1.1 ELECTRICAL SPECIFICATIONS

1. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE, SUBMIT AND FACILITATE ALL ITEMS RELATED TO MANITOBA HYDRO POWER SMART

2. REFER TO ARCHITECTURAL SPECIFICATIONS AND OTHER GENERAL CONDITIONS.

3. PROVIDE FOR A COMPLETE AND WORKING INSTALLATION AS HEREIN SPECIFIED AND AS SHOWN ON THE DRAWINGS.

4. THE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CANADIAN ELECTRICAL CODE, PROVINCIAL AND MUNICIPAL CODES AND REGULATIONS.

5. OBTAIN ALL PERMITS, APPROVALS AND PAY ALL RELATED FEES REQUIRED FOR THIS INSTALLATION.

6. ALL EQUIPMENT SUPPLIED UNDER THIS CONTRACT SHALL BE NEW AND BE C.S.A. APPROVED.

7. COORDINATE ALL CONDUIT RUNS AS SPECIFIED OR AS PER CONTRACT ADMINISTRATOR BEFORE INSTALLATION BEGINS.

8. ARRANGE FOR, AND COORDINATE, ROUGH-IN AND FINAL INSPECTIONS WITH INSPECTION AUTHORITIES, CONTRACT ADMINISTRATOR.

9. VISIT EXISTING SITE WHERE SUCH EQUIPMENT IS PRESENTLY INSTALLED, AND/OR OBTAIN OUTLETS, WIRING AND RECEPTACLE CONFIGURATIONS FROM EQUIPMENT MANUFACTURERS, EXACT CONFIGURATIONS MAY DIFFER FROM THOSE SHOWN ON THE DRAWINGS. INCLUDE ALL COSTS TO PROVIDE NECESSARY OUTLETS WIRING AND RECEPTACLES.

1.2 EXAMINATION

.1 EXAMINE THE ARCHITECTURAL AND MECHANICAL DRAWINGS TO ENSURE THAT THE WORK UNDER THIS CONTRACT CAN BE SATISFACTORILY CARRIED OUT. REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR.

.2 THE CONTRACTOR SHALL EXAMINE THE SITE, LOCAL CONDITIONS AND CONSIDER HOW THEY MAY AFFECT THE PROJECT.

1.3 SUPERVISION

.1 SUPERVISE THE WORK AT ALL TIMES THROUGH A RESPONSIBLE AND COMPETENT JOURNEYMEN ELECTRICIAN / SUPERVISOR.

.2 FULL COOPERATION SHALL BE SHOWN WITH OTHER TRADES TO FACILITATE INSTALLATIONS AND TO AVOID DELAYS IN CARRYING OUT THE WORK.

1.4 ACCURACY OF DATA

.1 DRAWINGS ARE SCHEMATIC: EXACT LOCATIONS, DISTANCES, LEVELS AND OTHER DIMENSIONS SHALL BE GOVERNED BY THE BUILDING AS CONSTRUCTED.

.2 OUTLETS OR EQUIPMENT SHALL BE MOVED TO ANY POINT WITHIN A 10' RADIUS WHEN RELOCATION IS REQUESTED BY THE CONTRACT ADMINISTRATOR BEFORE THE WORK HAS BEEN SUBSTANTIALLY COMPLETED. WITHOUT ADDITIONAL COST.

.3 BRANCH CIRCUIT WIRING SHALL BE INSTALLED WITH CIRCUITS ARRANGED EXACTLY AS SHOWN ON THE DRAWINGS. CONDUIT AND CABLE RUNS MAY BE MODIFIED TO SUIT THE INSTALLATION.

1.5 APPROVAL OF MATERIAL

.1 REQUEST FOR APPROVAL OF MATERIAL AS EQUALS OR ALTERNATES TO THAT SPECIFIED SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR IN ACCORDANCE WITH B7.

1.6 SHOP DRAWINGS

.2 THE REVIEW OF THE SHOP DRAWINGS IS FOR THE SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH THE GENERAL DESIGN CONCEPT. THE REVIEW SHALL NOT MEAN APPROVAL OF THE DETAILED DESIGN INHERENT IN THE EQUIPMENT, THE RESPONSIBILITY FOR WHICH SHALL REMAIN WITH THE CONTRACTOR. THE REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO MEET THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL REMAIN RESPONSIBLE FOR CONFIRMING AND CORRELATING THE DIMENSIONS ON THE JOBSITE, AND FOR INFORMATION THAT PERTAINS TO THE FABRICATION PROCESS, CONSTRUCTION TECHNIQUES, AND INSTALLATION DETAILS, AND FOR COORDINATING ALL WORK OF THE

.1 PROVIDE SHOP DRAWINGS FOR REVIEW BY THE CONTRACT ADMINISTRATOR. THE SHOP DRAWINGS MUST BE ASSEMBLED INTO COMPLETE BROCHURES.

.3 FABRICATION OF EQUIPMENT SHALL NOT COMMENCE UNTIL SHOP DRAWINGS OF SUCH EQUIPMENT HAVE BEEN REVIEWED AND APPROVED BY THE CONTRACT ADMINISTRATOR. TWO SETS SHALL BE SUBMITTED WITH LOCAL INSPECTION DEPARTMENT APPROVAL WHERE REQUIRED.

.4 THE ELECTRICAL SUB-CONTRACTOR SHALL REVIEW ALL MECHANICAL SHOP DRAWINGS - REQUIRING ELECTRICAL CONNECTION - AND COORDINATE VOLTAGE AND SIZES WITH DIVISION 15 AND GENERAL CONTRACTOR.

1.7 AS-BUILT DRAWINGS

.1 KEEP A RECORD SET OF DRAWINGS ON-SITE AT ALL TIMES RECORDING ANY CHANGES THAT MAY OCCUR. SUBMIT THESE DRAWINGS TO THE CONTRACT ADMINISTRATOR UPON COMPLETION OF THE WORK. AS-BUILTS SHALL INCLUDE TAGGING EXISTING AND NEW CIRCUITS AND EQUIPMENT.

.2 SUBMIT A CERTIFICATE OF INSPECTION FROM THE LOCAL INSPECTION AUTHORITY UPON COMPLETION OF WORK.

.3 THE CONTRACT ADMINISTRATOR RESERVES THE RIGHT TO RECOMMEND A PORTION OF THE CONTRACT FUNDS BE WITHHELD PENDING SUBMISSION OF ACCEPTABLE ON-SITE REDLINE DRAWINGS.

.1 THE ELECTRICAL INSTALLATION SHALL BE COMPLETELY TESTED DEMONSTRATING THE EQUIPMENT AND SYSTEMS INSTALLED PERFORM IN THE MANNER

1.9 GUARANTEE

.1 THE SATISFACTORY OPERATION OF ALL WORK SHALL BE GUARANTEED FOR A PERIOD OF 12 CALENDAR MONTHS AFTER FINAL ACCEPTANCE OF THE

1.10 REQUEST FOR CHANGE

.1 ALL QUOTATIONS IN RESPONSE TO REQUEST FOR CHANGE SHALL BE SUBMITTED COMPLETE WITH AN ITEMIZED COST BREAKDOWN OF ALL MATERIALS AND LABOUR REQUIRED IN THE CHANGE.

.1 THE ENTIRE INSTALLATION SHALL BE GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF CANADIAN ELECTRICAL CODE AND AS SHOWN ON

1.12 WORKMANSHIP .1 INSTALL EQUIPMENT. CONDUIT AND CABLES IN A WORKMANLIKE MANNER TO PRESENT. A NEAT APPEARANCE TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR. INSTALL CONDUITS AND CABLE RUNS PARALLEL AND/OR PERPENDICULAR TO BUILDING GRID LINES & COLUMNS IN CEILING SPACES,

.2 INSTALL EQUIPMENT AND APPARATUS REQUIRING MAINTENANCE, ADJUSTMENT OR EVENTUAL REPLACEMENT WITH ADEQUATE CLEARANCES AND ACCESSIBILITY FOR SAME.

CHASES & BEHIND FURRING. IN AREAS WHERE SYSTEMS ARE TO BE EXPOSED, INSTALL NEATLY AND GROUP TO PRESENT A TIDY APPEARANCE.

.3 INCLUDE, IN THE WORK, ALL REQUIREMENTS SHOWN ON THE SHOP DRAWINGS OR MANUFACTURERS' INSTALLATION INSTRUCTIONS.

.4 REPLACE WORK UNSATISFACTORY TO THE CONTRACT ADMINISTRATOR WITHOUT EXTRA COST.

.5 USE OF CLIPS FOR SECURING AC90 TO CEILING SYSTEM IS PROHIBITED.

.6 ALL CONDUITS MUST BE CLIPPED TO STRUCTURAL CONCRETE BY MEANS OF SUITABLE ANCHORS OR SUPPORTED BY UNISTRUT HANGERS AS CLOSE TO UNDERSIDE AS POSSIBLE. TYE WRAPS FOR WIRE HANGING AND FASTENING IS NOT ACCEPTABLE. PERFORATED STRAPPING IS ALSO UNACCEPTABLE. ALL ELECTRICAL COMPONENTS MUST BE SUPPORTED INDEPENDENTLY.

.7 ALL ELECTRICAL SUPPORTS AND HANGER SHALL CONFORM TO LATEST EDITION OF CANADIAN ELECTRICAL CODE AND/OR MANUFACTURER'S INSTALLATION INSTRUCTIONS.

2.0 MATERIALS AND INSTALLATION

.1 OUTLET, JUNCTION AND SWITCH BOXES SHALL BE GALVANIZED PRESSED STEEL OF SIZE AND TYPE TO SUIT EACH INDIVIDUAL APPLICATION.

.2 COMMERCIAL DUTY DUPLEX RECEPTACLES, DATA FACEPLATES SHALL BE "DECORA" STYLE, WHITE & CSA APPROVED, C/W STAINLESS STEEL FACE PLATES MOUNTED 18" ABOVE FINISHED FLOOR OR OTHERWISE NOTED.

.3 LIGHT SWITCHES SHALL BE MOUNTED 42" ABOVE FINISHED FLOOR OR OTHERWISE NOTED.

.4 OUTLETS SHALL NOT BE LOCATED ANYWHERE ON THE EXTERIOR CURTAIN WALL. OUTLETS SHOWN SHALL BE MOUNTED ON THE NEAREST DIVIDING WALL 2' FROM OUTSIDE WALL, OR NEAREST FURRED OUT COLUMN.

.5 PROVIDE ALL REQUIRED ACCESS PANELS WITH SUITABLE FIRE RATINGS FOR THE WALL OR CEILING THEY ARE BEING INSTALLED IN.

.6 DO NOT INSTALL OUTLETS BACK-TO-BACK IN WALL; ALLOW MINIMUM 16" HORIZONTAL CLEARANCE BETWEEN BOXES. RECEPTACLES & DATA DEVICE BOXES ON SAME SIDE OF WALL SHALL BE 4" ON CENTER

2.2 WIRING METHODS & SUPPORTS

1 EXISTING WIRING INCLUDING INSULATION THAT IS FRAYED, CRACKED OR DEEM NOT TO CODE SHALL BE REPLACED TO MEET CODE.

.2 UNLESS OTHERWISE SHOWN ON THE DRAWINGS, ALL WIRE SHALL BE COPPER. MINIMUM #12 AWG WITH 90 DEGREES CELSIUS X-LINK INSULATION. WIRING TO BE INSTALLED IN CONDUIT (INCLUDING WIRING ON ROOF DECK FLUTES WHERE APPROVED)

.3 WIRING IN CONCRETE OR MASONRY CONSTRUCTION SHALL BE INSTALLED IN STEEL ELECTRICAL METALLIC TUBING (EMT). PROVIDE A SEPARATE GROUNDING CONDUCTOR IN EMT CONDUIT RUNS EMBEDDED IN CONCRETE SLABS. CONDUITS INSTALLED IN AREAS EXPOSED TO MOISTURE SHALL HAVE

.4 ALL WIRING IN FINISHED AREAS SHALL BE CONCEALED. ALL CONDUCTORS AND CONDUITS SHALL BE RUN PERPENDICULAR OR PARALLEL TO THE BUILDING

.5 CONDUIT AND WIRING SHALL BE GROUPED WHERE POSSIBLE AND CLIPPED IN A NEAT AND WORKMANLIKE MANNER.

.6 AC-90 CABLE TO BE USED FOR DROPS FROM CONDUIT SYSTEMS TO RECESSED LIGHTING FIXTURES IN ACCESSIBLE CEILINGS OR OUTLET BOXES IN STEEL STUD WALLS ONLY HOME RUNS SHALL BE IN CONDUIT. MAXIMUM RUN OF AC-90 IN ACCESSIBLE CEILING. SPACE SHALL BE 5'-0"

.7 EACH CIRCUIT FOR COMPUTER EQUIPMENT, PRINTERS AND COPIERS SHALL HAVE A SEPARATE NEUTRAL CONDUCTOR.

.8 PROVIDE ONE ISOLATED GROUND CONDUCTOR PER THREE 2 WIRE ISOLATED GROUND CIRCUITS.

.9 CONDUIT RUNS SHALL BE INSTALLED AND INSPECTED BEFORE AC-90 RUNS ARE INSTALLED TO ENSURE CONFORMANCE WITH ITEM .5 HEREIN.

.10 THREE WIRE AC-90 SHALL NOT BE USED FOR ISOLATED GROUND WIRING, UNLESS IT INCLUDES A GREEN INSULATED CONDUCTOR FOR THIS PURPOSE.

.11 ALL AC-90 USED FOR DROPS SHALL BE RUN TIGHT TO DECK AND FOLLOW LINES OF BEAMS AND BUILDING.

.12 ALL WIRING IN SERVICE AREAS TO BE IN SURFACE MOUNTED EMT. DO NOT RUN CONDUIT HORIZONTALLY ON WALLS, VERTICAL DROPS ONLY. .13 ALL BRANCH CIRCUIT WIRING AND CONDUIT SHALL BE INSTALLED TO MINIMIZE VOLTAGE DROP, INSTALL ADDITIONAL CONDUIT RUNS AS REQUIRED TO

.14 INSTALLATION IN RACEWAYS

.1 INSTALL WIRING AS FOLLOWS

. 2 ENSURE CONDUITS ARE DRY AND FREE OF DEBRIS BEFORE PULLING CABLES.

.3 COLOUR CODING AND IDENTIFICATION AS PER THE C.E.C.

TAKE THE MOST DIRECT AND SHORTEST ROUTE TO OUTLETS, LIGHT FIXTURES, ETC.

.4 WIRES IN OUTLET, JUNCTION AND SWITCH BOXES, NOT HAVING A CONNECTION WITHIN BOX SHALL NOT BE SPLICED, BUT SHALL CONTINUE UNBROKEN THROUGH THE BOX.

.5 BRANCH CIRCUITS EXCEEDING 68 FEET SHALL BE #10 AWG, BRANCH CIRCUITS EXCEEDING 35 METRES SHALL BE #8 AWG OR UNLESS OTHERWISE NOTED

.15 INSTALLATION OF SINGLE CONDUCTOR CABLES

.1 SINGLE CONDUCTOR CABLES SHALL BE INSTALLED ONE CABLE DIAMETER APART ON SUSPENDED CABLE TRAY OR CHANNEL SUPPORTS AND SHALL BE CLAMPED WITH ALUMINUM CABLE CLAMPS, CABLES SHALL BE TERMINATED USING NON-MAGNETIC CONNECTORS, CABLE ARMOR SHALL BE GROUNDED VIA AN ALUMINUM PLATE AT THE SUPPLY END AND ISOLATED VIA AN INSULATING PLATE, AT THE LOAD END OF THE CABLE, A #3/0 AWG BARE (UNLESS OTHERWISE NOTED) COPPER GROUND WIRE SHALL BE INSTALLED WITH EACH FEEDER, CABLE BENDING RADIUS SHALL BE AT LEAST TWELVE TIMES THE OVERALL CABLE DIAMETER AND BENDS SHALL NOT DAMAGE OR DISTORT THE OUTER SHEATH. .2 DO NOT INSTALL PVC JACKETED CABLES IN CIRCULATING AIR PLENUMS.

.3 SINGLE CONDUCTOR CABLES INSTALLED UNDERGROUND SHALL BE INSTALLED IN THE INSTALLATION CONFIGURATION OUTLINED IN APPENDIX B OF THE CANADIAN ELECTRICAL CODE TO PROVIDE THE ALLOWABLE AMPACITY REQUIRED FOR THE FEEDER.

.16 INSTALLATION OF FLEXIBLE ARMOURED CABLE

.1 TYPE AC90 ARMOURED CABLE (BX) SHALL BE USED FOR CONNECTIONS FROM CONDUIT SYSTEMS TO RECESSED LUMINARIES IN ACCESSIBLE CEILINGS, CABLE TO BE OF SUFFICIENT LENGTH TO ALLOW THE LIGHTING FIXTURE TO BE RELOCATED TO ANY LOCATION WITHIN A 6' RADIUS, CABLE SHALL BE CLAMPED BEFORE ENTERING THE LIGHTING FIXTURE AND SHALL BE CLIPPED BEFORE ENTERING THE CONDUIT SYSTEM JUNCTION BOX

.17 INSTALLATION IN EQUIPMENT .1 GROUP AND LACE-IN NEATLY WIRE AND CABLE INSTALLED IN SWITCHBOARDS, PANELBOARDS, CABINETS, WIRE WAYS AND OTHER SUCH

ENCLOSURES .2 TERMINATIONS

.3 TERMINATE WIRES AND CABLES WITH APPROPRIATE CONNECTORS IN AN APPROVED MANNER. .18 IDENTIFICATION

.19 SUPPORT PRODUCT

.1 WIRE IN CONDUIT #2 AWG AND SMALLER SHALL HAVE SOLID COLOURED INSULATION, COLOUR CODED AS PER CANADIAN ELECTRICAL

...2 WIRE IN CONDUIT 1/0 AWG AND LARGER AND SINGLE CONDUCTOR CABLES FOR NORMAL POWER FEEDERS SHALL BE IDENTIFIED AT EACH A DAY, 365 DAYS A YEAR, OUTLET BOX AND TERMINATION WITH A 6" BAND OF COLOURED VINYL TAPE OF THE APPROPRIATE COLOUR. EMERGENCY POWER FEEDERS 2.4 ACCEPTABLE MANUFACTURERS SHALL BE PROVIDED WITH AN ADDITIONAL 3-1/2" BAND OF RED VINYL TAPE INSTALLED ADJACENT TO THE 6" BAND OF THE COLOURED PHASE IDENTIFICATION TAPE, AS LISTED BELOW, NEUTRAL AND GROUND CONDUCTORS SHALL BE IDENTIFIED, PAINT OR OTHER MEANS OF .1 THE DISTRIBUTION SHALL BE AS BUILD BY J.R. STEPHENSON MFG. LTD COLOURING THE INSULATION SHALL NOT BE USED. .2 ANY REQUESTS FOR ALTERNATES SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR IN WRITING AT LEAST 10 DAYS .3 IDENTIFY CONTROL CONDUCTORS IN MOTOR CONTROL EQUIPMENT, CONTACTORS, ETC. WITH MYLAR/CLOTH WIRE MARKERS. PRIOR TO CLOSING OF THE BID. EACH ALTERNATE REQUEST MUST LIST DETAILS OF ALL COMPARABLE FEATURES AND ANY

1 SUPPORT CHANNELS

.2 U SHAPE, SIZE 41 X 41MM, 2.5MM THICK, SURFACE MOUNTED, SUSPENDED OR SET IN POURED CONCRETE WALLS AND CEILINGS OR AS

.3 MANUFACTURERS; B-LINE, BURNDY, ELECTROVERT, UNISTRUT, PILGRIM, PURSLEY.

.20 SUPPORT EXECUTION .1 INSTALLATION

.2SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.

.3 SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.

.4 SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.

.5 SECURE SURFACE MOUNTED EQUIPMENT WITH TWIST CLIP FASTENERS TO INVERTED T BAR CEILINGS, ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED REFORE INSTALLATION, PROVIDE ADDITIONAL SUPPORT AS .6 SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNED AS ACCESSORIES TO

BASIC CHANNEL MEMBERS. .7 FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.

.8 ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.

.9 TWO-HOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2". .10 BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.

11 SUSPENDED SUPPORT SYSTEMS

.12 SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS. .13 SUPPORT 2 OR MORE CABLES OR CONDUITS ON CHANNELS SUPPORTED BY 1/4" DIAMETER THREADED ROD HANGERS WHERE DIRECT

FASTENING TO BUILDING CONSTRUCTION IS IMPRACTICAL .14 FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60" OC SPACING.

.15 PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS

.16 ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL .17 DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.

.18 DO NOT USE SUPPORTS OR EQUIPMENT INSTALLED FOR OTHER TRADES FOR CONDUIT OR CABLE SUPPORT EXCEPT WITH PERMISSION OF OTHER TRADE AND APPROVAL OF CONTRACT ADMINISTRATOR.

.19 INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION RECOMMENDATIONS.

.20 THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

2.3 IDENTIFICATION OF EQUIPMENT AND WARNING SIGNS

.1 ALL EQUIPMENT SHALL BE IDENTIFIED WITH 3/8" X 1-1/2" (1/4" LETTERS) ENGRAVED LAMACOID NAMEPLATES INDICATING PANEL AND CIRCUIT NUMBER (A1). LAMACOIDS SHALL BE EITHER SCREWED OR RIVETED IN PLACE. WITH EXCEPTION TO RECEPTACLES AND LIGHTING SWITCHES, SELF ADHESIVE TYPE IS ACCEPTABLE.

.2 LAMACOIDS SHALL BE WHITE LETTERING ON RED FACE FOR EMERGENCY POWER CIRCUITS AND FIRE ALARM DEVICES.

.3 BLACK LETTERING ON WHITE FACE FOR NORMAL POWER DEVICES AND COMMUNICATION PANELS.

.4 PROVIDE 1" X 3" LAMACOIDS FOR EACH NEW MD, CDP & PANELBOARDS, INDICATING PANEL "FED TO", " FEED FROM" OR LABEL "SPARE" OR "SPACE" ON PANEL LIST FOR CIRCUITS.

.5 MANUFACTURER'S NAMEPLATES AND CSA LABELS SHALL BE VISIBLE AND LEGIBLE AFTER EQUIPMENT IS INSTALLED.

.6 PROVIDE WARNING SIGNS ON EQUIPMENT, AS REQUIRED, TO MEET THE REQUIREMENTS OF THE INSPECTION AUTHORITIES, INCLUDING INDICATION OF MULTIPLE POWER SOURCES.

2.4 LUMINAIRES (IF APPLICABLE)

1 SUPPLY AND INSTALL LUMINAIRES AND ASSOCIATE COMPONENTS, AS PER LUMINAIRE SCHEDULE TO OPERATE AS INTENDED WITH MANUFACTURES

.2 ALL LUMINAIRES SHALL BE 4000 K, UNLESS NOTED OTHERWISE.

.3 ALL SWITCHING SHALL BE RUN IN CONDUIT

2.5 CUTTING AND PATCHING

.1 ARRANGE AND PAY FOR ALL CUTTING AND PATCHING AS REQUIRED FOR THE ELECTRICAL INSTALLATION.

.2 PROVIDE & INSTALL APPROPRIATE FIRE STOP AT ALL FIRE WALL &/OR FLOOR PENETRATIONS. ACCEPTABLE MANUFACTURERS: HILTI, DOW CORNING FIRE-STOP SYSTEMS (ELASTA-SEAL) OR G.E. SILICONE.

.3 REFER TO MANUFACTURERS' SPECIFICATIONS FOR PRODUCT AND INSTALLATION DETAILS.

2.6 DEVICES

.1 COLORS OF RECEPTACLES, SWITCHES, AND OUTLETS SHALL BE BLACK, UNLESS NOTED OTHERWISE.

.2 SWITCHES SHALL BE "DECORA" STYLE, HUBBELL, ARROW HART, BRYANT, LEVITON, WOODHEAD, PASS & SEYMOUR, 15 AMPS, 125 / 347 VAC. MOUNT SWITCHES 42" ABOVE FINISH FLOOR, UNLESS OTHERWISE NOTED.

.3 ACCEPTABLE MANUFACTURERS FOR "DECORA" STYLE RECEPTACLES SHALL BE HUBBELL, ARROW HART, BRYANT, LEVITON, WOODHEAD, PASS & SEYMOUR. MOUNT RECEPTACLES 18" ABOVE FINISH FLOOR, UNLESS OTHERWISE NOTED.

.4 PROVIDE STAINLESS STEEL FACEPLATES FOR DEVICES. UPS POWERED RECEPTACLES SHALL HAVE RED FACEPLATES & LAMACOIDS WITH WHITE LETTERING ON RED FACE. LETTERING SIZE SAME AS EMERGENCY POWER ABOVE.

2.7 SERVICE ENTRANCE/TRANSFER DISTRIBUTION

GENERA

.1 FURNISH AND INSTALL PANELS WITH ARRANGEMENT AS SHOWN ON DRAWINGS. THE DISTRIBUTION SHALL BE INDOOR WITH THE FOLLOWING MAJOR COMPONENTS:

.4 MAIN BREAKERS 1.2 CODES AND STANDARDS

3 PANELBOARDS

ZZMDP \

.1 THE COMPONENTS AND ACCESSORIES SHALL CONFORM TO THE REQUIREMENTS OF:

.1 CSA C22.1 - CANADIAN ELECTRIC CODE

.5 INTERNATIONAL STANDARDS ORGANIZATION ISO 9001: 2000

.2 NFPA 110 - EMERGENCY AND STANDBY POWER SYSTEMS

.3 IEEE STANDARD 446 - IEEE RECOMMENDED PRACTICE FOR EMERGENCY AND STANDBY POWER SYSTEMS FOR COMMERCIAL AND INDUSTRIAL APPLICATIONS .4 CSA C22.2 NO. 29 ENCLOSED PANELS

PART 2 PRODUCTS

2.1 MAIN BREAKER

.1 THE MAIN BREAKER SHALL BE RATED AS SHOWN ON DRAWINGS.

.2 THE BREAKER SHALL BE SUITABLE FOR BOTTOM CABLE CONNECTION WITHOUT INVERTING THE BREAKER.

.1 RATED 1000A 120/2080V, 3-PHASE, 4WIRE .2 COPPER BUS

.3 MINIMUM 8 CIRCUITS WITH AT LEAST 5 - FUTURE SPACES FOR (1) 200A, (4)100A, 120/208V, 3-PHASE, 4WIRE. .4 THE MDP SHALL BE INSTALLED AS AN INTEGRAL PART OF THE SERVICE ENTRANCE PANELBOARD

2.3 SERVICE REPRESENTATION .1 THE MANUFACTURER SHALL MAINTAIN A WINNIPEG BASED SERVICE ORGANIZATION OF COMPANY-EMPLOYED PERSONNEL. THE SERVICE CENTER'S PERSONNEL MUST BE FACTORY TRAINED AND MUST BE READY TO PROVIDE ELECTRICAL SERVICE 24 HOURS

2.8 PANELBOARDS

.2 DRAWINGS SHALL INCLUDE ELECTRICAL DETAIL OF PANEL, BRANCH BREAKER TYPE, QUANTITY, AMPACITY AND ENCLOSURE DIMENSION.

1.3 PLANT ASSEMBLY

DEVIATIONS FROM THIS SPECIFICATION.

.1 INSTALL CIRCUIT BREAKERS IN PANELBOARDS BEFORE SHIPMENT. .2 IN ADDITION TO CSA REQUIREMENTS, MANUFACTURER'S NAMEPLATE SHALL SHOW FAULT CURRENT THAT PANEL, INCLUDING BREAKERS, HAS BEEN BUILT TO WITHSTAND.

1.4 PANELBOARDS

.1 PANELBOARDS: TO CSA C22.2 LATEST EDITION. .2 PANELBOARDS SHALL BE PRODUCT OF ONE MANUFACTURER THROUGHOUT PROJECT .3 EACH BREAKER SHALL BE IDENTIFIED BY PERMANENT NUMBER IDENTIFICATION AS TO CIRCUIT NUMBER.

.4 PANELBOARDS: MAINS, NUMBER OF CIRCUITS, AND NUMBER AND SIZE OF BRANCH CIRCUIT BREAKERS AS INDICATED. .5 TWO KEYS FOR EACH PANELBOARD AND KEY PANELBOARDS ALIKE.

.6 COPPER BUS WITH FULL SIZE NEUTRAL. .7 FLUSH OR SURFACE-MOUNTED TUBS AS SHOWN .8 FINISH TRIM AND DOOR BAKED GREY ENAMEL.

1.5 BREAKERS .1 BREAKERS TO TO CSA C22.2 LATEST EDITION.

.2 BREAKERS WITH THERMAL MAGNETIC TRIPPING IN PANELBOARDS, EXCEPT AS INDICATED OTHERWISE .3 MAIN BREAKER: MOUNTED ON TOP OR BOTTOM OF PANEL TO SUIT CABLE ENTRY .4 LOCK-ON DEVICES FOR 5% OF 15A BRANCH BREAKERS INSTALLED AS INDICATED. TURN OVER UNUSED LOCK-ON DEVICES TO THE CITY

1.6 EQUIPMENT IDENTIFICATION .1 SIZE 4 NAMEPLATE FOR EACH PANELBOARD AND MDP TO INDICATE PANEL DESIGNATION AND VOLTAGE. .2 SIZE 3 NAMEPLATE FOR EACH BREAKER IN MDP PANELBOARDS ENGRAVED TO INDICATE LOAD BEING SUPPLIED .3 COMPLETE CIRCUIT DIRECTORY WITH TYPEWRITTEN LEGEND SHOWING ROOM NUMBER AND LOAD OF EACH CIRCUIT.

1.7 MANUFACTURERS .1 ACCEPTABLE MANUFACTURERS: EATON, CGE, CUTLER-HAMMER, SCHNEIDER CANADA, SIEMENS OR JRS.

.3 MOUNT PANELBOARDS TO HEIGHT INDICATED IN THIS SPECIFICATION, UNLESS OTHERWISE INDICATED.

1.8 INSTALLATION .1 LOCATE PANELBOARDS AS INDICATED AND MOUNT SECURELY, PLUMB, TRUE AND SQUARE, TO ADJOINING SURFACES. .2 INSTALL SURFACE-MOUNTED PANELBOARDS ON U-CHANNELS. WHERE PRACTICAL, GROUP PANELBOARDS ON COMMON LENGTH OF U-CHANNEL.

.4 CONNECT /RE-CIRCUIT LOADS TO CIRCUITS AS INDICATED. .5 INSTALL SPARE CONDUITS FROM RECESSED PANELBOARDS IN ACCORDANCE WITH CEC. LATEST EDITION. .6 CONNECT ISOLATED GROUND BUS IN PANELBOARDS TO MAIN BUILDING GROUNDS SOURCE OR DISTRIBUTION SECONDARY NEUTRAL WITH #2/0

.7 MOUNT PANELBOARD SUCH THAT THE TOP IS 6'-0" FINISHED FLOOR.

TEMPERATURE COMPENSATION FOR 40°C (104°F) AMBIENT,

2 COMMON-TRIP BREAKERS WITH SINGLE HANDLE FOR MULTI-POLE APPLICATIONS.

.1 ACCEPTABLE MANUFACTURERS: EATON, CGE, CUTLER-HAMMER, SCHNEIDER CANADA, SEIMENS.

AWG. GREEN INSULATED GROUND WIRE. IN CONDUIT.

2.9 CIRCUIT BREAKERS .1 SUBMIT PRODUCT DATA IN ACCORDANCE WITH THIS SPECIFICATION .2 INCLUDE WITH REQUESTS FOR EQUAL, TIME-CURRENT CHARACTERISTICS CURVES FOR BREAKERS WITH AMPACITY OF 800A AND OVER, OR

WITH INTERRUPTING CAPACITY OF 18,000 SYMMETRICAL RMS AND OVER AT SYSTEM VOLTAGE. 1.3 BREAKERS - GENERAL ,1 BOLT-ON MOLDED CASE CIRCUIT BREAKER, QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH

.3 MAGNETIC INSTANTANEOUS TRIP ELEMENTS IN CIRCUIT BREAKERS, TO OPERATE ONLY WHEN THE VALUE OF CURRENT REACHES SETTING. TRIP SETTINGS ON BREAKERS WITH ADJUSTABLE TRIPS TO RANGE FROM 3-10 TIMES CURRENT RATING.

1.5 GROUND FAULT CIRCUIT INTERRUPTERS

1.7 INSTALLATION

..1 MOLDED CASE CIRCUIT BREAKER SHALL OPERATE AUTOMATICALLY BY MEANS OF THERMAL AND MAGNETIC TRIPPING DEVICES TO PROVIDE INVERSE TIME CURRENT TRIPPING UNDER OVERLOAD CONDITIONS AND INSTANTANEOUS MAGNETIC TRIPPING FOR SHORT CIRCUIT

.1 MOLDED CASE CIRCUIT BREAKERS AS ABOVE WITH INTEGRAL CLASS A GROUP 1 GROUND FAULT INTERRUPTER.

1 INSTALL CIRCUIT BREAKERS AS INDICATED

3.0 MOTOR AND CIRCUIT DISCONNECTS

1.1 SUBMIT PRODUCT DATA IN ACCORDANCE WITH THIS SPECIFICATION.

.1 FUSIBLE AND NON-FUSIBLE DISCONNECT SWITCHES IN EEMAC '1' ENCLOSURE FOR INTERIOR APPLICATIONS, AND EEMAC '3' ENCLOSURE FOR EXTERIOR APPLICATIONS, UNLESS OTHERWISE INDICATED.

.2 PROVISION FOR PADLOCKING IN "ON-OFF" POSITION. .3 MECHANICALLY INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IN "ON" POSITION.

.4 FUSE HOLDERS IN EACH SWITCH SUITABLE WITHOUT ADAPTORS, FOR TYPE OF FUSE, AS INDICATED.

HANDLE WITH SIDE AND BACK WIRING COMPLETE WITH PILOT LIGHT.

.6 "ON-OFF" SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER. .7 SINGLE-PHASE MOTOR DISCONNECT SWITCHES SHALL BE ONE OR TWO-POLE TOGGLE-TYPE, 20 AMP, 120/227V AC, BLACK

1.4 EQUIPMENT IDENTIFICATION

1.2 EQUIPMENT

.1 INDICATE NAME OF LOAD CONTROLLED ON SIZE 4 NAMEPLATE.

1.5 MANUFACTURERS

.5 QUICK-MAKE, QUICK-BREAK ACTION.

.1 ACCEPTABLE MANUFACTURERS: EATON, CGE, CUTLER-HAMMER, SQUARE D, SIEMENS.

1.6 INSTALLATION

.1 INSTALL MOTOR DISCONNECT SWITCHES WHERE INDICATED.

.2 INSTALL FUSED CIRCUIT DISCONNECT SWITCHES WHERE INDICATED OR WHERE REQUIRED BY THE INSPECTION AUTHORITIES AND/OR FOR EQUIPMENT SUPPLIED BY OTHER TRADES.

4.0 ELECTRICAL MODIFICATIONS

FOR SCENARIO WITH ELECTRICAL SERVICE UPGRADE TO 800A, 120/208V, 3PH., 4W FROM EXISTING ELECTRICAL SERVICE (400A, 120/208V,3RH., 4W):

1.1. PROVIDE COMPLETE SHORT CIRCUIT STUDY FOR NEW 800A. 120/208V.3PH.4W MAIN DISTRIBUTION.

1.2. PROVIDE NEW 800A-3P (100% RATED) MAIN BREAKER WITH RECOMMENDED LSI SETTINGS & ANY REQUIRE MODIFICATIONS. 1.3. REMOVE EXISTING RANELS "C1", "C2, "C3", "SUB-M", "SUB-J" & "Q" AS SHOWN ON SINGLE LIME DIAGRAM - EXISTING & RE-CIRCUIT TO AS SHOWN ON SINGLE LINE DIAGRAM - WITH GENSET.

TO SINGLE LINE DIAGRAM - WITH GENSET. 1.5. ENSURE ALL EQUIPMENT DESIGNATE AS "EXISTING TO REMAIN" OR "EXISTING TO BE RELOCATED" IS SUITABLE FOR ITS INTENDED RE-USE. INCLUDING PANELBOARDS AND CIRCUITS. REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE CLOSE OF BID OPPORTUNITY.

1.4. PROVIDE NEW PANELS "EP-A", "EP-B", NEW CIRCUIT BREAKERS, RE-FEED FEEDERS TO EXISTING RENAMED PANELS, REFER

5.0 CO-ORDINATION, SHORT CIRCUIT AND ARC FLASH HAZARD STUDY

1.1 PROVIDE CO-ORDINATION , SHORT CIRCUIT.AND ARC FLASH HAZARD STUDY OF ALL ELECTRICAL EQUIPMENT, STUDY SHALL BE PROVIDED BY J.R. STEPHENSON OR APPRØVED EQUAL WITH SEALED STAMP FROM A REGISTERED. PROFESSIONAL ENGINEER. STUDY TO INCLUDE:

1.1.1. EACH BREAKER OPERATING TIME CYCLES/TRIPPING TIMES.

1.1.6. RECOMMENDATIONS & SETTINGS OF DEVICES FOR REVIEW.

1.1.2. FINAL SELECTION OF TRIPPING DEVICES (FUSES SIZES, RELAYS, CT RATIOS) BASED ON STUDY RESULTS. 1.1.3. SYMMETRICAL & ASYMMETRICAL FAULT CURRENT CALCULATIONS FOR VERIFICATION OF SYSTEM PROTECTIVE ELEMENTS

1.1.4. SINGLE LINE DIAGRAM OF RESULTANT SHORT CIRCUIT VALUES. INDICATING DEVICE NUMBERS & EQUIPMENT RATINGS. 1.1.5. INSTALL ARC FLASH WARNING LABELS FROM STUDY RESULTS ON ALL ELECTRICAL DISTRIBUTION EQUIPMENT.

THE DATA CABLING CONTRACTOR SHALL PROVIDE REFERENCES OF SIMILAR PROJECTS

DATA CABLING SPECIFICATIONS

THE CONTRACTOR PERFORMING THE DATA CABLING INSTALLATION SHALL HAVE A STRUCTURED CABLING INDUSTRY AFFILIATION SUCH AS BICSI (BUILDING INDUSTRY CONSULTANTS INTERNATIONAL) MEMBERSHIP, RCDD (REGISTERED

COMMUNICATIONS DISTRIBUTOR DESIGNER) AND/OR A STRUCTURED CABLING VENDOR CERTIFICATION. ALL DATA CABLING INSTALLERS SHALL BE LICENSED AND INSURED.

1.1 . CATEGORY 6 CABLING SHALL BE CERTIFIED AND TESTED TO A MINIMUM OF 250 MHZ. THE CATEGORY 6 HORIZONTAL CABLING SHALL MEET THE MINIMUM TECHNICAL SPECIFICATIONS IN (TELECOMMUNICATIONS INDUSTRY

ASSOCIATION) TIA 568A. COLOUR TO BE BLUE AND PLENUM-RATED (FT6) OR (FT4) IN EMT.

1.3. NO INSTALLED CABLING MAY BE EXPOSED TO VIEW OUTSIDE OF THE WIRING ROOM. IT SHALL BE WITHIN A RACEWAY, CONDUIT, POWER POLE OR BEHIND SUSPENDED CEILING. 1.4. ALL HORIZONTAL CABLING RUNS SHALL RUN FROM EACH WORK AREA IN A STAR TOPOLOGY TO A WIRING ROOM OF AS SHOWN. INSTALL CONDUITS AND CABLE RUNS PARALLEL AND/OR PERPENDICULAR TO BUILDING GRID LINES &

COLUMNS IN CEILING SPACES. CHASES & BEHIND FURRING. THERE SHALL BE NO CONNECTOR IN THE CABLE RUN

BETWEEN THE OUTLET IN THE WORK AREA AND THE WIRING ROOM , EXCEPT FOR DATA ZONE BOXES. ALL CABLES

1.2. ALL DATA TELECOMMUNICATIONS JACKS AND CONNECTORS SHALL BE TIA 568A CERTIFIED. JACK AND CONNECTOR

SHALL SUPPORTED BY J-HOOKS OR SUPPORTED BY EXISTING WIRE TRAY. ALL EXPOSED CATEGORY 6 CABLING SHALL BE PLENUM-RATED (FT6).

1.5. NO CABLING RUN MAY EXCEED A LENGTH OF 90 METERS. 1.6. UNLESS OTHERWISE SPECIFIED, ALL CATEGORY CABLING SHALL BE TERMINATED IN THE WIRING ROOM EXISTING

RACK MOUNT PATCH PANELS (MAXIMUM OF 48 JACKS PER PANEL). SUPPLY PATCH PANELS, COMPONENTS, WIRE

1.7. ALL CATEGORY CABLING IN THE RACKS SHALL BE INSTALLED WITH SUFFICIENT AND APPROPRIATE MOUNTING CLIPS BRACKETS, AND CABLE MANAGEMENT TO PROVIDE A SECURE AND MAINTAINABLE SYSTEM. CARE SHALL BE TAKEN TO

MANAGEMENT, IF THERE IS INSUFFICIENT DATA PORTS IN EXISTING PATCH PANEL.

1.8. THE UTP CATEGORY CABLE TAIL SHALL BE TERMINATED WITH A MINIMUM OF 14" OF SLACK BUT NOT TO EXCEED 18". 1,9. AFTER DRESSING CABLE TO THE FINAL LOCATION, THE SHEATH SHALL BE REMOVED TO A POINT THAT ALLOWS THE CONDUCTORS TO BE SPLAYED AND TERMINATED IN A NEAT AND UNIFORM FASHION. EVERY EFFORT MUST BE MADE TO MAINTAIN SHEATH INTEGRITY BY REMOVING ONLY AS MUCH AS IS PRACTICAL TO ACCOMPLISH TERMINATION. CABLE PAIR TWIST SHALL BE MAINTAINED UP TO THE POINT OF TERMINATION, AS STATED IN TIA-568A. THE PAIRS IN A CABLE SHOULD NEVER BE UNTWISTED MORE THAN 0.5 INCH FROM THE POINT OF TERMINATION, UNDER NO

CIRCUMSTANCES SHALL CABLE PAIRS BE UNTWISTED OR OTHERWISE ALTERED PRIOR TO TERMINATION.

1.10. ANY UNUSED HORIZONTAL CABLING SHALL BE LABELED AND LOOSELY COILED.

ANEL MUST BE IN SEQUENTIAL ORDER.

1.11. CONTRACTOR SHALL SPECIFY CABLES PROPOSED FOR USE AND SUBMIT DOCUMENTATION PROVING THE PROPOSED CABLES MEET THESE SPECIFICATIONS.

Labell**i**ng

2.1. ALL CABLES (NEW & RELOCATED) SHALL BE LABELED WITH TAG WRAPS OR SOME OTHER PERMANENT MARKER CAPABLE OF WITHSTANDING MULTIPLE PULLING OF CABLE THROUGH RACEWAYS. LABELS SHALL BE LOCATED 18

2.2. ALL TERMINATIONS SHALL BE CLEARLY IDENTIFIED ON PATCH PANELS IN WIRING ROOM. ALL JACKS IN THE PATCH

2.3. AT EACH WORK AREA, FACEPLATE OUTLET SHALL BE PROFESSIONALLY PRINTED WITH JACK NUMBERS CLEARLY VISIBLE WITHOUT REMOVING OUTLET FACEPLATE. THE LABELING SHALL BE METAL OR VINYL ADHESIVE TAPE WITH EMBOSSED OR INDELIBLE PRINTING FOR EACH OUTLET

3.2. CONDUCT CABLE TESTING ONLY UPON COMPLETION OF INSTALLATION.

3.1. THE CONTRACTOR SHALL VISUALLY INSPECT ALL CABLES, CABLE REELS, AND SHIPPING CARTONS TO DETECT CABLE DAMAGE INCURRED DURING SHIPPING AND TRANSPORT. VISIBLY DAMAGED ITEMS SHALL NOT BE INSTALLED.

3.3. A MINIMUM OF A LEVEL II-E FIELD TESTER SHALL BE USED TO VERIFY CABLING PERFORMANCE 3.4. IN ADDITION TO HARD COPY TEST RESULTS, ACCEPTABLE ELECTRONIC FORMAT FOR TEST RESULTS ARE MICROSOFT

3.5. THE CONTRACTOR SHALL DESCRIBE IN DETAIL ITS PROPOSED TEST PLAN TO DETECT ANY DEFECTIVE COMPONENTS

AND TO DEMONSTRATE THAT THE INSTALLATION COMPLIES WITH THE SPECIFICATION.

RECORD DRAWINGS

EXCEL FOR EACH LINK

FIELD TEST QUALITY

4.1. THE CONTRACTOR SHALL KEEP A RECORD SET OF DRAWINGS ON THE SITE AT ALL TIMES RECORDING ALL CHANGES THAT MAY OCCUR. AS-BUILT DRAWINGS ARE TO BE SUBMITTED WITH CONTRACTOR'S NAME, SIGNATURE AND DATE

ISSUED FOR ADDENDUM 3. DELETED 2.7.1.1.1.1, 2.7.1.1.1.2, 4.0 & DTA ISSUED FOR CONSTRUCTION 000 ISSUED FOR CLASS 3 ESTIMATE DTA REVISION/DESCRIPTION

DESIGNED



DEVELOPMENT DEPARTMENT MUNICIPAL ACCOMMODATIONS DIVISION 3-65 GARRY STREET, R3C 4K4

INTERIOR RENOVATIONS

ELECTRICAL

DRAWING SHEET SIZE: A1 (841mm x 594mm) PLOT 1:1

APPROVAL

PROJECT WINNIPEG FIRE PARAMEDIC SERVICES

65 ELLEN STREET BID OPP: SHEET TITLE

THE CITY OF WINNIPEG PLANNING, PROPERTY AND

FIRE STATION #1

GENERAL NOTES:

REFER TO DRAWING E1