

**1.1 ELECTRICAL SPECIFICATIONS**

- THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE, SUBMIT AND FACILITATE ALL ITEMS RELATED TO MANITOBA HYDRO POWER SMART PROGRAM INCENTIVES.
- REFER TO ARCHITECTURAL SPECIFICATIONS AND OTHER GENERAL CONDITIONS.
- PROVIDE FOR A COMPLETE AND WORKING INSTALLATION AS HEREIN SPECIFIED AND AS SHOWN ON THE DRAWINGS.
- THE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CANADIAN ELECTRICAL CODE, PROVINCIAL AND MUNICIPAL CODES AND REGULATIONS.
- OBTAIN ALL PERMITS, APPROVALS AND PAY ALL RELATED FEES REQUIRED FOR THIS INSTALLATION.
- ALL EQUIPMENT SUPPLIED UNDER THIS CONTRACT SHALL BE NEW AND BE C.S.A. APPROVED.
- COORDINATE ALL CONDUIT RUNS AS SPECIFIED OR AS PER CONTRACT ADMINISTRATOR BEFORE INSTALLATION BEGINS.
- ARRANGE FOR, AND COORDINATE, ROUGH-IN AND FINAL INSPECTIONS WITH INSPECTION AUTHORITIES, CONTRACT ADMINISTRATOR.
- 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 RECEPTABLES.

**1.2 EXAMINATION**

- 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.

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

**1.3 SUPERVISION**

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

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

- 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.

- 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**

- 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**

- PROVIDE SHOP DRAWINGS FOR REVIEW BY THE CONTRACT ADMINISTRATOR. THE SHOP DRAWINGS MUST BE ASSEMBLED INTO COMPLETE BROCHURES.
  - 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 RELATED SUB-TRADES.
  - 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.

- 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**

- 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.

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

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

**1.8 TESTING**

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

**1.9 GUARANTEE**

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

**1.10 REQUEST FOR CHANGE**

- 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**

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

**1.12 WORKMANSHIP**

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

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

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

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

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

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

- ALL ELECTRICAL SUPPORTS AND HANGER SHALL CONFORM TO LATEST EDITION OF CANADIAN ELECTRICAL CODE AND/OR MANUFACTURERS' INSTALLATION INSTRUCTIONS.

**2.0 MATERIALS AND INSTALLATION****2.1 OUTLET BOXES**

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

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

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

- 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.

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

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

**2.2 WIRING METHODS & SUPPORTS**

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

- 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).

- 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 WATER-TIGHT FITTINGS.

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

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

- 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 54'.

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

- PROVIDE ONE ISOLATED GROUND CONDUIT PER THREE 2 WIRE ISOLATED GROUND CIRCUITS.

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

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

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

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

- ALL BRANCH CIRCUIT WIRING AND CONDUIT SHALL BE INSTALLED TO MINIMIZE VOLTAGE DROP. INSTALL ADDITIONAL CONDUIT RUNS AS REQUIRED TO TAKE THE MOST DIRECT AND SHORTEST ROUTE TO OUTLETS, LIGHT FIXTURES, ETC.

- INSTALLATION IN RACEWAYS
  - INSTALL WIRING AS FOLLOWS:
    - ENSURE CONDUITS ARE DRY AND FREE OF DEBRIS BEFORE PULLING CABLES.
    - COLOR CODING AND IDENTIFICATION AS PER THE C.E.C.
    - WIRES IN OUTLET, JUNCTION AND SWITCH BOXES, NOT HAVING A CONNECTION WITHIN BOX SHALL NOT BE SPLICED, BUT SHALL CONTINUE UNBROKEN THROUGH THE BOX.
    - BRANCH CIRCUITS EXCEEDING 68 FEET SHALL BE #10 AWG, BRANCH CIRCUITS EXCEEDING 35 METRES SHALL BE #8 AWG OR UNLESS OTHERWISE NOTED.
  - INSTALLATION OF SINGLE CONDUCTOR CABLES
    - 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 #30 AWG BARE (UNLESS OTHERWISE NOTED) COPPER GROUND WIRE SHALL BE INSTALLED WITH EACH FEEDER. CABLE BENDING RADIUS SHALL BE AT LEAST 17 TIMES THE OVERALL CABLE DIAMETER AND BENDS SHALL NOT DAMAGE OR DISTURB THE OUTER SHEATH.
    - DO NOT INSTALL PVC JACKETED CABLES IN CIRCULATING AIR FLEANSJMS.
    - 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.

- INSTALLATION OF FLEXIBLE ARMOUR CABLE
  - TYPE AC90 ARMOUR CABLE (BX) SHALL BE USED FOR CONNECTIONS FROM CONDUIT SYSTEMS TO RECESSED LUMINAIRES 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.

- INSTALLATION IN EQUIPMENT
  - GROUP AND LACE-IN NEATLY WIRE AND CABLE INSTALLED IN SWITCHBOARDS, PANELBOARDS, CABINETS, WIRE WAYS AND OTHER SUCH ENCLOSURES.
  - TERMINATIONS
  - TERMINATE WIRES AND CABLES WITH APPROPRIATE CONNECTORS IN AN APPROVED MANNER.

- INSTALLATION
  - WIRE IN CONDUIT #2 AWG AND SMALLER SHALL HAVE SOLID COLOURED INSULATION, COLOUR CODED AS PER CANADIAN ELECTRICAL CODE.
  - WIRE IN CONDUIT 1/0 AWG AND LARGER AND SINGLE CONDUCTOR CABLES FOR NORMAL POWER FEEDERS SHALL BE IDENTIFIED AT EACH OUTLET BOX AND TERMINATION WITH A 6" BAND OF COLOURED VINYL TAPE OF THE APPROPRIATE COLOUR. EMERGENCY POWER FEEDERS SHALL BE PROVIDED WITH AN ADDITIONAL 3/16" 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 COLOURING THE INSULATION SHALL NOT BE USED.
  - IDENTIFY CONTROL CONDUCTORS IN MOTOR CONTROL EQUIPMENT, CONTACTORS, ETC. WITH MYLAR/CLOTH WIRE MARKERS.

- SUPPORT PRODUCT
  - SUPPORT CHANNELS
  - U SHAPE, SIZE 41 X 41MM, 2.9MM THICK, SURFACE MOUNTED, SUSPENDED OR SET IN POURED CONCRETE WALLS AND CEILINGS OR AS REQUIRED.
  - MANUFACTURERS: B-LINE, BURNDY, ELECTROVERT, UNISTRUT, PILGRIM, PURSLEY.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
    - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
    - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
    - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
    - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
    - 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.
    - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
    - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT PRODUCT
  - SUPPORT CHANNELS
  - U SHAPE, SIZE 41 X 41MM, 2.9MM THICK, SURFACE MOUNTED, SUSPENDED OR SET IN POURED CONCRETE WALLS AND CEILINGS OR AS REQUIRED.
  - MANUFACTURERS: B-LINE, BURNDY, ELECTROVERT, UNISTRUT, PILGRIM, PURSLEY.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
      - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
      - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
      - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
      - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
      - 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.
      - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
      - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
      - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
      - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
      - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
      - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
      - 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.
      - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
      - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
      - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
      - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
      - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
      - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
      - 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.
      - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
      - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
      - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
      - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
      - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
      - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
      - 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.
      - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
      - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
      - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
      - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
      - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
      - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
      - 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.
      - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
      - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS AND CABLES 50MM AND SMALLER.
      - WHOLE STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 2".
      - BEAM CLAMPS TO SECURE CONDUIT TO EXPOSED STEEL WORK.
    - SUSPENDED SUPPORT SYSTEMS.
      - SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH 1/4" DIAMETER THREADED RODS AND SPRING CLIPS.
      - 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.
      - FOR SURFACE MOUNTING OF TWO OR MORE CONDUITS USE CHANNELS AT 60° OC SPACING.
      - PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.
      - ENSURE ADEQUATE SUPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.
      - DO NOT USE WIRE LASHING OR PERFORATED STRAP TO SUPPORT OR SECURE RACEWAYS OR CABLES.
      - 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.
      - INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUITS, AND IN ACCORDANCE WITH MANUFACTURERS' INSTALLATION RECOMMENDATIONS.
      - THREADED ROD TO BE MINIMUM 1/4" DIAMETER GALVANIZED OR NICKEL PLATED. BLACK STEEL ROD IS NOT ACCEPTABLE.

- SUPPORT EXECUTION
  - INSTALLATION
    - SECURE EQUIPMENT TO SOLID MASONRY, TILE AND PLASTER SURFACES WITH LEAD ANCHORS.
    - SECURE EQUIPMENT TO POURED CONCRETE WITH CAST IN OR EXPANDABLE INSERTS.
    - SECURE EQUIPMENT TO HOLLOW MASONRY WALLS OR SUSPENDED CEILINGS WITH TOGGLE BOLTS.
    - SECURE SURFACE MOUNTED EQUIPMENT WITH THIST CLIP FASTENERS TO INVERTED T BAR CEILING. ENSURE THAT T BARS ARE ADEQUATELY SUPPORTED TO CARRY WEIGHT OF EQUIPMENT SPECIFIED BEFORE INSTALLATION. PROVIDE ADDITIONAL SUPPORT AS REQUIRED.
    - SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS DESIGNATED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
    - FASTEN EXPOSED CONDUIT OR CABLES TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING STRAPS.
      - ONE-HOLE MALLEABLE IRON STRAPS TO SECURE SURFACE CONDUITS