

THE FOLLOWING ADDENDUM SUPERCEDES INFORMATION CONTAINED IN DRAWINGS AND SPECIFICATIONS ISSUED FOR THE PROJECT TO THE EXTENT REFERENCED. THIS ADDENDUM FORMS PART OF THE TENDER DOCUMENTS AND IS SUBJECT TO ALL OF THE CONDITIONS SET OUT IN THE CONTRACT CONDITIONS.

This electrical addendum contains five (5) pages plus nineteen (19) pages of SOW for a total of twenty four (24) pages.

Refer to the email from Apple Electric dated November 20, 2016.

Part 1 Tender RFI E-01: Re; Sol# F1700-165107/A SAR Station Building Construction Campbell River

1.1 QUESTION

- .1 Detail 2/E2.0 – Where is the location of the 100A 600V feeder breaker and is it and the cable feed part of this tender? Isn't the breaker something that contractor supplies?

AES RESPONSE

The 100A – 600V breaker and 4 #3 -.35mm not in this contract.

- .2 Detail 2/E2.0 – Is the SAR Meter private? If it is where can I find the spec on it? Isn't the breaker something that contractor supplies?

AES RESPONSE

The SAR Meter – digital meter, L.C.D display, consumption, demand, voltage per phase, amperage per phase, harmonics, frequency and history.

- .3 Detail 2/E2.0 – What is the feed size and disconnect for the crane? Where is it located? I don't have an answer on this at the moment.

AES RESPONSE

The crane is not in this contract. Delete disconnect for crane. Leave space of splitter for future crane disconnect.

- .4 Detail 2/E2.0 – I cannot find a 90A 1P TL receptacle, typically TL receptacles are max 50A 125V. There is a 100A 120/208V 3W pin and sleeve available, please clarify or provide make and model of the 90A 1P TL.

AES RESPONSE

100A – 125V - 2W – 3P unfused pin and sleeve, mechanical interlock, watertight receptacle in non-metallic enclosure.

- .5 Drawing M2.01 – Indicates the BB and Unit Heaters are supplied by Electrical Contractor however they are in Division 23 spec not Division 26, please clarify.

AES RESPONSE

The Canadian National Master Construction Specifications (NMS) has the electric heating under Division 23. This Division forms part of the electrical contract.

- .6 Drawing E3.0 – There is no indication on how many watts UH-101 is, please clarify.

AES RESPONSE

The UH-101 is 2.5kW – 208V – 1P 15A – 2P – 3 #12 – 19mm.

- .7 Drawing E2.0 – How thick is the concrete float deck? How far down from the surface are the ducts? Do you have concrete float IFC dwgs? I will get Gary to send his best version of as-built dwgs for us to include.

AES RESPONSE

See Architectural Addendum #1.

- .8 Drawing E2.0 – The location of the shore power kiosk is not shown on the drawings, I am assuming it must be mounted over the duct, please clarify.

AES RESPONSE

The shore power Kiosk is shown on the site plan. Installed adjacent to the outlet edge of the float deck. 6 meters from the end.

- .9 Drawing E2.0 – The crane location is not shown on the drawings, is it a future install? If so are we supposed to run cable to it under this tender? Future install. Since we're not sure about details, what should be done about power feed?

AES RESPONSE

There will be no provisions for the future crane.

- .10 Detail 4/E2.0 – Are all ground wires shown #6? Typically we use DLO cable for marine grounding but no particular type of cable is specified, please clarify.

AES RESPONSE

The ground wire from the crane (lighting) to be #2 copper. The ground wire for the service to be #6. DLO (diesel locomotive cable) is a recommended ground for this location.

- .11 Detail 4/E2.0 – The ground wire between the " supply service ground " and the " 100A 600V disconnect "; is it 2/0 or #6? Does it have to go all the way to the wharf head?

AES RESPONSE

This contract does not have shore power available to the site. The main disconnect to be temporarily grounded with #6 to a underwater copper ground plate.

- .12 Drawing E2.0 – If we need to get the main 100A 600V feeder and the system ground to the wharf head how do you want the SAR float to dock transition to be done?

AES RESPONSE

No feeder to dock at this time.

- .13 Drawing E1.0 – Shouldn't the light fixtures in corridors 116 & 117 be type 'A1'?

AES RESPONSE

The lights to be Type 'A1'.

- .14 Drawing E2.0 – There are door contacts on two outside doors but there is no spec or description in the symbol legend, are these part of this tender?

AES RESPONSE

Symbol "C" = Access Door Control.

Provide a complete installation F.O.B. access door entry system including controls, F.O.B, reader, and electric strike.

Electric strike – Rutherford Controls Series 7 adjustable.

Access control F.O.B and reader – ICT security.

- .15 Detail 6/E2.0 – detail indicates there are 3 data cables to each outlet however the symbols legend only indicates 2 cables, please clarify.

AES RESPONSE

3 cat 6 cables required at each outlet.

- .16 General – This project is being approached from two different perspectives 'Build in Sidney' or 'Build in Campbell River', how are you dealing with work between the wharf head and the float for contractors building this in Sidney?

AES RESPONSE

The General Contractor will select the site location to outfit the building.

Refer to the email from Number TEN Architecture Group dated November 21, 2016.

1. Supply and install 4c#2 c/w grd G-cable (#3 to small for distance) from 100A 600V disconnect in SAR to the main distribution panel to the wharf head, this includes going up the ramp and under the approach.

AES RESPONSE

No incoming service to the SAR building in this tender.

2. Supply and install a 600AF/100AT in the CDP at the wharf head.

AES RESPONSE

No 600AF/100AT in CDP Panel at wharf head, not in this tender.

3. Supply and install DLO ground cable to the main system ground at the wharf head.

AES RESPONSE

No ground cable to Main system ground at wharf head. Disconnect to be DLO #6 grounded to copper ground plate.

4. Supply and install a fibre optic cable to the SAR from the Telus board at the wharf head for both internet and telephone.

AES RESPONSE

No fiber optic cable to the SAR building in this tender.

5. Although it is not my scope but the SAR requires a water and sewer hook-up as well. The sewer will require lift of almost 6m to get the wharf head.

AES RESPONSE

Sewer will be in another project.

Part 2 Refer to Electrical Drawings

2.1 DRAWING E1.0, LUMINAIRE SCHEDULE

- .1 Type 'A1'; - same as Type 'A' except 600mm long, 2,000 lumens.
.2 Type 'A' – luminaire to be suitable for surface or suspended installation.
.3 Provide dual head emergency lights in change Room 108/109, Shower 111, Shower 107 Washroom 105 and 106.
.4 Change 100W – 12V emergency battery to 200W – 12V.

- 2.2 CORRIDOR 116 AND 117**
- .1 Luminaires to be Type 'A1'.
 - .2 Luminaires that are partially hatched to be 24/7 operation cct 'A1'.
- 2.3 SHOWER 111**
- .1 Provide 2 head weatherproof emergency light.
- Part 3 Refer to Electrical Drawing E-2**
- .1 Locate Kiosk with 100A – 125V – 2W – 3P unfused pin and sleeve mechanical interlock, watertight, receptacle in non-metallic enclosure.
 - .2 Kiosk to be on outer edge of float opposite Corridor 116 entry door.
- 3.2 GROUNDING LAYOUT**
- .1 Delete ground to future crane.
 - .2 Change #6 DLO lighting ground from Tower to #2 copper. Ground to underwater ground plate (copper).
 - .3 Interconnect lightning ground to building ground with #6.
 - .4 Delete ground from Main Disconnect to remote incoming services.
 - .5 Provide #6 copper ground from main disconnect to underwater ground plate (copper).
- 3.3 WORKSHOP**
- .1 Delete 100A – 1P receptacle.
 - .2 100a receptacle located on kiosk.
 - .3 Delete 30kVA diesel generator located in shop. Generator located exterior of building.
 - .4 Unit heater to be 2.5kW 208V.
- 3.4 ELECTRICAL DISTRIBUTION RISER DIAGRAM**
- .1 Delete 100A – 600V breaker and 4 #3 – 35mm incoming site service.
 - .2 Change 90A-1p Kiosk receptacle to 100A – 1P.
 - .3 Provide 4 #3 – 35 plus ground from Panel 'B1' to 15kVA transformer.
 - .4 Provide 2 # 3-35 plus ground to 100A receptacle.
- 3.5 15KVA TRANSFORMER**
- .1 208 Delta Primary to 120/208V single phase secondary.
 - .2 115° max temperature.
 - .3 Core solid ground
 - .4 Copper coil.
 - .5 2 x 2.5% Primary Taps.
 - .6 2 x 2.5% Secondary taps.
 - .7 Soft start.
- 3.6 COMMUNICATION CABINET**
- .1 Rack to be 19" and 20.5" deep.
 - .2 Fan to be B-13.
 - .3 Receptacles B15.
- All conduits to be grounded with #6.

- 3.7** **PANEL 'B'**
- .1 Change 16 circuit to 24 circuit.
 - .2 Change 90A – 2P to 90A - 3P breaker.
 - .3 Communication Fan 15A-1P B-13.
 - .4 Communication receptacle 15A-1P B15.

Part 4 **Mechanical Equipment Schedule**

- 4.1** **HP-1 / CU-1**
- .1 Change 15-3P breaker to 30A-3P breaker 4 #10 – 25mm.

Part 5 **Supplement**

- .1 See attached SOW (Statement of Work) communication information.

END OF ELECTRICAL ADDENDUM NO. 01

SOW (Statement of Work)

1. Overview of Project: This project covers the installation of a combined Main Terminal Room (MTR) and Equipment Room (ER) and associated telecommunication pathway system within, "*Enter Name here*".

2. Applicable Codes, Standards And Design Guidelines The following codes, standards and Design Guidelines shall apply:
 - a. Canadian Electrical Code;
 - b. National Building Code;
 - c. National Fire Code;
 - d. All applicable provincial and municipal codes;
 - e. TBITS GCG10069– Telecommunications Wiring Systems in Government-owned and Leased Buildings;
 - f. TIA/EIA – 569 Commercial Building Standard for Telecommunication Pathway and Spaces;
 - g. TIA/EIA – 606 Administration Standard for Commercial Telecommunications Infrastructure;
 - h. TIA/EIA – 607 Commercial Building Grounding and Bonding Requirements for Telecommunications;
 - i. BICSI – Telecommunication Distribution Methods Manual; and
 - j. BICSI - Information Transport System Installation 4th edition.

3. Terminology
 - a. The word "Provide" shall mean "supply and install"; and
 - b. The word "indicated" shall mean "as shown on the drawings and/or noted in the contract documents.

4. Telecommunication Space and Pathway Specifications

a. Incoming Communication Entrance Conduits Service: Unless otherwise indicated, provide a minimum of one 100 mm PVC conduits encased in concrete to the outside plant facility such as telecommunications poles, service/steam tunnels, underground conduit duct banks and /or maintenance holes.

- (1) Extend conduits up to either the Main Telecommunication Room (MTR). The end of the conduits shall be suitably marked and terminated at a **maximum distance of 50 mm from the wall used to mount the telecom terminals and protector units.**
- (2) Install conduits parallel or perpendicular to building grid lines.
- (3) All conduits shall be clear of any obstructions and shall meet or exceed all design requirements.
- (4) Maximum distance between building MTR and the nearest access point (manhole or pole) shall not exceed 180 M.
- (5) The contractor is to refer to applicable documentation to determinate if additional entrance conduits are required and for the proper installation method.

b. Main Telecommunication Room (MTR): is a centralized space where the telecommunications service entrance ducts terminate and where the main entrance cable from the outside plant is terminated along with its associated equipment and hardware. The following general requirements shall apply to the Main Telecom Room:

- (1) The MTR shall be located in a dry area not subjected to flooding and as close as possible aligned with the vertical backbone pathway.
- (2) Minimum room dimensions shall be 3m x 2.2m (6.6 square meters). Minimum clear height shall be 2600mm (8.5 ft). A false ceiling is not required, unless the ceiling deck above is sprayed with fire protection substance.

(3) The room shall be located a minimum of 4 meter away from sources of electromagnetic interference and at a distance which will reduce the electrical interference to 3V/m and reduce the magnetic interference @ 60Hz to 1A/m. Special attention shall be given to electrical power wiring, radio frequency (RF) sources, transformers, motors, motor control centres and relays, generators, induction heaters, photocopiers, arc welders, etc. The MTR room shall **not** be located in the electrical/mechanical room. Shared space with other building facility shall be avoided.

(4) The room shall be connected to the zone conduit and cable tray system.

(5) Minimum clear height in the room shall be 2600 mm (8.5 ft). The size of the MTR shall be determined by the amount of workable floor space and the number of individual work areas that the MTR will serve through both the backbone and horizontal cabling system. Refer to the applicable standards for details on requirements.

(6) The MTR shall be of a fully opening, lockable door design. The door shall be 915mm wide (36") and 2000mm high (80"), without a doorsill, shall be of solid core construction, shall have flat surfaces on both sides, and shall not be fitted with windows, vents or louvers. The door shall be finished / painted to match the existing décor. The door shall be hung to open **outward** using three 115mm by 115mm ball bearing hinges with non-removable pins. The door shall be fitted with a Corbin type 60 (or similar) lockset, keyed to user standards.

(7) The floor shall be tiled. The Telecommunications cable designer shall consult with the building contractor on preferred treatments, paints, or other coatings that may be applied to minimize dust and static electricity.

(8) The room shall be equipped with a minimum of two wall mounted dedicated, non-switched, 3-wire, 15 amp, 120 volt duplex powered receptacles and one wall mounted dedicated, non-switched, 3-wire, 20 amp, 120 volt duplex powered receptacles All receptacles shall be installed using single point grounding principles in accordance with Building Network Design (BND) Manual C-56-007-003/AB-001 Section 7. Location of electrical outlets **shall** be coordinated with the Design Approval Authority. Conduit installed for electrical shall, whenever possible, be installed within the walls of the MTR.

(9) The room shall be equipped with a minimum of a 300mm (12") wide **ladder type** cable tray installed around the perimeter and above the equipment racks, 2250mm (88") above finished floor (AFF). Where possible, a minimum of 300mm (12 in.) access headroom shall be provided above cable tray. A minimum distance of 300mm shall be provided between the cable tray and any sources of EMI i.e. luminaires. The location and installation of perimeter cable tray shall be coordinated with the Design Approval Authority prior to installation. Proper manufactured accessories and fittings such as elbows, reducers, crossovers, tees, wall support, connectors and risers shall be used for any installation, change in direction, height or size of the cable tray. Tray shall be supported in accordance with the manufacturer's specifications and the CEC. Bond all trays to the ground bus.

(10) All the interior walls shall be finished with rigidly fixed 19mm (3/4"), good one side plywood. The plywood is to be installed from the finished floor to a maximum height of 2440mm (8 ft) AFF. The plywood is to be painted with two coats of light-coloured non-conductive fire retardant paint. All joints, screw and nail holes are to caulked and/or covered. The walls shall be left clear for the mounting of communication equipment. The room is to be equipped with rubber baseboards. A false ceiling is not required, unless the ceiling deck above is sprayed with a fire protection substance.

(11) Lighting shall be fluorescent; a minimum of 500 lux (50 ft. candles) measured 1 meter above the floor, and mounted 2600mm (8.5 ft.) above finished floor. One or more switches located near the entrance door shall control lighting. Emergency lighting shall be properly placed as to not hamper the installation of cable racks/trays etc. and within the equipment room where absence of light would hamper an emergency exit.

(12) Provide a minimum 100mm wide x 6mm thick x 255mm long predrilled copper telecommunications main grounding bus bar (TMGB) mounted on insulated supports. The TMGB shall be variable in length and shall accommodate the bonding and grounding of all telecommunications equipment and support structures. TMGB is to be complete with standard NEMA bolthole sizing and spacing for the type of connector used. TMGB is to be mounted in proximity to the service entrance ducts.

(13) Supply, install and terminate an independent green jacketed, insulated, stranded copper ground wire (refer to the standards for the exact size), from the TMGB to the main building approved electrical ground. The ground wire shall be terminated to the approved ground and to the MTR's TMGB. Bond and ground all conduits, riser cable, cable tray, racks, etc in accordance with CEC and Manufacture's specifications. Refer to the Design Approval Authority for clarification of requirements.

(14) The MTR shall be connected to the conduit and/or the cable tray distribution system.

(15) All distribution conduits shall be terminated, bushed and reamed immediately upon entering the MTR.

(16) Pre-action sprinkler heads located in the room shall be complete with wire mesh guards to prevent accidental impact and activation. Piping to be equipped with drip trays.

(17) Piping, duct work, vents etc. not dedicated or supporting telecommunications and related equipment **shall not** be located in or pass through the MTR.

(18) Telecommunications equipment can be very sensitive to environmental conditions and typically have strict requirements for its operating environment. The MTR must either have dedicated HVAC equipment or have access to the main HVAC delivery system. The MTR shall have a climate control system with an individual control and shall meet the environmental factors such as temperature, relative humidity and heat dissipation as stated in the standards. (BICSI Telecommunications Distribution Methods Manual).

(19) Provide fire stopping of all cable pathways entering or leaving the MTR. Refer to the CFC and BICSI Telecommunications Distribution Methods Manual Chapter 22 for details.

c. Cable Tray Specifications:

(1) All cable trays shall be either ventilated or ladder type, prefabricated structure 300mm in width or greater. Ventilated tray shall be equipped with two side rails minimum height of 100mm (4 inches) and consisting of light, rugged and tubular steel or aluminium construction. Should aluminium trays be specified, the engineer is to ensure that, during the grounding or bonding aspects of the installation, the contractor uses tin-plated or zinc coated ground connectors. This practice will minimize the effect of galvanic or premature oxidation of ground connections due to dissimilar metal connection (copper and aluminium). The ventilated cable tray is to be installed in the horizontal cable distribution system such as hallways and under floor. Ladder cable tray is to be installed within the MTR/TR's and equipment rooms. Refer to the Design Approval Authority for the type of cable tray to be used in the horizontal cable distribution system and within the applicable MTR/TR's.

(2) Cable tray must be installed to meet the National and local Building codes, CEC and TIA/EIA- 569 standards. Inaccessible ceiling areas such as lock-in type ceiling tiles, drywall or plaster **shall not** be used as distribution pathways.

- (3) The installation of spine type cable tray **is not acceptable**.
- (4) Cable trays shall be located to suit the application. Also, it shall be accessible for future changes to both the cable tray and cabling system.
- (5) Support cable trays to suit loading and recommended support requirements in the Canadian Electrical Code, Part 1, for the applicable class. A support shall be placed within a maximum of 610mm on either side of any connection to a fitting.
- (6) The inside of the cable tray shall be free of burrs; sharp edges or projections, which could damage cable insulation.
- (7) All metal cable trays entering a Telecommunication Space (EF, MTR, ER and TR) shall be bonded together and to the TMGB or a TGB. For additional details, refer to TIA/EIA 607.
- (8) Cable trays shall be coated to prevent rust or galvanic action.
- (9) Proper manufactured accessories and fittings such as elbows, reducers, crossovers, tees and riser shall be used for any change in direction, height or size of the cable tray.
- (10) Cable trays shall be installed at least 300mm away from fluorescent luminaries and shall cross power cables at right angles. Provide minimum 300mm access headroom above the cable tray where practical. **“Do not”** permit other building components such as: air conditioning ducts to restrict access to trays.

d. Conduit Specifications:

- (1) All telecommunications cables shall be installed in home run conduits originating from the outlet to the cable tray system or to the applicable Telecom Room (MTR) the use of cable ties and other attachment **is not** permitted.
- (2) All conduits shall be installed in accordance with CEC, part 1 and applicable building codes. Conduit shall be rigidly fastened and adequately supported to withstand pulling tensions.
- (3) The inside radius of a bend in a conduit shall be not less than six times the internal diameter when the conduit is less than 50 mm in diameter and ten times the internal diameter when conduit is 50 mm in diameter or larger.

- (4) All conduits shall be identified and labelled at both ends. Tags shall identify start and finish of conduit runs. Pull boxes shall be labelled on the exposed exterior.
- (5) All conduits shall originate and be physically connected to the telecom backboards in the MTR, cable tray and pull box.
- (6) All metallic parts of the cable distribution supporting system shall be bonded together mechanically, including at all transition points (i.e. cable tray and distribution conduit not mechanically connected) using a 6 AWG green jacketed stranded copper ground wire. The metallic components of the cable distribution system shall be bonded together at the MTR and TR and then bonded to their respective telecom ground bus bars.
- (7) All fittings, connectors and couplings are to be steel.
- (8) All conduits/sleeves that enter the EF, MTR, ER or any TR shall be fitted with an approved ground bushing c/w ground lug and bonded together mechanically (one continuous piece preferred). This shall be connected to the approved building ground by means of a No. 6 AWG to the grounding bus bar.
- (9) All conduits entering or existing through the ceiling or walls of the MTR shall protrude into the room 25-50mm or as designated by the Design Approval Authority.
- (10) Riser sleeves in the Main Telecom Room and Telecommunication Rooms shall protrude through the floor 50-75mm above finished floor (AFF).
- (11) All conduit runs shall follow building grid lines and shall be concealed where possible.
- (12) All conduits shall be thin wall EMT, reamed and bushed at both ends and bonded to the distribution system. **Rigid PVC or flexible metallic conduits are NOT acceptable.**
- (13) Unless otherwise specified, all conduit runs shall be a maximum of 30 meters (100 ft) in length with a maximum of two 90 degree bends between pull points.
- (14) A pull box shall be placed in conduit runs where the cumulative sum of the bends exceeds 180 degrees, where the overall length of the conduit run is more than 30m, or if there is a reverse bend in the run.
- (15) Pull boxes shall be constructed in accordance with Canadian Standard Association, of code gauge steel and shall have a rust resistant finish. Each

pull box should be sized per CEC requirements and in accordance with TIA/EIA 569. The locations and sizes of all pull boxes shall be indicated on the 50% Design review submission.

(16) In all instances pull boxes shall be placed in straight sections of conduit run and **shall not** be used in lieu of a bend. Corresponding ends of the conduit are to be aligned with each other. Conduit fittings **shall not** be used in place of pull boxes or bends.

(17) Pull boxes shall be installed at a reasonable height, in an exposed location and such that access for installation of cables is not prohibited. Pull boxes shall not be placed in a fixed false ceiling space, unless immediately above a suitably marked and hinged access panel. Provide indicator decals on ceiling T-bar rail or ceiling tiles showing location of pull box or splice box.

(18) Conduit must enter the outlet boxes from the top or bottom.

(19) All conduits shall be installed in accordance with Canadian Electrical Code, Part 1 Section 12, applicable building codes and TIA/EIA- 569.

(20) The minimum size (inside diameter) for EMT conduit running between the Main Telecom Room or a Telecommunications Room and the Telecommunications outlet at an outlet location is twenty-five millimetres (25 mm). **Conduit sizes shall be indicated on the 50% design review submission.**

(21) Conduit and pull boxes shall be rigidly fastened and adequately supported to withstand pulling tension in accordance with CEC, Part 1, Section 12.

(22) To assist with the design of the horizontal telecom support infrastructure the following is provided:

a. The maximum conduit horizontal distance shall be 90 metres. This is the cable length from the mechanical termination in the MTR rooms to the Telecommunications outlet. Where the horizontal distance exceeds 90 meters, provide additional telecom rooms (TRs) as required.

b. The initial cable fill capacities of conduit, cable tray and raceway system shall not be greater than 40%.

c. Future requirements for additional UTP or fibre optics cables to each outlet shall be considered. Refer to the Design Approval Authority for any additional requirements.

- (23) A pull cord or fish tape shall be installed in all conduits.
- (24) The telecommunications outlet conduit system shall be labelled green.
- (25) Place pull boxes in readily accessible locations only.
- (26) The use of LB, LL and LR type fittings is strictly prohibited.
- (27) Conduits ending in the vicinity of a cable tray shall be terminated at a height of no less than 100mm and no more than 150mm from the top of the cable tray. Conduit runs **shall not** be punched through the side of the cable tray. Conduit ends are to be bonded to the cable tray. Installer is to ensure that the bonding cable is secured to the outside of the cable tray.

e. Sleeves Specifications:

- (1) Provide sleeves for new conduit and cable penetrations of building construction.
 - a. Openings to accept sleeves in new building construction will be formed in building construction by the Contractor for General Construction work. Openings to accept sleeves in existing building construction shall be provided under this division of the Specifications. Refer to Article, CUTTING AND PATCHING in this Section.
 - b. Use galvanized rigid conduit or intermediate metallic conduit or electrical metallic tubing or schedule 40 PVC sleeves for penetrations through exterior masonry/concrete walls and foundations, concrete floor slabs on grade and above grade, and concrete-filled decks.
 - c. Use only fire-rated listed assemblies for the type of sleeve being installed through CMU walls or gypsum walls for communications penetrations. Sleeve type shall be galvanized rigid conduit or intermediate metallic conduit or electrical metallic tubing or schedule 40 PVC
- (2) Where conduits are installed before building construction being penetrated, install sleeves loose around conduits.
 - a. Split, fit, and weld steel sleeves over existing conduits.
- (3) Secure sleeves firmly in place using filling and patching materials (grout) that match with surrounding construction.
- (4) In floor penetrations, extend sleeve 4" above finished floor unless noted otherwise. In wall penetrations, cut sleeves flush with wall surface and use metal escutcheon plates in finished interior areas.

(5) Seal voids between sleeves and building construction with joint sealants. Make allowances for and coordinate the Work with installation of firestopping, conduit insulation, and waterproofing, as applicable.

(6) The Contractor shall be fully responsible for final and correct location of sleeves.

a. Sleeves which are omitted or incorrectly located in existing building construction, shall be corrected and provided by the Communications Contractor.

f. Outlet boxes specification:

(1) All outlet boxes shall be Double gang (minimum 100mm x 100mm x 70mm deep) and, unless otherwise specified, flush mounted in all areas.

(2) Outlet boxes shall be installed in locations identified on drawings. Unless otherwise noted on the building plans, the outlet box shall be installed at 300mm AFF or at the same height and within 300mm of the adjacent electrical duplex receptacles. Wherever possible, the face of the plaster ring should be installed flush with the finished wall.

(3) Back to back outlet boxes **shall not** be used.

(4) Plaster rings or raised adapter plates shall not reduce the size of the outlet such that two additional outlets could not be added in the future.

5. Bonding And Grounding Requirements:

(1) The Telecommunications Bonding Backbone (TBB) consists of green jacketed stranded copper conductors and insulated copper buss bars. The system extends from the Building Grounding Electrode Conductor through the MTR to the TR's, within the building. The construction of the TBB is a requirement of the latest version of Treasury Board Information Technology Standard TBITS GCG10069 and TIA/EIA - 607 "Grounding and Bonding for telecommunications in Commercial Building". These publications shall be used in the design, installation, management and administration of the TBB systems in government-owned and leased buildings.

(2) All metallic parts shall be bonded together mechanically and attached to the approved building ground in accordance with the CEC, CSA and TIA/EIA standards. In all cases, the CEC shall be met or exceeded.

(3) Bonding conductors shall be continuous and routed in the shortest possible straight-line path. Any bends placed in the conductor shall be sweeping bends.

(4) Aluminium wires, clamps or terminal connectors are **unacceptable** for grounding and bonding.

(5) The following general requirements shall apply when constructing the TBB system:

a. An insulated pre-drilled copper busbar, minimum dimensions of 6mm thick x 100mm wide x 255mm long, (longer length may be required to accommodate large or future connection requirements), shall be installed on the wall of the MTR adjacent to the cable entrance conduits, 150mm from the corner of the MTR and 150mm AFF. This busbar is known as the Telecommunications Main Grounding Busbar (TMGB) and shall be insulated from its support by a minimum of 50mm.

b. An insulated pre-drilled copper busbar, minimum dimensions of 6mm thick x 50mm wide x 255mm long, (longer length may be required to accommodate large or future connection requirements), shall be installed on the wall of each TR, adjacent to the cable entrance sleeves, 150mm from the corner of the TR and 150mm AFF. These busbars are known as the Telecommunications Grounding Busbars (TGBs) and shall be insulated from its support by a minimum of 50mm.

c. A green jacketed stranded copper ground wire sized to maintain a voltage drop of less than 40 Volts under maximum short time rating. This wire shall be sized no smaller than No. 6 AWG nor larger than a 3/0 and be installed from the electrical service equipment (power) ground (main Building ground) to the TMGB in the MTR. This ground wire is known as the Bonding Conductor for Telecommunications. The Bonding Conductor for Telecommunications (BCT) may be secured to the surface of the building if not subject to physical and mechanical damage, or installed in non-ferrous conduit. If ferrous conduit, such as EMT is used, the conductors shall be bonded to each end of the conduit with a conductor minimum sized as a No. 6 AWG green jacketed stranded copper ground wire.

d. The BCT shall be connected to Telecommunications Main Grounding Busbar (TMGB). The connection to the TMGB shall be done using a 2-hole compression connector. All joints to the BCT shall be done using irreversible compression-type connectors, exothermic welding, or the equivalent.

e. The Bonding Conductor for Telecommunications (BCT) shall be connected to the service equipment (power) ground (main building ground) by qualified personnel.

- f. A green jacketed stranded copper ground wire sized the same as the Bonding Conductor for Telecommunications, shall be installed from the farthest TR, through each TR to the Bonding Conductor for Telecommunications located in the MTR. This ground wire is known as the Telecommunications Bonding Backbone (TBB). The TBB may be stapled to the surface of the building if not subject to physical and mechanical damage, under open cable tray or installed in non-ferrous conduit. If ferrous conduit, such as EMT is used, the conductors shall be bonded to each end of the conduit with a minimum 6 AWG green jacketed conductor.
- g. The TBB in each TR shall be connected to the TGB. All joints to the grounding wires shall be done using irreversible compression-type connectors, exothermic welding, or equivalent. The connection to the TGBs shall be done using 2-hole compression connectors.
- h. The TMGB in the MTR and the TGB in the TRs shall be bonded to the closest electrical panel using a No. 6 AWG green-jacketed stranded copper ground wire.
- i. The metallic components of the horizontal distribution supporting infrastructure (conduits, cable trays and ducts) shall be bonded to the to the telecommunications busbars of the MTR or TR in which they originate using a No. 6 AWG green jacketed stranded copper ground wire.
- j. A No. 6 AWG green-jacketed stranded copper ground wire shall be installed from each telecommunications busbar to the metal frame (structural steel) of buildings that are effectively grounded and whose structural steel is accessible.

6. Detailed Requirements

a. Telecommunication Spaces

- (1) Provide a 6.5m² Combination Telecommunication Room (MTR) Equipment Room (ER) at the location indicated on drawing number. Refer Gold River F&O - Space Plan March 23, 2011 Rev 6 for room physical layout.
- (2) Install 1 standard 19 inch x 72 inch pre-drill telecommunications rack no closer than 1 metre from any wall and orientated parallel to the longest wall.

- (3) Install applicable plywood back board as indicated above
- (4) Install 1 x 24 port modular RJ45 patch panel at the top of the rack and supply and install and terminate a 25 pair voice grade riser cable from this patch panel to the telecommunications provider demarcation point indicated in (5). RJ45 modular adapters shall be coloured white and labelled according to the telecom service provider's standard.
- (5) All service provider telecommunications services shall be terminated in the building entrance facility on the plywood back board using termination hardware provided by the telecommunications vendor.
- (6) Work station cross connects to the telecommunications system shall be done at the patch panel, in the MTR/ER
- (7) Install 1 x 48 port modular RJ45 patch panels below (4) leaving a minimum of 3RU between patch panels for cable management units.
- (8) Install 1 x 3RU metallic cable management units with hinged covers below each patch panel
- (9) populate the patch panels with modular adapters colour coded and labelled to match the work station locations sequentially starting at 1 (1a=blue, 1b=red, 1c=grey, etc)
- (10) Install full height 4"x6" vertical cable management unit on each side of the Telecommunications rack. The management unit will be of steel construction with a hinged metal door.
- (11) In addition to conduit required to complete the telecommunications pathway system above. Install 1 x 2" EMT conduit from the MTR extending above the cable tray to the building exterior at a location above the MTR / ER. The interior end shall be reamed, bushed, fire stopped and bonded. The exterior end shall be fitted with an appropriate weather tight "goose neck" or other suitable device
- (12) Install 1 x 6 position 120v/15 amp rack mount power block at the bottom of the Rack.

b. Telecommunication Pathway System

All cabling shall be Category 6 and all telecommunications electrical termination hardware shall be modular Keystone compliant.

- (1) Provide a vertical telecommunication support infrastructure pathway

system as indicated on drawing number (***state the drawing number***). For additional details, refer to block diagram (***state applicable figure numbers***) for vertical pathway type, size, configuration and physical layout.

(2) Provide a horizontal telecommunication support infrastructure pathway system as indicated on drawing, Gold River, F&O office Space Plan March 23, 2011 Rev 6. For additional details, refer to block diagram (***state applicable figure numbers***) for horizontal pathway type, size, configuration and physical layout.

(3) Provide a double gang telecommunication outlet box at locations indicated on drawing number Gold River, F&O office Space Plan March 23, 2011 Rev 6. Provide 3 runs of Category 6 cable terminated RJ 45 (female) to each work station indicated on the supplied drawings. Jacks shall be colour coded (Blue, Red, Grey)

(4) Each work location outlet box shall be labelled sequentially starting at 1 and each of the three RJ45 outlets shall be labelled alphabetically a,b,c (a = Blue, b=Red, c=Grey) corresponding to item 6 a (9) above

7. Firestopping

a. Firestopping Material:

(1) Products may be in the form of caulk, putty, strip, sheet, or devices that shall be specifically designed to fill holes, spaces, and voids (hereinafter referenced as cavities) at communications penetrations. Firestopping materials shall also provide adhesion to substrates and maintain fire and smoke seal under normal expected movements of substrates, conduits, and cables.

b. Firestopping General:

(1) New and existing raceways, cable trays, and cables for power, data, and communications systems penetrating non-rated and fire-rated floors, walls, and other partitions of building construction shall be firestopped where they penetrate new or existing building construction.

(2) Firestopping shall be accomplished by using a combination of materials and devices, including penetrating raceway, cable tray, or cables, required to make up complete firestop.

(3) Verify that cabling and other penetrating elements and supporting devices have been completely installed and temporary lines and cables have been removed.

c. Firestopping Installation

(1) Select appropriate type or types of through penetration firestop devices or systems appropriate for each type of communications penetration and base each selection on criteria specified herein.

(2) Selected systems shall not be less than the hourly time delay ratings indicated in the Contract Documents for each respective fire-rated floor, wall, or other partition of building construction. Firestop for each type of communications penetration shall conform to requirements of an independent testing laboratory design drawing or manufacturer's approved modification when used in conjunction with details shown on the Drawings.

(3) Perform all necessary coordination with trades constructing floors, walls, or other partitions of building construction with respect to size and shape of each opening to be constructed and device or system approved for use in each instance.

(4) Coordinate each firestop selection with adjacent Work for dimensional or other interference and for feasibility. In areas accessible to public and other "finished" areas, firestop systems Work shall be selected, installed, and finished to the quality of adjacent surfaces of building construction being penetrated.

(5) Use materials that have no irritating or objectionable odours when firestopping is required in existing buildings and areas that are occupied.

(6) Provide damming materials, plates, wires, restricting collars, and devices necessary for proper installation of firestopping. Remove combustible installation aids after firestopping material has cured.

(7) All firestops shall be installed in accordance with the manufacturer's instructions in order to maintain the specific rating assigned by the independent testing laboratory.

d. Additional requirements for existing penetrations are as follows:

(1) Existing raceways, cable trays, and cabling that penetrate existing building construction shall be firestopped to the extent necessary to fill cavities that may exist between existing building construction and existing communications penetrations or existing conduit sleeve, and between existing conduits and existing conduit sleeve.

(2) Assemblies consisting of individual steel hat type restricting collars filled with intumescent type materials that completely surround communications penetration shall be used for non-metallic raceways and cabling.

e. If required by inspecting authorities:

(1) Expose and remove firestopping to the extent directed by inspecting authority to permit his or her inspection.

(2) Reinstall new firestopping and restore Work where removed for inspection.

8. Materials

a. Unless otherwise specified, only use new materials.

b. Unless otherwise specified, comply with manufacturers' latest printed instructions for materials and installation method to be used.

c. Fastenings – Prevent electrolytic action between dissimilar metals.

9. Restoration

a. Prior to commencement of work, conduct a condition survey with Engineer of existing buildings, equipment or facilities, which may be affected by work of this contract. Engineer to note any existing damage in writing to relieve the contractor of responsibility for such damage other than that indicated for repair in the contract documents.

b. The Contractor is responsible to make good, to the satisfaction of the Engineer, any damage caused to the property resulting either directly or indirectly from work done on this contract at no additional cost to the contracting agency.

c. Clean and reinstate areas affected by work as directed by Engineer.

10. Submittals:

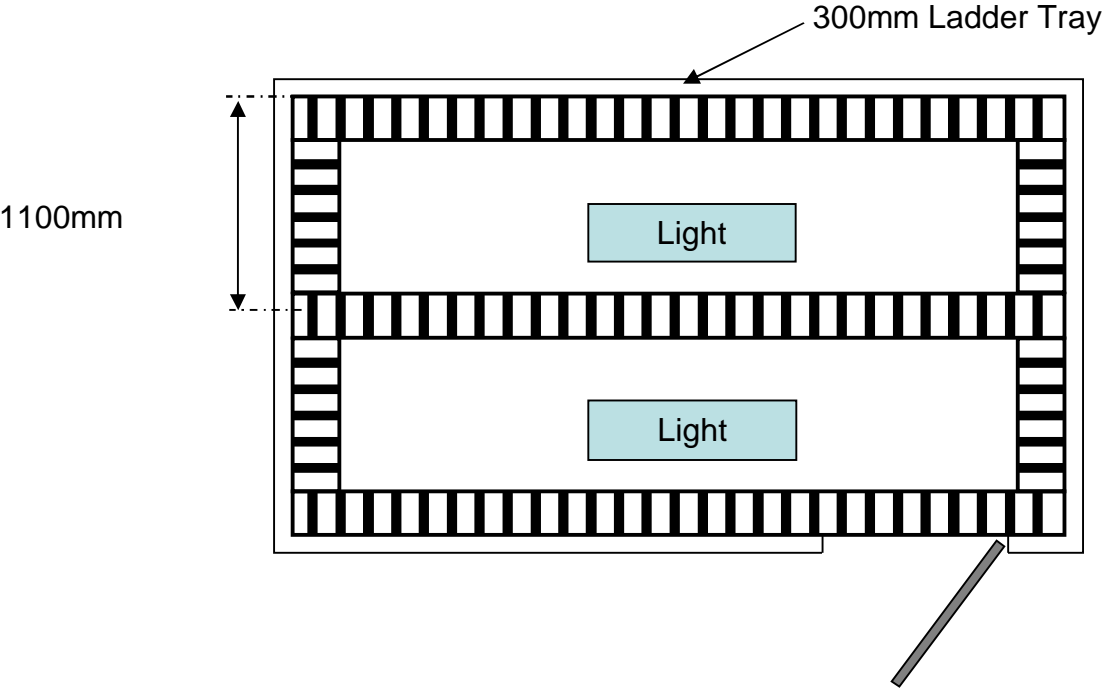
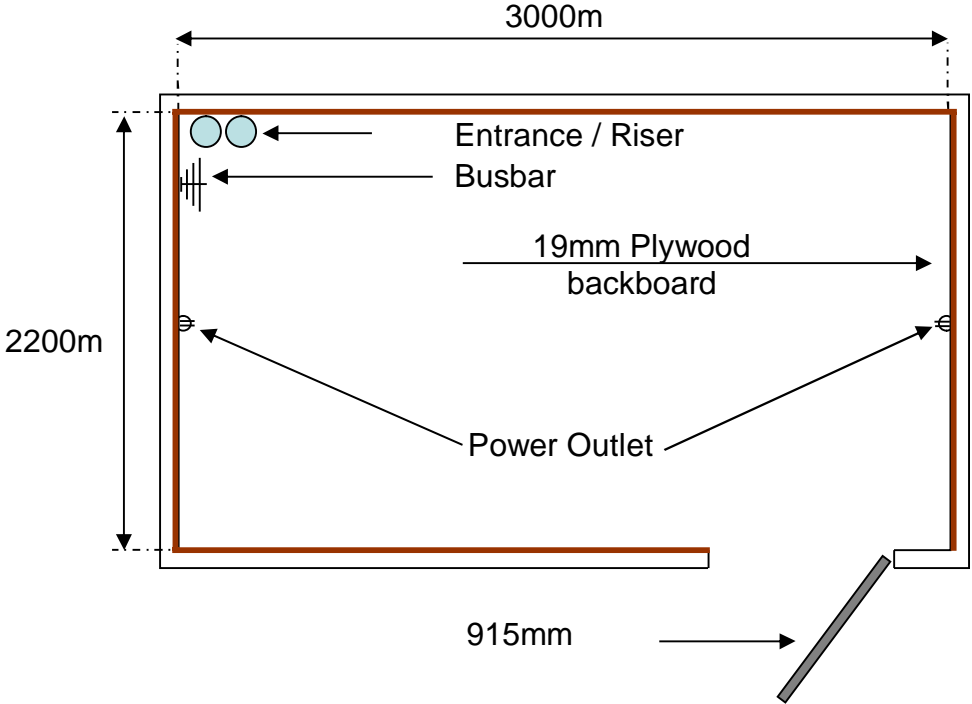
a. Submit approved shop drawings for record purposes. Include a riser diagram.

b. Submit plan drawings indicating the approved locations and identification of work area outlets, the location and size of cable pathways (conduit, pull box, sleeve and raceway runs) and the location of Telecom Rooms (MTR, TR, ER, or EF).

- c. An Electronic copy of the approved and complete Telecommunications Design Plan drawings is to be submitted in AutoCAD format (latest version).
 - d. Submit block diagrams detailing the approved zone pathway system originating from individual Telecom Room and terminating at outlet location.
 - e. Submit all test and verification reports.
11. Operations and Maintenance Manuals:
- a. Provide maintenance details including:
 - b. Copies of approved shop drawings;
 - c. List of spare parts and supplies; and
 - d. Test and verification reports.
12. Commissioning:
- a. Systems supplied shall be tested, verified and put into operation complete with all necessary training.
13. Point Of Contact
- a. For technical assistance, please contact

*Stephen Lingard, Fisheries and Oceans Canada,
Phone: 604-666-7086,
Email: Stephen.Lingard@dfo-mpo.gc.ca*

Typical Telecommunication Space (EF, MTR and TR) Layout



Typical Vertical Conduit Block Diagram

