

ELECTRICAL SPECIFICATION
SECTION 16010 ELECTRICAL GENERAL PROVISIONS

- 1 GENERAL
 - 1 PROVIDE ALL MATERIALS, LABOUR, PLANT AND EQUIPMENT NECESSARY TO MAKE A COMPLETE INSTALLATION AS DESCRIBED AND SHOWN. THIS INSTALLATION SHALL BE LEFT COMPLETE AND READY FOR OPERATION.
 - 2 THE ENTIRE INSTALLATION SHALL BE GUARANTEED FOR ONE YEAR FROM DATE OF FINAL ACCEPTANCE BY THE CITY. REPLACE AT NO ADDITIONAL COST ANY WORK OR MATERIAL WHICH MAY FAIL OR PROVE DEFECTIVE DURING THE GUARANTEE PERIOD.
 - 3 THE INSTALLATION SHALL CONFORM IN EVERY RESPECT TO THE RULES AND REGULATIONS OF THE LATEST EDITION OF THE CANADIAN ELECTRICAL CODE AND ALL LOCAL CODES. ALL WORK SHALL BE UNIFORM AND HIGH QUALITY. ALL EQUIPMENT SUPPLIED UNDER THIS CONTRACT SHALL BE NEW AND BUILT IN ACCORDANCE WITH EMAC STANDARDS, SHALL BE CSA CERTIFIED OR CERTIFIED BY AN EQUIVALENT RECOGNIZED CERTIFYING AGENCY TO MEET CANADIAN STANDARDS AND LOCALLY APPROVED. ELECTRICAL EQUIPMENT CONSISTING OF INDIVIDUAL CERTIFIED COMPONENTS MUST ALSO HAVE A CSA OR EQUIVALENT CERTIFICATION FOR THE ENTIRE ASSEMBLY. PROVIDE INSPECTION CERTIFICATE UPON COMPLETION OF THE WORK.
 - 4 CAREFULLY EXAMINE ALL PLANS AND SPECIFICATIONS PERTAINING TO THIS CONTRACT AND VISIT SITE TO DETERMINE ALL FACTORS AFFECTING COSTS AND INCLUDE SAME IN TENDER. NOTIFY CONTRACT ADMINISTRATOR OF DISCREPANCIES OR CONFLICTS WITH ANY REGULATION BEFORE SUBMITTING PRICE. FAILING SUCH NOTIFICATION, THIS CONTRACTOR SHALL MEET ALL SUCH REQUIREMENTS WITHOUT EXTRA COST TO THE CITY.
 - 5 OBTAIN ALL NECESSARY PERMITS, PAY ALL NECESSARY FEES, GIVE ALL NECESSARY NOTICES AND OBTAIN APPROVAL OF THE ELECTRICAL AUTHORITIES HAVING JURISDICTION.
- 2 SHOP DRAWINGS
 - 1 SUBMIT SIX (6) COPIES OF SHOP DRAWINGS FOR ALL EQUIPMENT TO SHOPDRAWINGS@SMS.ENG.COM.
 - 2 EQUIPMENT PROPOSED SHALL MEET THE SAME STANDARDS OF PERFORMANCE, QUALITY AND WORKMANSHIP AS THAT SPECIFIED.
 - 3 SHOP DRAWINGS TO BE REVIEWED AND STAMPED BY THE TRADES AND GENERAL CONTRACTOR.
- 3 REQUEST FOR INTERPRETATION (RFIS)
 - 1 FOR RFIS SUBMITTED ELECTRONICALLY, INCLUDE PROJECT NAME AND RFI NUMBER IN SUBJECT LINE OF E-MAIL. SEND RFIS TO RFI@SMS.ENG.COM
 - 2 CONTENT OF THE RFI: INCLUDE A DETAILED DESCRIPTION OF THE ITEM NEEDING INTERPRETATION AND PROPOSED SOLUTION.
- 4 AS-BUILTS
 - 1 PROVIDE TWO COPIES OF "AS-BUILT" DRAWINGS.
- 5 OPERATION AND MAINTENANCE MANUALS
 - 1 PROVIDE DATA FOR INCORPORATION INTO MAINTENANCE MANUAL. MANUAL SHALL INCLUDE INSTRUCTIONS FOR ALL EQUIPMENT SUPPLIED, COPY OF REVIEWED SHOP DRAWINGS AND TECHNICAL DATA SUCH AS PARTS LISTS, OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS, ETC. THREE (3) HARD COVER COPIES OF MAINTENANCE MANUALS ARE TO BE SUBMITTED.
- 6 REMOVALS
 - 1 REMOVE ALL UNNECESSARY EXISTING ELECTRICAL EQUIPMENT, WIRING AND FIXTURES IN THOSE PORTIONS OF THE EXISTING BUILDING WHICH ARE BEING REMODELED OR DEMOLISHED. THE EQUIPMENT MAY BE REUSED ON THIS PROJECT IF, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, SUCH EQUIPMENT IS IN SATISFACTORY CONDITION AND MEETS THE STANDARDS ESTABLISHED. THE CITY MAY SELECT FROM THE MATERIALS AND/OR EQUIPMENT REMAINING WHICH HE WISHES TO RETAIN AND THE REMAINDER SHALL BE REMOVED FROM THE SITE.
 - 2 ANY ELECTRICAL EQUIPMENT IN REMODELED SECTIONS OR IN STRUCTURES REMOVED OR ALTERED, ADJACENT TO NEW WORK, NECESSARY FOR THE OPERATION OF THE EXISTING BUILDING, SHALL BE RELOCATED AS NECESSARY.
 - 3 ALL EXISTING EQUIPMENT REUSED SHALL BE MADE GOOD AND GUARANTEED.
 - 4 POWER INTERRUPTIONS SHALL BE KEPT TO A MINIMUM AND SHALL BE A TIME SUITABLE TO THE BUILDING OCCUPANT(S).
- 7 WORK IN EXISTING BUILDING
 - 1 CO-ORDINATION:
 - 1 THE BUILDING SHALL REMAIN OPEN AND IN NORMAL OPERATION DURING THE CONSTRUCTION PERIOD.
 - 2 WHERE EXISTING SERVICES SUCH AS ELECTRICAL POWER, FIRE ALARM SYSTEM, SOUND SYSTEM, ETC. ARE REQUIRED TO BE INTERRUPTED AND/OR SHUT DOWN, CO-ORDINATE THE SHUTDOWNS WITH THE CITY AND CARRY OUT THE WORK AT A TIME AND IN A MANNER ACCEPTABLE TO THEM. CAREFULLY SCHEDULE ALL DISRUPTION AND/OR SHUT-DOWNS AND ENSURE THAT THE DURATION OF EACH IS KEPT TO THE ABSOLUTE MINIMUM. SUBMIT FOR APPROVAL A WRITTEN, CONCISE SCHEDULE OF EACH DISRUPTION AT LEAST 120 HOURS IN ADVANCE OF PERFORMING WORK AND OBTAIN OWNER'S WRITTEN CONSENT PRIOR TO IMPLEMENTING.
 - 3 SHOULD ANY TEMPORARY CONNECTIONS BE REQUIRED TO MAINTAIN SERVICES DURING WORK IN THE EXISTING BUILDING, SUPPLY AND INSTALL ALL NECESSARY MATERIAL AND EQUIPMENT AND PROVIDE ALL LABOUR AT NO EXTRA COST. SHOULD ANY EXISTING SYSTEM BE DAMAGED, MAKE FULL REPAIRS WITHOUT EXTRA COST, AND TO THE SATISFACTION OF THE CITY AND CONTRACT ADMINISTRATOR.
 - 4 IF EXISTING EQUIPMENT SHOWN ON DRAWINGS IS DEFECTIVE IT SHOULD BE BROUGHT TO THE CONTRACT ADMINISTRATOR AND CITY ATTENTION PRIOR TO WORK COMPLETION.
 - 2 INSTALLATION
 - 1 INSTALL BOXES, CONDUIT AND WIRING THROUGH EXISTING AREAS AS REQUIRED FOR THE NEW INSTALLATION.
 - 2 ADD MODULES, SWITCHES, ETC. IN EXISTING CONTROL PANELS, AS REQUIRED, TO EXTEND EXISTING SYSTEMS TO NEW OR RENOVATED AREAS.
 - 3 PATCH AND REPAIR WALLS AND CEILINGS IN EXISTING AREAS THAT HAVE BEEN DAMAGED OR CUT OPEN DUE TO THE NEW ELECTRICAL INSTALLATION.
 - 4 WHERE NEW CABLES OR CONDUITS HAVE BEEN INSTALLED THROUGH EXISTING FIRE RATED WALLS, SEAL OPENING AROUND CABLES AND CONDUIT TO MAINTAIN FIRE RATING.
 - 5 ALL EXISTING EQUIPMENT REUSED SHALL BE MADE GOOD AND GUARANTEED.
 - 6 POWER INTERRUPTIONS SHALL BE KEPT TO A MINIMUM AND SHALL BE A TIME SUITABLE TO THE BUILDING OCCUPANT(S).

SECTION 16100 ELECTRICAL MATERIALS AND INSTALLATION

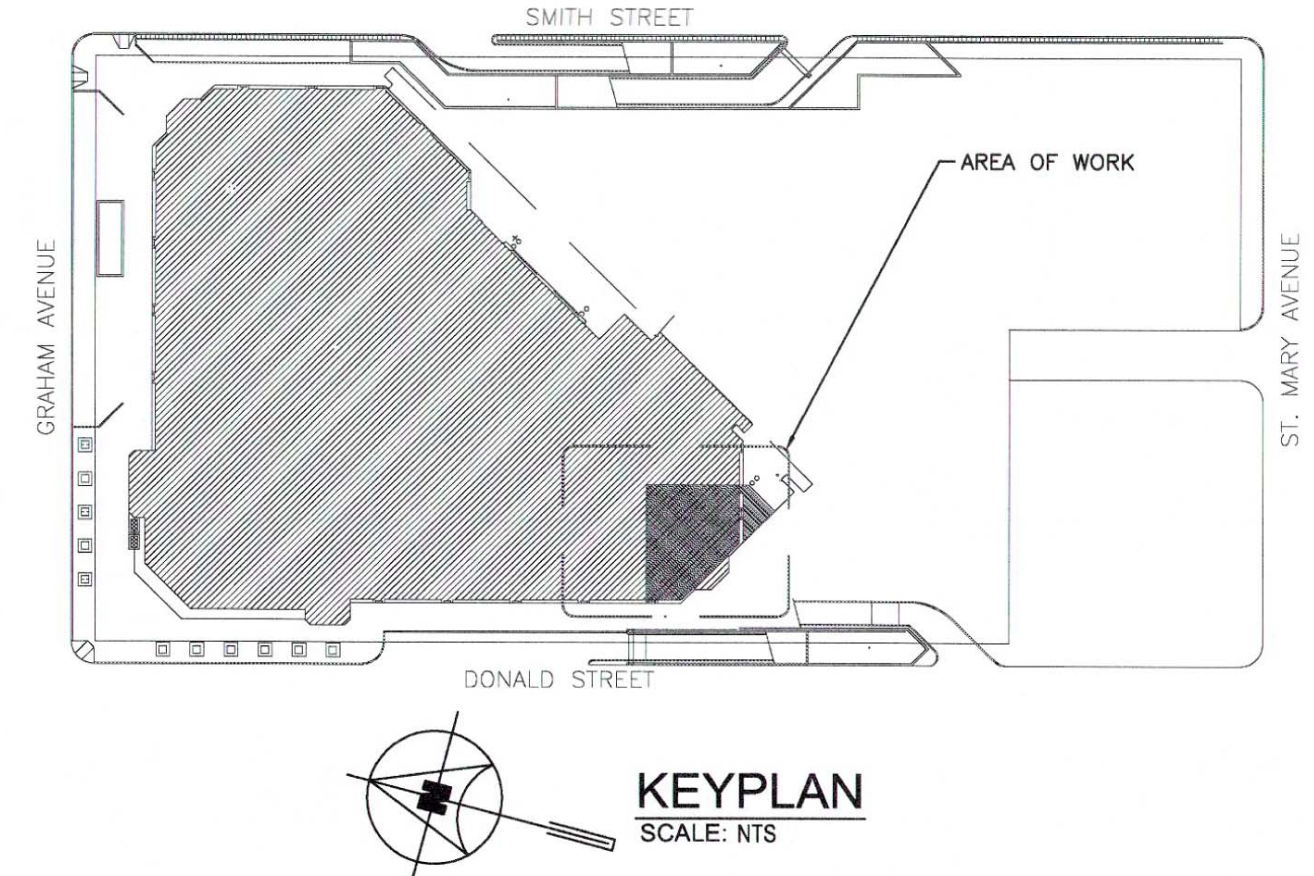
- 1 WIRING METHOD
 - 1 FOR GENERAL PURPOSE WIRING: RW90 CONDUCTORS IN EMT CONDUIT. USE AC90 FOR FIXTURE DROPS AND IN METAL STUD WALLS.
 - 2 RUN ALL CONDUIT AND CABLE CONCEALED, PARALLEL AND PERPENDICULAR TO BUILDING LINES, STAPLED AND/OR CLIPPED IN A NEAT WORKMANLIKE MANNER.
 - 3 ALL CONDUCTORS SHALL BE COPPER. MINIMUM CONDUCTOR SIZE SHALL BE #12 AWG EXCEPT AS NOTED.
- 2 GROUNDING
 - 1 THE ENTIRE INSTALLATION SHALL BE GROUNDED IN CONFORMANCE TO THE LATEST EDITION OF THE CANADIAN ELECTRICAL CODE.
- 3 BOXES
 - 1 OUTLET, JUNCTION AND SWITCH BOXES SHALL BE GALVANIZED STEEL AND SIZED ACCORDING TO THE ELECTRICAL CODE AND TO SUIT EACH APPLICATION.
 - 2 PROVIDE MOULDED BOX VAPOR BARRIER: FACTORY MOULDED POLYETHYLENE BOX FOR USE WITH RECESSED ELECTRIC BOXES IN EXTERIOR WALLS.
- 4 WIRING DEVICES
 - 1 PROVIDE WIRING DEVICES FOR ALL OUTLETS AS REQUIRED AND INDICATED. COLOUR AND MOUNTING TO MATCH EXISTING.
 - 2 STANDARD OF ACCEPTANCE FOR DEVICES SHALL BE AS FOLLOWS:
 - 1 NEMA 5-15R / IKA 120VAC RECEPTACLES SHALL BE U-GROUND PARALLEL SLOT SIDE WIRED AS FOLLOWS:
 - 1 GENERAL PURPOSE DUPLEX AND SIMPLEX TO BE SERIES HUBBELL #5262, ARROW HART #5262, BRYANT #5262, COE #4065 OR LEVITON #5262.
 - 2 PATIENT CARE AREAS TO BE HOSPITAL GRADE RECEPTACLES.
 - 3 COVERPLATES FOR DEVICES MATCH EXISTING.
- 5 LIGHTING SYSTEM - GENERAL
 - 1 PROVIDE FIXTURES EQUAL TO THOSE SPECIFIED WITH LAMPS, SUSPENSION HARDWARE, LENSES AND ALL OTHER ACCESSORIES REQUIRED TO COMPLETE THE INSTALLATION.
 - 2 FLUORESCENT FIXTURE BALLASTS SHALL BE T-8 ELECTRONIC TYPE. BALLAST MUST BE LISTED BY MANITOBA HYDRO AS ACCEPTABLE BY THEIR POWER SMART REBATE PROGRAM.
- 6 EMERGENCY LIGHTING SYSTEM
 - 1 CONNECT NEW FIXTURES TO EXISTING EMERGENCY POWER CIRCUIT SERVING AREA WITH CAPACITY.
- 7 POWER DISTRIBUTION SYSTEM
 - 1 SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH SECTION 16010.
 - 2 DRAWINGS TO INCLUDE ELECTRICAL DETAIL OF BRANCH BREAKER TYPE, QUANTITY AND AMPACITY.
 - 3 MULTI-POLE BREAKERS SHALL BE MADE OF ONE PIECE CONSTRUCTION WITH COMMON TRIP.
 - 4 PROVIDE TANDEM BREAKERS AS INDICATED IN THE PANEL SCHEDULE AND AS INDICATED ON THE DRAWING.
 - 5 ALL NEW BREAKERS SHALL MATCH PANEL VOLTAGE UNLESS INDICATED OTHERWISE. CIRCUIT BREAKERS SHALL BE THERMAL MAGNETIC TYPE.
 - 6 COMPLETE CIRCUIT DIRECTORY WITH TYPED/WITTEN LEGEND SHOWING LOCATION AND LOAD OF EACH CIRCUIT.
 - 7 ACCEPTABLE MANUFACTURERS: TO MATCH PANELBOARD (WESTINGHOUSE).
 - 8 WIRING IN PANELBOARDS SHALL BE NEAT AND SET IN AS IF LACED. ALL NEUTRAL CONDUCTORS SHALL BE IDENTIFIED IN THE PANEL WITH THEIR ASSOCIATED CIRCUIT NUMBERS BY MEANS OF BRADY MARKERS.
 - 9 INTERRUPTING CAPACITY OF NEW BREAKERS IN EXISTING PANELS SHALL MATCH EXISTING.
- 8 MOUNTING HEIGHTS
 - 1 MOUNTING HEIGHT IS CENTERLINE OF EQUIPMENT ABOVE FINISHED FLOOR. IF MOUNTING HEIGHT IS NOT INDICATED VERIFY BEFORE PROCEEDING WITH INSTALLATION. MOUNT SAME HEIGHT AS EXISTING IF DIFFERENT FROM THAT SHOWN HERE UNLESS INDICATED OTHERWISE ON DRAWING.
 - 2 MOUNTING HEIGHTS:
 - 1 MOUNTING HEIGHT OF EQUIPMENT IS FROM FINISHED FLOOR TO CENTRE LINE OF EQUIPMENT UNLESS SPECIFIED OR INDICATED OTHERWISE.
 - 2 IF MOUNTING HEIGHT OF EQUIPMENT IS NOT SPECIFIED OR INDICATED, VERIFY BEFORE PROCEEDING WITH INSTALLATION.
 - 3 INSTALL ELECTRICAL EQUIPMENT AT FOLLOWING HEIGHTS UNLESS INDICATED OTHERWISE.
 - 1 WALL RECEPTACLES:
 - 1 GENERAL: 400MM.
 - 2 FIRE ALARM MANUAL STATIONS: 1200MM.
 - 3 WALL MOUNTED FIRE ALARM BELLS AND SPEAKERS: WHERE CEILING HEIGHTS ALLOW TOP OF THE DEVICE SHALL NOT BE LESS THAN 2300MM ABOVE FINISHED FLOOR, AT LEAST 1500MM BELOW THE CEILING.
 - 4 FIRE ALARM STROBES: THE ENTIRE LENS SHALL NOT BE LESS THAN 2000MM AND NOT MORE THAN 2400MM ABOVE FINISHED FLOOR.
 - 5 HEIGHTS AS ABOVE OR AT BOTTOM OF NEAREST BLOCK OR BRICK COURSE EXCEPT WHERE REQUIRED TO COMPLY WITH MANITOBA BUILDING CODE, OTHER APPLICABLE CODES, AUTHORITIES HAVING JURISDICTION, ETC.
 - 6 HEIGHTS TO MATCH EXISTING WHERE APPLICABLE EXCEPT WHERE REQUIRED TO COMPLY WITH MANITOBA BUILDING CODE, OTHER APPLICABLE CODES, AUTHORITIES HAVING JURISDICTION, ETC.
 - 7 ALL CONTROLS FOR THE OPERATION OF BUILDING SERVICES OR SAFETY DEVICES INCLUDING ELECTRICAL SWITCHES, DIMMERS, THERMOSTATS, INTERCOM ACCESSORIES, DOOR SECURITY REQUEST TO EXIT PUSHBUTTONS, FIRE ALARM PULL STATIONS, ETC. THAT ARE INTENDED TO BE OPERATED BY THE OCCUPANT, MUST BE MOUNTED BETWEEN 400MM AND 1200MM ABOVE THE FINISHED FLOOR (TO COMPLY WITH THE MANITOBA BUILDING CODE FOR ACCESSIBILITY TO A PERSON IN A WHEELCHAIR).

- 9 MECHANICAL EQUIPMENT CONNECTIONS
 - 1 REFER TO MECHANICAL DRAWINGS FOR THE EXACT LOCATION OF MOTOR CONTROL DEVICES, AND OTHER MECHANICAL EQUIPMENT REQUIRING AN ELECTRICAL CONNECTION.
 - 2 OBTAIN FULL INFORMATION FROM DIV. 15 REGARDING WIRING, CONTROLS, OVERLOAD HEATERS, EQUIPMENT RATINGS AND OVERCURRENT PROTECTION. NOTIFY THE DIV. 15 SUBCONTRACTOR, AT ONCE, IF ANY INFORMATION PROVIDED IS INCORRECT OR UNSATISFACTORY.
 - 3 CO-ORDINATE CONTROL WIRING REQUIREMENTS WITH DIV. 15 AND PROVIDE ALL CONTROL WIRING AND CONNECTIONS AS REQUIRED TO MAKE THE CONTROL SYSTEMS OPERATE AS SPECIFIED.
- 10 CONDUITS AND CABLE
 - 1 DRAWINGS DO NOT INDICATE ALL CONDUIT AND CABLE RUNS. THOSE INDICATED ARE IN DIAGRAMMATIC FORM ONLY.
 - 2 MINIMUM CONDUIT SIZE SHALL BE 3/4" UNLESS INDICATED OTHERWISE.
 - 3 ALL CONDUITS SHALL HAVE A SEPARATE INSULATED GREEN GROUND CONDUCTOR.
- 11 CONDUIT AND CABLE IDENTIFICATION
 - 1 COLOUR CODE CONDUITS, BOXES AND METALLIC SHEATHED CABLE.
 - 2 COLOUR CODING TO MATCH EXISTING WHERE APPLICABLE.
 - 3 CONFIRM COLOUR CODING WITH OWNER AND CONTRACT ADMINISTRATOR PRIOR TO START OF WORK.
 - 4 CODE WITH PLASTIC TAPE OR PAINT AT POINTS WHERE CONDUIT OR VALE ENTERS WALL, CEILING OR FLOOR AND AT 15M INTERVALS.
 - 5 COLOURS: 25MM WIDE PRIME COLOUR AND 20MM WIDE AUXILIARY COLOUR.

PRIME	AUXILIARY
UP TO 250V (NORMAL POWER)	YELLOW
UP TO 600V (NORMAL POWER)	YELLOW & RED
UP TO 250V (EMERGENCY POWER)	YELLOW & RED
UP TO 600V (EMERGENCY POWER)	YELLOW & RED
VOICE/DATA	GREEN
OTHER COMMUNICATION SYSTEMS	GREEN
FIRE ALARM	RED
EMERGENCY VOICE	RED
OTHER SECURITY SYSTEMS	RED
CONTROL	BLUE
FIBRE OPTIC	ORANGE
 - 6 OTHER CONDUIT SYSTEMS AS DIRECTED ON SITE. ALL CONDUIT SYSTEMS SHALL BE IDENTIFIED.
 - 7 COLOR OUTLET BOX COVERS TO COLOR DESIGNATED AND SHOW CIRCUIT NUMBERS IN BLACK FELT MARKER ON INSIDE OF COVERS.
- 12 CONDUITS, FASTENINGS AND FITTINGS
 - 1 ONE HOLE STEEL STRAPS TO SECURE SURFACE CONDUITS 50MM AND SMALLER.
 - 2 FITTINGS FOR RACEWAYS: TO CSA C22.2 NO. 18
 - 3 FITTINGS: MANUFACTURER FOR USE WITH CONDUIT SPECIFIED COATING SAME AS CONDUIT.
 - 4 FACTORY "TELLS" WHERE 90° BENDS ARE REQUIRED FOR 25MM AND LARGER CONDUITS.
 - 5 STEEL SET SCREW CONNECTORS AND COUPLINGS. INSULATED THROAT LINERS ON CONNECTORS.
- 13 DISCONNECT SWITCHES
 - 1 FUSIBLE AND NON-FUSIBLE DISCONNECT SWITCH IN CSA ENCLOSURE.
 - 2 PROVISION FOR PADLOCKING "ON-OFF" SWITCH POSITION BY THREE LOCKS.
 - 3 MECHANICAL INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IS IN "ON" POSITION.
 - 4 QUICK-MAKE, QUICK-BREAK ACTION.
 - 5 "ON-OFF" SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER.
 - 6 INSTALL DISCONNECT SWITCHES AS INDICATED ON DRAWINGS.
 - 7 WEATHERPROOF WHERE REQUIRED.
- 14 FIRE ALARM
 - 1 NEW SMOKE DETECTORS AND OTHER EQUIPMENT SHALL MATCH EXISTING EQUIPMENT. THE INSTALLATION SHALL BE IN CONFORMANCE WITH CAN/ULC-5524-M, STANDARD FOR INSTALLATION OF FIRE ALARM SYSTEMS. PROVIDE A COMPLETE VERIFICATION REPORT FOR ZONES AFFECTED IN CONFORMANCE WITH CAN/ULC-5537. A MANITOBA FIRE ALARM TECHNICIAN "M" LICENSE IS REQUIRED TO PERFORM FIRE ALARM VERIFICATIONS.
- 15 EQUIPMENT IDENTIFICATION
 - 1 IDENTIFY ELECTRICAL EQUIPMENT WITH NAMEPLATES AND LABELS AS FOLLOWS:
 - 1 NAMEPLATES: LAMACOID 3MM THICK PLASTIC ENGRAVING SHEET, WHITE FACE WITH BLACK CORE (WHITE WITH BLACK LETTERS) LETTERING ACCURATELY ALIGNED AND ENGRAVED INTO CORE MECHANICALLY ATTACHED WITH SELF TAPPING SCREWS. LETTERS TO BE MINIMUM 5MM HIGH.
 - 2 WORDING ON NAMEPLATES AND LABELS TO BE APPROVED BY CONTRACT ADMINISTRATOR PRIOR TO MANUFACTURE.
 - 3 LOW FOR MINIMUM OF TWENTY-FIVE(25) LETTERS PER NAMEPLATE AND LABEL.
 - 4 NAMEPLATES FOR TERMINAL CABINETS, STARTERS AND CONTACTORS: INDICATE EQUIPMENT BEING CONTROLLED AND VOLTAGE.
 - 5 TRANSFORMERS: INDICATE CAPACITY, PRIMARY AND SECONDARY VOLTAGES.
 - 6 ROOM NAMES AND NUMBERS USED SHALL BE ACTUAL ROOM NAMES AND NUMBERS THAT WILL BE USED ON THE PROJECT. COORDINATE AND CONFIRM WITH TRADES INVOLVED.
 - 7 COORDINATE NAMES OF EQUIPMENT AND SYSTEMS WITH MECHANICAL SECTION TO ENSURE THAT IDENTICAL NAMES ARE USED.
 - 8 NAMEPLATES FOR CONTROL DEVICES: INDICATE EQUIPMENT CONTROLLED.
 - 9 ADJACENT TO EACH BREAKER IN CDP TYPE PANELBOARDS, PROVIDE AND MOUNT LAMACOID NAMEPLATES IDENTIFYING THE RESPECTIVE LOAD AND LOCATION.
 - 10 TO MATCH EXISTING WHERE APPLICABLE.
 - 12 ALL RECEPTACLES SHALL HAVE A LAMACOID ON WHICH THE PANEL AND CIRCUIT NUMBER FROM WHICH IT IS FED, IS INDICATED. THE IDENTIFICATION SHALL BE MECHANICALLY SECURED TO THE COVERPLATE ON THE APPROPRIATE OUTLET. PRESSURE INDENTED ADHESIVE STRIP NAMEPLATES ARE NOT ACCEPTABLE AND SHALL NOT BE USED.
 - 13 ALL RECEPTACLES FED FROM A UPS SHALL HAVE A "UPS" LAMACOID NEAR TOP OF COVER PLATE.
- 16 VOICE AND DATA COMMUNICATIONS PATHWAY
 - 1 LATEST EDITION OF THE FOLLOWING:
 - 1 CAN/CSA-T529 (TIA/EIA 568 B) (COMMERCIAL BUILDING TELECOMMUNICATION CABLING SYSTEMS).
 - 2 CAN/CSA-T528 (TIA/EIA 606A) (COMMERCIAL BUILDING TELECOMMUNICATION SYSTEMS ADMINISTRATION)
 - 3 CAN/CSA-T530 (TIA/EIA 569B) (COMMERCIAL BUILDING TELECOMMUNICATION PATHWAYS AND SPACES)
 - 4 CAN/CSA-T527 (TIA/EIA 607A) (COMMERCIAL BUILDING TELECOMMUNICATION GROUNDING AND BONDING)
 - 5 CAN/CSA-T606 (TIA/EIA 608A) (COMMERCIAL BUILDING TELECOMMUNICATION INFRASTRUCTURE)
 - 6 IEEE STD. 1100 (POWERING AND GROUNDING SENSITIVE ELECTRONIC EQUIPMENT, EMERALD BOOK.)
 - 7 EIA/TIA, IEEE, FCC STANDARDS (DATA SYSTEM PERFORMANCE STANDARDS).
 - 8 MANITOBA BUILDING CODES (FIRE RATINGS, WALL PENETRATION, ETC.)
 - 9 CAN/CSA C22.1 SECTION 60, LATEST EDITION.
- 17 CONTRACTOR
 - 1 ONLY EXPERIENCED DATA INSTALLATION CONTRACTORS SHALL BE CONSIDERED FOR THE WORK. CONTRACTORS MUST BE ABLE TO PROVIDE EVIDENCE OF HAVING PERFORMED WORK OF A SIMILAR TYPE AS SPECIFIED.
 - 2 CONTRACTOR SHALL OWN AND MAINTAIN TOOLS AND TEST EQUIPMENT NECESSARY FOR THE SUCCESSFUL INSTALLATION AND TESTING OF THE CAT 6 COMMUNICATIONS CABLING SYSTEM.
 - 3 ALL PERSONNEL EMPLOYED IN THE INSTALLATION OF THESE SYSTEMS SHALL BE ADEQUATELY TRAINED IN THE USE OF SUCH EQUIPMENT AND TESTERS.
- 18 SYSTEM TO INCLUDE:
 - 1 THE COMMUNICATIONS HORIZONTAL CABLING PATHWAY SHALL CONSIST OF AN OPEN CABLING HOOKS.
 - 2 EQUIPMENT RACKS (EXISTING)
 - 3 PATCH PANELS (EXISTING)
 - 4 COMMUNICATION OUTLETS
 - 5 PATCH CORDS
 - 6 HORIZONTAL AND VERTICAL CABLE MANAGEMENT
- 19 SUBMITTALS
 - 1 GROUNDING TERMINATION CONNECTORS.
 - 2 GROUNDING BUS BARS
 - 3 DATA EQUIPMENT INCLUDING:
 - 1 CABLING
 - 2 JACKS.
 - 3 PATCHPLATES.
 - 4 RACK CABLE MANAGEMENT
 - 5 OUTLET PLATES.
 - 6 PATCH AND LINE CORDS.
- 20 VOICE AND DATA COMMUNICATIONS PATHWAY
 - 1 EMT CONDUIT
 - 1 MINIMUM TRADE SIZE SHALL BE 19MM.
 - 2 THE USE OF 90 DEGREE CONDULETS IS NOT ALLOWED.
 - 2 ELECTRO-GALVANIZED OUTLET BOXES:
 - 1 FLUSH WALL MOUNTED ELECTRO-GALVANIZED STEEL DEVICE BOX 100MM SQUARE X 65MM DEEP.
 - 2 SINGLE OR TWO GANG RAISED PLASTER RINGS WITH SQUARED CORNERS AS REQUIRED.
 - 3 ACCEPTS STANDARD TYPE DUPLEX OUTLET.
 - 4 REFER TO DETAIL SHEETS FOR FACEPLATE CONFIGURATIONS.
 - 3 ALL COMMUNICATION PATHWAYS SHALL MAINTAIN THE FOLLOWING DISTANCES FROM THE EQUIPMENT LISTED:
 - 1 MOTORS OR TRANSFORMERS 4FT
 - 2 WIRE IN CONDUIT AND/OR CABLES >300V 3FT
 - 3 WIRE IN CONDUIT AND/OR CABLES <300V 12IN
 - 4 347V LIGHTING 3FT
 - 5 120V LIGHTING 12IN
 - 4 CONDUITS
 - 1 PROVIDE ONE 3/4" EMT CONDUIT FROM EXISTING DATA PATCH PANEL TO NEW POKE THROUGH. UTILIZE EXISTING CABLE DUSTS IF AVAILABLE.
 - 2 BOND ALL CONDUITS TO GROUND.

- 21 VOICE SYSTEM OFFER
 - 1 ALL WIRING FOR VOICE SYSTEM TO UTILIZE CAT 6 DATA CABLING FROM OUTLET LOCATION BACK TO EXISTING RACK MOUNT VOICE PATCH PANEL LABEL, TERMINATE AND TEST CABLE ON BOTH ENDS.
- 22 DATA SYSTEMS COPPER - CAT #6
 - 1 ALL WIRING COMPONENTS AND INSTALLATION PROCEDURES SHALL BE APPROVED, FOR AND CAPABLE OF, 100 OHM CABLE WHOSE TRANSMISSION CHARACTERISTICS ARE SPECIFIED UP TO 250 MHZ AS IDENTIFIED IN TIA/EIA STANDARD 568-B.2-1
 - 2 CABLE: UNSHIELDED TWISTED PAIRS. GENERALLY, THE U.T.P. MEDIA SPECIFICATIONS CONTAINED IN THIS SECTION REFLECT THE PHYSICAL CHARACTERISTICS CONSISTENT WITH THE UTP MEDIA, COMMONLY KNOWN AS CATEGORY 6.
 - 3 CONSTRUCTION: EIGHT SINGLE, SOLID CONDUCTORS, 23 GAUGE (AWG), 100% FLUORINATED ETHYLENE PROPYLENE (FEP) INSULATED, FORMED INTO 4 INDIVIDUALLY TWISTED PAIRS AND ENCLOSED BY AN OVERALL PLENUM-RATED JACKET (ETB). CABLE CONSTRUCTION TO BE DETERMINED BY THE MANUFACTURER TO ENSURE COMPLIANCE WITH THE CROSS-TALK REQUIREMENTS OF THE ABOVE STANDARD.
 - 4 POLARIZATION: GENERALLY ARRANGED IN COMPLIANCE WITH STANDARD CSA-T529A. EACH OF EIGHT (8) CONDUCTORS, WHEN USED IN CONJUNCTION WITH RJ45 MODULAR PLUGS, OR THEIR CORRESPONDING JACKS, SHALL BE ARRANGED IN ACCORDANCE WITH THE FOLLOWING TABLE:

PAIR ID	PIN ID	COLOUR CODE
1	5	WHITE/BLUE (T)
2	4	BLUE/WHITE (T)
3	3	WHITE/ORANGE (T)
4	6	ORANGE/WHITE (T)
5	2	WHITE/GREEN (T)
6	7	GREEN/WHITE (T)
7	1	WHITE/BROWN (T)
8	8	BROWN/WHITE (T)
 - 5 CABLE CHARACTERISTICS:
 - 1 ACR 24.5 DB AT 100 MHZ, 5.5 DB AT 250 MHZ.
 - 2 PROPAGATION DELAY 5.36 NS/M AT 250 MHZ, MAX.
 - 3 DELAY SKEW AS NS AT 100M MAX.
 - 6 PERFORMANCE: CATEGORY 6 CABLE PERFORMANCE IS INTENDED FOR HIGH SPEED LAN APPLICATIONS (>= 1 GBPS). CATEGORY 6 CABLES MEET THE ELECTRICAL AND CORRESPONDING DISTANCE REQUIREMENTS OF THE COMMERCIAL BUILDING STANDARD SPECIFICATION (CSA29M) FOR HORIZONTAL UTP CABLES. THIS SPECIFICATION PLACES LIMITS ON THE HORIZONTAL DISTANCES TO ASSURE MINIMUM BOUNDARIES OF PERFORMANCE. THE CABLE RUN FROM THE COMMUNICATIONS CLOSET TO THE WORK AREA OUTLET IS LIMITED TO 90 METRES. AN ADDITIONAL 3 METRES IS ALLOWED FROM THE OUTLET TO THE TERMINAL AND 6 METRES ALLOWANCE FOR PATCHING ON THE CABINET PATCH PANEL TO HUB EQUIPMENT.
 - 7 WIRE MANAGEMENT PANELS: PATCH PANEL ASSEMBLIES UTILIZING INSULATION DISPLACEMENT CONNECTION (IDC) TYPE TERMINALS WILL BE ARRANGED AT KEY CENTRAL LOCATIONS. THESE PANELS WILL BE GROUPED AND IDENTIFIED IN SUCH A MANNER AS TO PROVIDE THE CLIENT WITH THE GREATEST DEGREE OF FLEXIBILITY IN THE ORGANIZATION OF THE NETWORK FIELD.
 - 1 FLOOR MOUNTED RACK IS EXISTING
 - 8 MODULAR PATCH CORDS: (DATA ROOM RACK) FOUR TWISTED PAIR CATEGORY 6 TYPE STRANDED CABLE COMPLETE WITH RJ45 NON-KEYED MODULAR PLUGS. THE CONNECTION INDICATED UNDER POLARIZATION PREVIOUSLY SHOWN. LENGTH OF CORD - 2 METRES FOR WALL MOUNTED ENCLOSURES AND 3 METRES LONG FOR FLOOR MOUNTED RACKS. CORDS ARE REQUIRED TO BE EQUIPPED WITH STRAIN RELIEF BOOTS OVER THE JACKS. PROVIDE 10 SPARE 3M LONG PATCH CORDS. SPARE PATCH CORDS TO BE COILED UP IN ROOM.
 - 9 MODULAR LINE CORDS: (WORKSTATION) AS DETAILED ABOVE FOR PATCH CORDS.
 - 10 COMMUNICATIONS OUTLET ASSEMBLIES: OUTLET ASSEMBLIES AT EACH WORK STATION IDENTIFIED ON DRAWINGS SHALL CONTAIN MODULAR 8-WIRE JACK (RJ45 TYPE). THIS ASSEMBLY SHALL BE MOUNTED AS A WALL OUTLET COMPLETE WITH 2 DROPS PER SINGLE CABLE FACEPLATE ON 2 GANG BOX. THIS SHALL BE ACCEPTABLE WITH CABLE MANUFACTURER FOR A CERTIFIED CAT 6 SYSTEM. THIS ASSEMBLY WILL BE MOUNTED AS A VERTICAL FLUSH MOUNTED IN WALL OUTLET WITH THE ASSOCIATED WALL PLATE, WITH FACEPLATE COLOR SELECTED BY CONTRACT ADMINISTRATOR.
 - 11 CONNECTOR PERFORMANCE: ALL EQUIPMENT USED TO TERMINATE HORIZONTAL DATA WIRING IN DATA STATION FIELDS SHALL BE REQUIRED TO MATCH THE SAME TRANSMISSION PERFORMANCE CRITERIA SET FORTH FOR RJ45 JACK IN COMMUNICATION OUTLET ASSEMBLIES. THE SPECIFIC CRITERIA SHALL MEET CAT 6 PERFORMANCE REQUIREMENTS SET.
- 23 INSTALLATION
 - 1 ENSURE THAT ALL PLENUM CABLING IS KEPT CLEAR OF ALL POWER EQUIPMENT AND LIGHTING FIXTURES.
 - 1 INSTALLATION GUIDELINES
 - 2 TRANSFORMERS = > 2M
 - 3 POWER LINES (120V SYSTEMS) = > 300MM
 - 4 FLUORESCENT LIGHTING = > 300MM
 - 5 POWER LINES (600V SYSTEMS) = > 1M
 - 6 ELECTRICAL MOTORS = > 1M
 - 2 IDENTIFY ALL CABLES WITH NUMBERED MARKERS AT BOTH ENDS. TRANSFER IDENTITY NUMBER ON TO MARK-UP DRAWING FOR RECORD PURPOSES.
 - 3 ENSURE THAT ALL EQUIPMENT IS CONSTRUCTED TO THE STANDARDS SPECIFIED ABOVE. ALL CONNECTED CABLEING SYSTEMS TO BE OF ONE MANUFACTURER.
 - 4 CABLEING SHOULD BE INSTALLED OVER CORRIDOR AREAS AND/OR ALONG LINES PARALLEL TO BUILDING STRUCTURES. PENETRATIONS THROUGH WALL PARTITIONS SHOULD BE MADE THROUGH PRE-ESTABLISHED HORIZONTAL OPENINGS OR SLEEVES.
 - 5 CABLEING INSTALLED IN CEILING PLENUM OR CRAWL SPACES SHALL BE INSTALLED IN A CLIP WIREWAY (J-hook) AT 4"-0" CENTRES TO EFFECTIVELY SUPPORT ALL MULTI-CABLE HARNESSING.
 - 6 SUPPORT BY CABLE TIES TO EXISTING STRUCTURES WILL ONLY BE APPROVED BY WRITTEN CONSENT OF THE CONTRACT ADMINISTRATOR.
 - 7 CABLE SHOULD BE FREE FROM TENSION OVER THE ENTIRE LENGTH OF EACH RUN.
 - 8 CABLE INSTALLATION AND TERMINATION METHODS SHALL BE COMPLETED IN A MANNER THAT WILL NOT DEGRADE THE CABLE SPECIFICATION. ALL TERMINATIONS SHALL BE INSERTED BY THE USE OF THE PROPER TOOL. USE OF THE DUST CAP TO EFFECT INSERTION WILL NOT BE CONSIDERED ADEQUATE. BUNDLING, SUPPORTING, STRIPPING OF OUTER JACKET, AND RETENTION OF WIRING TWIST WILL BE SUBJECT TO THE FINAL APPROVAL OF THE CONTRACT ADMINISTRATOR.
 - 9 ALL CABLES SHALL BE LABELED GENERALLY AS INDICATED ON DRAWINGS AND SHALL ADHERE TO CSA-T528 STANDARD.
 - 10 CONDUIT SLEEVES SHALL EXTEND A MINIMUM OF 100MM ABOVE THE FINISHED FLOOR OR WALL.
 - 11 CONDUIT RUNS SHALL NOT CONTAIN MORE THAN TWO (2) 90 DEGREE BENDS BETWEEN PULL POINTS OR PULL BOXES.
 - 12 PULL BOXES SHALL BE USED FOR STRAIGHT THROUGH PULLS ONLY. 90 DEGREE TURNS IN PULL BOXES NOT ALLOWED.
 - 13 CONTINUOUS CONDUIT RUNS SHALL NOT EXCEED 100FT WITHOUT A PULL POINT OR PULL BOX.
 - 14 CONDUIT COUPLINGS AND CONNECTORS SHALL BE STEEL TYPE WITH AN INSULATED BUSHING.
 - 15 ALL CONDUITS SHALL BE LEFT WITH A NYLON PULL CORD WITH A MINIMUM TEST RATING OF 200LBS.
 - 16 ALL FIRE SEPARATION PENETRATIONS (WALL OR FLOOR) SHALL BE FIRE STOPPED IN COMPLIANCE WITH MANITOBA BUILDING CODE AND WFA REGULATIONS.
 - 17 ALL CONDUIT ENDS, INCLUDING VERTICAL STUBS IN WALL CAVITIES, SHALL BE FITTED WITH INSULATED GROMMETS.
 - 18 CONDUITS STUBBED UP FROM COMMUNICATIONS OUTLET SHALL BE ROUTED TO THE NEAREST POINT OF THE CABLE TRAY. CONDUITS SHALL TERMINATE ONTO THE CABLE TRAY WITH CONDUIT TO TRAY ADAPTORS.
 - 19 CONDUIT FILL SHALL BE AS PER CABLE MANUFACTURERS RECOMMENDATIONS, BUT SHALL IN NO CASE EXCEED THE MAXIMUM FILL ALLOWED BY CODE.
 - 20 WHERE THE USE OF CONCEALED OR SURFACE CONDUIT SHALL BE USED A MINIMUM BOX SIZE FOR DATA/VOICE TERMINATION SHALL BE 4" X 4" X 2-1/4" INCHES. COMPLETE WITH EITHER A SINGLE GANG OR DOUBLE GANG MUD-RING AS REQUIRED BY NUMBER OF DROPS SPECIFIED.
 - 21 WHERE INSTALLATION IS APPROVED IN A HOLLOW WALL CONSTRUCTION, MP1 OR MP2 PLATES SHALL BE USED TO ALLOW MAXIMUM CABLE SPACE IN WALL CAVITY.
 - 22 CABLES DROPPED IN WALL CAVITY SHALL HAVE INSULATED BUSHINGS FITTED TO THE TOP WALL PLATE.
 - 23 VERTICAL FACEPLATE INSTALLATION IS PREFERRED FOR VOICE/DATA USE.
 - 24 WHERE NUMBERS WARRANT, CENTRE HUNG CABLE TRAY SHALL BE INSTALLED TO SUPPORT MAJOR HARNESSING, PREFERABLY OVER CORRIDOR AREAS.
 - 25 DURING INSTALLATION DATA CABLE COILS SHALL NOT BE SUSPENDED FROM THE STRUCTURE BY NYLON TIES OR EQUIVALENT. PROPER SUPPORT OF COILS TO PREVENT DAMAGE IS ESSENTIAL.
 - 26 ONE SMALL LOOP OF CABLE SHALL BE ARRANGED IN THE CABLE BEFORE ENTERING THE WALL CAVITY. EXCESSIVE SLACK CABLE SHOULD BE AVOIDED AS THIS INCREASES RUN LENGTH.
 - 27 BUNDLE DATA CABLE IN TRANSITION AREAS BETWEEN CONDUIT AND TRAY RUNS. UTILIZE DATA GRADE VELCRO TIES FOR BUNDLING ONLY AND NOT TO SUPPORT WEIGHT.
 - 28 NO SPLICING, TAPPING OR BRIDGING DEVICES WILL BE USED BETWEEN SPECIFIED CONNECTING HARDWARE AND OUTLET ASSEMBLIES.
 - 29 TEST FOR CONTINUITY, PAIR PLACEMENT, PAIR REVERSAL AND INCORRECTLY TERMINATED CABLES. ALL TESTS IN ACCORDANCE WITH EIA/TIA 568B.
 - 30 TEST AND RECORD IN TABULAR FORM THE FOLLOWING FOR EACH OUTLET: ATTENUATION, CROSSTALK, RESISTIVE IMPEDANCE, LINK TEST ALL INDIVIDUAL CABLES IN COMPLIANCE WITH EIA/TIA 568B.
 - 31 TEST AND RECORD THE LENGTH OF ALL HORIZONTAL DATA FIELD WIRING FROM THE WIRE MANAGEMENT PANEL TO THE WORKSTATION OUTLET ASSEMBLY.
 - 32 SUPPLY CONTRACT ADMINISTRATOR WITH A TEST SUMMARY SHEET AND FULL TEST RESULTS ON COMPUTER DISK UPON COMPLETION OF PROJECT. DISK FORMAT SHOULD ALLOW CLIENT TO DOWNLOAD INDIVIDUAL TEST SHEETS TO VIEW AND PRINT. (MICROSOFT WORD) A COPY OF THE SUMMARY SHEET AND THE TEST DATA DISK SHOULD BE INCLUDED IN THE MAINTENANCE MANUALS PREPARED BY THE CONTRACTOR.
 - 33 AN EXPERIENCED DATA INSTALLER IN COMPLIANCE WITH THIS SPEC SHALL PERFORM THE ABOVE TESTING.
 - 34 THE INSTALLATION CONTRACTOR SHALL SUPPORT THE ABOVE SYSTEM FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE BY THE CONTRACT ADMINISTRATOR.



KEYPLAN
SCALE: NTS

2.	ISSUED FOR TENDER	TG	12.07.04
1.	ISSUED FOR 99% REVIEW	TG	12.06.25
NO.	REVISIONS	BY	TRM/DY

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PROJECT TITLE
**Southwest Entrance Development -
Millennium Library**

251 Donald Street, Winnipeg, MB

DRAWING TITLE
Electrical Specification

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12-175-01

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APEGM
Certificate of Authorization
SMS Engineering Ltd.
No. 166 Expiry: April 30, 2013

PROVINCE OF MANITOBA
REGISTERED PROFESSIONAL ENGINEER
HEWITT
July 4, 2012
Member # 24022

APPROVED	CHECKED	DRAWN BY
CJH	TG	JFB
SCALE	DATE	FILE NO.
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DRAWING NUMBER	REVISION NUMBER	
E4.0	2	
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