SECTION 16191 – SUPPORTING DEVICES:

PART 1 – GENERAL:

1.01 CODES AND STANDARDS

1. ALL MATERIAL SHALL BE NEW, OF THE BEST AVAILABLE QUALITY AND C.S.A. AND U.L.C. APPROVED FOR THEIR RESPECTIVE USE.

PART 2 – PRODUCTS:

2.01 SUPPORTING DEVICES

1. SUPPLY ALL NECESSARY INSERTS, RODS, CHANNELS, ANGLE BARS, BRACKETS, ETC. TO FORM A SUPPORT SYSTEM CAPABLE OF CARRYING AT LEAST TWICE THE WEIGHT OF EQUIPMENT SUPPORTED.
2. IN CONCRETE, USE CAST–IN THREADED INSERTS WHEREVER POSSIBLE. SHOULD ADDITIONAL INSERTS BE REQUIRED, USE A "RED–HEAD" TYPE INSERT CAPABLE OF CARRYING AT LEAST 500 POUNDS.
3. ALL HANGER RODS TO BE 3/8" DIAMETER STANDARD MILD STEEL, CUT TO REQUIRED LENGTHS AND THREADED.
4. SUPPORTS FOR ALL CONDUIT WORK SHALL BE ONE–HOLE STEEL PIPE STRAPS; UNISTRUT OR EQUAL, WITH NECESSARY FITTINGS; CADDY CLIPS OR EQUAL, APPROVED FOR THEIR RESPECTIVE USE.
5. FASTENING DEVICES FOR CABINETS, BOXES, SUPPORTS, ETC. SHALL BE NUT AND BOLT.
6. FASTENING DEVICES FOR OUTLET BOXES SHALL BE NUT AND BOLT, RAM–SET, EXPANSION SHIELDS, WEDGE ANCHORS, OR CADDY CLIPS, SIZE AND NUMBER TO SUIT THE APPLICATION OR AS DETAILED ON THE DRAWINGS.

PART 3 – EXECUTION:

3.01 SUPPORTING DEVICES

1. SECURE ALL EQUIPMENT IN A MANNER SO AS NOT TO DISTORT OR CAUSE UNDUE STRESS ON ANY COMPONENTS.
2. SUPPORT OF ANY EQ.UIPMENT SHALL NOT RELY ON THE STRENGTH OF PLASTER OR PLASTERBOARD CONSTRUCTION.
3. ENSURE THAT INSTALLATION IS SAFE FOR FUTURE ELEVATED WORK. TRIM AND/OR CUT ANY EXCESS THREAD FROM ANY ROD INSTALLATION.

SECTION 16410 – MOULDED CASE CIRCUIT BREAKERS:

PART 1 – GENERAL:

1.01 CODES AND STANDARDS

1. ALL MATERIAL SHALL BE NEW, OF THE BEST AVAILABLE QUALITY AND C.S.A. AND U.L.C. APPROVED FOR THEIR RESPECTIVE USE.

1.02 SUBMITTALS

1. SUBMIT PRODUCT DATA IN ACCORDANCE WITH SECTION 16010.

PART 2 – PRODUCTS:

2.01 BREAKERS GENERAL

1. MOULDED CASE CIRCUIT BREAKERS, CIRCUIT BREAKERS, AND GROUND–FAULT CIRCUIT–INTERRUPTERS: TO CSA C22.2 NO. 5.
2. BOLT–ON MOULDED CASE CIRCUIT BREAKER: QUICK–MAKE, QUICK–BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION HAVING DE–IONIZING ARC CHAMBERS, BE TRIP FREE OF OPERATING HANDLES ON OVERLOADS WITH A DEFINITE INDICATION WHEN TRIPPING HAS TAKEN PLACE, ALL FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40°C AMBIENT.
3. PLUG–IN MOULDED CASE CIRCUIT BREAKERS: QUICK–MAKE, QUICK–BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40°C AMBIENT.
4. COMMON–TRIP BREAKERS: WITH SINGLE HANDLE FOR MULTI–POLE APPLICATIONS; TIE HANDLES WILL NOT BE ACCEPTABLE.
5. MAGNETIC INSTANTANEOUS TRIP ELEMENTS IN CIRCUIT BREAKERS TO OPERATE ONLY WHEN VALUE OF CURRENT REACHES SETTING. TRIP SETTINGS ON BREAKERS WITH ADJUSTABLE TRIPS TO RANGE FROM 3–8 TIMES CURRENT RATING.
6. CIRCUIT BREAKERS WITH INTERCHANGEABLE TRIPS AS INDICATED.
7. CIRCUIT BREAKERS TO HAVE MINIMUM 10,000 A SYMMETRICAL RMS INTERRUPTING CAPACITY RATING.

2.02 THERMAL MAGNETIC BREAKERS

1. MOULDED CASE CIRCUIT BREAKER TO OPERATE AUTOMATICALLY BY MEANS OF THERMAL AND MAGNETIC TRIPPING DEVICES TO PROVIDE INVERSE TIME CURRENT TRIPPING AND INSTANTANEOUS TRIPPING FOR SHORT CIRCUIT PROTECTION.

2.03 MANUFACTURERS

1. EQUIPMENT SHALL MEET THE STANDARD OF UNIFORMITY AS DESCRIBED IN THE GENERAL ELECTRICAL SPECIFICATIONS–UNIFORMITY–1.06.
2. STANDARD OF ACCEPTABILITY
   - 2.1. POW–R–LINE 1 PANELBOARDS;
   - 2.2. CUTLER–HAMMER 'BAB' SERIES.

PART 3 – EXECUTION:

3.01 INSTALLATION

1. CIRCUIT BREAKERS SHALL BE SECURELY MOUNTED IN PANELBOARDS AND TIGHTENED DOWN TO THE BUSSING AS PER THE MANUFACTURERS' RECOMMENDED TORQUE LEVELS.
2. INSTALL BREAKERS IN QUANTITIES AS INDICATED.
3. SUPPLY AND INSTALL BLANK SECTIONS IN PANELBOARDS FOR ALL UNUSED BREAKER SPACES.

SECTION 16701 – COMMUNICATIONS:

PAURT 1 – GENERAL:

1.01 CODES AND STANDARDS

1. ALL MATERIAL SHALL BE NEW, OF THE BEST AVAILABLE QUALITY AND C.S.A. AND U.L.C. APPROVED FOR THEIR RESPECTIVE USE.

PART 2 – PRODUCTS:

2.01 COMMUNICATIONS WIRING

1. WIRE SHALL BE 4 PAIR No. 24 GAUGE EIA/TIA LEVEL 6 FT6 RATED CABLE. CABLES MAY BE INSTALLED THROUGH CEILING SPACES OF FRAME CONSTRUCTION USING CONDUIT. IN SUCH INSTANCES, CABLE SHALL BE RUN PARALLEL TO BUILDING LINES AND SECURED WITHIN 12" OF TERMINATIONS AND AT INTERVALS NOT EXCEEDING 48".

PART 3 – EXECUTION:

3.01 COMMUNICATIONS WIRING

1. PROVIDE A STRUCTURED WIRING SYSTEM TO CAN/CSA–T529–M95 STANDARD AND AS INDICATED ON THE DRAWINGS.
2. CONNECT JACKS TO WIRING AT OUTLETS AND TAG CABLES IN OUTLETS AND THE COMMUNICATIONS ROOM WITH NUMBERS AND UNIQUE IDENTIFIERS. TERMINATE CABLES ON EXISTING PATCH PANELS IN COMMUNICATIONS ROOM. IDENTIFY JACKS AND PORTS IN ACCORDANCE WITH TIA/EIA–568–B.
3. TELECOMMUNICATIONS BONDING AND GROUNDING SHALL BE DONE IN ACCORDANCE WITH ANSI/NECA/BICSI 607–2011.
4. EACH RUN OF CATEGORY 6 UNSHIELDED TWISTED PAIR CABLE SHALL BE TESTED FOR SHORTS, G ROUNDS, OPENS, AND POLARITY REVERSALS. IN ADDITION, EACH RUN OF CABLE SHALL BE PERFORMANCE TESTED AT 250 MEGAHERTZ FOR IMPEDANCE, ATTENUATION, CAPACITANCE, PS–NEXT, PS–ACR, PS–ELFEXT, AND RETURN LOSS. IN ORDER TO BE CONSIDERED ACCEPTABLE, EACH CABLE RUN INCLUDING TERMINATIONS SHALL BE WITHIN THE LIMITATIONS SPECIFIED BY TIA/EIA–568–B. PROVIDE DOCUMENTATION OF ALL TESTS.
5. INSTALLERS OF COMMUNICATIONS CABLE AND JACKS SHALL HAVE A DEMONSTRATED EXPERIENCE IN THIS SPECIFIC LINE OF WORK FOR A PERIOD NOT LESS THAN THE LAST THREE CONSECUTIVE YEARS.

SECTION 16702 – H2 GAS DETECTION SYSTEM

PART 1 – GENERAL:

1.01 CODES AND STANDARDS

1. ALL MATERIAL SHALL BE NEW, OF THE BEST AVAILABLE QUALITY AND C.S.A. AND U.L.C. APPROVED FOR THEIR RESPECTIVE USE.

1.1 ZONE 2 HAZARDOUS GAS CLASSIFICATION

1.02 SUBMITTALS

1. SUBMIT PRODUCT DATA IN ACCORDANCE WITH PART 1 SECTION 1.20.

PART 2 – PRODUCTS:

2.01 DETECTORS GENERAL

1. COMBUSTIBLE GAS SENSOR TYPE TO CATALYTIC BEAD.
2. THE RANGE OF SENSOR MEASUREMENT SHALL BE 0– 100% LEL, 0–1000 PPM FOR H_2.
3. THE ENCLOSURE RATING TO BE TYPE NEMA 4X OR IP66.
4. THE OPERATING TEMPERATURE RANGE SHALL BE –40 ^{o}C TO +60 ^{o}C.
5. THE RELATIVE HUMIDITY (NON–CONDENSING) TOBE 0 – 95% RH.
6. THE INPUT VOLTAGE TO BE 11 TO 30VDC, 3 WIRE WITH DUAL 4–20MA CURRENT SOURCE, HART.
7. RELAY RATINGS CONSIST OF 5A @ 30VDC, 5A @ 220VAC, 3X SPDT, FAULT, WARN, ALARM WITH A RELAY MODE CONSIST OF COMMON, DISCREET, HORN.
8. THE DISPLAY SHALL BE ORGANIC LED (MULTI LINGUAL) WITH CONTRAST RATIO OF 2000:1 AND A VIEW ANGLE OF 160 ^{o}.
9. THE CABLE REQUIREMENT SHALL BE 3–WIRE SHIELDED AND ACCOMMODATE UP TO #12AWG.
10. MANUFACTURER: MSA, ULTIMA X5000 GAS MONITOR OR APPROVED EQUALS

2.02 ALARM CONTROL PANEL GENERAL

1. THE PANEL ACCEPTS UP TO 12 ANALOG INPUTS / OUTPUTS.
2. IT IS CAPABLE TO PROVIDE DATA AND EVENT LOGGING VIA INTEGRATION TO EXISTING JOHNSON CONTROL METASYS BACNET PROTOCOL.
3. THE FRONT PANEL MONITOR DISPLAY TO BE COLOR TOUCH SCREEN INTERFACE.
4. UTILIZE ALLEN BRADLEY CONTROL LOGIX PLC PLATFORM.
5. THE PANEL ENCLOSURE RATED TO NEMA 12.
6. IT SHALL BE CAPABLE OF PROVIDING REMOTE ACCESS CAPABILITY IN VARIOUS DIGITAL COMMUNICATIONS SUPPORTED.
7. IT SHALL HAVE PROVISIONS FOR A PROGRAM STORAGE SD CARD FOR RETRIEVAL AND BACK UP OPTIONS.
8. INPUT POWER TO 85–264VAC , 60HZ CAPABLE OF AUTO SWITCHING INPUT WITH A POWER CAPACITY OF 370 WATTS DC.
9. PROVIDE GROUND FAULT MONITORING.
10. THE OPERATING TEMPERATURE RANGE SHALL BE 0 ^{o} C TO 49 ^{o} C.
11. THE RELATIVE HUMIDITY (NON CONDENSING) TO BE 0 TO 90 % RH.
12. THE HOUSING COLOR SHALL BE GRAY.
13. MANUFACTURER: MSA, HAZARD WATCH FX–12 OR APPROVE EQUAL.

2.03 ALARM HORN & STROBE

1. COMBINATION OF SIREN AND STROBE CONSIST OF HIGH INTENSITY LED WITH CLEARLY VISIBLE RED STROBE AND ADJUSTABLE SOUND AND LIGHT OPTIONS,
2. VOLUME SOUND @ 105 DB SIRENS.
3. OPERATING VOLTAGE SHALL BE 12 – 24VDC.
4. OPERATING CURRENT SHALL BE 0.42A @ 12VDC / 0.22A @ 24VDC.
5. OPERATING TEMPERATURE TO BE –20° c TO 60°c.
6. ENCLOSURE IP RATING TO BE IP54.
7. IT HAS A DRY CONTACT NC, 12VDC, 50MA.
8. PROVIDE VARIOUS TONES AND FLASH PATTERNS.
9. MANUFACTURER: SENVA, MODEL SS–A, SS–B, SS–R OR APPROVE EQUAL

PART 3 – EXECUTION:

3.01 INSTALLATION

1. GAS DETECTORS SHALL BE SECURELY MOUNTED IN THE CEILING COMPLETE WITH HARDWARE AND SUPPORTS RECOMMENDED BY THE MANUFACTURER.
2. PROVIDE ALL THE ADAPTERS AND BUSHING REQUIRED TO TERMINATE THE CABLES TO THE DETECTORS..
3. ENSURE ALL DETECTORS ARE PROPERLY CALIBRATED PRIOR TO INSTALLATION. CONTRACTOR TO PROVIDE CALIBRATION REPORT TO ENGINEER.
4. PROVIDE ALARM SETTINGS AS REQUIRED.
5. INSTALL ALARM PANEL IN THE LOCATION AS SHOWN ON THE PLAN. PROVIDE CABLE TAGGING FOR ALL CABLE CONNECTED TO THE PANEL.

ISSUED FOR TENDER

NOT FOR CONSTRUCTION

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
Dillon Consulting Limited (MB)
No. 1789 Date: 2023.10.06

LOCATION UNDERGROUND STRUCTURES APPROVED

SUPV. U/G STRUCTURES COMMITTEE DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ELEV.

NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	2023/10/06	JCY

DESIGNED BY ABL
DRAWN BY ABL
CHECKED BY CAL
APPROVED BY CAL
HOR. SCALE N.T.S.
VERTICAL
DATE

DILLON CONSULTING

RELEASED FOR CONSTRUCTION
DATE OCTOBER 06, 2023

ENGINEER'S SEAL
PROVINCE OF MANITOBA
C.A. LANGE
Member
37791
2023/10/06
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT PROJECT NO.
23-6412

Winnipeg
THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

WINNIPEG TRANSIT
ARTIC ROOM MODIFICATIONS

CITY DRAWING NUMBER P-XXXX-
SHEET 21 OF 21

ELECTRICAL
SPECIFICATIONS 2 OF 2

CONSULTANT DRAWING NUMBER
EL8

FILENAME: C:\PW WORKING DIRECTORY\PROJECTS 2023\DILLON_402HL\DAES34625\EL07.DWG PLOTTED BY: LIU, ZHIHAO
PLOT DATE: 2023–10–06 @ 5:01:50 PM PLOT SCALE: 1:1 PLOT STYLE: DILLON–STANDARD.CTB
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