

## ELECTRICAL SPECIFICATIONS

### 1. GENERAL

1. Supply all labour, equipment, and materials necessary to install complete and operational, the electrical systems described herein and shown on the drawings. The requirements of this section are in addition to those contained in the General Conditions and other portions of the Contract Documents.
2. Refer to General Requirements in the Architectural Specification.

### 2. DRAWINGS AND SPECIFICATIONS

1. It is the intent of these drawings and specifications to provide for an electrical installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.

### 3. CODES, PERMITS AND FEES

1. The complete installation shall be in accordance with the current edition of the Canadian Electrical Code (as amended for use in presiding jurisdiction), and the by-laws of the city or municipal electrical energy inspection department whose authority covers the area in which the work is being done.
2. Obtain and pay for all permits and licenses required to execute the work.

### 4. SUBSTITUTIONS

1. Where materials, equipment and apparatus or other products are specified by the manufacturer's name, other manufacturers may be substituted upon obtaining written approval of the engineer three days prior to opening of bids. Submit list of proposed equivalent products in duplicate to the Engineer.
2. Ensure that space requirements are met if using service and distribution equipment by alternate manufacturers.
3. Service and distribution equipment by alternate manufacturers that requires redesign of electrical room will not be accepted. Engineer's costs caused by failure to comply with this will be charged to the electrical contractor.

### 5. MATERIALS

1. All materials supplied shall be new and of the quality indicated in the Specifications and shall conform to the standards of the C.S.A. and the U.L.C. and approved by these agencies where applicable.
2. In the event that a material specified does not bear C.S.A. and U.L.C. approval, obtain the approval of the local inspection authority, pay all charges levied by the inspection authority and make any modifications required, at no additional expense to the owner.
3. Ensure that service entrance equipment bears evidence of "suitable for service entrance".

### 6. EQUIPMENT LOCATIONS

1. No extra charge for materials and labour shall be added to the Contract for equipment moved within 3000mm from the location shown on the plans prior to rough-in.

### 7. GUARANTEES

1. Guarantee all work for one year, following final acceptance. This guarantee shall include all problems caused by improper installation or equipment failure.

### 8. SHOP DRAWINGS

1. Prior to delivery of any products to the job site and sufficiently in advance to allow ample time for checking, submit Shop Drawings for review as specified in Division 1.
2. Show details, dimensions, construction, size, arrangement, operating clearances, performance characteristics and capacities of products and parts of the work.
3. Manufacture of products shall conform to reviewed Shop Drawings.
4. Where applicable include wiring, single line and schematic diagrams.
5. Include wiring drawings or diagrams showing interconnection with work of other Sections.
6. Keep one complete set of Shop Drawings at job site during construction.

### 9. PROJECT RECORD DRAWINGS

1. Before commencing work, obtain two sets white prints of all Drawings pertinent to the work. Keep Drawings on site and, daily or weekly as necessary, record in coloured pencil all changes, alterations, or additions in runs of conduit, numbers and location of panels, luminaries and devices that may occur during progress of the work.
2. Obtain, at own expense, from Engineer a computer disk and upon completion of the job and before final payment, transcribe all information from the record prints to the disk. Forward computer disk and a set of full size blackline mylar plots of all electrical drawings to the Engineer. Completed transparencies shall be clearly marked as "Record Drawings". Transcription of information shall conform to the standards as set forth by the Engineer. Include in the tender all costs associated with same.

### 10. MAINTENANCE MANUALS

1. Before requesting final certificate, submit copies of the maintenance manual as specified in Division 1 and as further called for in Division 16.
2. Include in the manual information based on the following requirements:
  1. Operation and maintenance instructions to be sufficiently detailed with respect to design elements, construction features and component function and maintenance requirements to permit effective operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.
  2. Technical data to be in form of approved Shop Drawings, supplemented by bulletins, technical descriptions of items, and parts lists. Advertising or sales literature will not be acceptable.
  3. Provide wiring and schematic diagrams and performance curves where necessary.
  4. Include names and addresses of nearest supplier for all items included in the maintenance manuals.
  5. Provide manual and seminar with Owner forces to ensure proper operation of building prior to Substantial Performance.

### 11. DISTRIBUTION

1. Match existing breakers.
2. Update panel indexes. Panel indexes to be typewritten.

### 12. WIRING METHODS

1. All wiring shall be copper unless indicated otherwise.
2. Branch circuit wiring shall be min. #12 AWG for circuits up to 50 feet in length, 90 C rated in EMT and AC-90. Where wire size is not indicated, ampacity must match or exceed that of protective device.
3. Feeders shall be 90C rated wire in EMT. Teck 90, ACWU 90 and AC-90 and NMD-90 cables may be used where permitted by Code, unless specifically noted otherwise.

### 13. BASIC METHODS

1. Install wiring continuously within raceways or cables; splices will be permitted only at outlets and junction boxes. Sufficient slack wire shall be left at these points to permit proper connection of motor starters, motor safety disconnects, thermostats, motors, devices, equipment, etc.
2. All wiring shall be run concealed in crawlspace, basement, walls or bulkheads wherever possible. Any exposed conduits or cables shall be approved by the Owner/Architect prior to installation and if approved, run parallel to or at right angles to building lines, in a neat and workmanlike manner. Surface raceways to run using multitrack two (2) channel basetrack. No "BX" or flexes or surface conduits allowed on Main Floor except in Washroom, Crawlspace and Mechanical room.
3. Install pull boxes in the locations shown on the Drawings and as further required by the Canadian Electrical Code. Pull boxes shall be located in inconspicuous spaces.

### 14. WIRING DEVICES

1. Receptacles shall be commercial grade, 120V, 15A-20A, "T"-slot type, white finish or unless otherwise shown.
2. Wiring devices and cover shall be of one manufacturer; Hubbell, P & S, Leviton or Bryant.

### 15. TELEPHONE PROVISIONS

1. Conduits: as shown on drawings.
2. Wall outlet boxes: Installed in new two (2) channel basetrack.
3. Wiring: Plenum rated Category 6 UTP, 24 AWG, 4 pair, stranded, white jacketed.
4. Supply and install jacks and wall plates for all outlets.
5. Minimum conduit size 21mm (3/4 inch) c/w telephone cabling as required.

### 16. DETACHMENT RADIO REQUIREMENTS

- 1.1 CAT 5 OR CAT 6 CABLE FOR RADIO REMOTE UNIT
  - .1 CAT 5 or CAT 6 cable drop location for future Base Station upgrade.
  - .2 All CAT 5 or CAT 6 cable preferred Red (Alternate Orange or Grey) in colour.
  - .3 All cables must be terminated as per shared services Canada's recommended provided guide line.
  - .4 All cable installed must be free of any obstruction and be accessible, at any given time across identified location for radio remote unit.
  - .5 CAT 5 or CAT 6 drop must be provided at every location identified for radio remote unit.

### 17. TELEPHONE AND SYSTEMS DATA CABLING

- 1.1 UTILITY POWER
  - .1 Power outlet for each of the above listed CAT 5 or CAT 6 Cable drop location for installation of radio remote unit.

### 18. PROVISION FOR RELOCATION OF EXISTING COAX CABLE

- 1.1 The present coax cable for Base station needs a provision for relocation to the rack located in the basement for evergreen of base station.

### 1.0 GENERAL

- 1.1 SCOPE
  - .1 Install complete telephone and data cabling system as indicated on the drawings and specified. Cables are provided by the Electrical Contractor or Sub-Trade for low tension work.
  - .2 System to be complete with all outlets, hardware, cable management systems, termination blocks, wire and cable to form a complete operating system.
  - .3 System to be a Category 6 certified cabling system as indicated on the drawings and specified herein.
  - .4 Contractors to obtain approval on all equipment prior to bidding.
  - .5 Personnel installing communications cabling shall be trained and conversant with communications cabling practices required for this project. Proof of certification must be provided prior to commencement of work.
  - .6 The system shall be installed by a contractor designed and trained by the manufacturer of being capable to do so and shall provide written confirmation of this fact.
  - .7 Outlets are to be:
    - (a) Cat. 6 jacks.
    - (b) Patch panels.
    - (c) Match existing.

### 1.2 SHOP DRAWINGS

- 1.1 Shop drawings to be submitted as outlined herein and contain all items within one complete submission.
2. Shop drawings which are submitted incomplete will be returned to Contractor without review.
3. Shop drawings to include a complete material list with manufacturer, style, model number and quantity. Wire and cable to be included in material list.
4. Shop drawings to include manufacturer's specification sheets with photographic depiction of all system components. Specification and descriptive data to include dimension, weight, appearance, connection provisions, materials, metal gauges and operating specifications, characteristics, features and controls.
5. Shop drawings to include the following diagrams:
  - (a) Front backboard punchdown block elevations for each backboard. Elevations to indicate component layouts, cable routing and component functions.
  - (b) System LAN Closet plan drawings depicting backboards and cable routing.
  - (c) Layout drawings for patch panels and jackfields.
  - (d) Cable details, including type and electrical characteristics.
  - (e) Complete engineering drawings of all custom made components indicating all materials, gauges, finishes and wiring diagrams.
  - (f) Complete system block diagrams indicating all components, interconnection and cabling.
  - (g) Complete detailed system circuit diagrams depicting how components are interconnected component functions, cable terminations, terminal identification and cable designation.
  - (h) Complete system wire and cable designation schedule indicating origin, terminus, origin terminal identification, terminus terminal identification, cable function, cable type and cable designation, at each demarcation point.
  - (i) Under no circumstances will wiring schematics or typical wiring details be considered as circuit diagrams.

### 1.3 APPROVALS

1. Request for approvals from the contractors to be submitted as outlined.
2. All requests for approval must be submitted ten (10) days prior to tender closing. No approvals will be considered after this date.
3. Submit two (2) copies of request for approval with self-addressed stamped envelope.
4. Requests for approval must include full product description, performance data and construction details.
5. Include a form listing all products and teleprinter number so that items can be easily identified as acceptable or rejected and this form transmitted to the office of the supplier once completed.
6. Where equipment has been specified as "no substitutions" no approval of alternates will be given.

### 1.4 OPERATING MANUALS

1. Operating manuals to be furnished as specified in Section 26 05 00. Operating instructions to consist of following:
  - (a) Individual factory issued manuals containing all technical information on each type of equipment installed. In event such manuals are not available from the factory, system installer to establish same and compile within the manual to satisfaction of the Owner.
  - (b) Each manual to contain a system parts list, a parts list for individual components, detailed schematics and recommended maintenance procedures. Advertising brochures or operational instructions shall not be considered as technical manuals. Refer to Section 16010 for manual completion.
  - (c) Engineering drawings depicting layout and interconnection of all system components and as-built conduit layout.
2. In addition to the above described manuals, system installer to deliver one (1) set of all shop and drawings, wiring schedules and single line block drawings.

### 1.5 GENERAL REQUIREMENTS

1. System to be complete with all necessary components to provide functions required whether or not each and every item is necessarily mentioned. All components to be production proven models. Custom designed units will only be considered for those items that are not currently available on commercial market. System to be supplied and installed by an established communications contracting firm that is approved by Owner.
2. Selection of system to be made on the basis of quality and suitability of equipment, service facilities, and past performance of contracting firm.
3. Before proceeding with installation, successful system installer to submit to Owner for approval a complete detailed proposal as outlined in Clause 1.4, Shop Drawings.
4. All conduit, pullboxes, junction boxes and terminal panels are to be installed to provide a complete conduit system for the Telephone and Data system.
5. All wiring for systems to be PVC insulated, unshielded, twisted pair. ALL WIRING TO BE INSTALLED IN CONDUIT, J-HOOKS AND TRAY SYSTEM UNLESS OTHERWISE SPECIFIED.
6. The system, when complete, must perform to complete satisfaction of Owner and must be free of all interference from cross-talk, hum, switch and relay noise, etc. All wiring in LAN Closet to be terminated on punchdown blocks and to be neatly installed, laced and tagged.

### 1.6 SYSTEM DESCRIPTION

1. The data system consists of horizontal and vertical wiring.
  - Horizontal: 4-pair unshielded twisted pair (UTP) cable from patch panel in LAN Closet to every computer outlet shown on drawings and BE COMPLETE WITH ALL SPECIFIED PATCH CABLES.
  - Vertical: Provide 4-pair unshielded cable from punchdown blocks in LAN Closet to every phone outlet shown on drawings.
2. The telephone system consists of horizontal and vertical wiring.

### 1.7 WARRANTY/SERVICE

1. System installer to include with his base tender price a guarantee stating:
  - (a) Full warranty on new system to be provided for fifteen (15) years.
  - (b) Service to be provided on system within 24 hours of call origination during the warranty period.
  - (c) During warranty period system installer at his expense to repair and replace all such defective work and other work to new system damaged thereby which fails or becomes defective during term of warranty, provided that such failure is not caused by improper usage or physical damage.
  - (d) Warranty date to commence from date of Final Acceptance of this work.
  - (e) System to be certified to meet and or exceed Category 6 standards of gigabit speed and of performance as specified herein for the duration of the warranty as specified by the manufacturer.
2. Training
  - 1.8 TRAINING
    - .1 System installer to conduct training program for designated maintenance and operating personnel. This program to include but not be limited to the following:
      - (a) Operation: designated personnel to be trained to accomplish and understand all aspects of system operation.
      - (b) Maintenance: designated personnel to be trained to perform routine maintenance on the system.
    - .2 Training period schedule to be established by Owner. Training periods to take place after building completion and prior to system use.

### 1.9 PRODUCTS

### 2.0 COMMUNICATIONS OUTLET ASSEMBLIES

1. Communications Outlet - Boxes:
  - (a) Single gang recessed box, 63 mm minimum depth comes with 19 mm deep two (2) device ring. Single gang wallboard adapter ring, 1.6 mm 16 AWG thickness.
  - (b) 21 mm EMT, stubbed from basetrack to junction box as part of communications system. Conduit and sleeves must be grounded by use of a grounding bushing and ground wire.
2. Communications Outlet - Housings:
  - (a) Formed outlet plate:
    - i) Rear and side entry of cable. Strain relief provisions for side entry of cable.
    - ii) Flat plate: minimum thickness 3.9 mm.
  - (b) Mounts to standard one-device, two-device, electrical box, or adapter ring opening.
  - (c) Constructed of high-impact fire-retardant thermoplastic.
3. Communications Outlet - Jacks, Bix Blocks and Patch Panels:
  - (a) Panduit mini jacks # CJ6887PBL for Cat. 6 cables
  - (b) Bix's Blocks-QCBX1A4
  - (c) Panduit CPP24WBL mini-com patch panels.

### 2.1 All equipment, cabling, patch panels, outlets, etc. to match existing.

### 3.0 EXECUTION

### 3.1 INSTALLATION

1. Cable Installation:
  - (a) Install data cable and telephone cable in conduit, J-hooks, multitrack basetracks, wireways and surface raceways indicated on drawings.
  - (b) All voice and data lines to be terminated on the patch panels in the hubs.
2. Multitrack Basetrack, Wireways and Surface Raceways:
  - (a) Install cable management raceway on both sides of racks and on backboards.
3. Boxes and Fittings:
  - (a) Ensure in advance that outlet box/data outlet installation methods yield vertically mounted data outlets.
4. Cabinets, Enclosures, Racks, Backboards:
  - (a) Install at locations and heights indicated on drawings.
  - (b) Use green insulated 6 AWG ground conductors for grounding racks. Use grounding bushing, solderless lug, clamp, or cup washer and screw.
  - (c) Protect ground conductors from mechanical injury.
  - (d) Install ground conductors such that neither ground conductors nor data cables interfere with one another in regards to future servicing of patch panel rear connections.
  - (e) Anchor or stabilize racks.
5. Wire and Cable:
  - (a) Swab raceway system before installing wiring.
  - (b) Do not exceed manufacturer's maximum pulling force specifications.
  - (c) Maintain not less than minimum bending radius for fiber and copper conductors.
  - (d) Install cable conduits or tray along or at right angles to building lines unless impractical to do so. Verify specific cases of deviation in advance with Consultant.
  - (e) Maintain open copper conductor cable at maximum practical distance from fluorescent ballasts and other EMF - or discharge-generating equipment.
  - (f) Ensure that cable is not flattened, squeezed, or crimped at any point along entire run. NO SPLICES OR INTERMEDIATE TERMINATIONS IN CABLE RUNS EXCEPT BY SPECIAL PERMISSION IN ADVANCE, with documentation detailing locations and nature of splices.
  - (g) Install cables in raceway in LAN Closet and fan individual cables to applicable patch panels in neat, logical fashion.
  - (h) Tie wrap cables neatly into logical bundles. NO NYLON TIE STRAPS ACCEPTABLE FOR FIBRE OPTICS USE ONLY VELCRO STYLE TIE WRAPS.
  - (i) Minimum slack cable per run as specified on drawing.
  - (j) Label all conduits and wireways with fibre caution labels at both ends, all junction boxes, and spaced on a maximum of 10 meter intervals.
6. Connectors:
  - (a) Use tooling specific to connector types in use.
  - (b) Use connectors suitable for nature of conductor in cable, e.g. stranded vs. solid copper.
  - (c) Ensure that connectors' strain relief provisions are used. Strip jackets only amount required.
  - (d) Maintain pair twists and jackets within 13 mm of termination.
7. Cabling System Labelling
  - (a) The contractor shall request cabling line numbers from R.C.M.P. Personnel.
  - (b) All label printing will be machine generated using indelible ink ribbons or cartridges. Cable jacket labels to be sized to the OD of the cable, and placed within view of the termination point on each end and be either heat shrink sleeves or clear plastic wrap on strips with white writing section. Outlet labels will be the manufacturer's labels provided with the outlet assembly.
  - (c) No hand-written labels and / or identification strips allowed.
8. Identification
  - (a) Label both ends of cables with a cable number.
  - (b) Label both room number and cable number on the rack.
  - (c) Label cable numbers on outlet face plate.
  - (d) All labelling requirements to the satisfaction of the Owner (R.C.M.P. Personnel).
- 3.2 LOOSE CABLE SCHEDULE
  1. Supply to the Owner in loose form the following cables. All cables to be factory assembled and tested.
    - (a) UTP Loose Cable:
      - i) For each data outlet installed supply as specified on the drawing.
- 3.3 COMMUNICATION CABLE TESTING
  1. Communication cabling testing by the Contractor and provide testing results on CD Disc to Owner R.C.M.P. Personnel as part of as-built records.

### 18. NAMEPLATES

1. Provide and install adhesive labels to identify the following:
  1. Panel
 Labels shall give the designated name of the equipment (Panel Name and Circuit Number) or its function (Starters, Safety Disconnect, Thermal protected on/off Switch, etc.).

### 19. INSPECTIONS

1. Call the Engineer and Local Authorities' Electrical Inspector for inspections at the following stages of construction:
  1. Rough-in
  2. Substantial completion
  3. Completion of deficiencies (if applicable)
2. Provide two (2) working days notice for all inspections.

### 20. SUBSTANTIAL COMPLETION

1. Prior to requesting substantial completion inspection, the following items must be complete:
  1. All labelling/tagging of mechanical equipment and all associated controls, disconnects, thermal protected on/off switches and combination magnetic starters.
  2. All Mechanical equipment, associated controls and starters/on-off switches/disconnect must be operational to the satisfaction of the Owner/Architect.
  3. Project Record drawings must be submitted to Engineer for review.
  4. Maintenance manuals must be submitted to Engineer for review.
  5. All electrical equipment not located in service rooms must have covers and/or doors installed complete.
  6. Provide Certificate of Acceptance from Electrical Inspection Department.
  7. Continuity of fire separations at electrical penetrations must be complete.
  8. All labelling of electrical equipment/devices/motor starters must be complete.
  9. All Panel indexes/directories/labelling of breakers must be complete.
2. If any of the above items have not been completed at the time of substantial completion inspection, and the letter of "Assurance of Professional Field Review and Compliance" cannot be issued, any costs for subsequent inspections will be charged to the electrical contractor.

#### Notes:

- Do not scale drawing
- It is the responsibility of the appropriate Contractor to check and verify all dimensions on site and report all errors and/or omissions to the Architect or Engineer
- It is the responsibility of the appropriate Contractor to comply with all Codes and Regulations applicable to the performance of their work.
- All Drawings and Specifications are instruments of service and are the property of the Architect or Engineer. This Drawing is the Copyright of STEPHENS KOZAK ACI ARCHITECTS AND PLANNERS or the Consultant named on this Drawing as at the date shown and may not be used or reproduced in whole or in part without the express written consent of the Architect or Engineer.
- All dimensions are in mm unless noted otherwise.



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#### Issues/Revisions

No.	Description	Date	By
1	Issued for Tender	Dec.9/2015	D.O.

#### Seal

#### Client

#### Project

## VIKING

Scale	As Noted	Designed By	D.O./D.S.
Project No.	1557	Drawn By	D.O./D.S.
Date	December 2015	Checked By	D.O.

#### Drawing Title

## ELECTRICAL SPECIFICATIONS

Drawing No.

# E-03