INSTALLATION OF EQUIPMENT MUST CONFORM TO THE ICC STANDARDS OF THE INTERNATIONAL MECHANICAL CODE, THE NATIONAL BUILDING CODE, INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS STANDARD, NFPA 90A, ASHRAE, CSA & LOCAL BUILDING, PLUMBING & WASTE WATER CODES. ALL APPLIANCES MUST BE ELECTRICALLY GROUNDED IN ACCORDANCE WITH LOCAL CODES & THE LATEST CANADIAN ELECTRICAL CODE.

REMOVING & INSTALLATION OF ROOF CONDUITS. ROOF EQUIPMENT & OTHER ROOF COMPONENTS SHALL BE COORDINATED WITH THE ROOFING TRADE TO MINIMIZE DOWN TIME & POSSIBLE WEATHER WORKING CONDITIONS.

## 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, STRUCTURAL, MECHANICAL 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 EXAMINE THE ARCHITECTURAL, STRUCTURAL 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 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, CIRCUITS 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 REQUEST FOR APPROVAL OF MATERIAL AS EQUALS OR ALTERNATES TO THAT SPECIFIED SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR IN ACCORDANCE WITH B6.

### 1.6 SHOP DRAWINGS

.1 PROVIDE A MINIMUM OF THREE (3) COPIES OF SHOP DRAWINGS FOR REVIEW BY THE CONTRACT ADMINISTRATOR. THE SHOP DRAWINGS MUST BE ASSEMBLED INTO COMPLETE BROCHURES, WITH NO LOOSE SHEETS. UNASSEMBLED SUBMISSIONS WILL BE RETURNED AS INCOMPLETE.

.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

.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

### 1.7 AS-BUILT DRAWINGS

ACCEPTABLE AS-BUILT DRAWINGS.

VOLTAGE AND SIZES WITH DIVISION 15 AND GENERAL CONTRACTOR.

.1 KEEP A RECORD SET OF DRAWINGS ON THE 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 AND INCLUDE IN "AS-BUILT" DRAWINGS. .3 THE CONTRACT ADMINISTRATOR RESERVES THE RIGHT TO RECOMMEND A PORTION OF THE CONTRACT FUNDS BE WITHHELD PENDING SUBMISSION OF

# 1.8 TESTING

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.

## 1.11 GROUNDING

DRAWINGS.

.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 CONDUIT AND CABLE RUNS PARALLEL AND PERPENDICULAR IN CHASES, BEHIND FURRING OR ABOVE CEILINGS. IN AREAS WHERE SYSTEMS ARE TO BE EXPOSED, INSTALL NEATLY AND GROUP TO PRESENT A TIDY APPEARANCE.

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

.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 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, UNLESS OTHERWISE SPECIFIED.

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

### 2.2 WIRING METHODS

.1 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 STEEL ELECTRICAL METALLIC TUBING (EMT) CONDUIT (INCLUDING WIRING ON ROOF DECK).

.2 WIRING IN CONCRETE OR MASONRY CONSTRUCTION SHALL BE INSTALLED IN EMT . PROVIDE A SEPARATE GROUNDING CONDUCTOR IN EMT CONDUIT RUNS EMBEDDED IN CONCRETE SLABS. CONDUITS INSTALLED IN AREAS EXPOSED TO MOISTURE SHALL HAVE WATERTIGHT FITTINGS.

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

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

.5 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". .

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

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

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

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

.10 ALL WIRING IN SERVICE AREAS TO BE IN SURFACE MOUNTED EMT. DO NOT RUN CONDUIT HORIZONTALLY ON WALLS, VERTICAL DROPS ONLY.

### 2.3 IDENTIFICATION OF EQUIPMENT

.1 ALL EQUIPMENT SHALL BE IDENTIFIED WITH 3/8" X 1-1/2" (1/8" LETTERS) ENGRAVED LAMACOID NAMEPLATES INDICATING PANEL AND CIRCUIT NUMBER OR FIRE ALARM HORN DESIGNATION. LAMACOIDS SHALL BE EITHER SCREWED OR RIVETED IN PLACE. WITH EXCEPTION TO RECEPTACLES AND LIGHTING SWITCHES, SELF ADHESIVE TYPE IS ACCEPTABLE. LAMACOIDS SHALL BE WHITE LETTERING ON RED FACE FOR EMERGENCY AND FIRE ALARM DEVICES AND WHITE LETTERING ON BLACK FACE TO NORMAL POWER DEVICES AND

.2 PROVIDE 1" X 3" LAMACOIDS FOR EACH NEW CDP BREAKER, INDICATING PANEL OR FEED BEING FED.

.1 SUPPLY AND INSTALL FLUORESCENT LUMINARIES COMPLETE WITH ELECTRONIC BALLASTS, AND LAMPS, AS PER LUMINAIRE SCHEDULE.

.2 ALL FLUORESCENT LAMPS SHALL BE 3500 K AND 82 CRI MINIMUM, 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.

.1 GENERAL ARRANGEMENT AND SIZE OF COMPONENTS SHALL BE AS SHOWN ON THE DRAWINGS.

.2 ALL DISTRIBUTION EQUIPMENT IS TO BE COMPLETE WITH LOCKING DOOR AND SPRINKLER HOODS.

# 2.7 DEVICES

1 COLORS OF RECEPTACLES, SWITCHES & OUTLETS SHALL BE WHITE , UNLESS NOTED OTHERWISE. PROVIDE STAINLESS STEEL COVER PLATES

.2 SWITCHES SHALL BE HUBBELL, ARROW HART, BRYANT, LEVITON, WOODHEAD, PASS & SEYMOUR, 15 AMPS, 120 VAC. MOUNT SWITCHES 36" ABOVE FINISH FLOOR, UNLESS OTHERWISE NOTED, OCCUPANCY SENSOR SWITCHES SHALL BE MOUNTED 47" ABOVE FINISH FLOOR,

.3 ACCEPTABLE MANUFACTURERS FOR RECEPTACLES SHALL BE HUBBELL, ARROW HART, BRYANT, LEVITON, WOODHEAD, PASS & SEYMOUR. CATALOGUE NO.5252 FOR ALL MANUFACTURERS. ISOLATED GROUND RECEPTACLES TO BE ORANGE FACE. MOUNT RECEPTACLES 18" ABOVE FINISH FLOOR, UNLESS OTHERWISE NOTED.

.4 PROVIDE STAINLESS STEEL COVER PLATES FOR RECESSED DEVICES.

# 2.8 EMERGENCY AND EXIT LIGHTING

1 EMERGENCY LIGHTING SHALL BE CONNECTED TO EXISTING PANEL CIRCUIT(S).

.2 NEW EXIT LIGHT FIXTURES SHALL BE LOW WATTAGE, LED TYPE, WHITE, STEEL, SEE LUMINAIRE SCHEDULE. UNITS TO BE ONE OR TWO SIDED AS INDICATED UNITS TO BE PROVIDED WITH FULL PANEL (HIGH BRIGHTNESS) LED'S, WITH MINIMUM 100,000 HOUR LIFE RATING, AS SHOWN ON LUMINAIRE SCHEDULE.. PROVIDE AC AND DC POWER.

.3 WIRING SHALL BE MINIMUM #12 AWG. PROVIDE #10 AWG WHERE REQUIRED TO ATTAIN 2% (OR LESS) VOLTAGE DROP. UNLESS OTHERWISE NOTED. ALL WIRING IN EMT.

.4 ALL EXIT SIGNS TO BE CSA C860 APPROVED.

## 2.9 SECURITY CONDUIT

.1 SECURITY CONDUIT SHALL BE COMPLETELY INDEPENDENT FROM OTHER CONDUIT.

# 2.10 FIRE ALARM SYSTEM

.1 ALL FIRE ALARM WIRING, INCLUDING WIRING TO STEEL STUD PARTITIONS, SHALL BE IN EMT CONDUIT.

.2 ALL WORK REGARDING FIRE ALARM SYSTEM WILL REQUIRE A ULC APPROVED FIRE ALARM VERIFICATION. INCLUDE ALL COSTS FOR SAME IN CONTRACT.

.3 THE VERIFICATION INSPECTION REPORT SHALL ACCOMPANY THE "AS-BUILT" DRAWINGS.

.4 TEST THE COMPLETE SYSTEMS IN THE PRESENCE OF THE CONTRACT ADMINISTRATOR AND SUBMIT TEST SHEET BEFORE REQUESTING FIRE INSPECTION.

.5 MAKE ALL PROVISIONS TO WIRE AND CONNECT FIRE ALARM SUPPRESION CONTROL PANEL. COORDINATE WITH SYSTEMS INSTALLER.

.6 PROVIDE LABELS ON FIRE ALARM COMPONENTS AND PANEL PER CITY OF WINNIPEG FIRE DEPT. REQUIREMENTS.

## CATEGORY 5E DATA CABLING SPECIFICATIONS

### CONTRACTOR QUALIFICATIONS

THE CONTRACTOR PERFORMING THE DATA CABLING INSTALLATION SHALL HAVE A STRUCTURED CABLING INDUSTRY AFFLIATION 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.

THE DATA CABLING CONTRACTOR SHALL PROVIDE REFERENCES OF SIMILAR PROJECTS.

### HORIZONTAL CABLING

1.1 CATEGORY 5E CABLING SHALL BE CERTIFIED AND TESTED TO A MINIMUM OF 100 MHZ. THE CATEGORY 5E HORIZONTAL CABLING SHALL MEET THE MINIMUM TECHNICAL SPECIFICATIONS IN (TELECOMMUNICATIONS INDUSTRY ASSOCIATION) TIA 568A. COLOUR TO BE BLUE.

1.2 ALL DATA TELECOMMUNICATIONS JACKS SHALL BE OF CATEGORY 5E CONNECTORS AND SHALL BE TIA CERTIFIED CATEGORY 5E. COLOUR TO BE BLUE.

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 CEILING. ALL MAIN FLOOR DATA CABLING & DEVICE BOXES SHALL BE OUT OF VIEW, IN WALLS OR FLOOR PEDESTALS AS SHOWN, NO CONDUITS OR RACEWAYS. EXCEPT WHERE MOUNTED BEHIND CIRCULATION DESK OR COUNTERS OR OTHERWISE SPECIFIED.

1.4 ALL HORIZONTAL CABLING RUNS IN CRAWLSPACES & BASEMENT SHALL RUN FROM EACH WORK AREA IN A STAR TOPOLOGY TO A WIRING ROOM OR AS SHOWN. THERE SHALL BE NO CONNECTOR IN THE CABLE RUN BETWEEN THE OUTLET IN THE WORK AREA AND THE WIRING ROOM. ALL CABLES SHALL SUPPORTED BY J-HOOKS OR WIRE TRAY. ALL EXPOSED CATEGORY 5E CABLING SHALL BE PLENUM-RATED.

1.5 NO CABLING RUN MAY EXCEED A LENGTH OF 90 METERS.

1.6 ALL CATEGORY 5E CABLING SHALL BE TERMINATED IN THE WIRING CLOSET ON RACK MOUNT CATEGORY 5E PATCH PANELS (MAXIMUM OF 48 JACKS PER PANEL). SUPPLY PATCH PANELS. COMPONENTS, WIRE MANAGEMENT, IF THERE IS INSUFFICIENT DATA PORTS IN EXISTING PATCH PANEL. SUPPLY & INSTALL COMPLETE DATA CABLING FROM PATCH PANEL TO ORIGINAL SOURCE IN BUILDING.

1.7 THE CATEGORY 5E 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 NOT CAUSE THE CABLES TO BE OVERLY CRIMPED.

1.8 THE UTP CATEGORY 5E 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.

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

FROM THE WORK AREA END.

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 0.5 METER

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

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.

2.4 THE ALPHA-NUMERIC NUMBERING SCHEME IS AS SHOWN:

XXX-YYY

FXAMPLE:

XXX ROOM NUMBER ON FLOOR

YYY WORKSTATION JACK NUMBER

CIRCULATION, ROOM 1-04, 1st DATA JACK; 104-001

# FIELD TEST QUALITY

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

3.2 CONDUCT CABLE TESTING ONLY UPON COMPLETION OF INSTALLATION.

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 EXCEL FOR EACH LINK,

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

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 OF AS-BUILT.

### SEQUENCE OF OPERATION

THE EQUIPMENT MENTIONED SHALL BE CONNECTED TO THE EXISTING JOHNSON METASYS SYSTEM (N2 DEVICES COMMUNICATING TO CITY HALL (510 MAIN STREET, ADMINISTRATION BUILDING) OVER ETHERNET IP2) FOR REMOTE NOTES:

SEE NOTES ON SHEET E1

EXISTING BOILER IS CURRENTLY NOT CONTROLLED VIA METASYS. THEREFORE, SUPPLY & INSTALL BOILER CONTROLS TO METASYS. INTERLOCK BOILER WITH RTU-1 TO NOT OPERATE IN COOLING MODE WHEN THE BOILER IS OPERATING.

SUPPLY & INSTALL AN NAE CONTROLLER (LOCATION TO BE DETERMINED) TO COMMUNICATE WITH BOTH THE N2 DEVICES & BACnet DEVICES FROM THE NEW RTU-1, CU-1 & CU-2, COORDINATE WITH CITY OF WINNIPEG, BUILDING SERVICES MAINTENANCE BRANCH, CALL 204-986-2351.

PROVIDE A COMPLETE SYSTEM COMMISSIONING WITH THE RTU-1, CU-1, CU-2 & BOILER SEQUENCED TO RUN TROUBLE-FREE IN HEATING, VENTILATION & AIR-CONDITIONING AS PER SEQUENCE OF OPERATION INDICATED BELOW TO ACCOMMODATE NORMAL & FAILURE MODES OF OPERATION.

### 1.0 PACKAGED ROOF TOP UNIT (RTU-1)

THE PACKAGED ROOF TOP UNIT (RTU-1) SHALL PROVIDE A SINGLE -ZONE SYSTEM TO HEAT, VENTILATE & AIR-CONDITION THE MAIN FLOOR AND MEZZANINE. THE AAON MINI CONTROLLER WITH SPACE TEMPERATURE CONTROL SHALL BE CONNECTED TO THE METASYS SYSTEM AS MENTIONED ABOVE TO PROVIDE REMOTE MONITORING & CONTROL & INTERLOCKED TO THE EXISTING FIRE ALARM SYSTEM TO SHUT DOWN IN THE EVENT OF A FIRE ALARM. THERE IS AN EXISTING ROOF TOP FIRE ALARM SHUT DOWN PANEL IN THE BASEMENT ELECTRICAL ROOM. REWORK PANEL TO ACCOMMODATE NEW RTU-1.

### 1.1 HEATING OPERATION

WHEN THE SPACE TEMPERATURE DROPS BELOW THE SETPOINT, HEATING IS ACTIVATED. IF THE SPACE TEMPERATURE STILL REMAINS BELOW THE SPACE TEMPERATURE SETPOINT & HEATING DELAY TIMES OUT, HEATING IS MODULATED TO ACHIEVE THE SPACE TEMPERATURE SETPOINT VIA THE MODULATING BURNER CONTROL & SUPPLY AIR TEMPERATURE

SUPPLY FAN OPERATION IS SELECTABLE BETWEEN "AUTO", "HEAT", "COOL" & "ON". IN "AUTO" MODE, HEATING/COOLING OPERATION SHALL CYCLE THE SUPPLY FAN. IN "HEAT" OR "COOL" OPERATIONS SHALL CYCLE THE SUPPLY FAN IN "ON" MODE THE SUPPLY FAN OPERATES CONTINUOUSLY.

1.4 ECONOMIZER

WHEN THE SPACE TEMPERATURE IS ABOVE THE SPACE TEMPERATURE SETPOINT, THE VARIABLE CAPACITY SCROLL COMPRESSOR IS ACTIVATED TO MAINTAIN THE SPACE TEMPERATURE SETPOINT & THE SUPPLY FAN WILL ACTIVATE & OPERATE AT THE COOLING MAXIMUM SPEED.

IN COOLING MODE, IF THE OUTSIDE AIR TEMPERATURE IS BELOW THE ECONOMIZER ENABLE TEMPERATURE SETPOINT,

### RTU-1 SHALL USE OUTSIDE AIR TO COOL THE SPACE. THE ECONOMIZER SHALL MODULATE TO MAINTAIN 55°F SUPPLY AIR

TEMPERATURE, IF OUTSIDE AIR TEMPERATURE IS BELOW 50°F.

1.5 CARBON DIOXIDE (CO2) ECONOMIZER OVERRIDE THE REMOTE CO2 SENSOR SETPOINT SHALL CONTROL THE ECONOMIZER OUTSIDE AIR DAMPER POSITION TO INCREASE

# 2.0 OUTDOOR VARIABLE REFRIGERANT FLOW (VRF) HEAT PUMP SYSTEM

OR DECREASE PROPORTIONALLY TO VENTILATE THE SPACE TO ACHIEVE CO2 SETPOINT PPM.

THE OUTDOOR VRF HEAT PUMP SYSTEM CONSIST OF (2) OUTDOOR AIR -COOLED CONDENSING UNITS (CU-1, CU-2) PROVIDING COOLING & HEATING (DOWN TO -18°C WB OPERATING OUTDOOR TEMPERATURE). EACH CONDENSING UNIT HAS (5) OUTLETS CONNECTED TO (5) INTERIOR WALL MOUNTED EVAPORATORS. EACH EVAPORATOR IS CONNECTED TO A HARDWIRED WALL MOUNTED CONTROLLER FOR SETTING ROOM TEMPERATURES, FAN SPEED, AIR FLOW DIRECTION, LOUVER & INTERLOCKING OF HVAC EQUIPMENT. A COMMON CENTRALIZED CONTROLLER PROVIDES WEB FUNCTION CONTROL/FEEDBACK TO ALL (10) EVAPORATORS THROUGH THE INTERNET TO CITY OF WINNIPEG METASYS.

## 2.1 HEATING OPERATION

THIS OUTDOOR VRF HEAT PUMP SYSTEM IS NOT CONNECTED TO THE PRIMARY HEATING SYSTEM (BOILER) & OPERATES INDEPENDENTLY. IN HEATING MODE, EACH EVAPORATOR IS ACTIVATED INDEPENDENTLY WHEN THE EVAPORATOR SPACE TEMPERATURE SENSOR TEMPERATURE DROPS BELOW THE SPACE TEMPERATURE SETPOINT ON THE CORRESPONDING WALL MOUNTED CONTROLLER. THE INVERTER-DRIVEN (VARIABLE SPEED) COMPRESSOR WILL RUN ACCORDING USING ITS VRF TECHNOLOGY.

## 2.2 COOLING OPERATION

THIS OUTDOOR VRF HEAT PUMP SYSTEM IS NOT CONNECTED TO RTU-1 & OPERATES INDEPENDENTLY. IN COOLING MODE, EACH EVAPORATOR IS ACTIVATED INDEPENDENTLY WHEN THE EVAPORATOR SPACE TEMPERATURE SENSOR TEMPERATURE IS ABOVE THE SPACE TEMPERATURE SETPOINT ON THE CORRESPONDING WALL MOUNTED CONTROLLER. THE INVERTER-DRIVEN (VARIABLE SPEED) COMPRESSOR WILL RUN ACCORDING USING ITS VRF TECHNOLOGY.

REVISION/DESCRIPTION

DESIGNED **DATE** 2012.08.17 **APPROVAL** 



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

1360 PEMBINA HWY

SHEET TITLE

ELECTRICAL, LIGHTING, SECURITY

THE CITY OF WINNIPEG PLANNING, PROPERTY AND

> FORT GARRY LIBRARY INTERIOR & EXTERIOR REFURBISHING

SPECIFICATIONS, SEQUENCE OF OPERATIONS POWER, DATA AND COMMUNICATION

2011-096-01 AS SHOWN

ROJECT No:

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