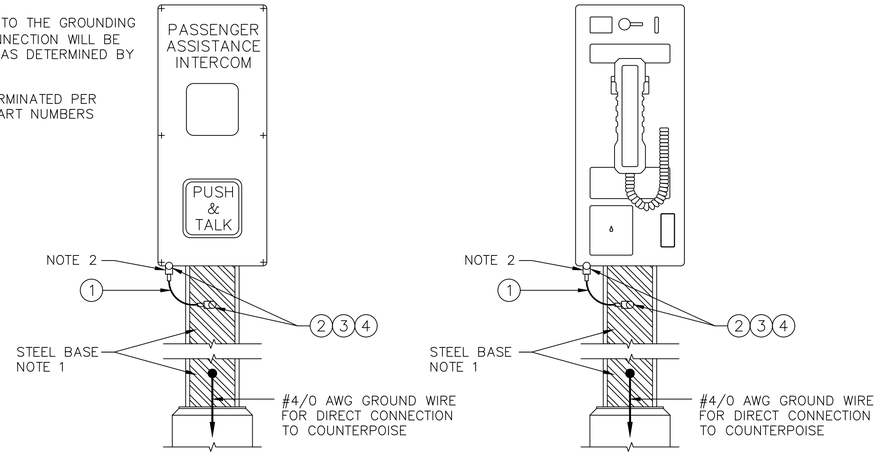
GROUNDING CONNECTION TO PASSENGER INFORMATION DYNAMIC DISPLAY

NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	FLEXIBLE COPPER BRAID	BURNDY: BD12 OR EQUIVALENT
2	2	EA	BOLT, HEX, SS, 3/8"–16 x 1", A304/A316 W/NUT	(GENERIC)
3	2	EA	WASHER, SPRING (LOCK), STAINLESS, 3/8, A304/A316	
4	2	EA	WASHER, FLAT, SS, 3/8", A304/A316	

NOTES:

1. STEEL BASE MUST BE CONNECTED TO THE GROUNDING (COUNTERPOISE) SYSTEM. THIS CONNECTION WILL BE MADE IN A CONVENIENT LOCATION AS DETERMINED BY THE CONTRACTOR ON SITE.
2. GROUND CONDUCTOR SHALL BE TERMINATED PER MANUFACTURERS SPECIFICATION. PART NUMBERS PROVIDED FOR REFERENCE ONLY.



GROUNDING CONNECTION TO TELEPHONE (BELL) PEDESTALS

NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	FLEXIBLE COPPER BRAID	BURNDY: BD12 OR EQUIVALENT
2	2	EA	BOLT, HEX, SS, 3/8"–16 x 1", A304/A316 W/NUT	(GENERIC)
3	2	EA	WASHER, SPRING (LOCK), STAINLESS, 3/8, A304/A316	
4	2	EA	WASHER, FLAT, SS, 3/8", A304/A316	

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY:	DESIGNED BY:
T. SUYDAM 17/10/09	T. DOYLE 17/10/09
CHECKED BY:	APPROVED BY:
W. J. CARNEY 17/10/09	T. BANDY 17/10/09
SCALE:	

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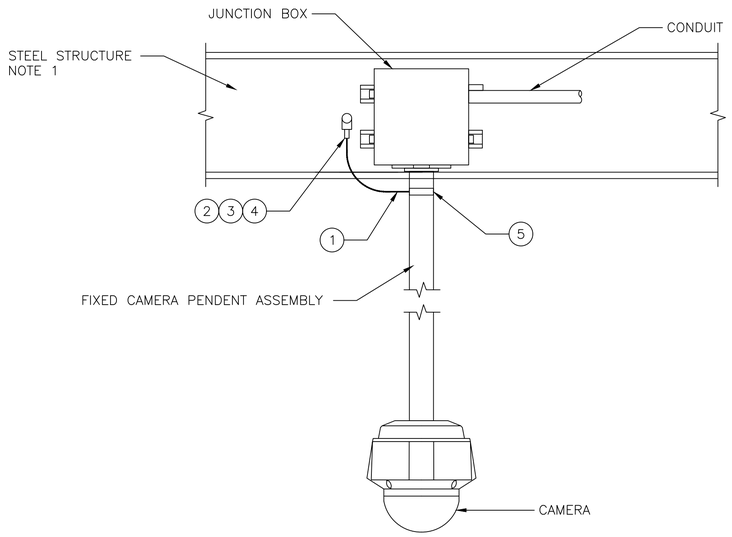
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING CONNECTION DETAILS (SHEET 5 OF 6)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0123	1	XX

NOTE:

1. STEEL STRUCTURE MUST BE CONNECTED TO THE GROUNDING (COUNTERPOISE) SYSTEM. THIS CONNECTION WILL BE MADE IN A COMMENT LOCATION AS DETERMINED BY THE CONTRACTOR ON SITE.

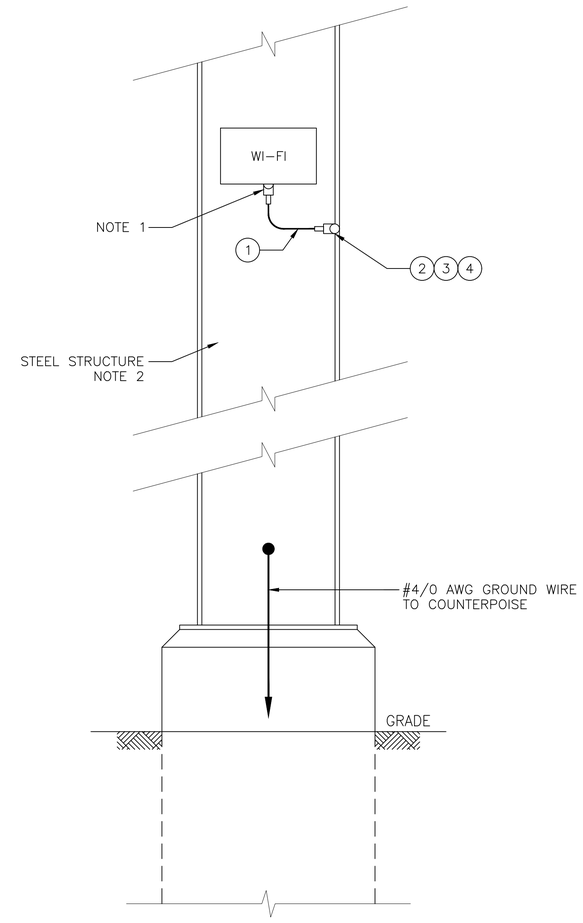


GROUNDING CONNECTION TO CCTV CAMERAS
NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	FLEXIBLE COPPER BRAID	BURNDY: BD12 OR EQUIVALENT
2	1	EA	BOLT, HEX, SS, 3/8"–16 x 1", A304/A316 W/NUT	(GENERIC)
3	1	EA	WASHER, SPRING (LOCK), STAINLESS, 3/8, A304/A316	
4	1	EA	WASHER, FLAT, SS, 3/8", A304/A316	
5	1	EA	WIRE TO 2'' PIPE CONNECTION	BURNDY: GAR1829 OR EQUIVALENT

NOTES:

1. GROUNDING EQUIPMENT CONNECTED TO WI–FI ROUTERS AND ANTENNAS PER MANUFACTURERS SPECIFICATION.
2. STEEL STRUCTURE MUST BE CONNECTED TO THE GROUNDING (COUNTERPOISE) SYSTEM. THIS CONNECTION WILL BE MADE IN A COMMENT LOCATION AS DETERMINED BY THE CONTRACTOR ON SITE.



GROUNDING CONNECTION TO WIFI ROUTERS AND ANTENNAS (ACCESS POINTS)
NOT TO SCALE

ITEM	QTY	UNIT	MATERIAL DESCRIPTION	MANUFACTURER & CAT. NO.
1	1	EA	FLEXIBLE COPPER BRAID	BURNDY: BD12 OR EQUIVALENT
2	1	EA	BOLT, HEX, SS, 3/8"–16 x 1", A304/A316 W/NUT	(GENERIC)
3	1	EA	WASHER, SPRING (LOCK), STAINLESS, 3/8, A304/A316	
4	1	EA	WASHER, FLAT, SS, 3/8", A304/A316	

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: T. SUYDAM 17/10/09	DESIGNED BY: T. DOYLE 17/10/09
CHECKED BY: W. J. CARNEY 17/10/09	APPROVED BY: T. BANDY 17/10/09
SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ET GROUNDING AND BONDING
CONNECTION DETAILS (SHEET 6 OF 6)

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0124	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

GENERAL NOTES:

1. THESE DRAWINGS, IN ADDITION TO THE PERFORMANCE SPECIFICATION, PRESENTS THE REQUIREMENTS FOR PROVISIONAL OCS SUPPORT AT PASSENGER STATIONS FOR COORDINATION WITH FUTURE ELECTRIFICATION. THE OCS SUPPORTS CONSISTS OF VARIOUS STRUCTURES SUCH AS PORTALS AND CANTILEVERS WHICH CARRY THE OVERHEAD CONTACT SYSTEM WIRES AS WELL AS ANCILLARY FEEDER AND STATIC WIRES THROUGH THE STATION.
2. THE PROVISIONAL OCS SUPPORT ELEMENTS SHALL PROVIDE THE MEANS FOR THE FUTURE ELECTRIFICATION CONTRACTOR TO EASILY AND CONSISTENTLY CONSTRUCT THE FINAL OCS STRUCTURES WITHOUT ANY MAJOR DEMOLITION OR MAJOR RETROFIT REQUIRED.
3. ADEQUATE PROVISIONAL OCS SUPPORTS SHALL BE DESIGNED AND INSTALLED THROUGHOUT THE STATION PLATFORM AREA TO PROVIDE CONNECTION POINTS FOR ALL FUTURE OCS STRUCTURES WITHIN THE NEW OR REHABILITATED PLATFORMS.
4. ALL PROVISIONAL OCS SUPPORT DESIGNS SHALL BE COORDINATED WITH THE VARIOUS DISCIPLINE DESIGNS, INCLUDING CIVIL, ARCHITECTURAL, ELECTRICAL AND ELECTRONIC, MECHANICAL, AND PLUMBING, TRACTION POWER SUPPLY AND DISTRIBUTION, COMMUNICATIONS, AND SIGNALING.
5. ALL GROUNDING AND BONDING DESIGNS SHALL BE COORDINATED WITH ANY NEIGHBORING STRAY CURRENT AND CORROSION CONTROL MEASURES FOR ADJACENT SYSTEMS, AS WELL AS WHEN IN THE VICINITY OF DIRECT CURRENT (DC) TRACTION POWER TRANSIT SYSTEMS.

OCS STRUCTURAL REQUIREMENTS:

1. PROVISIONS FOR FUTURE OCS SUPPORTS SHALL BE DESIGNED WITH THE FUTURE OVERBUILD CONSIDERATIONS INCLUDED. THE INTENT OF THESE PROVISIONS IS TO ALLOW THE FUTURE ELECTRIFICATION CONTRACTOR TO ATTACH VIA SPLICE OR STANDALONE DRILLED FOUNDATION TO COMPLETE THE OCS STRUCTURE. SPLICES AND FOUNDATIONS PROVIDED FOR THIS PURPOSE SHALL BE DESIGNED TO RESIST ALL FUTURE LOADS.
2. INTEGRATED COLUMNS WHICH SUPPORT BOTH OCS AND CANOPY OR SHELTERS SHALL BE PROVIDED WITH PROVISIONS FOR A SPLICE FOR THE FUTURE ELECTRIFICATION CONTRACTOR TO ATTACH THE REMAINING OVERBUILD. THIS SPLICE SHALL BE DESIGNED TO RESIST ALL FUTURE LOADS AND SHALL HAVE A BOLT HOLE PATTERN CONSISTENT WITH THE DESIGN PROVIDED BY METROLINX ELECTRIFICATION.
3. DEFLECTION OF THE SUPPORT STRUCTURE SHALL BE KEPT AT A MINIMUM OF 75mm IN THE ACROSS–TRACK DIRECTION AT THE HEIGHT OF THE FUTURE CATENARY SUPPORTS. THIS SHALL BE CALCULATED AS THE DEFLECTION OF THE STEEL IN ADDITION TO THE EFFECT OF ROTATION AT THE TOP OF FOUNDATION. THIS DEFLECTION WILL BE CALCULATED AT A HEIGHT OF 9600mm ABOVE THE TOP OF HIGH RAIL.

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: W. FRYER 16/06/30
CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 16/06/30
SCALE:	

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METROLINX

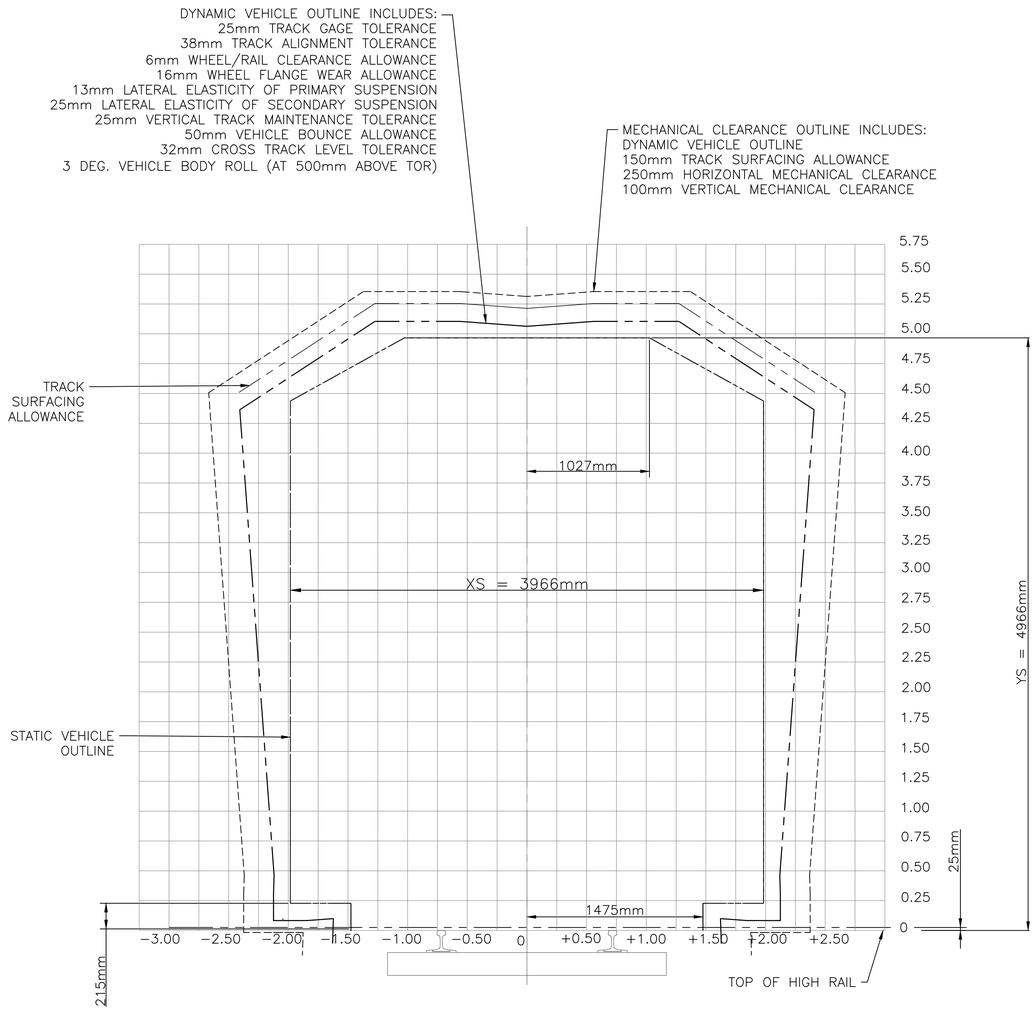
METROLINX PROJECT NO. 149724

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
OVERHEAD CONTACT SYSTEM
GENERAL NOTES

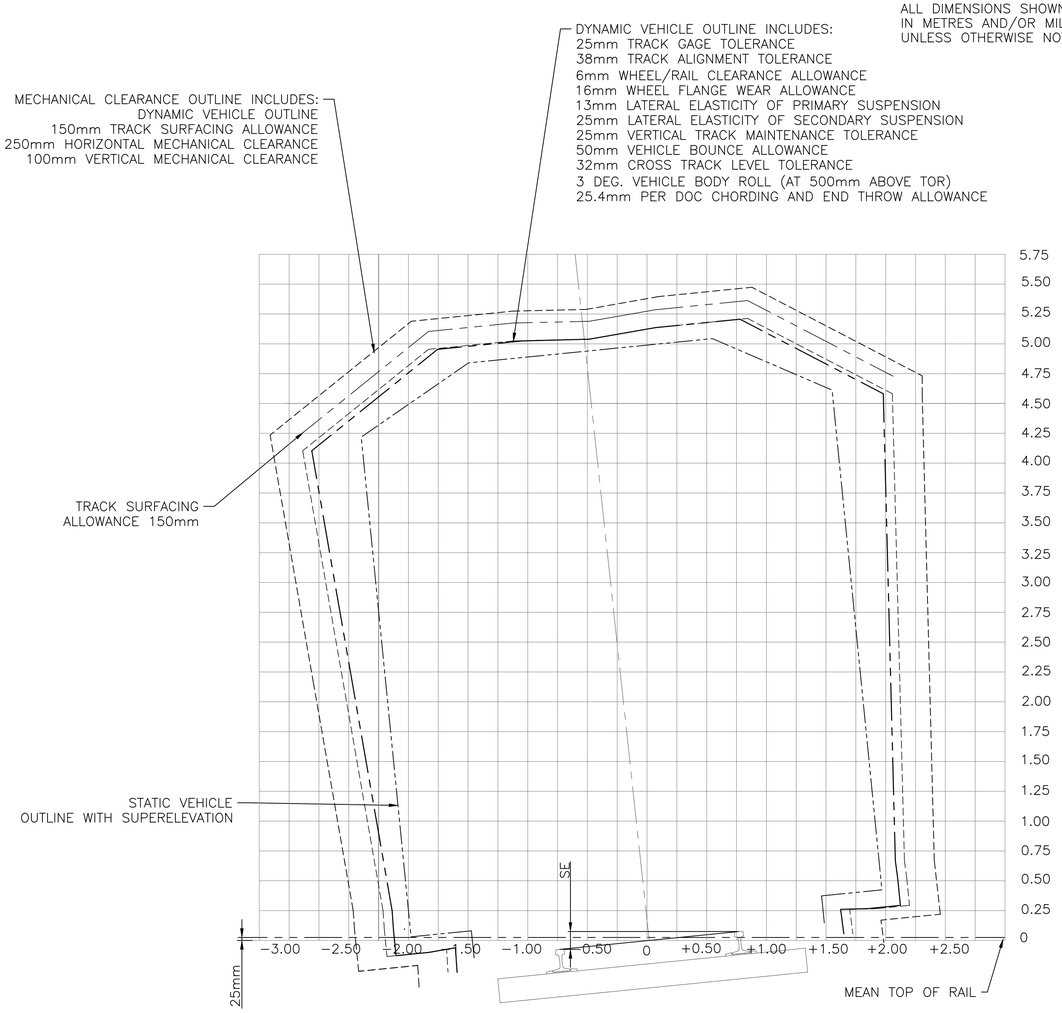
CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0201	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



GO VEHICLE USRC DYNAMIC PLATE FOR TANGENT TRACK



GO VEHICLE USRC DYNAMIC PLATE WITH SUPERELEVATION

EXAMPLE DOC = 3°; SE = 150mm

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW−ET−0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW−ET−0201.
   FOR ABBREVIATIONS, SEE DRAWING EW−ET−0004.
2. TRACK TOLERANCES ARE ASSUMED BASED ON FRA CLASS 4 MAINTENANCE TOLERANCES.
3. VEHICLE AND PANTOGRAPH DYNAMIC PARAMETERS ARE ASSUMED AND MUST BE CONFIRMED.
4. DIMENSIONS SHOWN ARE BASED ON THE DESIGN REQUIREMENT MANUAL.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW−ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: W. FRYER 16/06/30
CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 16/06/30
SCALE:	

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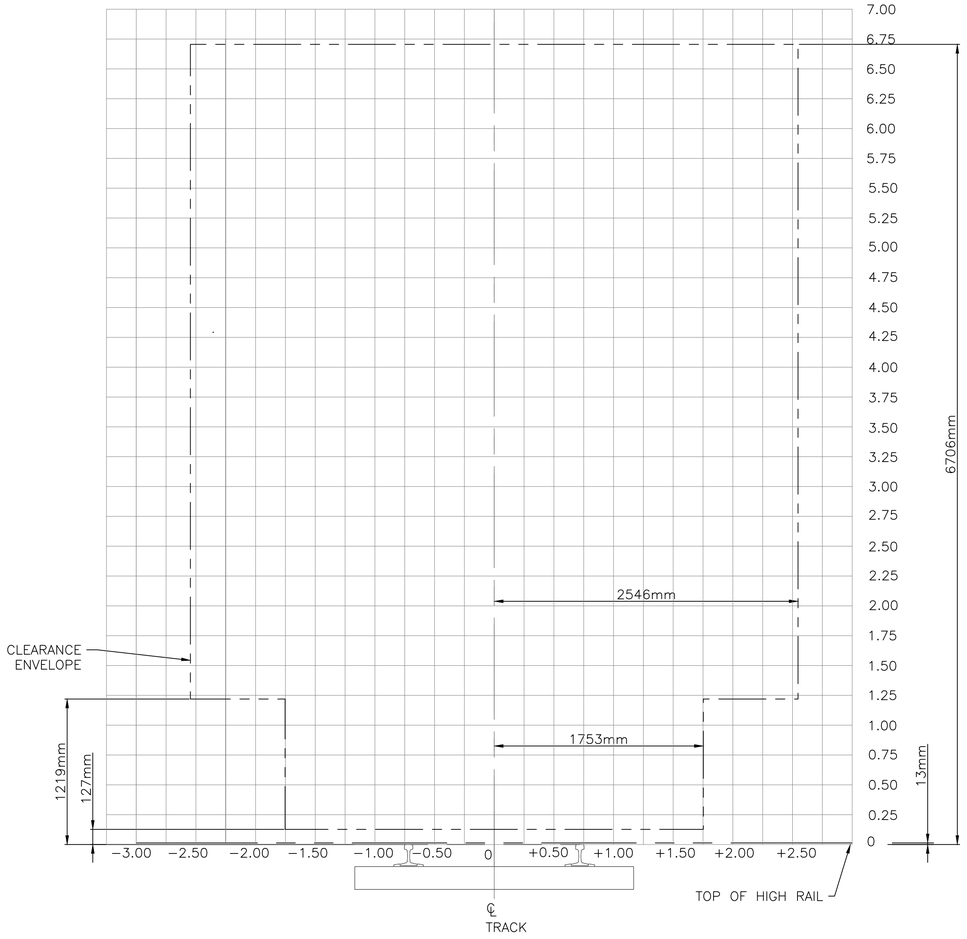
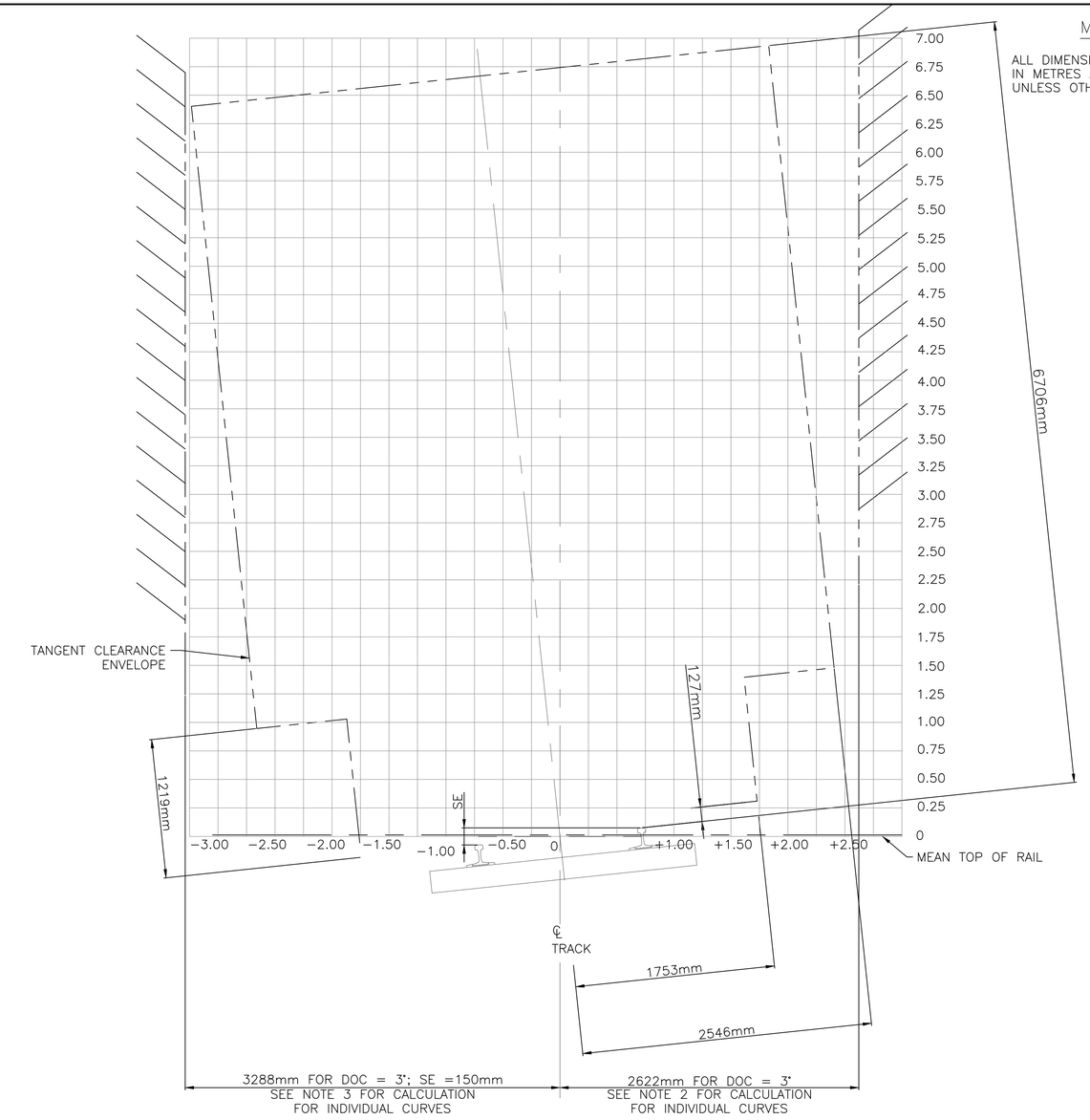
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DYNAMIC PLATE CLEARANCE
GO VEHICLE USRC

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS−2014−IEP−002	EW−ET−0210	1	XX



CLEARANCE TO TANGENT TRACKS



CLEARANCE TO CURVED TRACKS

EXAMPLE: DOC = 3°; SE = 150mm

CURVED TRACK:

ADDITIONAL FACTORS:

SUPERELEVATION (SE) = VARIES, 150mm IN THE EXAMPLE SHOWN

VEHICLE CHORDING AND END−THROW (Cms) = 25.4mm PER DEGREE OF CURVATURE

DEGREE OF CURVATURE (DOC) = VARIES, 3 DEGREES IN EXAMPLE SHOWN

WHERE:

DOC = DEGREE OF CURVE
SE = SUPERELEVATION

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW−ET−0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW−ET−0201.
   FOR ABBREVIATIONS, SEE DRAWING STD−ET−0004.
2. MINIMUM STANDARD CLEARANCES ARE BASED ON TRANSPORT CANADA STANDARD. TC_E_05e DIAGRAM 1 − "CLEARANCE ENVELOPE ON ALL STRUCTURES OVER OR BESIDE THE RAILWAY TRACKS"
3. ON CURVED TRACK ON OPPOSITE SIDE OF TRACK FROM CURVE CENTER INCREASE MINIMUM CLEARANCE TO: 2546+25.4xDOC.
4. ON CURVED TRACK ON SAME SIDE OF TRACK AS CURVE CENTER INCREASE MINIMUM CLEARANCE TO: 2546+25.4xDOC+SE*6706/1510.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW−ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/05/06	DESIGNED BY: D. MIHAI 16/05/06
CHECKED BY: W. FRYER 16/05/06	APPROVED BY: B. SHOBER 16/05/06
SCALE:	

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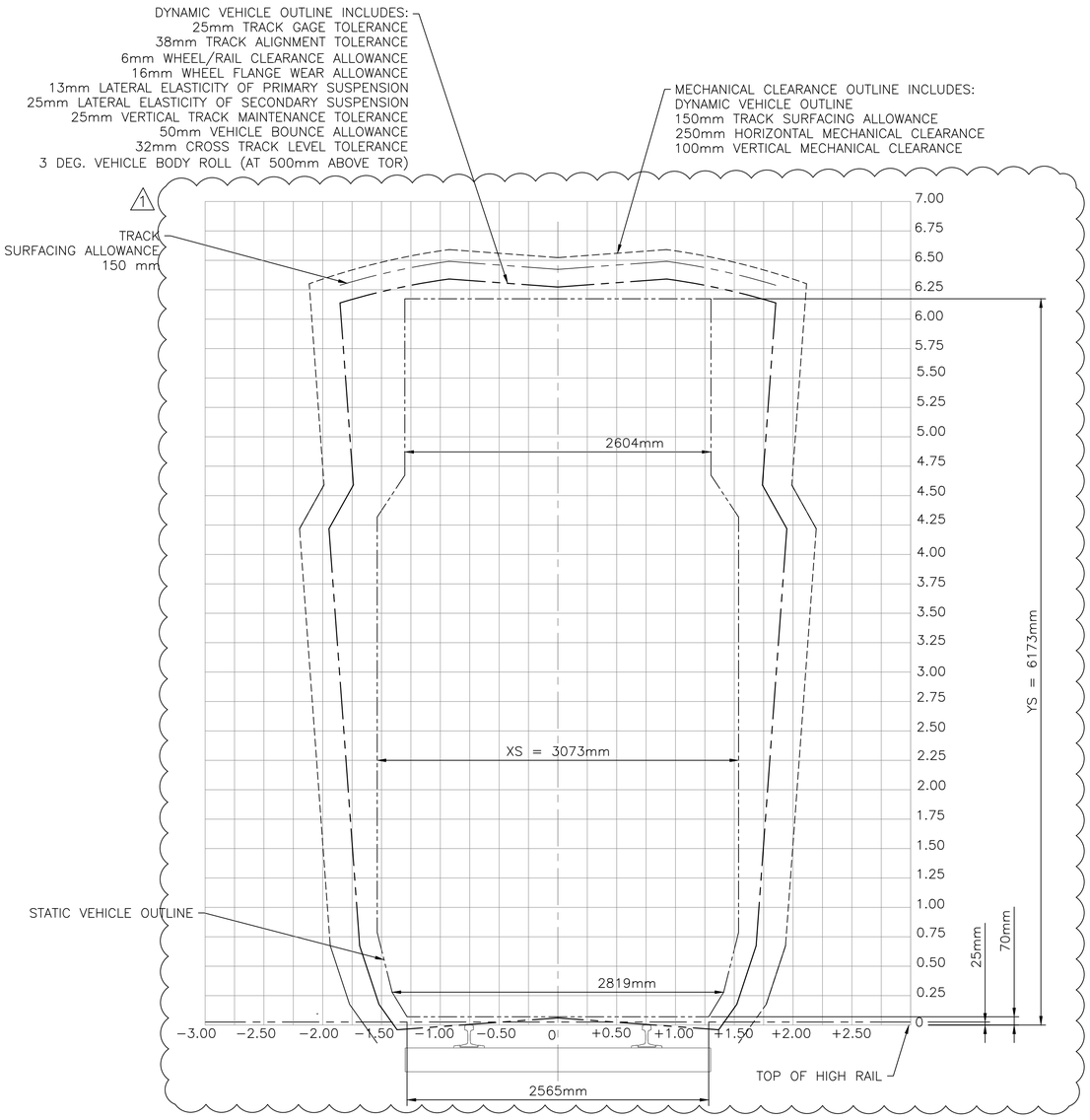
METROLINX

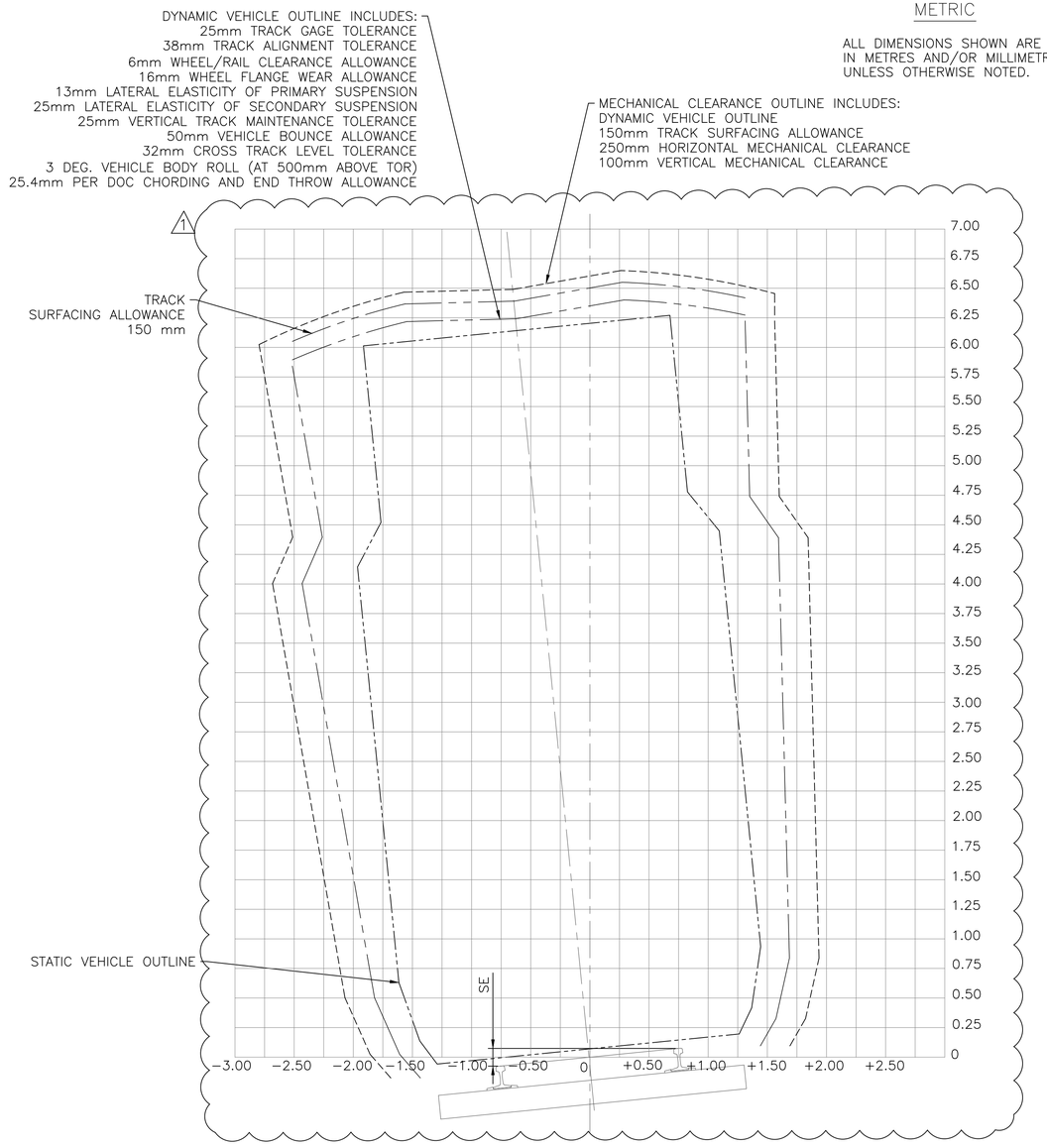
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DYNAMIC PLATE CLEARANCE
TC_E_05e DIAGRAM 1

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS−2014−IEP−002	EW−ET−0211	1	XX

GFTRS − C:\pwworking\gfpw01\svfidleris\d0630010\149724−EW−ET−0211.dwg [LAYOUT] July 11, 2018 − 4:10pm svfidleris



DYNAMIC PLATE "H" DOUBLE STACK FOR TANGENT TRACK



DYNAMIC PLATE "H" DOUBLE STACK WITH SUPERELEVATION

EXAMPLE DOC = 3°; SE = 150mm

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. TRACK TOLERANCES ARE ASSUMED BASED ON FRA CLASS 4 MAINTENANCE TOLERANCES.
3. VEHICLE AND PANTOGRAPH DYNAMIC PARAMETERS ARE ASSUMED AND MUST BE CONFIRMED.
4. PLATE NOMENCLATURE AS PER ASSOCIATION OF AMERICAN RAILROADS (AAR).
5. LIMITS OF PLATE "H" PRE–LIMIT DOUBLE STACK FREIGHT.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: D. MIHAI 16/06/30
CHECKED BY: S. MARZI 17/14/12	APPROVED BY: S. MARZI 18/05/01
SCALE:	

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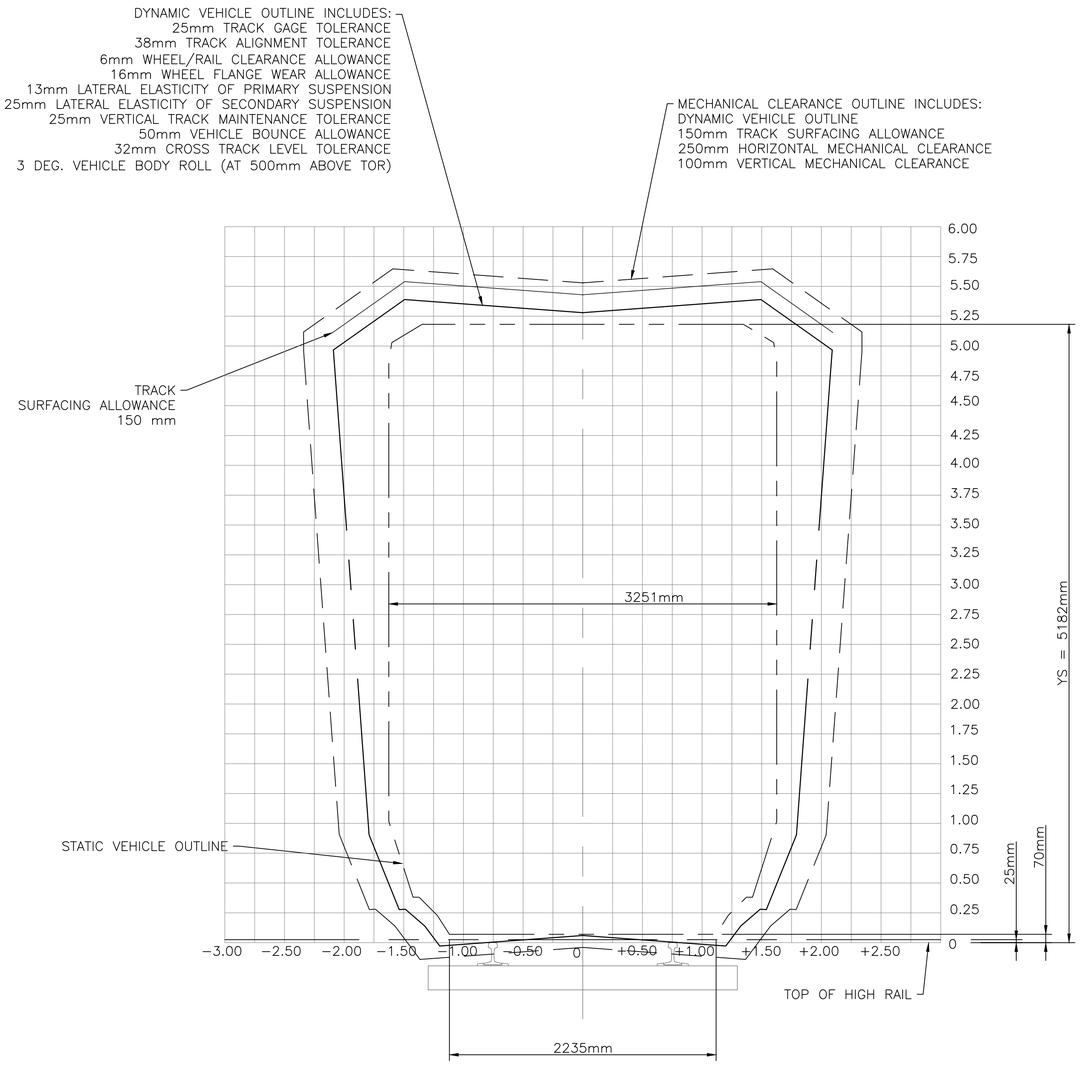
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DYNAMIC PLATE CLEARANCE PLATE H

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0212	1	XX

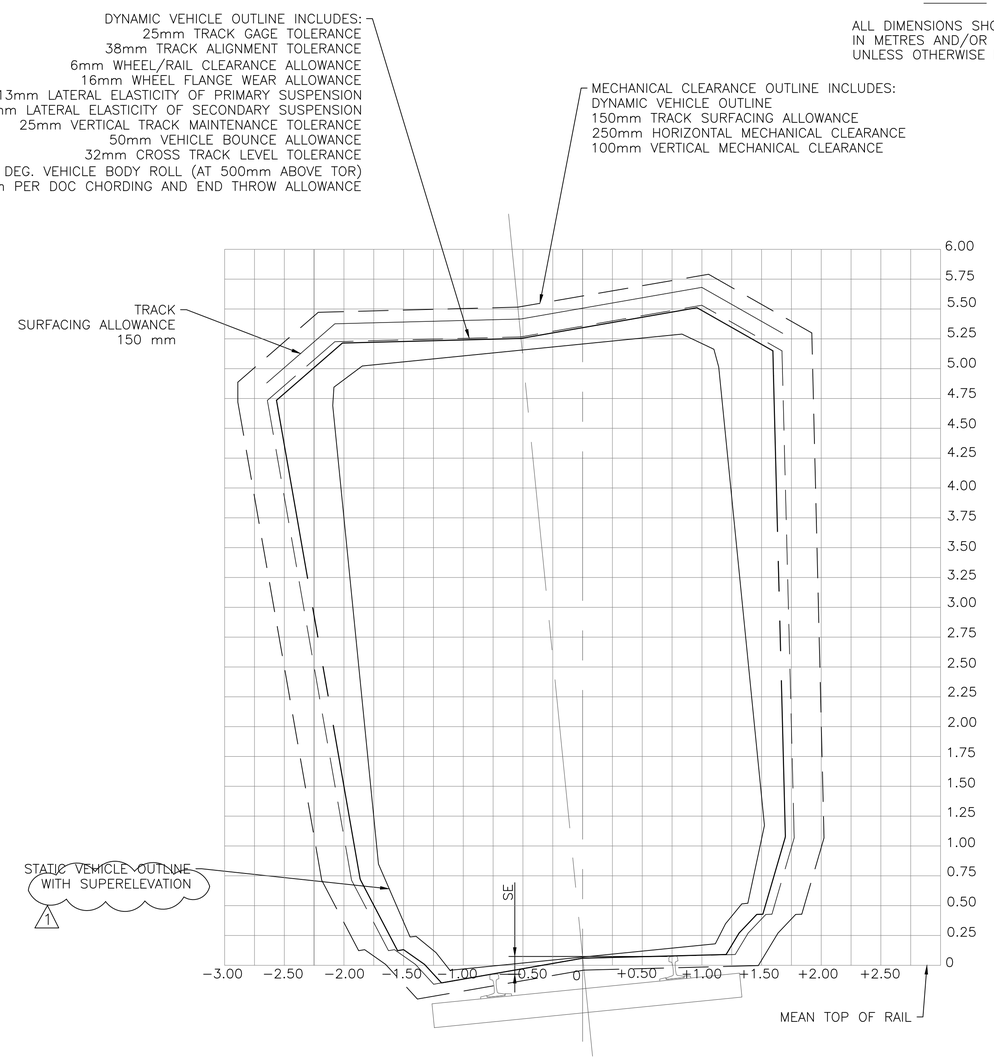
GFTRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0212.dwg [LAYOUT] November 06, 2018 – 3:35pm svfidleris

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



DYNAMIC PLATE "F" FOR TANGENT TRACK



DYNAMIC PLATE "F" WITH SUPERELEVATION

EXAMPLE DOC = 3°; SE = 150mm

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. TRACK TOLERANCES ARE ASSUMED BASED ON FRA CLASS 4 MAINTENANCE TOLERANCES.
3. VEHICLE AND PANTOGRAPH DYNAMIC PARAMETERS ARE ASSUMED AND MUST BE CONFIRMED BEFORE ACTUAL CONSTRUCTION BEGINS.
4. PLATE NOMENCLATURE AS PER ASSOCIATION OF AMERICAN RAILROADS (AAR).
5. PLATE "F" CONSISTS OF DIMENSIONS THAT CIRCUMSCRIBE THE COACH AND LOCOMOTIVE VEHICLES DEPICTED IN DRM FIGURE "USRC TRAIN SHED MINIMUM CLEARANCE ENVELOPE".

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: D. MIHAI 16/06/30
CHECKED BY: S. MARZI 17/15/12	APPROVED BY: S. MARZI 18/05/01
SCALE:	

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METROLINX

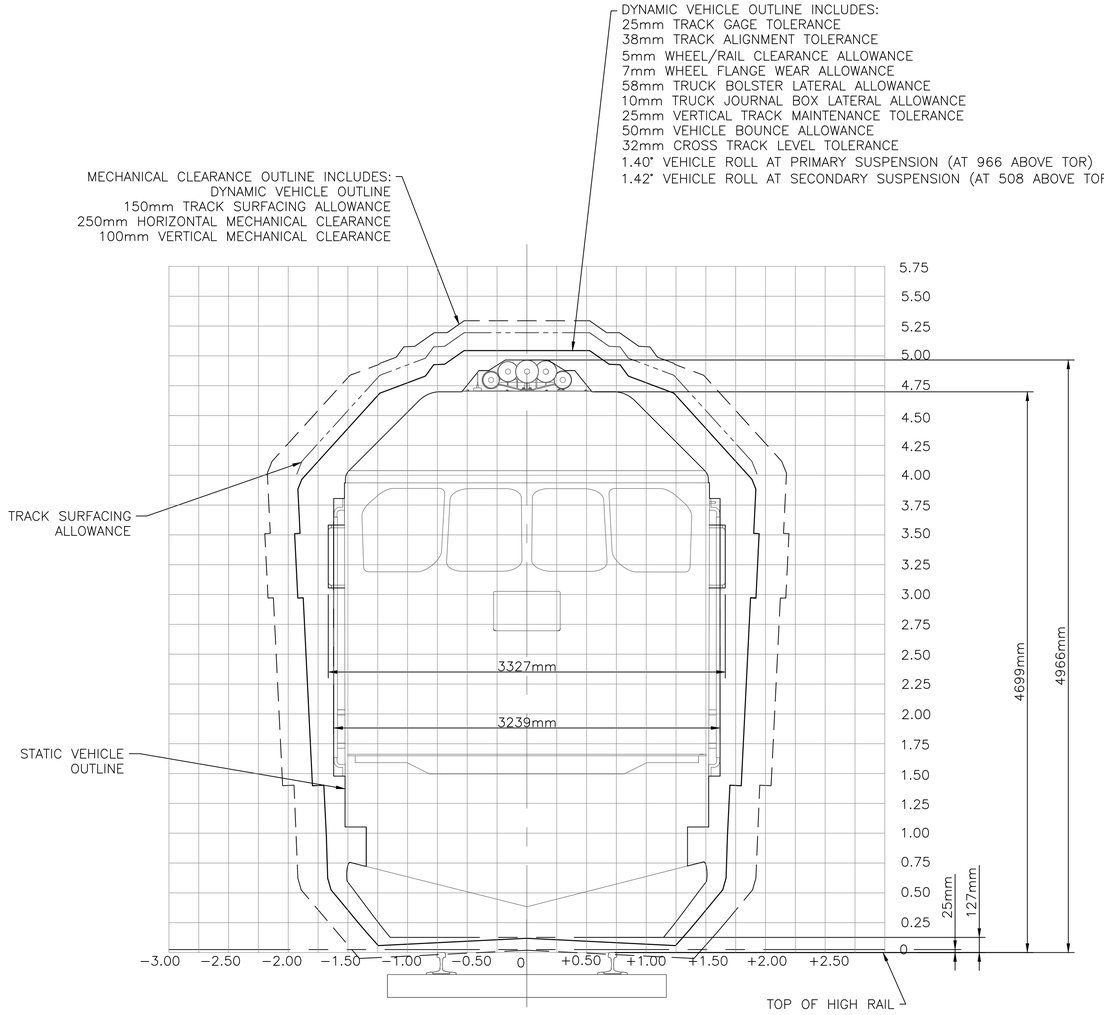
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DYNAMIC PLATE CLEARANCE PLATE F

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0213	1	XX

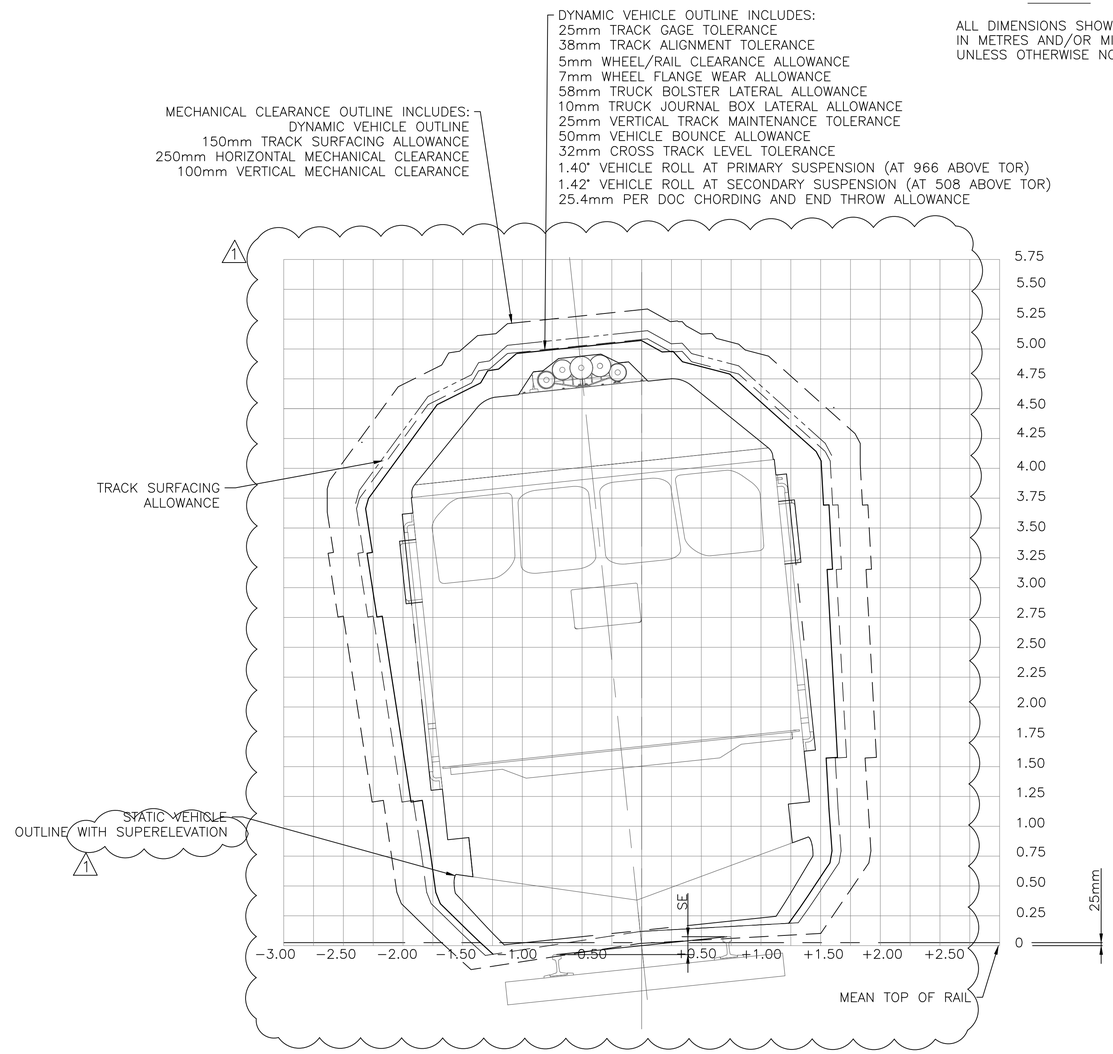
GFTRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0213.dwg [Layout1] November 06, 2018 – 3:38pm svfidleris

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



DYNAMIC PLATE "MP–40" FOR TANGENT TRACK



DYNAMIC PLATE "MP–40" WITH SUPERELEVATION

EXAMPLE DOC = 3°; SE = 150mm

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. TRACK TOLERANCES ARE ASSUMED BASED ON FRA CLASS 4 MAINTENANCE TOLERANCES.
3. VEHICLE AND PANTOGRAPH DYNAMIC PARAMETERS ARE ASSUMED AND MUST BE CONFIRMED BEFORE ACTUAL CONSTRUCTION BEGINS.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
MP40–003	MP 40 LOCOMOTIVE CLEARANCE DRAWING	0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/05/06	DESIGNED BY: D. MIHAI 16/05/06
CHECKED BY: S. MARZI 17/14/12	APPROVED BY: S. MARZI 18/05/01
SCALE:	

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METROLINX

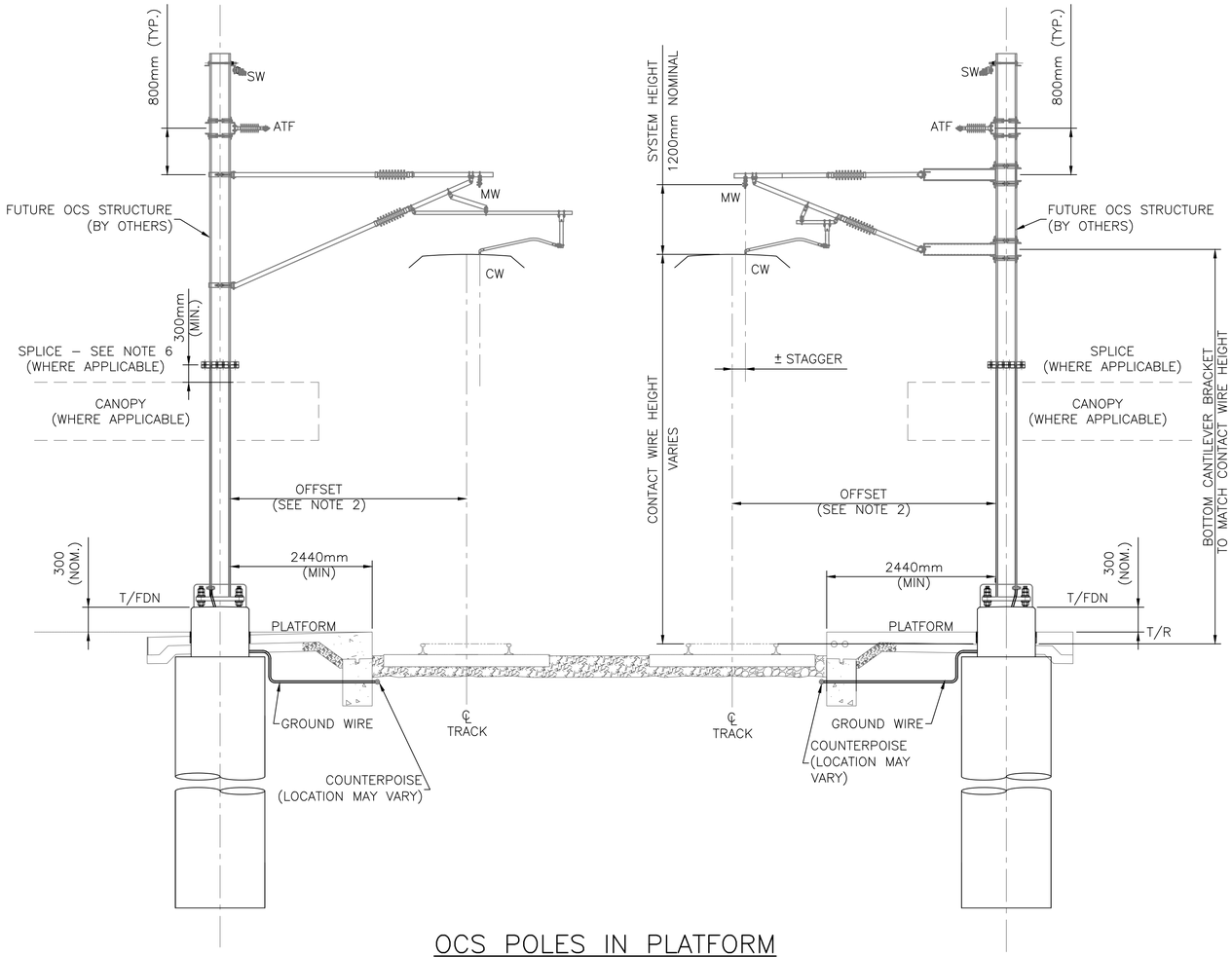
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DYNAMIC PLATE CLEARANCE
GO VEHICLE MP–40

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0214	1	XX

GTFRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0214.dwg [LAYOUT] November 06, 2018 – 3:46pm svfidleris

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



OCS POLES IN PLATFORM

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004,
2. OFFSET VARIES DEPENDING ON LOCATION. ADDITIONAL STAND OFF BRACKET REQUIRED FOR LONG REACH APPLICATIONS. 5791mm MAXIMUM OFFSET FROM FACE OF POLE TO CONTACT WIRE.
3. POLE RAKE TO BE INSTALLED TO COUNTERACT DEAD LOAD DEFLECTION. VALUES TO BE DETERMINED BY FINAL DESIGNER.
4. SIGN OF STAGGER DESIGNATES WHICH SIDE OF TRACK CENTER LINE THE CONTACT WIRE IS ON RELATIVE TO OCS CANTILEVER BASE. DIRECTION ARROW OF STAGGER DESIGNATES DIRECTION OF STEADY ARM PULL.
5. FOR OCS STRUCTURES GROUNDING AND BONDING IN STATION AREAS, SEE EW–ET–0100 SERIES DRAWINGS.
6. WHERE CANOPY IS PROPOSED IN THE AREA OF AN OCS POLE, A CANOPY SUPPORT POLE SHALL BE PROVIDED WITH A FULL STRENGTH SPLICE TO ACCEPT A FUTURE OCS POLE. THIS POLE AND ITS FOUNDATIONS SHALL BE DESIGNED TO RESIST ALL FUTURE LOADS FROM THE OCS STRUCTURE.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: W. FRYER 16/06/30
CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 16/06/30
SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
GENERAL ARRANGEMENT
SIDE POLES ON PLATFORM

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0220	1	XX

GFTRS – C:\pwworking\gfpw01\svfidleris\d0630010\149724–EW–ET–0220.dwg [Layout2] July 11, 2018 – 4:25pm svfidleris

METRIC

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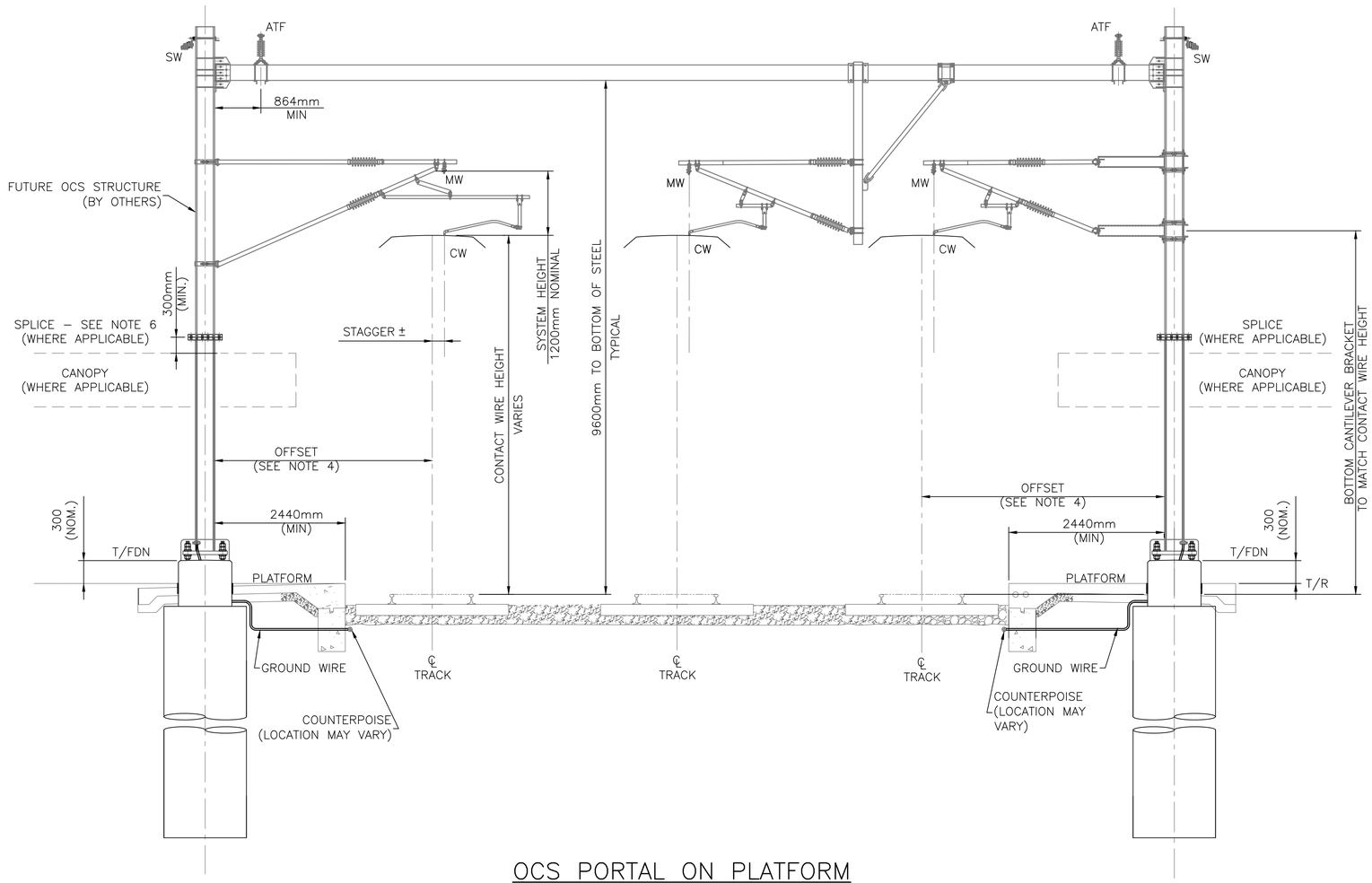

OCS PORTAL ON PLATFORM

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004,
2. OFFSET VARIES DEPENDING ON LOCATION. ADDITIONAL STAND OFF BRACKET REQUIRED FOR LONG REACH APPLICATIONS. 5791mm MAXIMUM OFFSET FROM FACE OF POLE TO CONTACT WIRE.
3. POLE RAKE TO BE INSTALLED TO COUNTERACT DEAD LOAD DEFLECTION. VALUES TO BE DETERMINED BY FINAL DESIGNER.
4. SIGN OF STAGGER DESIGNATES WHICH SIDE OF TRACK CENTER LINE THE CONTACT WIRE IS ON RELATIVE TO OCS CANTILEVER BASE. DIRECTION ARROW OF STAGGER DESIGNATES DIRECTION OF STEADY ARM PULL.
5. FOR OCS STRUCTURES GROUNDING AND BONDING IN STATION AREAS, SEE EW–ET–0100 SERIES DRAWINGS.
6. WHERE CANOPY IS PROPOSED IN THE AREA OF AN OCS POLE, A CANOPY SUPPORT POLE SHALL BE PROVIDED WITH A FULL STRENGTH SPLICE TO ACCEPT A FUTURE OCS POLE. THIS POLE AND ITS FOUNDATIONS SHALL BE DESIGNED TO RESIST ALL FUTURE LOADS FROM THE OCS STRUCTURE.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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SCALE:	

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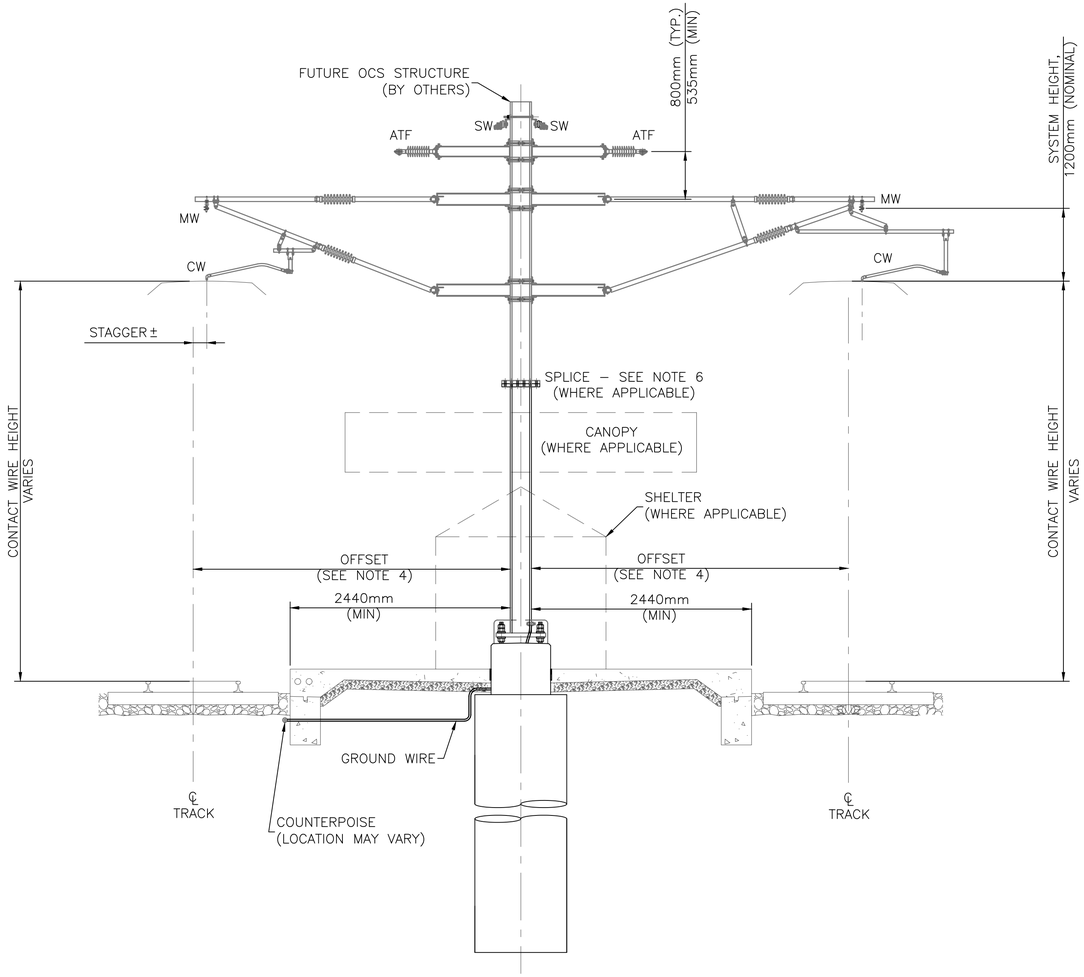
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
GENERAL ARRANGEMENT
PORTAL ON PLATFORM

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0221	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



CENTER POLE ON ISLAND PLATFORM

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004,
2. OFFSET VARIES DEPENDING ON LOCATION. ADDITIONAL STAND OFF BRACKET REQUIRED FOR LONG REACH APPLICATIONS. 5791mm MAXIMUM OFFSET FROM FACE OF POLE TO CONTACT WIRE.
3. POLE RAKE TO BE INSTALLED TO COUNTERACT DEAD LOAD DEFLECTION. VALUES TO BE DETERMINED BY FINAL DESIGNER.
4. SIGN OF STAGGER DESIGNATES WHICH SIDE OF TRACK CENTER LINE THE CONTACT WIRE IS ON RELATIVE TO OCS CANTILEVER BASE. DIRECTION ARROW OF STAGGER DESIGNATES DIRECTION OF STEADY ARM PULL.
5. FOR OCS STRUCTURES GROUNDING AND BONDING IN STATION AREAS, SEE EW–ET–0100 SERIES DRAWINGS.
6. WHERE CANOPY IS PROPOSED IN THE AREA OF AN OCS POLE, A CANOPY SUPPORT POLE SHALL BE PROVIDED WITH A FULL STRENGTH SPLICE TO ACCEPT A FUTURE OCS POLE. THIS POLE AND ITS FOUNDATIONS SHALL BE DESIGNED TO RESIST ALL FUTURE LOADS FROM THE OCS STRUCTURE.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 16/06/30
SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
GENERAL ARRANGEMENT
CENTER POLE ON ISLAND PLATFORM

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0222	1	XX

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METRIC

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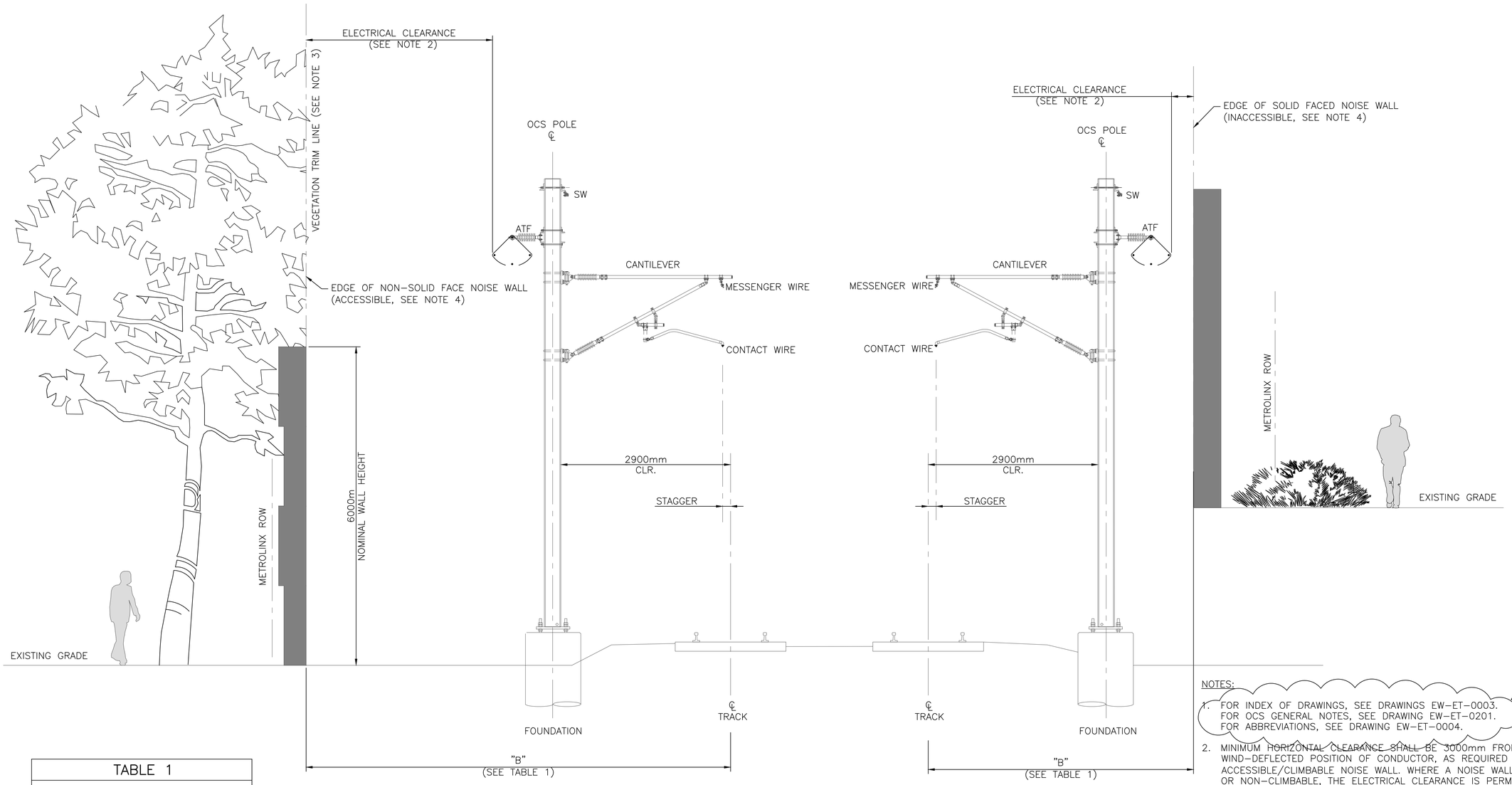

TABLE 1	
MINIMUM OFFSET "B" FOR ACCESSIBLE AND INACCESSIBLE NOISE WALLS (SEE NOTE 5)	
WALL CLASSIFICATION	OFFSET DIMENSION "B" (m)
INACCESSIBLE	5.0
ACCESSIBLE	8.0

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW-ET-0003. FOR OCS GENERAL NOTES, SEE DRAWING EW-ET-0201. FOR ABBREVIATIONS, SEE DRAWING EW-ET-0004.
2. MINIMUM HORIZONTAL CLEARANCE SHALL BE 3000mm FROM LIVE EQUIPMENT, OR FROM WIND-DEFLECTED POSITION OF CONDUCTOR, AS REQUIRED BY OESC TABLE 33 FOR ACCESSIBLE/CLIMBABLE NOISE WALL. WHERE A NOISE WALL IS CONSIDERED INACCESSIBLE OR NON-CLIMBABLE, THE ELECTRICAL CLEARANCE IS PERMITTED TO BE REDUCED TO 270mm FOR STATIC CLEARANCE AND 205mm PASSING CLEARANCE. DETERMINATION OF INACCESSIBILITY IS AT THE SOLE DISCRETION OF METROLINX.
3. SITE SPECIFIC APPROVAL WILL HAVE TO BE OBTAINED FROM METROLINX FOR LOCATIONS WHERE THE 8.0m REQUIREMENT CAN NOT BE MET.
4. INACCESSIBLE WALLS ARE CONSIDERED SUCH BASED ON THE DETERMINATION THAT THEY ARE SUFFICIENTLY DIFFICULT TO CLIMB AND POSE A SIGNIFICANTLY REDUCED RISK TO THE PUBLIC'S ACCESS TO ENERGIZED RAILROAD ELEMENTS.
5. NOISE WALLS LOCATED WITHIN THE LIMITS OF THE OCLZ AS DEFINED BY EW-ET-0102, MUST BE BONDED AND GROUNDED TO THE RAILROAD TRACTION RETURN.

1

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW-ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: S. MARZI 17/14/12	APPROVED BY: S. MARZI 18/05/01
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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
CLEARANCE TO NOISE WALLS ALONG RAILROAD

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0225	1	XX

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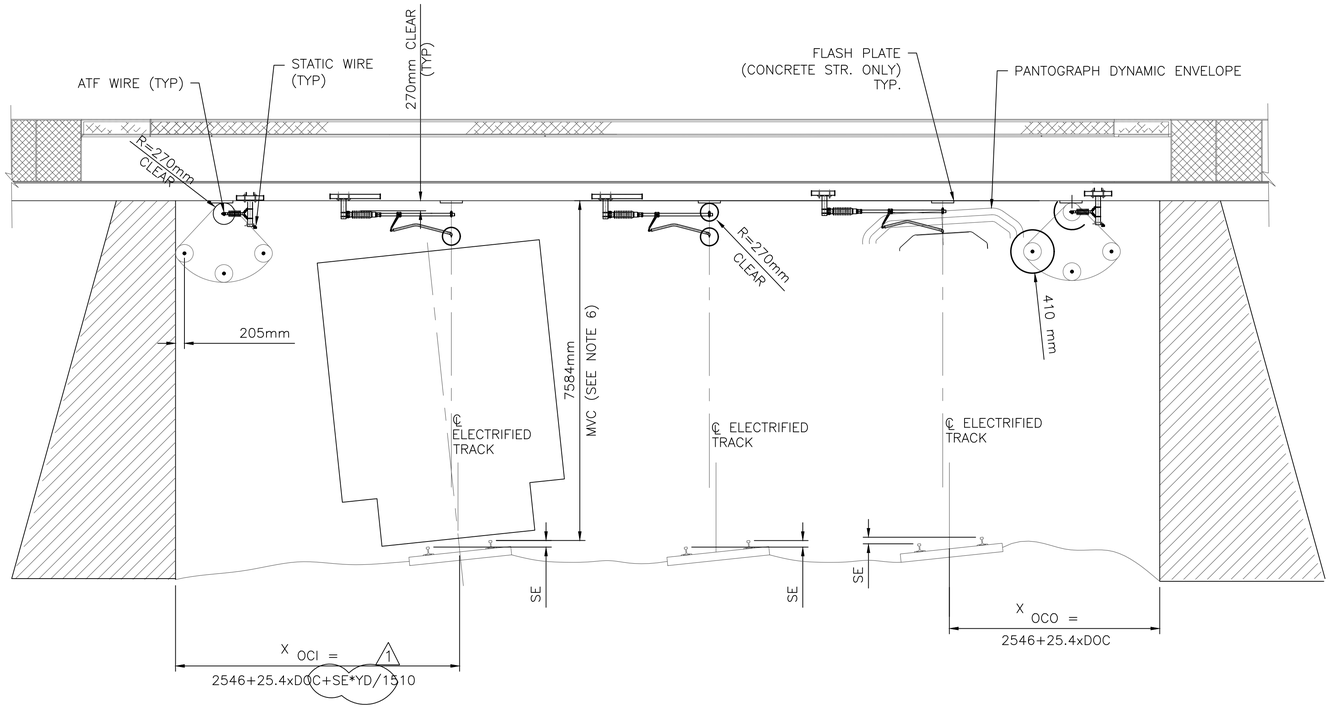
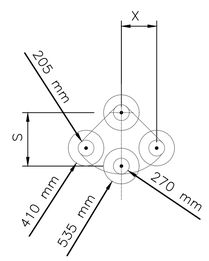


OVERHEAD BRIDGE CLEARANCE



CONDUCTOR SAG AND SWAY BETWEEN SUPPORTS FIGURE 2

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

NOTES

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003. FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201. FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004. (1)
2. ELECTRICAL CLEARANCE FROM ENERGIZED PARTS OF THE OCS OR VEHICLE TO GROUNDED STRUCTURES SHALL BE AS RECOMMENDED BY AREMA CHAPTER 33, TABLE 33–2–2, WHICH REQUIRES A NORMAL MINIMUM STATIC CLEARANCE OF 270mm FOR 25KV AC. FOR CONCRETE STRUCTURES ONLY, A FLASH PLATE SHALL BE PROVIDED ABOVE LIVE PARTS WHEN THE SEPARATION OF THE OCS TO THE BOTTOM OF BRIDGE IS LESS THAN 0.914m.
3. NORMAL MINIMUM STATIC CLEARANCE BETWEEN 25 KV AUTOTRANSFORMER FEEDER (ATF) AND ENERGIZED CATENARY OR PANTOGRAPH SHALL BE 535mm AS REQUIRED BY AREMA CHAPTER 33, TABLE 33–2–2.
4. THE MINIMUM HORIZONTAL CLEARANCE TO BRIDGE STRUCTURE SHALL BE XOCO OR XOCI. MORE CLEARANCE MAY BE REQUIRED TO FIT AUTOTRANSFORMER FEEDER WIRES.
5. THE NORMAL CLEARANCE FOR OVERHEAD BRIDGES (TOP OF RAIL ELEVATION TO BOTTOM OF BRIDGE ELEVATION) – SHALL BE CALCULATED AS REQUIRED BY AREMA CHAPTER 33, FIGURE 33–2–3.
6. FOR THE GO STANDARD DOUBLE STACK FREIGHT VEHICLE, THE MINIMUM NORMAL CLEARANCE MVC = 7584mm. THE FOLLOWING PARAMETERS WERE USED TO CALCULATE THE MINIMUM NORMAL CLEARANCE: THE PARAMETER REQUIRED AT SPECIFIC BRIDGE MAY VARY.

STATIC ELECTRICAL CLEARANCE	270mm
OCS TOLERANCE	25mm
OCS DEPTH	160mm
PASSING ELECTRICAL CLEARANCE	205mm
DYNAMIC VEHICLE LOAD (YD)	6706mm
TRACK MAINTENANCE TOLERANCE	25mm
TRACK RAISE	155mm
FLASH PLATE THICKNESS	12.7mm
SUPERELEVATION	0.0mm

VEHICLE BOUNCE IS ASSUMED TO BE INCLUDED IN THE DYNAMIC PLATE.

7. MAXIMUM SAG AND BLOW OFF MUST BE CONSIDERED, WHEN DETERMING CLEARANCE TO CONDUCTORS IN SPAN.
8. WHERE LOCAL CONDITIONS WARRANT AND RAIL TRAFFIC IS LIMITED TO PLATES OF LESS HEIGHT, THE DIMENSIONS SHOWN ON THIS DRAWING MAY BE MODIFIED WITH THE APPROVAL OF METROLINX. VERTICAL CLEARANCE MAY BE REDUCED.
9. FOR ATF WIRE MAXIMUM AND MINIMUM SAGS, SEE DRAWING EW–ET–0228.
10. SITE SPECIFIC EVALUATIONS SHALL BE PERFORMED FOR EACH BRIDGE LOCATION. ANY OVERHEAD BRIDGE TO BE COORDINATED WITH METROLINX ELECTRIFICATION

ABBREVIATIONS:

S = MAXIMUM VERTICAL SAG OF AUTOTRANSFORMER FEEDER.

X = MAXIMUM HORIZONTAL SWAY OF AUTOTRANSFORMER FEEDER DUE TO WIND.

DOC = DEGREE OF CURVE

SE = SUPERELEVATION

YD = HEIGHT OF VEHICLE DYNAMIC PLATE

MVC = MINIMUM VERTICAL CLEARANCE TO BRIDGES

ATF = AUTOTRANSFORMER FEEDER

MAXIMUM HEIGHT PLATE TYPE PERMITTED	MAXIMUM STATIC PLATE HEIGHT	MAXIMUM STATIC PLATE WIDTH
USRC GO VEHICLE	4966	3966
MP40 LOCOMOTIVE	4966	3327
AAR PLATE "F"	5182	3251
AAR PLATE "H"	6173	3073

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
EW–ET–0210							
THRU	PLATE CLEARANCE DRAWINGS						
EW–ET–0214							
EW–ET–0228	FEEDER WIRE–MAX. AND MIN. SAGS						
EW–ET–0118	G&B – TYPICAL STEEL BRIDGE	1	180713	REVISED PER METROLINX COMMENT			
EW–ET–0117	G&B – TYPICAL CONCRETE BRIDGE	0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
OVERHEAD BRIDGE CLEARANCE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0226	1	XX

METRIC

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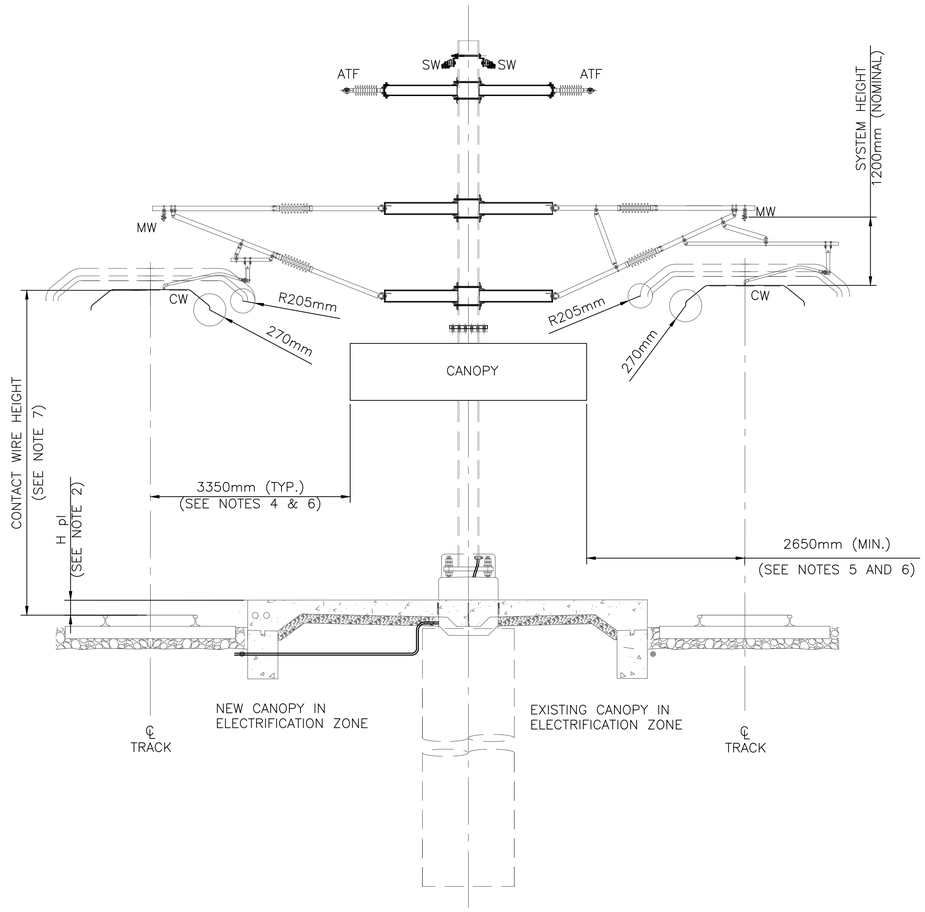
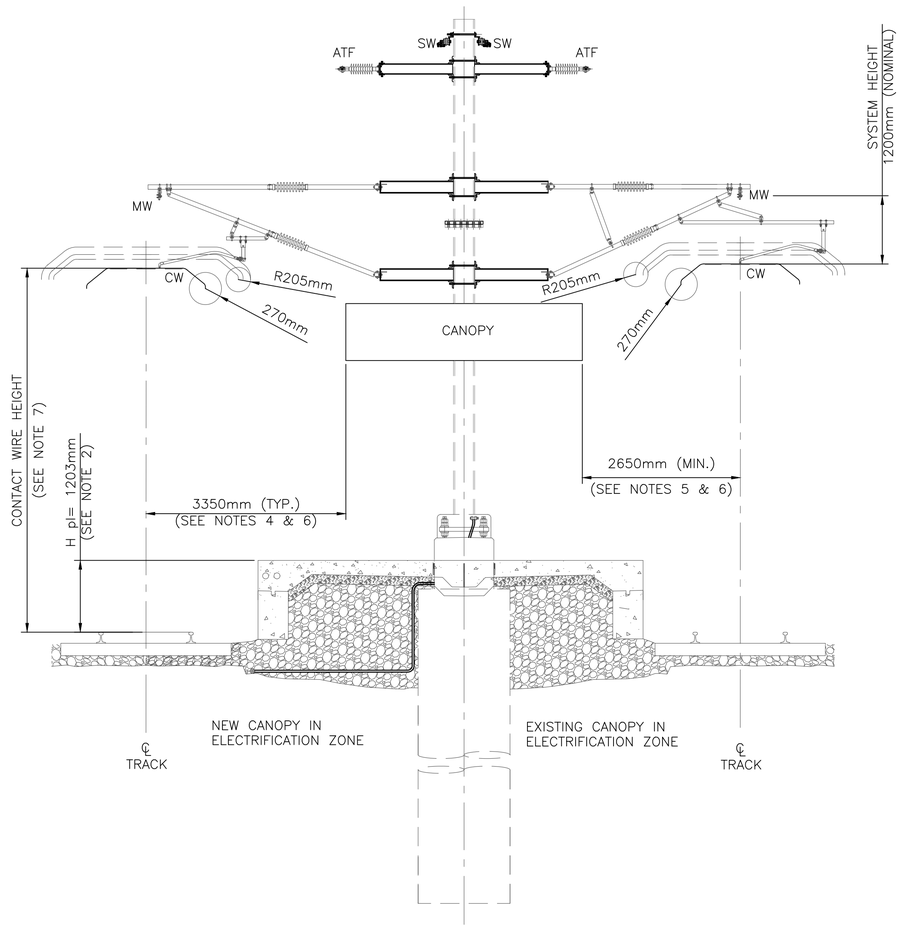


CENTER PLATFORM POLE
LOW LEVEL PLATFORM CLEARANCE TO CANOPY



CENTER PLATFORM POLE
HIGH LEVEL PLATFORM CLEARANCE TO CANOPY

1

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. PLATFORM HEIGHT VARIES Hpl VARIES AND SHALL BE A MAXIMUM OF 127mm IN GENERAL, 250mm FOR TRACKS EXCLUSIVE TO GO TRANSIT, AND 1203mm AT UP PLATFORM MEASURED FROM TOP OF RAIL.
3. STATIC WIRE TO BE INSULATED FROM OCS POLES IN STATION PLATFORMS.
4. STANDARD EDGE OF CANOPY TO CENTER LINE OF TRACK IS BASED ON DRM CI–0407.
5. THE MINIMUM EXISTING EDGE OF CANOPY TO CENTERLINE OF TRACK OF 2650 mm IS ACCEPTABLE FOR EXISTING CONDITIONS IN TANGENT TRACK AS IT DOES NOT VIOLATE ELECTRIFICATION REQUIREMENTS. THE EDGE OF THE CANOPY TO CENTERLINE OF TRACK SHALL BE AS REQUIRED BY DRM CI–0407, UNLESS OTHERWISE APPROVED BY METROLINX.
6. CLEARANCES ARE BASED ON TANGENT TRACK WITH NO SUPERELEVATION. SIDE CLEARANCE ADJUSTMENTS SHALL BE MADE FOR CURVED TRACK, AS REQUIRED BY THE DEGREE OF CURVATURE AND SUPERELEVATION.
7. CONTACT WIRE HEIGHTS SHOWN VARY.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
CLEARANCE TO STATION PLATFORM CANOPY

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0227	1	XX

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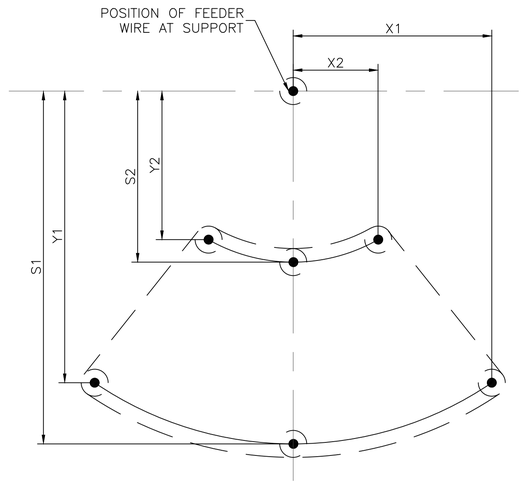
METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

FEEDER WIRE (556 KCMIL ACSR 37 STRAND EAGLE)										
	CONDITION 1					CONDITION 2				
SPAN (m)	S1 (mm) (75°C, 0 m/s)	T1 (N) (75°C, 0 m/s)	X1 (mm) (16°C, 35 m/s)	Y1 (mm) (16°C, 35 m/s)	T1' (N) (16°C, 35 m/s)	S2 (mm) (−40°C, 0 m/s)	T2 (N) (−40°C, 0 m/s)	X2 (mm) (−40°C, 25 m/s)	Y2 (mm) (−40°C, 25 m/s)	T2' (N) (−40°C, 25 m/s)
65	1119.094	5998	482.152	586.152	20137	148.469	45209	111.622	185.193	45421
64	1097.939	5927	468.885	570.024	20074	143.759	45264	108.097	179.346	45470
62	1056.033	5783	442.810	538.325	19949	134.590	45373	101.233	167.958	45566
60	1014.626	5637	417.350	507.373	19822	125.754	45479	94.614	156.976	45659
58	973.720	5488	392.512	477.177	19695	117.247	45581	88.238	146.396	45749
56	933.334	5338	368.303	447.746	19567	109.063	45681	82.100	136.214	45837
54	893.443	5185	344.730	419.088	19438	101.199	45776	76.200	126.425	45921
52	854.064	5030	321.802	391.214	19309	93.651	45870	70.534	117.025	46003
50	815.175	4872	299.527	364.135	19180	86.418	45959	65.101	108.011	46082
48	776.762	4712	277.916	337.863	19051	79.495	46044	59.899	99.379	46158
46	738.868	4550	256.980	312.410	18922	72.878	46127	54.924	91.126	46231
44	701.454	4385	236.729	287.791	18793	66.563	46206	50.176	83.248	46301
42	664.548	4217	217.176	264.021	18665	60.551	46282	45.652	75.742	46368
40	628.113	4047	198.335	241.116	18538	54.835	46354	41.351	68.606	46432
38	592.159	3874	180.220	219.094	18413	49.416	46422	37.270	61.835	46493
36	556.6953	3698	162.847	197.973	18288	44.289	46488	33.408	55.428	46551
34	521.725	3520	146.233	177.775	18166	39.452	46550	29.764	49.382	46606
32	487.217	3339	130.395	158.521	18046	34.903	46609	26.336	43.695	46658
30	453.186	3155	115.352	140.233	17929	30.640	46664	23.123	38.363	46707
28	419.654	2968	101.129	122.943	17815	26.662	46714	20.123	33.386	46753
26	386.578	2778	87.738	106.663	17706	22.965	46763	17.335	28.761	46796
24	353.997	2585	75.203	91.424	17601	19.550	46807	14.758	24.485	46835
22	321.885	2389	63.553	77.261	17501	16.413	46848	12.392	20.559	46871
20	290.250	2189	52.810	64.201	17406	13.553	46886	10.234	16.979	46904
18	259.079	1987	42.993	52.266	17318	10.971	46918	8.284	13.744	46935
16	228.394	1781	34.132	41.494	17236	8.662	46950	6.542	10.853	46962
14	198.165	1571	26.242	31.902	17164	6.628	46977	5.006	8.305	46985
12	168.439	1358	19.353	23.528	17099	4.867	47000	3.676	6.099	47006
10	139.154	1142	13.485	16.393	17041	3.379	47019	2.552	4.234	47024



CONDITION 1		
S1	TEMPERATURE °C	75
	WIND SPEED (m/s)	0
	TENSION (N)	T1
X1	TEMPERATURE °C	16
	WIND SPEED (m/s)	35
	TENSION (N)	T1'
Y1	TEMPERATURE °C	16
	WIND SPEED (m/s)	35
	TENSION (N)	T1'

CONDITION 2		
S2	TEMPERATURE °C	−40
	WIND SPEED (m/s)	0
	TENSION (N)	T2
X2	TEMPERATURE °C	−40
	WIND SPEED (m/s)	25
	TENSION (N)	T2'
Y2	TEMPERATURE °C	−40
	WIND SPEED (m/s)	25
	TENSION (N)	T2'

NOTES

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW−ET−0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW−ET−0201.
   FOR ABBREVIATIONS, SEE DRAWING EW−ET−0004.
2. S1 AND S2: VERTICAL SAG AT MID−SPAN UNDER NO WIND AND NO ICE CONDITION.
3. X1 AND X2: HORIZONTAL SAG AT MID−SPAN UNDER WIND AND NO ICE CONDITION.
4. Y1 AND Y2: VERTICAL SAG AT MID−SPAN UNDER WIND AND NO ICE CONDITION.
5. REFERENCE TENSION T = 17,800(N) AT 16°C, NO WIND.
6. TENSION CALCULATION T1 AND T1' = TREF. −5% (ERECTION TOLERANCE) FOR MAXIMUM SAG.
7. TENSION CALCULATION T2 AND T2' = TREF. +5% (ERECTION TOLERANCE) FOR MINIMUM SAG.
8. WIND EXPOSURE CO−EFFICIENT = 1.0

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW−ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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SCALE:	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
FEEDER WIRE − MAXIMUM AND MINIMUM SAGS

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS−2014−IEP−002	EW−ET−0228	1	XX

METRIC

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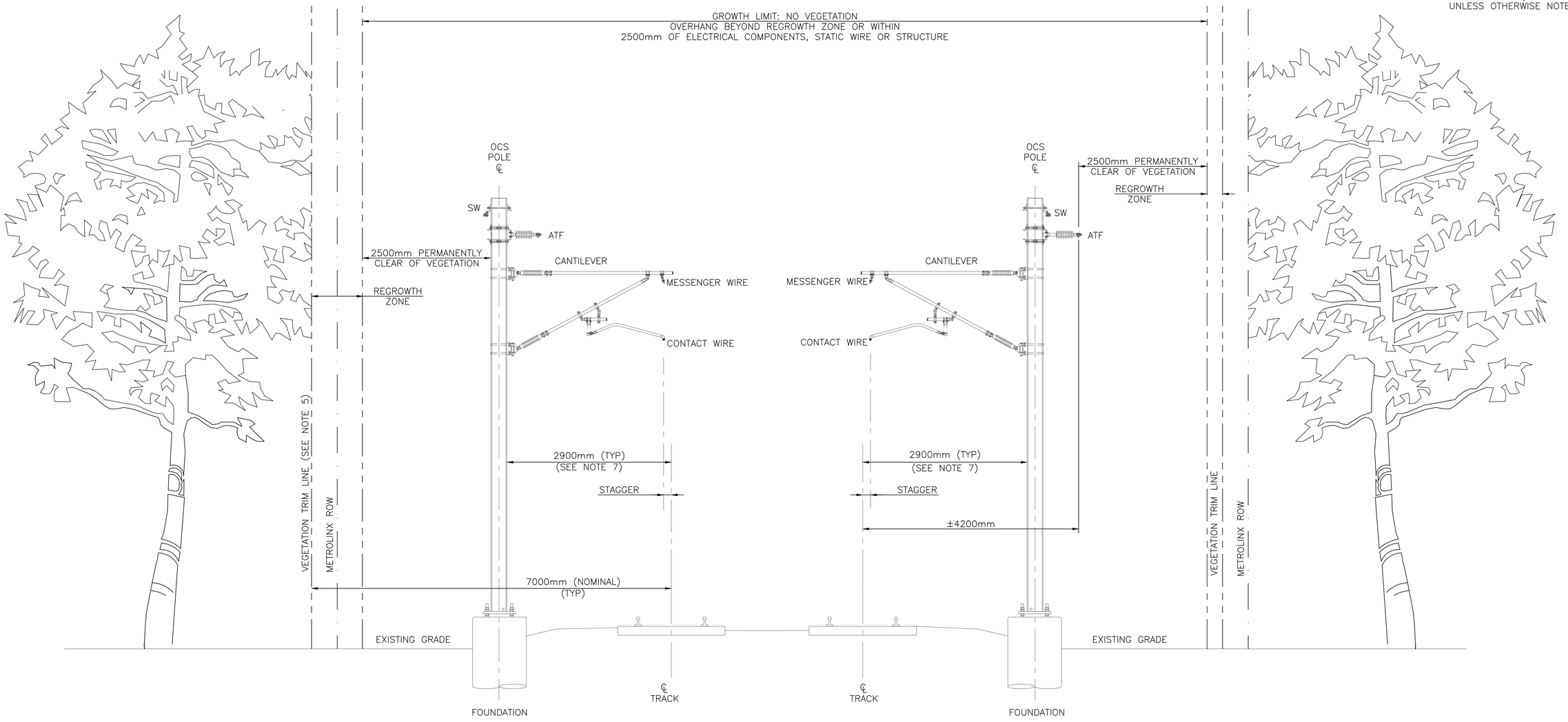

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. MINIMUM VEGETATION CLEARANCE BETWEEN LIVE PARTS OF THE OVERHEAD SYSTEM OR STEEL POLE AND BRANCHES OF TREES OR BUSHES, HORIZONTALLY AT MAXIMUM CONDUCTOR SWING AND VERTICALLY AT A MAXIMUM SAG, SHALL BE 2500mm, PER EN50122–1:2011+A1:2011 (E), PARAGRAPH 5.2.6.
3. VEGETATION TRIM LIMITS EXTENDED VERTICALLY FROM TOP OF RAIL TO THE VERTICAL LIMITS OF THE VEGETATION. OVERHANGING VEGETATION ABOVE OR BELOW THE ELECTRICAL COMPONENTS AND/OR STRUCTURE IS NOT PERMITTED.
5. LANDOWNER'S PERMISSION SHALL BE RECEIVED BEFORE CUTTING TREES OUTSIDE METROLINX ROW.
6. THIS DRAWING DOES NOT COVER AREAS WHERE ADDITIONAL TRACTION POWER FEEDERS OR TROLLEY CONDUCTORS ARE TRAVERSING PARALLEL TO THE RAILROAD, SUCH AS BARRIE CORRIDOR FROM ALLENDALE TP SUBSTATION TO NEWMARKET SWITCHING STATION, THE STOUFFVILLE CORRIDOR FROM LAWRENCE AVENUE 50kV SUBSTATION TO SCARBOROUGH TP SUBSTATION AND THE CANPA SUBDIVISION FROM MIMICO SUBSTATION TO KIPLING. ADDITIONAL PROPERTY MAY BE REQUIRED IN THESE AREAS.
7. NORMAL POLE OFFSET 2900mm. MINIMUM POLE OFFSET TO BE 2900mm PLUS 25.4mm PER DEGREE OF CURVE. WHERE THIS CAN NOT BE MET, IT MAY BE REDUCED AS PER THE PERFORMANCE SPECIFICATIONS FOR ELECTRIC TRACTION ENABLING WORKS.
8. THIS DRAWING PROVIDES INFORMATION ABOUT THE MINIMUM CLEARANCE TO VEGETATION ALONG THE RAILROAD. FOR TYPICAL OCS ARRANGEMENTS ON POLES AND PORTALS, SEE DRAWINGS EW–ET–0220 THRU EW–ET–0222.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	NEW SHEET ISUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: G. HAGER 17/02/17	DESIGNED BY: G. HAGER 17/02/17
CHECKED BY: W. FRYER 17/02/17	APPROVED BY: B. SHOBER 18/05/01
SCALE: 1:40 (0 1000 1600mm)	

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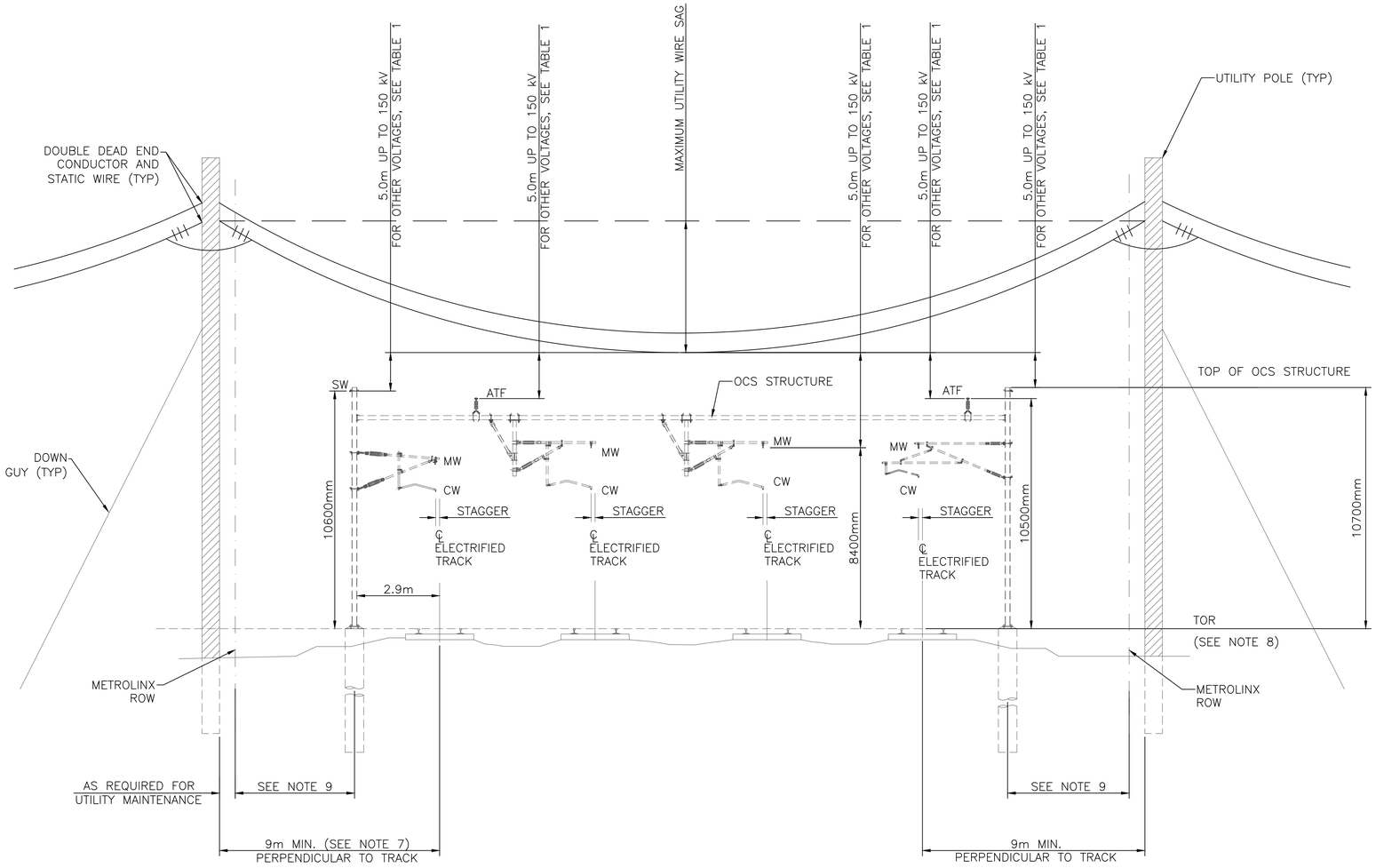
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
MINIMUM VEGETATION CLEARANCE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0229	1	XX



TYPICAL ELECTRICAL UTILITY CROSSING OF OCS CONDUCTORS AND STRUCTURES (TANGENT TRACK)

(N.T.S.)

TABLE 1	
MINIMUM DESIGN VERTICAL CLEARANCES BETWEEN WIRES CROSSING EACH OTHER AND SUPPORTED BY DIFFERENT STRUCTURES	
NOMINAL PHASE TO PHASE VOLTAGE RATING	MINIMUM DISTANCE,(m)
>0 ≥ 150 kV	5.0
>150 kV ≥250 kV	6.5
>250 kV	8.0
* SEE NOTE 4	

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. CLEARANCES SHALL BE CONSIDERED BETWEEN THE UPPER WIRE UNDER CONDITIONS THAT CAUSE MAXIMUM SAG AND THE LOWER WIRE AT A STRAIGHT LINE BETWEEN ITS SUPPORTS.
3. CLEARANCE INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWINGS IN CASES OF CROSSING ELECTRIFIED RAILROADS.
4. VERTICAL CLEARANCES SHOWN IN TABLE 1 ARE BASED ON OCCUPATIONAL HEALTH AND SAFETY ACT, ONTARIO REGULATION 213/91, CONSTRUCTION PROJECTS, ELECTRICAL HAZARDS, SECTION 188. WORKING SPACE OF 1.5m AND AN ADDITIONAL OCS MAINTENANCE ALLOWANCE OF 0.5m ARE ADDED. THE CLEARANCES SHOWN SHALL BE CONSIDERED ARE FROM THE HIGHEST OCS CONDUCTOR OR THE HIGHEST OCS STRUCTURE ELEVATION.
5. UTILITY CROSSING MAY BE ANYWHERE ALONG OCS SPAN.
6. HEIGHTS SHOWN PROVIDE GENERAL GUIDELINE FOR UTILITY CROSSING AND ARE NOT INCLUSIVE OF ALL LOCATIONS. UTILITY OWNER OR DESIGNEE SHALL SUBMIT PROPOSED CROSSING INFORMATION TO METROLINX FOR SITE SPECIFIC APPROVAL OF IMPACTS TO FUTURE ELECTRIFICATION.
7. HORIZONTAL CLEARANCE SHOWN IS BASED ON CANADIAN STANDARD ASSOCIATION CSA22.3 No.1–10,CLAUSE 5.5. THE DISTANCE BETWEEN METROLINX RIGHT OF WAY AND THE UTILITY STRUCTURE SHALL BE AS REQUIRED FOR UTILITY MAINTENANCE, BUT NO LESS THAN 1.1m.
8. FOR CURVED TRACKS, TOP OF RAIL SHALL BE CONSIDERED FROM HIGH RAIL ELEVATION.
9. SPLICING OF FACILITIES CROSSING METROLINX RIGHT OF WAY CORRIDOR IS NOT PERMITTED.
10. THIS DRAWING DOES NOT COVER AREAS WHERE ADDITIONAL TRACTION POWER FEEDERS OR TROLLEY CONDUCTORS ARE TRAVERSING PARALLEL TO THE RAILROAD, SUCH AS BARRIE CORRIDOR FROM ALLENDALE TP SUBSTATION TO NEWMARKET SWITCHING STATION, THE STOUFFVILLE CORRIDOR FROM LAWRENCE AVENUE 50kV SUBSTATION TO SCARBOROUGH TP SUBSTATION AND THE CANPA SUBDIVISION FRM MIMICO SUBSTATION TO KIPLING. ADDITIONAL CLEARANCE MAY BE REQUIRED IN THESE AREAS.
11. * THE PREFERENCE IS THAT VOLTAGES LESS THAN 25KV ARE TO BE INSTALLED BELOW GROUND.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	NEW SHEET ISUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 17/02/17	DESIGNED BY: D. MIHAI 17/02/17
CHECKED BY: W. FRYER 17/02/17	APPROVED BY: B. SHOBER 18/01/05
SCALE: N.T.S.	

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METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ELECTRICAL UTILITY CROSSING
3RD PARTY OVERHEAD LINE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0230	1	XX

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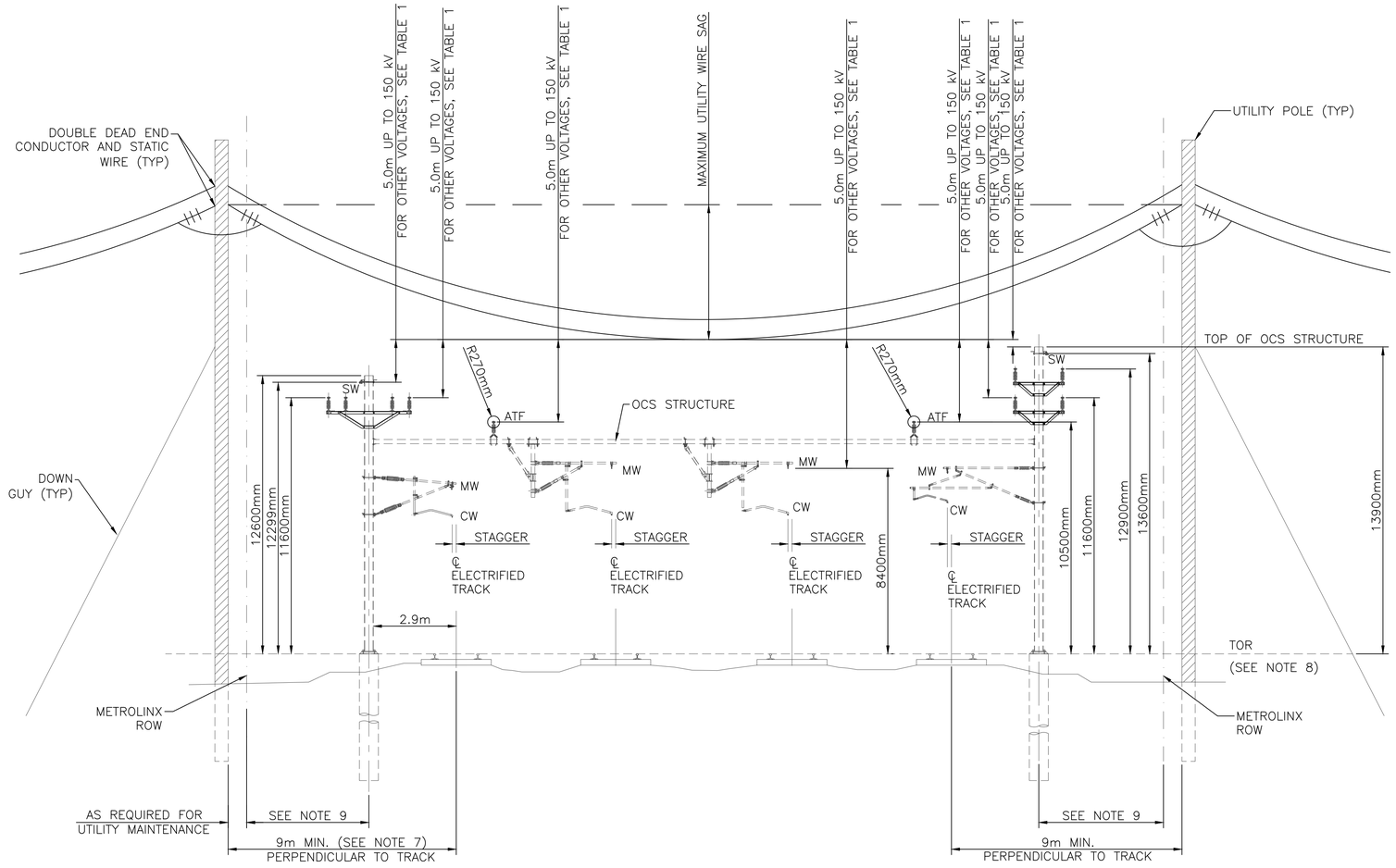

TABLE 1	
MINIMUM DESIGN VERTICAL CLEARANCES BETWEEN WIRES CROSSING EACH OTHER AND SUPPORTED BY DIFFERENT STRUCTURES	
NOMINAL PHASE TO PHASE VOLTAGE RATING	MINIMUM DISTANCE,(m)
>0 ≥ 150 kV	5.0
>150 kV ≥250 kV	6.5
>250 kV	8.0
SEE NOTE 4	

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

TYPICAL ELECTRICAL UTILITY CROSSING OF OCS CONDUCTORS AND STRUCTURES WITH ADDITIONAL DISTRIBUTION WIRES (TANGENT TRACK)

(NTS)

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. CLEARANCES SHALL BE CONSIDERED BETWEEN THE UPPER WIRE UNDER CONDITIONS THAT CAUSE MAXIMUM SAG AND THE LOWER WIRE AT A STRAIGHT LINE BETWEEN ITS SUPPORTS.
3. CLEARANCE INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWINGS IN CASES OF CROSSING ELECTRIFIED RAILROADS.
4. VERTICAL CLEARANCES SHOWN IN TABLE 1 ARE BASED ON OCCUPATIONAL HEALTH AND SAFETY ACT, ONTARIO REGULATION 213/91, CONSTRUCTION PROJECTS, ELECTRICAL HAZARDS, SECTION 188. WORKING SPACE OF 1.5m AND AN ADDITIONAL OCS MAINTENANCE ALLOWANCE OF 0.5m ARE ADDED. THE CLEARANCES SHOWN SHALL BE CONSIDERED ARE FROM THE HIGHEST OCS CONDUCTOR OR THE HIGHEST OCS STRUCTURE ELEVATION.
5. UTILITY CROSSING MAY BE ANYWHERE ALONG OCS SPAN.
6. HEIGHTS SHOWN PROVIDE GENERAL GUIDELINE FOR UTILITY CROSSING AND ARE NOT INCLUSIVE OF ALL LOCATIONS. UTILITY OWNER OR DESIGNEE SHALL SUBMIT PROPOSED CROSSING INFORMATION TO METROLINX FOR SITE SPECIFIC APPROVAL OF IMPACTS TO FUTURE ELECTRIFICATION.
7. HORIZONTAL CLEARANCE SHOWN IS BASED ON CANADIAN STANDARD ASSOCIATION CSA22.3 No.1–10, CLAUSE 5.5. THE DISTANCE BETWEEN METROLINX RIGHT OF WAY AND THE UTILITY STRUCTURE SHALL BE AS REQUIRED FOR UTILITY MAINTENANCE, BUT NO LESS THAN 1.1m.
8. FOR CURVED TRACKS, TOP OF RAIL SHALL BE CONSIDERED FROM HIGH RAIL ELEVATION.
9. SPLICING OF FACILITIES CROSSING METROLINX RIGHT OF WAY CORRIDOR IS NOT PERMITTED.
10. THIS DRAWING COVERS AREAS WHERE ADDITIONAL TRACTION POWER FEEDERS OR TROLLEY CONDUCTORS ARE TRAVERSING PARALLEL TO THE RAILROAD, SUCH AS BARRIE CORRIDOR FROM ALLENDALE TP SUBSTATION TO NEWMARKET SWITCHING STATION, THE STOUFFVILLE CORRIDOR FROM LAWRENCE AVENUE 50kV SUBSTATION TO SCARBOROUGH TP SUBSTATION AND THE CANPA SUBDIVISION FROM MIMICO SUBSTATION TO KIPLING. ADDITIONAL CLEARANCE MAY BE REQUIRED IN THESE AREAS.
11. * THE PREFERENCE IS THAT VOLTAGES LESS THAN 25KV ARE TO BE TO INSTALLED BELOW GROUND.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	NEW SHEET ISUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 17/02/17	DESIGNED BY: D. MIHAI 17/02/17
CHECKED BY: W. FRYER 17/02/17	APPROVED BY: B. SHOBER 18/01/05
SCALE: NTS	

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METROLINX

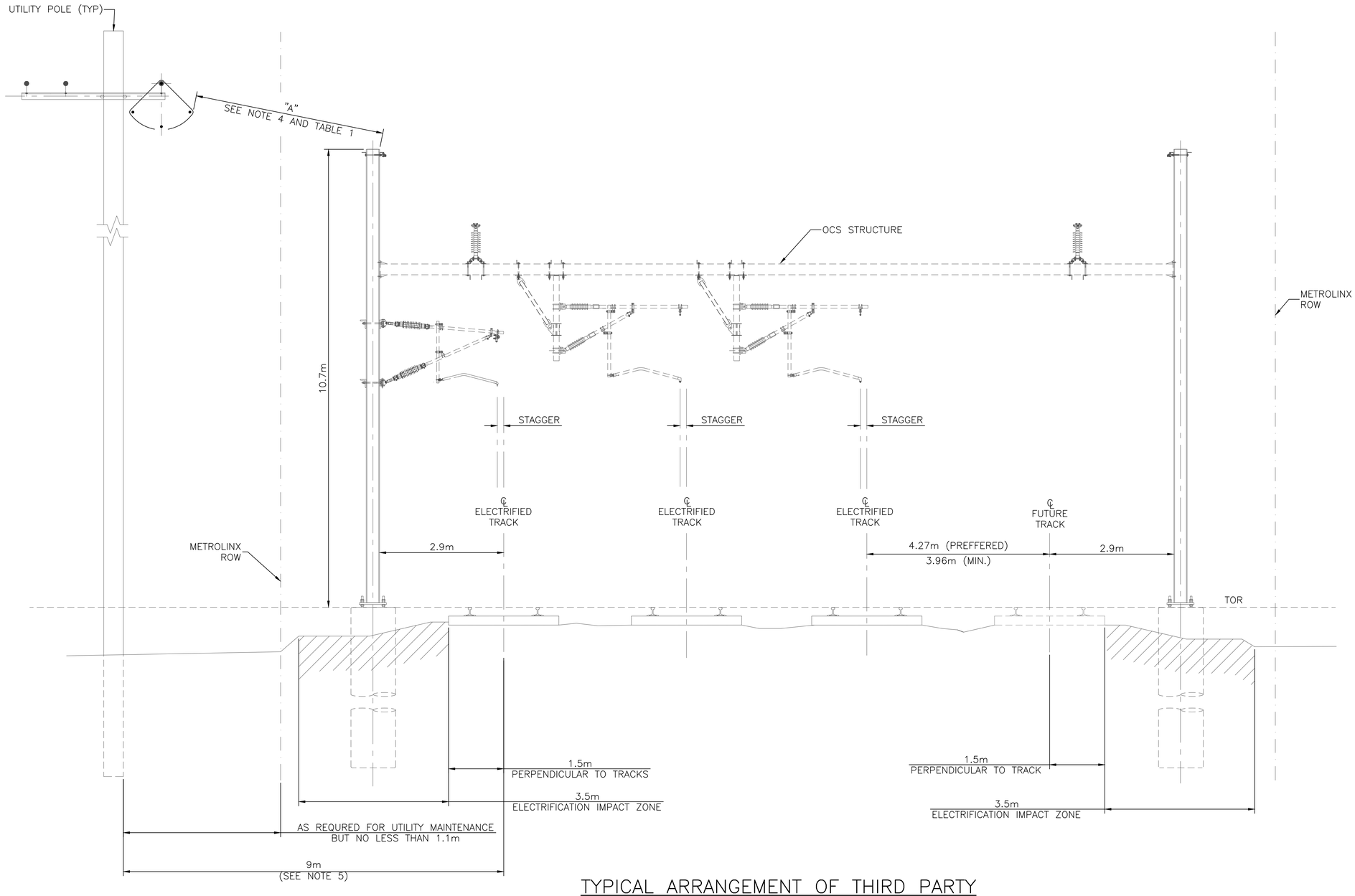
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
ELECTRICAL UTILITY CROSSING 3RD PARTY OVERHEAD LINE ZONES WITH ADDITIONAL DISTRIBUTION

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0231	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

TABLE 1	
MINIMUM DESIGN CLEARANCES BETWEEN WIRES SUPPORTED BY DIFFERENT STRUCTURES	
NOMINAL PHASE TO PHASE VOLTAGE RATING	MINIMUM DISTANCE, "A" (m)
>0 ≥ 150 kV	5.2
>150 kV ≥250 kV	6.7
>250 kV	8.2



TYPICAL ARRANGEMENT OF THIRD PARTY UTILITY POLES AND WIRES ALONG OCS STRUCTURES (WITH AND WITHOUT ADDITIONAL FUTURE TRACK)

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003. FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201. FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. ELECTRIFICATION 'IMPACT ZONE' TO BE CONSIDERED THE EXPECTED LIMITS OF OCS RELATED OBJECTS AT OR BELOW GROUND. THIS INCLUDES POLES, FOUNDATIONS, GUY ANCHORS AND BURIED OBJECTS SUCH AS DUCT BANKS.
3. ARRANGEMENT SHOWN INCLUDES ADDITIONAL FUTURE TRACK FOR INFORMATION PURPOSES. AREAS OF ADDITIONAL TRACK VARY IN NUMBER AND LOCATION OF TRACK.
4. UTILITY COMPANY TO DETERMINE WORST CASE WIRE POSITION DUE TO BLOW–OFF AND SAG. CLEARANCES SHOWN IN TABLE 1 ARE BASED ON OCCUPATIONAL HEALTH AND SAFETY ACT, ONTARIO REGULATION 213/91, CONSTRUCTION PROJECTS, ELECTRICAL HAZARDS, SECTION 188, AND ARE BASED ON THE WORST BLOW–OFF AND SAG POSITION OF THE WIRE. WORKING SPACE OF 1.5m AND SPACE FOR OCS STRUCTURE AND TOLERANCES OF 0.7m IS ADDED.
5. HORIZONTAL CLEARANCE SHOWN IS BASED ON CANADIAN STANDARD ASSOCIATION CSA22.3 No.1–10, CLAUSE 5.5.
6. THIS DRAWING DOES NOT COVER AREAS WHERE ADDITIONAL TRACTION POWER FEEDERS OR TROLLEY CONDUCTORS ARE TRAVERSING PARALLEL TO THE RAILROAD, SUCH AS BARRIE CORRIDOR FROM ALLENDALE TP SUBSTATION TO NEWMARKET SWITCHING STATION, THE STOUFFVILLE CORRIDOR FROM LAWRENCE AVENUE 50kV SUBSTATION TO SCARBOROUGH TP SUBSTATION AND THE CANPA SUBDIVISION FROM MIMICO SUBSTATION TO KIPLING. ADDITIONAL CLEARANCE MAY BE REQUIRED IN THESE AREAS.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	NEW SHEET ISUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 17/02/17	DESIGNED BY: D. MIHAI 17/02/17
CHECKED BY: W. FRYER 17/02/17	APPROVED BY: B. SHOBER 18/01/05
SCALE: 1:50 (0, 1, 2m)	

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ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
THIRD PARTY UTILITY PARALLEL TO THE TRACKS

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0232	1	XX

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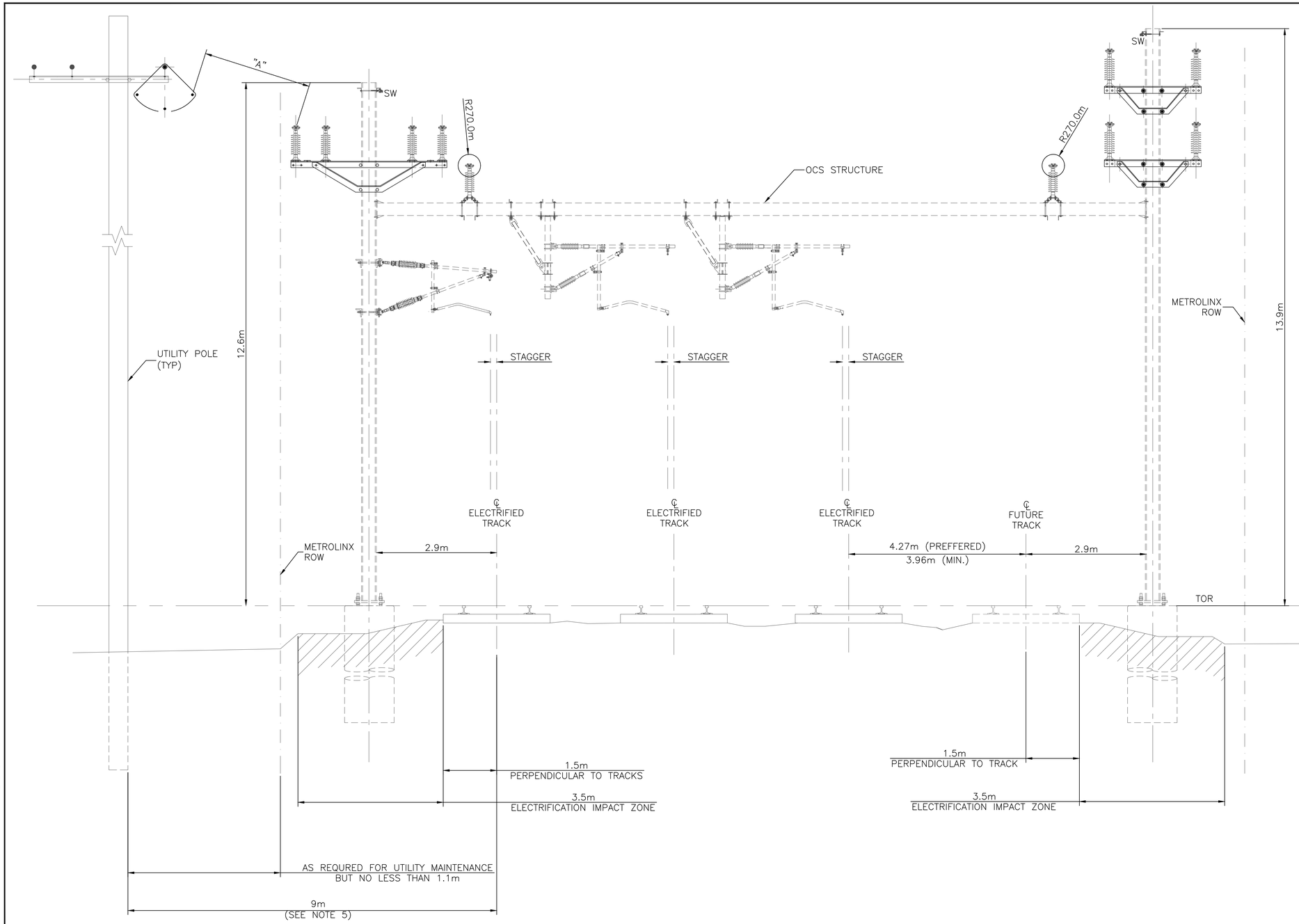

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

TABLE 1

MINIMUM DESIGN CLEARANCES BETWEEN WIRES SUPPORTED BY DIFFERENT STRUCTURES

NOMINAL PHASE TO PHASE VOLTAGE RATING	MINIMUM DISTANCE, "A" (m)
>0 ≥ 150 kV	5.2
>150 kV ≥ 250 kV	6.7
>250 kV	8.2

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003. FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201. FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. ELECTRIFICATION 'IMPACT ZONE' TO BE CONSIDERED THE EXPECTED LIMITS OF OCS RELATED OBJECTS AT OR BELOW GROUND. THIS INCLUDES POLES, FOUNDATIONS, GUY ANCHORS AND BURIED OBJECTS SUCH AS DUCT BANKS.
3. ARRANGEMENT SHOWN INCLUDES ADDITIONAL FUTURE TRACK FOR INFORMATION PURPOSES. AREAS OF ADDITIONAL TRACK VARY IN NUMBER AND LOCATION OF TRACK.
4. UTILITY COMPANY TO DETERMINE WORST CASE WIRE POSITION DUE TO BLOW–OFF AND SAG. CLEARANCES SHOWN IN TABLE 1 ARE BASED ON OCCUPATIONAL HEALTH AND SAFETY ACT, ONTARIO REGULATION 213/91, CONSTRUCTION PROJECTS, ELECTRICAL HAZARDS, SECTION 188, AND ARE BASED ON THE WORST BLOW–OFF AND SAG POSITION OF THE WIRE. WORKING SPACE OF 1.5m AND SPACE FOR OCS STRUCTURE AND TOLERANCES OF 0.7m IS ADDED.
5. HORIZONTAL CLEARANCE SHOWN IS BASED ON CANADIAN STANDARD ASSOCIATION CSA22.3 No.1–10, CLAUSE 5.5.
6. THIS DRAWING COVERS AREAS WHERE ADDITIONAL TRACTION POWER FEEDERS OR TROLLEY CONDUCTORS ARE TRAVERSING PARALLEL TO THE RAILROAD, SUCH AS BARRIE CORRIDOR FROM ALLENDALE TP SUBSTATION TO NEWMARKET SWITCHING STATION, THE STOUFFVILLE CORRIDOR FROM LAWRENCE AVENUE 50kV SUBSTATION TO SCARBOROUGH TP SUBSTATION AND THE CANPA SUBDIVISION FROM MIMICO SUBSTATION TO KIPLING. ADDITIONAL CLEARANCE MAY BE REQUIRED IN THESE AREAS.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	NEW SHEET ISUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 17/02/17	DESIGNED BY: D. MIHAI 17/02/17
CHECKED BY: W. FRYER 17/02/17	APPROVED BY: B. SHOBER 18/01/05
SCALE: 1:50 (0, 1, 2m)	

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ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

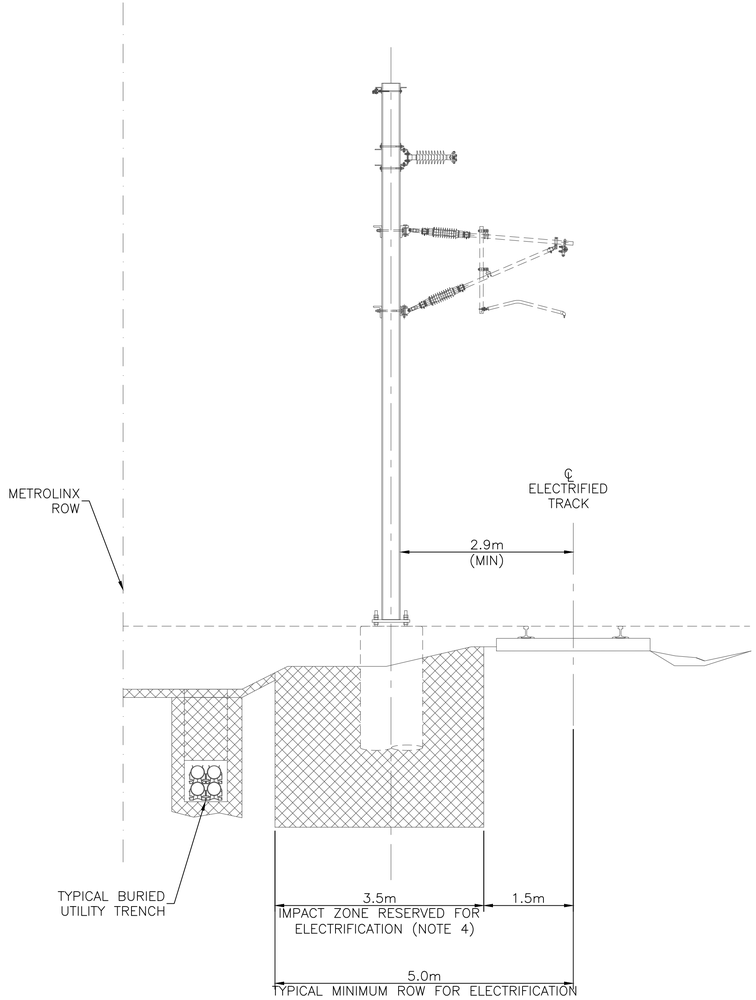
THIRD PARTY UTILITY PARALLEL TO THE TRACKS – ADDITIONAL DISTRIBUTION

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0233	1	XX

1

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWINGS EW–ET–0004.
2. ELECTRIFICATION 'IMPACT ZONE' TO BE CONSIDERED THE EXPECTED LIMITS OF OCS RELATED OBJECTS AT OR BELOW GROUND. THIS INCLUDES POLES, FOUNDATIONS, GUY ANCHORS AND BURIED OBJECTS SUCH AS DUCT BANKS.
3. FOR SUPER ELEVATED TRACKS, TOP OF RAIL SHALL BE CONSIDERED FROM HIGH RAIL ELEVATION.
4. BURIED UTILITIES TO BE COORDINATED WITH MX ELECTRIFICATION.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
EW–ET–0240	MINIMUM VEGETATION CLEARANCE	1	180713	NEW SHEET ISUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 17/02/17	DESIGNED BY: D.MIHAI 17/02/17
CHECKED BY: W. FRYER 17/02/17	APPROVED BY: B. SHOBER 18/01/05
SCALE: 1:50 (0, 1, 2m)	

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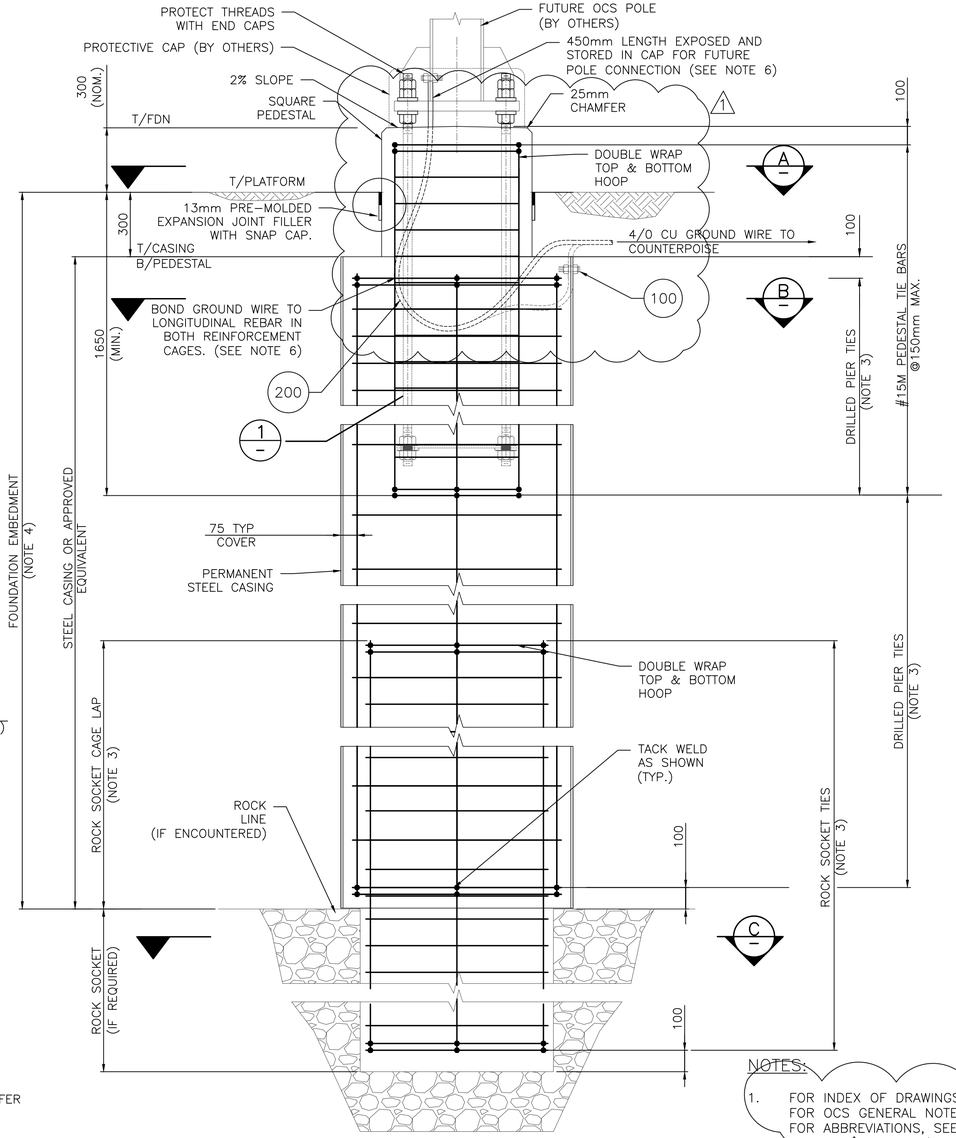
METROLINX

ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
BURIED UTILITIES

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0240	1	XX

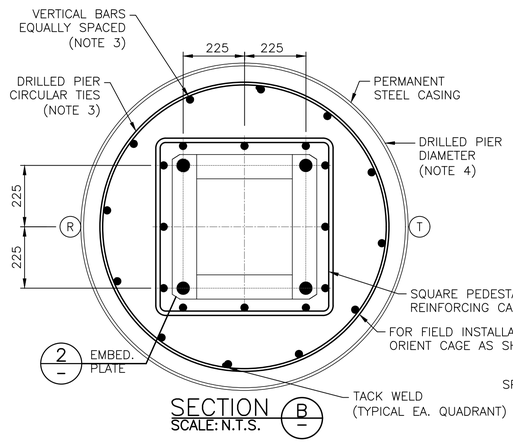
BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	UNIT	QUANT
–	–	30 MPA CONCRETE	CM	AS REQ'D
–	–	PERMANENT STEEL CASING	mm	AS REQ'D
–	–	F1554 ANCHOR BOLT 2100mm LONG, W/5 HEX NUTS, & 4 WASHERS	EA	4
–	–	EMBEDMENT PLATE ASSEMBLY	EA	1
–	–	ANCHOR BOLT TEMPLATE	EA	1
–	–	DRILLED PIER REINFORCING CAGE	EA	AS REQ'D
–	–	SQUARE PEDESTAL REINFORCING CAGE	EA	1
100	–	SERVIT POST FOR 4/0 COPPER W/POST 5/8–11UNC x 1 1/16, BURNDY #KC–28B1*	EA	AS REQ'D
200	–	4/0 1/C (19 STRAND) BARE COPPER	mm	5000

*OR EQUIVELANT



STATION PLATFORM FOUNDATION

SCALE: N.T.S.



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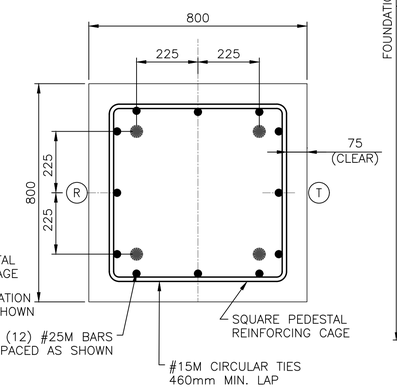

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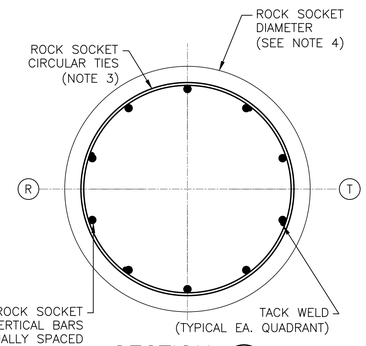

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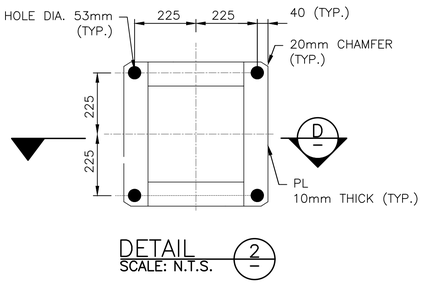
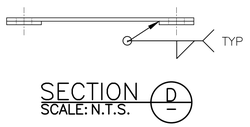
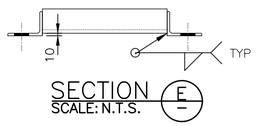


DETAIL 2
SCALE: N.T.S.

EMBEDMENT PLATE DETAIL



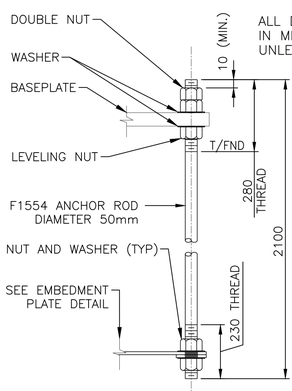
SECTION D
SCALE: N.T.S.



SECTION E
SCALE: N.T.S.

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



DETAIL 1
SCALE: N.T.S.

ANCHOR BOLT DETAIL

ANCHOR BOLT SETTING TEMPLATE

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWING EW–ET–0003. FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201. FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. BASE COVER SHALL BE 2 PIECE, REMOVABLE TYPE WITH TAMPERPROOF FASTENER, AND SHALL BE INSTALLED FOR ALL POLES LOCATED IN STATION PLATFORMS. COVER MATERIAL SHALL BE 4mm SHEET METAL.
3. ALL DRILLED PIER AND ROCK SOCKET VERTICAL BARS, TIE BARS, QUANITIES, LAP LENGTHS AND LOCATIONS TO BE DETERMINED BY CONTRACTOR.
4. DRILLED PIER AND ROCK SOCKET FOUNDATION DIAMETERS AND LENGTHS TO BE DETERMINED BY CONTRACTOR.
5. FOR CAST–IN–PLACE CONCRETE, CONCRETE REINFORCEMENT, ANCHOR BOLT, STEEL CASING AND FORMWORK PROCEDURES & REQUIREMENTS, SEE OCS–CATENARY FOUNDATIONS SPECIFICATIONS.
6. FOR DRILLED PIER FOUNDATION GROUNDING AND BONDING DETAILS, SEE DWG. EW–ET–251.
7. REINFORCEMENT TIES SHALL BE WELDED TO LONGITUDINAL REBAR IN ORDER TO FORM A CONTINUOUS BODY.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: W. FRYER 16/06/30
CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 18/01/05
SCALE:	

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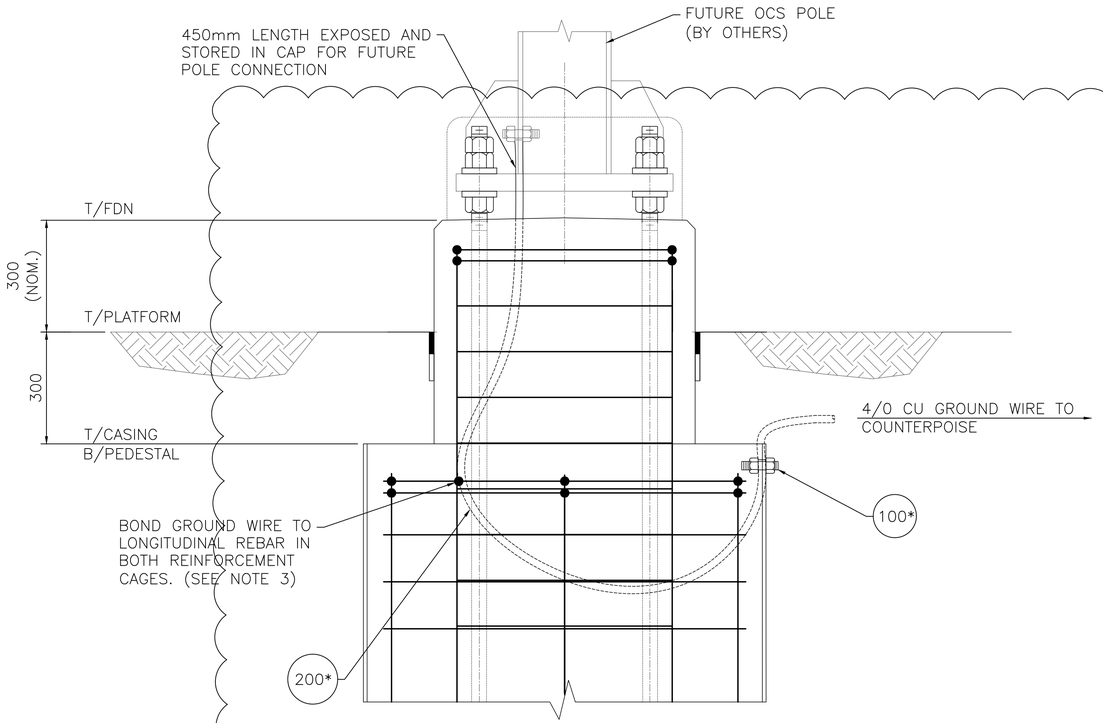
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DRILLED PIER FOUNDATION
STANDALONE OCS POLE IN STATION PLATFORM

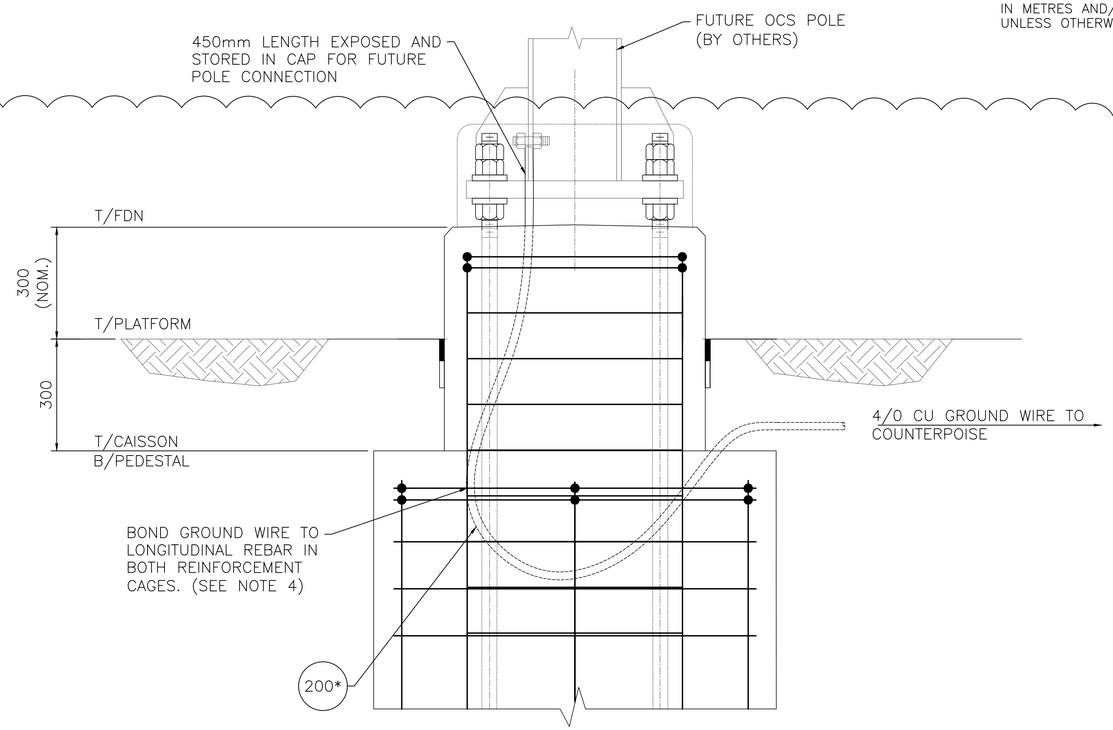
CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0250	1	XX

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



DRILLED PIER FOUNDATION GROUNDING AND BONDING
(WITH STAY–IN–PLACE STEEL CASING)
*FOR BILL OF MATERIAL SEE EW–ET–0250



DRILLED PIER FOUNDATION GROUNDING AND BONDING
(WITHOUT STEEL CASING)
*FOR BILL OF MATERIAL SEE EW–ET–0250

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWING EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. ALL DRILLED PIER AND ROCK SOCKET VERTICAL BARS, TIE BARS, QUANITIES, LAP LENGTHS AND LOCATIONS TO BE DETERMINED BY CONTRACTOR.
3. WHERE A STAY–IN–PLACE STEEL CASING IS AVAILABLE: BOND GROUND WIRE TO A MINIMUM OF ONE (1) LONGITUDINAL REBAR IN EACH CAGE BY C.U.L. RECOGNIZED IRREVERSIBLE COMPRESSION CONNECTION. BOND GROUND AND ALL ANCHORS TO STAY–IN–PLACE STEEL CASING.
4. WHERE STAY–IN–PLACE STEEL CASING IS NOT AVAILABLE: BOND GROUND WIRE TO EACH CAGE BY LONGITUDINAL REBAR WITH A MINIMUM OF TWO (2) REBAR IN THE MAIN CAISSON CAGE. BOND ALL ANCHORS TO LONGITUDINAL REBAR. BONDS SHALL BE C.U.L. RECOGNIZED IRREVERSIBLE COMPRESSION CONNECTIONS.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REVISED PER METROLINX COMMENTS			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: W. FRYER 16/06/30
CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 18/01/05
SCALE:	

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ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DRILLED PIER FOUNDATION
GROUNDING AND BONDING DETAIL

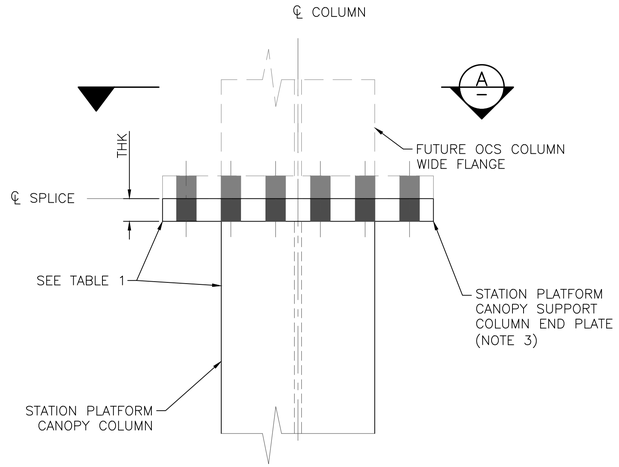
CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0251	1	XX

GFTRS - C:\pwworking\gfpw01\svfidleris\d0630010\149724-EW-ET-0251.dwg [Layout1] November 07, 2018 - 3:05pm svfidleris

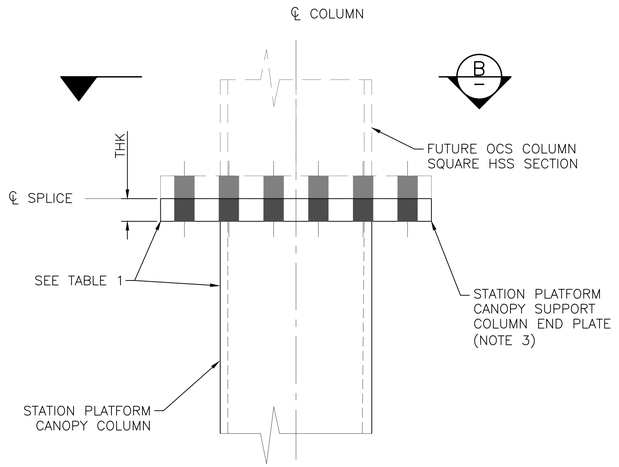
* TABLE 1

COLUMN TYPE	PLATE DIMENSIONS		"DA"	N SPACES
	W	THK		
W200	460mm	45mm	M27	2
W250	510mm	50mm	M27	3
W310	560mm	45mm	M27	4
W360	560mm	45mm	M27	4
HSS 203x203	460mm	35mm	M24	2
HSS 254x254	510mm	40mm	M24	2
HSS 305x305	560mm	40mm	M24	3
HSS 356x356	560mm	40mm	M24	4

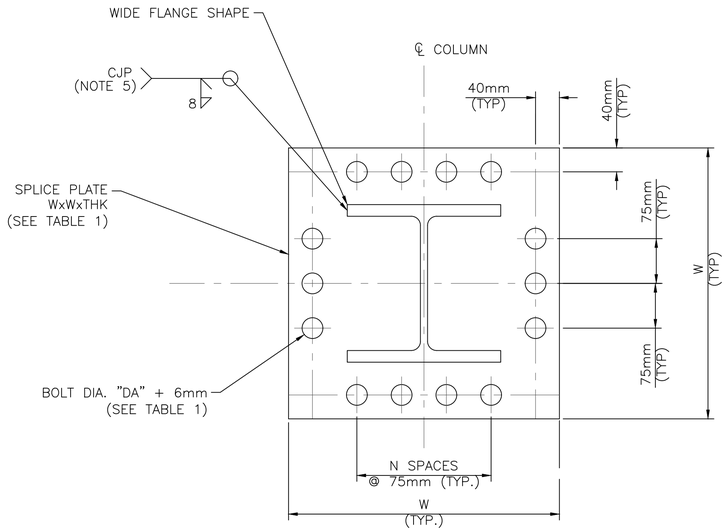
* SEE NOTE 2



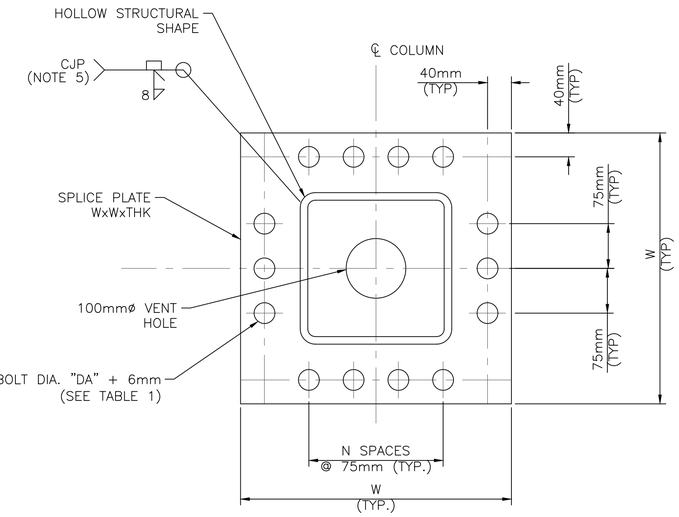
WF INTEGRATED CANOPY/OCS COLUMN SPLICE



HSS INTEGRATED CANOPY/OCS COLUMN SPLICE



SECTION A
SCALE: 1:5



SECTION B
SCALE: 1:5

METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW–ET–0003. FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201. FOR ABBREVIATIONS, SEE DRAWINGS EW–ET–0004. /1
2. TABLE 1 IS APPLICABLE ONLY FOR COLUMN SIZES UP TO 150 Kg/m. COLUMN SIZES SHOWN ARE THE NOMINAL DEPTHS.
3. END PLATE DESIGN OF CANOPY COLUMN TO BE INTEGRATED WITH THE BOLT SIZE AND PATTERN SHOWN IN TABLE 1.
4. BOLT GRADE FOR SPLICES SHALL BE A325M.
5. WELD SHALL BE COMPLETE JOINT PENETRATION.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180713	REISSUED WITH REVISION 1 SET			
		0	161214	ISSUED AS FINAL EW–ET STANDARDS			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 18/01/05
SCALE:	

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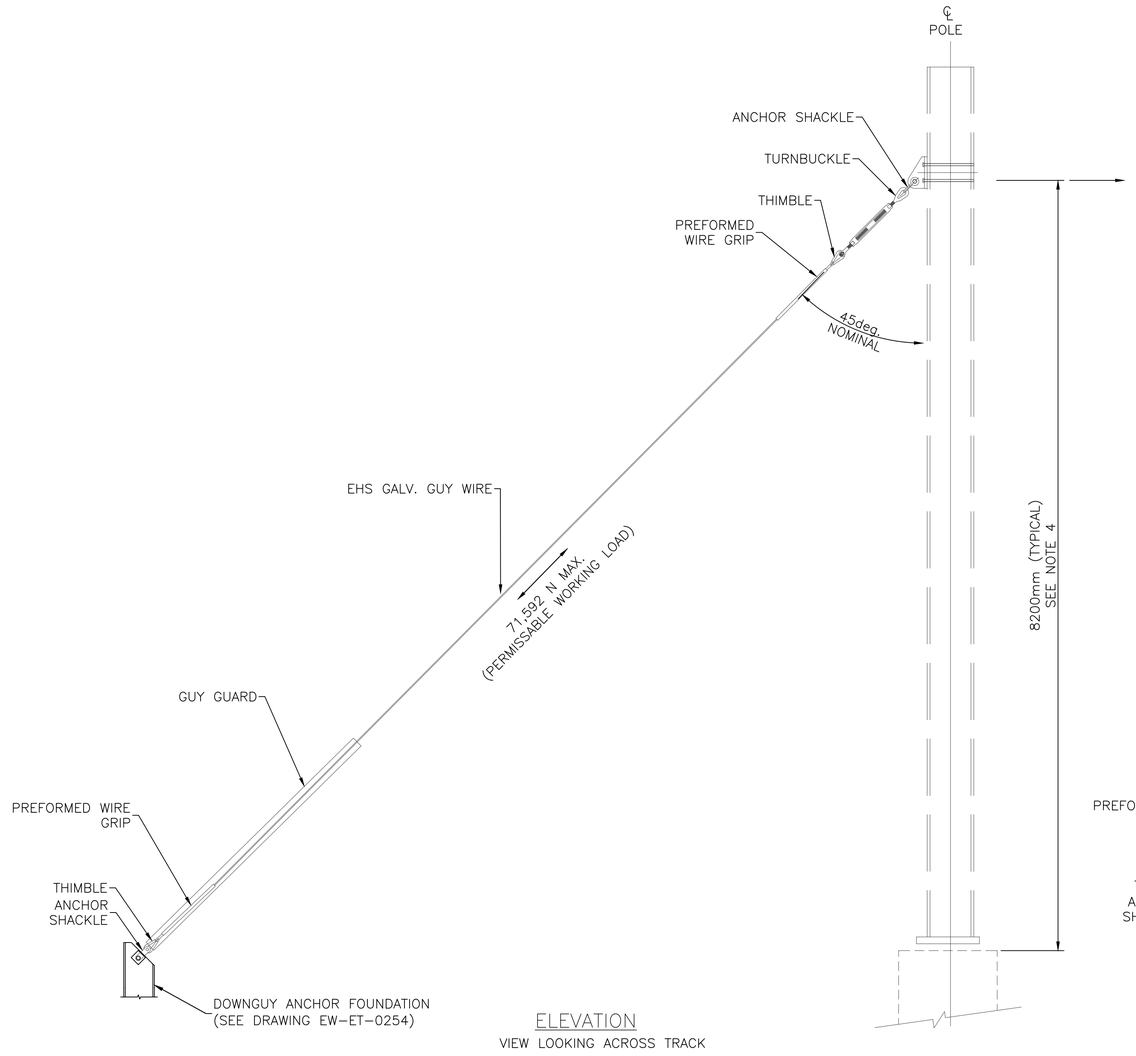
ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
STATION CANOPY INTEGRATION COLUMN SPLICE

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0252	1	XX

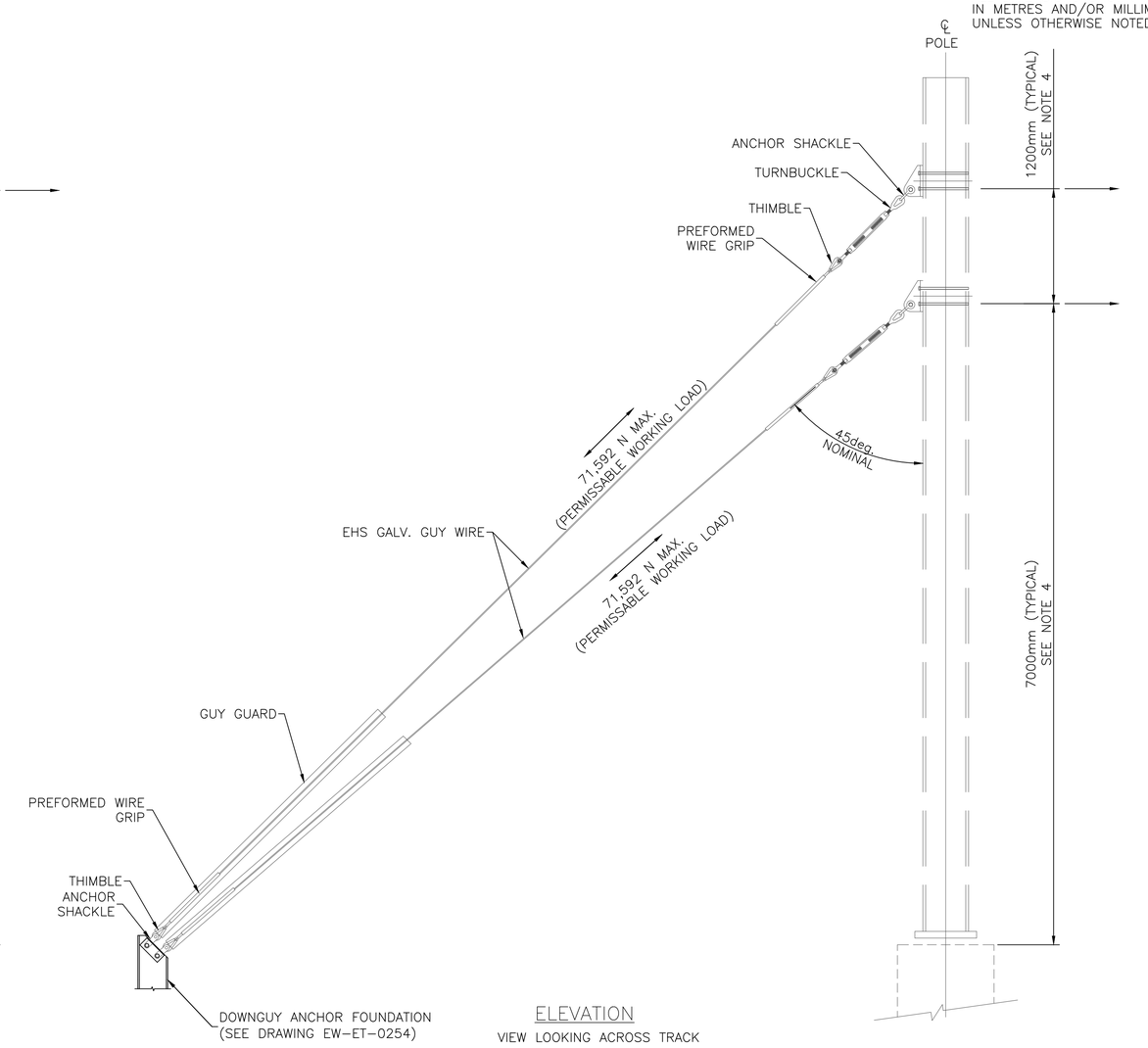
METRIC

ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



ELEVATION
VIEW LOOKING ACROSS TRACK

ASSEMBLY DG-1



ELEVATION
VIEW LOOKING ACROSS TRACK

ASSEMBLY DG-2

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWINGS EW-ET-0003. FOR OCS GENERAL NOTES, SEE DRAWING EW-ET-0201. FOR ABBREVIATIONS, SEE DRAWINGS EW-ET-0004.
2. DOWNGUY ANCHORS SHALL BE DESIGNED TO RESIST MAXIMUM WORKING LOADS OF THEIR RELATED GUY STRANDS.
3. WHERE DOWNGUY ANCHORS ARE TO BE ATTACHED TO FOUNDATIONS IN OPEN GROUND, SEE EW-ET-0254 FOR STANDARD DOWN GUY DRILLED CAISSON FOUNDATION. WHERE DOWNGUY ANCHORAGE IS TO BE INTEGRATED WITH ANOTHER STRUCTURAL ELEMENT (SUCH AS A PLATFORM OR BRIDGE PIER), THE INTEGRATED FOUNDATION MUST SHALL BE DESIGNED TO RESIST MAXIMUM WORKING LOADS OF THEIR RELATED GUY STRANDS.
4. ATTACHMENT HEIGHTS AND GUY STRAND ANGLES SHOWN ARE NOMINAL. THE CORRESPONDING LOCATION OF DOWN GUY ANCHORS SHALL BE COORDINATED DURING FINAL DESIGN WITH METROLINX ELECTRIFICATION.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180928	NEW SHEET ISSUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 18/09/21
SCALE:	

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ELECTRIFICATION IMPLEMENTATION

ENABLING WORKS ET STANDARDS

DOWNGUY ANCHORAGE
GENERAL ARRANGEMENT

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS-2014-IEP-002	EW-ET-0253	1	XX

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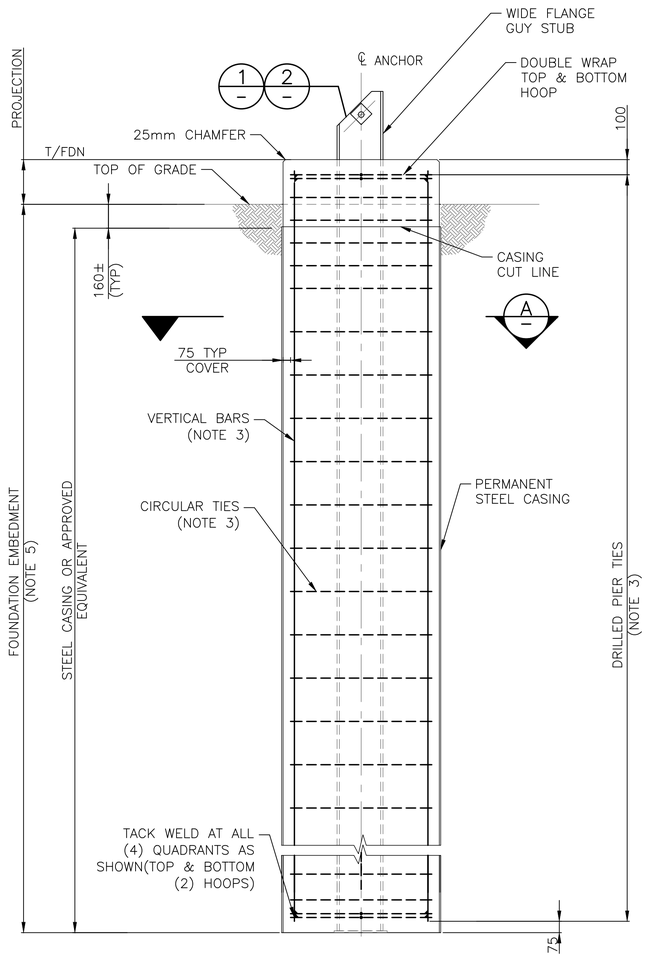
METRIC

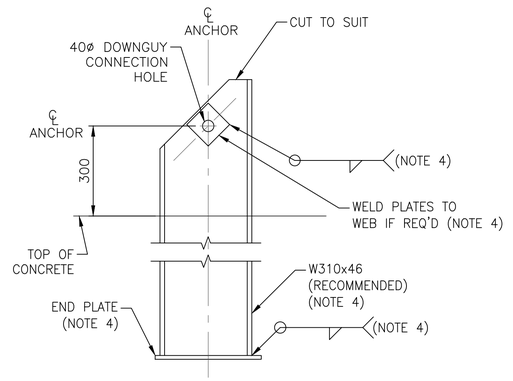
ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.



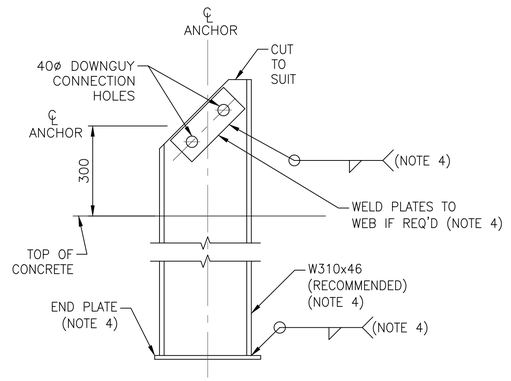
DRILLED PIER DOWNGUY ANCHOR FOUNDATION

SCALE 1:20

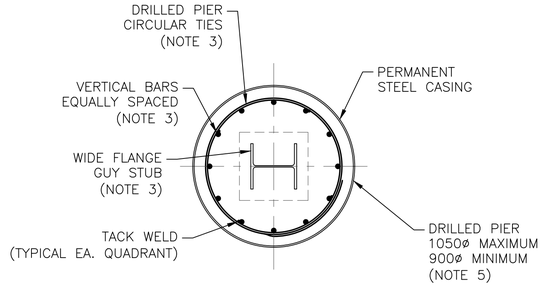
(FOR USE ON SINGLE AND DOUBLE ANCHORS)



DETAIL 1 –
SCALE: 1:10



DETAIL 2 –
SCALE: 1:10



SECTION A –
SCALE: 1:20

NOTES:

1. FOR INDEX OF DRAWINGS, SEE DRAWING EW–ET–0003.
   FOR OCS GENERAL NOTES, SEE DRAWING EW–ET–0201.
   FOR ABBREVIATIONS, SEE DRAWING EW–ET–0004.
2. DOWNGUY ANCHORS SHALL BE DESIGNED TO RESIST THE MAXIMUM WORKING LOAD OF THEIR RELATED GUY STRANDS AS SHOWN IN DWG. EW–ET–0253.
3. ALL DRILLED PIER VERTICAL BARS, TIE BARS, QUANTITIES, AND LOCATIONS TO BE DETERMINED BY CONTRACTOR.
4. GUY STUB SHALL BE A FULLY EMBEDDED WIDE FLANGE SECTION (CUT TO SUIT) WITH A RECOMMENDED SIZE OF W310x46. CONTRACTOR TO DETERMINE WEB PLATE SIZE (IF REQD.), AND WELD STRENGTHS.
5. DRILLED PIER FOUNDATION DIAMETER AND LENGTHS TO BE DETERMINED BY CONTRACTOR. SIZE OF DRILLED PIER SHALL NOT EXCEED 1050mmø OR BE SMALLER THAN 900mmø.
6. FOR DOWNGUY ANCHORS INTEGRATED WITH OTHER ELEMENTS (NOT SUPPORTED BY DRILLED CAISSON FOUNDATION) AN EQUIVALENT ANCHOR SHALL BE PROVIDED AND APPROVED BY METROLINX ELECTRIFICATION.

METROLINX PROJECT NO. 149724

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		1	180928	NEW SHEET ISSUED WITH REVISION 1 SET			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: R. BROWN 16/06/30	DESIGNED BY: W. FRYER 16/06/30
CHECKED BY: D. MIHAI 16/06/30	APPROVED BY: B. SHOBER 18/09/21
SCALE:	

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ELECTRIFICATION IMPLEMENTATION
ENABLING WORKS ET STANDARDS
DOWNGUY ANCHORAGE
GENERAL ARRANGEMENT

CONTRACT NO.	DWG. NO.	REV.	SHEET
QBS–2014–IEP–002	EW–ET–0254	1	XX

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