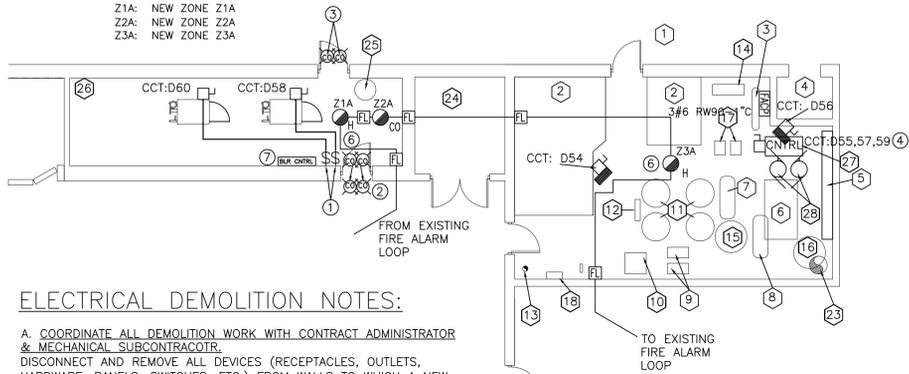


NEW FIRE ALARM ZONES:
Z1A: NEW ZONE Z1A
Z2A: NEW ZONE Z2A
Z3A: NEW ZONE Z3A



ELECTRICAL DEMOLITION NOTES:

- COORDINATE ALL DEMOLITION WORK WITH CONTRACT ADMINISTRATOR & MECHANICAL SUBCONTRACTOR. DISCONNECT AND REMOVE ALL DEVICES (RECEPTACLES, OUTLETS, HARDWARE, PANELS, SWITCHES, ETC.) FROM WALLS TO WHICH A NEW SURFACE IS BEING APPLIED AND WALLS THAT ARE BEING DEMOLISHED. RELOCATE THESE DEVICES IF THEY ARE IN GOOD CONDITION AND REPLACE THEM WITH NEW DEVICES EQUIVALENT TO THE EXISTING IF THEY ARE NOT, AND CONNECT TO SAME CIRCUIT AS ORIGINAL DEVICES.
- THE DRAWINGS INDICATE MAJOR ITEMS OF EQUIPMENT TO BE REMOVED, RELOCATED OR REPLACED BUT MAY NOT INDICATE EVERY ITEM OF EQUIPMENT TO BE REMOVED, RELOCATED OR REPLACED.
- PROVIDE PROTECTION FOR EXISTING ELECTRICAL EQUIPMENT THAT IS NOT BEING REMOVED OR RELOCATED. ARRANGE TO PAY FOR HAND DEMOLITION AND REPAIR OF EXISTING FLOOR AND WALLS AROUND THIS EQUIPMENT.
- PROVIDE TEMPORARY PROTECTION FROM DEMOLITION, CONSTRUCTION AND DUST FOR ALL EXISTING FIRE ALARM DEVICES. WHERE IT IS NECESSARY TO MOVE OR TEMPORARILY DISCONNECT FIRE ALARM DEVICES, RECONNECT AND REVERIFY THEM ONCE OTHER WORK IS DONE.
- WHERE REMOVAL OF CONDUIT FROM WALLS OR CEILING THAT IS BEING DEMOLISHED AFFECTS ELECTRICAL EQUIPMENT THAT IS TO REMAIN, PROVIDE NEW CONDUCTORS AND RECONNECT EQUIPMENT AS REQUIRED. COORDINATE ROUTING OF NEW CONDUIT ON SITE.
- BEFORE CONTRACTOR DEMOLISHES WALLS OR CEILING, CONFIRM THAT THERE ARE NO CONDUITS OR CONDUCTORS PASSING THROUGH THE STRUCTURE THAT IS TO BE DEMOLISHED THAT FEED ELECTRICAL LOADS THAT ARE NOT BEING MOVED OR DEMOLISHED. IF THERE ARE, REROUTE THEM AND EXTEND OR TRIM CONDUIT/CONDUCTORS AS REQUIRED TO MAINTAIN FEEDS TO LOADS.

A NEW ROOM LAYOUT BOILER PLAN
SCALE: 1/8"=1'-0"

DRAWING NOTES

- PROVIDE 2 NEW BOILER SHUT OFF SWITCHES C/W RED COVER PLATE & LAMACOID LABEL INDICATING: BOILER EMERGENCY SHUT OFF. CCT NEW BOILER TO EXISTING PANEL "D" IP20 = CCT D60 & D58
- RELOCATE AMBER AND RED EXISTING WARNING LIGHTS FROM INSIDE DOOR AS SHOWN TO NEW LOCATION AS SHOWN UNDER DOOR AREA. EXTEND FEEDERS, CONDUIT AS REQUIRED.
- NEW EXTERIOR RATED ALARM LIGHTS CONNECTED TO EXISTING GAS DETECTION SYSTEM IN PARALLEL TO EXISTING WARNING LIGHTS. EC TO MATCH NEW LIGHTS TO EXISTING AND MUST BE IDENTICAL FOR EXTERIOR DAMP LOCATION.
- P-1 & P-2; SUPPLY & INSTALL NEW 3P60; CCT D55,57,59; & 3#6 RW90-1" C
- AS PER LATEST EDITION OF MBC ARTICLE 3.2.4.2 CARBON MONOXIDE ALARMS - OTHER OCCUPANCIES. INSTALL A CARBON MONOXIDE ALARM AND DETECTION SYSTEM IN CONFORMANCE WITH NFPA-720 STANDARD INSTALLATION OF CARBON MONOXIDE (CO) DETECTION AND WARNING EQUIPMENT, & BE INTERCONNECTED TO THE FIRE ALARM SYSTEM WHERE A FIRE ALARM IS REQUIRED UNDER ARTICLE 3.2.4.1. ELECTRICAL SUBCONTRACTOR TO COORDINATE, FACILITATE AND USE THE SAME FIRE ALARM WARRANTEE APPROVED CONTRACTOR THAT UPGRADED THE FIRE ALARM SYSTEM IN THE 2013 BUILDING RENOVATION. IT IS OUR UNDERSTANDING THAT THESE CONTRACTORS WERE LOEWAN MECHANICAL & JOHNSON CONTROLS. THE WARRANTEE OF THE NEW FIRE ALARM SYSTEM IS TO NOT BE IMPACTED WITH THIS ADDITION.
- FIRE ALARM SYSTEM; INSTALL FIXED TEMP HEAT DETECTORS & CO DETECTOR.
- PROVIDE ALL DEVICES TO BE COMPATIBLE WITH EXISTING FIRE ALARM SYSTEM. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, INITIATING DEVICES, ALARM NOTIFICATION APPLIANCES, CONTROL PANEL, AUXILIARY CONTROL DEVICES, ANNUNCIATOR AND WIRING AS INDICATED ON DRAWINGS AND SPECIFIED HEREIN. THE FIRE ALARM SYSTEM SHALL COMPLY WITH CAN/ULC STANDARDS.
- ALL RELOCATED/REPLACED FIRE ALARM EQUIPMENT SHALL BE TO MATCH EXISTING AND SHALL BE TESTED AND PARTIAL FIRE ALARM VERIFICATION AS PER THE CURRENT EDITION OF CAN/ULC-5537-M AND VERIFICATION SHALL BE PERFORMED IN THE PRESENCE OF THE CONSULTANT. COPIES OF THE VERIFICATION CERTIFICATE SHALL BE SUBMITTED TO THE CONSULTANT AT THE COMPLETION OF THE PROJECT.
- SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH SECTION 1.08.
- UPON ACTIVATION OF ANY INITIATING DEVICE THE SYSTEM SHALL PROVIDE THREE SCANS OF THE INITIATING LOOP(S) TO ENSURE THAT THE DEVICE(S) ARE IN AN ALARM STATE AND ONCE THIS IS CONFIRMED IT SHALL CAUSE ALL SIGNAL APPLIANCES TO SOUND IN AN ALARM STATE. THE SIGNAL CIRCUITS CAN BE SILENCED AT THE FACP OR REMOTE ANNUNCIATOR, BUT SHOULD A SUBSEQUENT ALARM BE RECEIVED THE SYSTEM SHALL CAUSE THE SIGNAL APPLIANCES TO SOUND IN AN ALARM STATE.
- INSTALLATION OF THE FIRE ALARM EQUIPMENT SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF CAN/ULC-5524-M06 AND ALL LOCAL REGULATIONS AND AUTHORITIES.
- THE COMPLETE INSTALLATION OF THE FIRE ALARM EQUIPMENT SHALL BE TESTED IN CONFORMANCE WITH THE CURRENT EDITION OF CAN/ULC-5537-M06 AND SHALL BE PERFORMED IN THE PRESENCE OF THE CONTRACT ADMINISTRATOR. COPIES OF THE VERIFICATION CERTIFICATE SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR AND SHALL BE INCLUDED IN THE MAINTENANCE MANUALS.
- PROVIDE POWER FOR AERO BOILER MANAGEMENT SYSTEM II MODULE ZRS-384 C/W SECONDARY DISCONNECT; COORDINATE ON SITE WITH MECHANICAL DETAILS FOR UNIT LOCATION & POWER TO A SINGLE POINT CONNECTION REQUIREMENT. CONTROL DEVICE AND CONTROL WIRING BY DIV. 15. MECHANICAL CONTROL LOCATION BY DIV. 15. LOCATION IS REPRESENTATIVE ONLY-CONFIRM EXACT LOCATION WITH DIV. 15. MECHANICAL SUBCONTRACTOR.

ROOM LAYOUT

- OUTSIDE
- EXISTING AHU
- EXISTING H/X
- EXISTING CHLORINE ROOM
- EXISTING ELECTRICAL PANELS
- EXISTING BOILER
- HVAC HEAT EXCHANGER IN JOIST SPACE
- EXISTING BOILER SYSTEM EXPANSION TANK IN JOIST SPACE
- EXISTING PUMPS
- POOL RETURN PUMP
- EXISTING POOL FILTERS
- CONTROL PANEL
- POOL SUPPLY PIPE
- AIR COMPRESSOR C/W RERIG. DRYER
- EXISTING DHW HEATER
- EXISTING DHW STORAGE TANK
- EXISTING BOILER LOOP PUMPS
- EXISTING DISCONNECT SWITCH
- EXISTING PANEL "E"
- EXISTING PANEL "D"
- EXISTING PANEL "A"
- EXISTING PANEL "B"
- EXIST. STACK FROM BOILER & DHW HEATER
- STORAGE
- EXISTING CO2 STORAGE
- MAINTENANCE & STORAGE ROOM
- NEW LEAD/LAG PUMP CONTROLLER BY DIV. 15
- NEW PUMP 1 & 2 (CONFIRM EXACT LOCATION WITH DIV. 15)

GENERAL NOTES:

- ALL CONTROLS, CONTROL WIRING SUPPLIED & INSTALLED BY DIV. 15 MECHANICAL

SYMBOL LEGEND

- EXISTING WARNING LIGHTS
- DISCONNECT SWITCH-WP
- CEILING MOUNT UNIT HEATER
- 125V/15A/1P SWITCH
- MAGNETIC MOTOR STARTER-SIZE1 -C/W HOA/PL-CEM41
- MOTOR OUTLET
- ANALOG FIXED HIGH TEMP HEAT DETECTOR
- FAULT LOOP ISOLATOR
- (EXISTING)ADDRESSABLE FIRE ALARM CONTROL PANEL (FACP)
- ANALOG CO DETECTOR

PANEL SCHEDULE						
PANEL #	EXISTING "D"	PANEL TYPE	60 CCT STAB LOCK			
MOUNTING SURFACE	VOLTAGE		120/208			
TOTAL LOAD	EXISTING	PHASE:	3ø 4W			
FED FROM	EXISTING SPLITTER (MECHANICAL ROOM)	MAIN BREAKER	EXISTING			
FEEDER	EXISTING					
NOTES						
WATTS	DESCRIPTION	No	C/B	No	DESCRIPTION	WATTS
-	EXISTING	1		2	EXISTING	-
-	EXISTING	3		4	EXISTING	-
-	EXISTING	5		6	EXISTING	-
-	EXISTING	7		8	EXISTING	-
-	EXISTING	9		10	EXISTING	-
-	EXISTING	11		12	EXISTING	-
-	EXISTING	13		14	EXISTING	-
-	EXISTING	15		16	EXISTING	-
-	EXISTING	17		18	EXISTING	-
-	EXISTING	19		20	EXISTING	-
-	EXISTING	21		22	EXISTING	-
-	EXISTING	23		24	EXISTING	-
-	EXISTING	25		26	EXISTING	-
-	EXISTING	27		28	EXISTING	-
-	EXISTING	29		30	EXISTING	-
-	EXISTING	31		32	EXISTING	-
-	EXISTING	33		34	EXISTING	-
-	EXISTING	35		36	EXISTING	-
-	EXISTING	37		38	EXISTING	-
-	EXISTING	39		40	EXISTING	-
-	SPACE	41		42	EXISTING	-
-	SPACE	43		44	EXISTING	-
-	SPACE	45		46	SPACE	-
-	SPACE	47		48	SPACE	-
-	SPACE	49		50	SPACE	-
-	SPACE	51		52	SPACE	-
500W	MODULE SR5-348, & ***	53	15	154	NEW UNIT HEATER	750W
3333W	P1, P2, * & ***	55	3P	156	NEW UNIT HEATER	750W
3333W		57	20	58	BOILER, *** & ****	1.8kW
3333W		59	60	20	BOILER, *** & ****	1.8kW

- * PROVIDE 3#6-1" C
- ** HATCHING/SHADED AREA DENOTES EXISTING LOADS
- *** PROVIDE MATCHING DISCONNECT SWITCH AS PER MFR RECOMMENDATION & AS PER LATEST EDITION C.E.C
- **** PROVIDE EMERGENCY SHUT OFF SWITCH & WIRE AS PER MFR RECOMMENDATIONS AS PER LATEST EDITION C.E.C
- INSTALL SUIT INSTALLATION ENVIRONMENT. SEE DRAWING NOTE 1.

DO NOT SCALE DRAWINGS. ELECTRICAL SUBCONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS, AND/OR ACTUAL SITE CONDITIONS. ALL DIMENSIONS TO BE CONFIRMED ON SITE.

PART 1: ELECTRICAL SPECIFICATION GENERAL CONDITIONS

- GENERAL**
 - The specification covering the General Conditions of the CONTRACT, General Specifications, and all associated sections form an integral part of this specification and shall be read in conjunction herewith.
 - The electrical installation shall be in accordance with the current edition of the Canadian Electrical Code CSA 22.1, local jurisdiction having authority and/or City of Winnipeg and other codes, rules and regulations. Supply material and labour required to meet the requirements of these codes, rules and regulations even though the work is not shown on the drawings or mentioned in the specifications. Where the electrical installation calls for better quality materials or construction than the minimum of these codes, rules and regulations, the electrical installation shall be as shown on the drawings and as specified.
 - The electrical installation shall be in accordance with the requirements of the electrical supply authority and local inspection authority.
- SCOPE**
 - Provide all materials, labour, plant and equipment required for a complete and working installation and as shown and detailed on drawings.
 - The electrical installation shall be in accordance with the current edition of the Canadian Electrical Code and local regulations.
 - Obtain all permits, approvals and pay all fees required for installation. Electrical subcontractor shall obtain and provide a copy of the electrical inspection certificate from authority having jurisdiction and provide a copy to contract administrator.
 - All equipment supplied under this contract shall be new and be CSA approved.
 - Arrange for, and coordinate, rough-in and final inspections with the Inspection Authority having jurisdiction, Contract Administrator and Local Authorities.
 - Electrical subcontractor to take peak current reading of existing panel "D" when all electrical equipment operating to maximum capacity. This to be completed prior to rough in. Submit report to Contract Administrator for review.
- WORK INCLUDED**
 - Refer to detailed Scope of WORK as detailed on drawings.
 - All electrical power and miscellaneous wiring and make all connections as indicated.
 - Provide all lighting and control equipment as indicated and make all connections.
- EXAMINATION**
 - Prior to submitting a tender, the Electrical subcontractor shall examine all drawings and specifications of other disciplines to ensure that the WORK under this CONTRACT can be satisfactorily carried out. Report any discrepancies to the Contract Administrator prior to installation of equipment.
 - Prior to submitting a bid, the Electrical subcontractor shall examine the SITE, local conditions and all existing apparatus if any is to be re-used and verify that the condition of this equipment is suitable for its intended use in the new construction. Report any discrepancies to the Contract Administrator prior to commencing any WORK. Claims for extra payments resulting from conditions which could be reasonably foreseen from examination of the documents and/or site will not be recognized.
- SUPERVISION**
 - Supervise the WORK at all times through a responsible and competent supervisor.
 - Full cooperation shall be shown with other trades to facilitate installations and to avoid delays in carrying out the work.
- 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 foot 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 drawings. Conduit and cable runs may be modified to suit installation.
- APPROVAL OF MATERIAL**
 - Electrical subcontractor shall submit a bid based on the specified materials and equipment only.
- SHOP DRAWINGS**
 - Submit electronic legible pdf format of shop drawings of electrical equipment to the Contract Administrator for review. Send shop drawings to: info@sumitech.ca. Fabrication of equipment shall not commence until shop drawings of such equipment have been reviewed by the Contract Administrator. One set shall be submitted with Local Inspection Department approval where required.
 - Include details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material. Where applicable, include wiring, single line and schematic diagrams.
 - Submit shop drawings of service equipment to Supply Authority.
- PROJECT RECORD DOCUMENTS**
 - Keep a record set of drawings on the site at all times recording any changes that may occur.
 - Project record documents shall be transferred to electronic AutoCAD file format. The Electrical subcontractor shall be responsible for the production of electrical "as-constructed" drawings which shall provide a complete and accurate record of the actual electrical installation. The Electrical subcontractor shall stamp, sign and date these drawings as "Record Drawings". Submit one disk and hard copy for final review and submission to the Contract Administrator upon completion. Record documents that are incomplete shall be returned to the Electrical Subcontractor for correction. The Contract Administrator shall recommend a suitable deficiency holdback until such time as the Record Drawings are submitted in an acceptable form.
 - Indicate on the record drawings the exact location of underground services referenced to established survey benchmarks.
- OPERATION AND MAINTENANCE MANUALS**
 - Provide three (3) bound copies of catalogue sheets and maintenance materials for complete installation. Submit to Contract Administrator for review upon completion of project. Include Certificate of Electrical Inspection in manuals. Manuals that are incomplete shall be returned to the Electrical subcontractor for completion. Completed manuals shall be submitted, to the satisfaction of the Contract Administrator, before final payment may be considered to be due.
 - Include details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.
 - Include technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items and parts lists. Advertising or sales literature will not be acceptable.
 - Include wiring and schematic diagrams and breaker curves.
 - Include names and addresses of local suppliers for items included in Maintenance Manuals.
- TESTS**
 - The electrical installation shall be completely tested demonstrating that the equipment and systems installed perform in the manner intended.
 - Conduct and pay for tests including, but not limited to, the following systems: Circuits originating from branch distribution panels; Grounding systems; Power Generation System.
 - Carry out tests in presence of Contract Administrator where directed.
 - Check resistance to ground before energizing.
- VOLTAGE RATINGS**
 - Operating voltages to CAN3-C235-83.
 - Motors, electrical heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment shall operate in extreme operating conditions established in above standard without damage to equipment.
- INSPECTION**
 - Furnish a Certificate of Acceptance from the Inspection Authorities on completion of work. Copies of certificate shall be included in the Maintenance Manuals. This Certificate shall be submitted before final payment may be considered to be due.
 - During the course of the project construction, the Contract Administrator will carry out periodic site reviews and prepare a deficiency list for remedial action

by the Electrical subcontractor.

15. CARE, OPERATION AND START-UP

- Instruct the City's operating personnel in the operation, care and maintenance of equipment. Arrangement of such instructional sessions shall be done at a time convenient to the City.
- Arrange and pay for services of Manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.
- Provide these services for such a period and for as many visits as necessary to put equipment into operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

16. FINISHES

- Point indoor switchgear and distribution enclosures light grey to EEMAC-2Y-1. Outdoor electrical equipment enclosures shall be painted "equipment green" to EEMAC-2Y-1.
- Clean and touch up surfaces of shop-painted, scratched or marred during shipment or installation, to match original paint.
- Clean, prime and point exposed hangers, racks, fastenings to prevent rusting.

17. EQUIPMENT IDENTIFICATION

- Identify electrical equipment with lamiconid nameplates.
- Identify circuit numbers on receptacles with "BRADY" Globemark tape.
- Provide lamiconid nameplates, 1/8" thick plastic engraving sheet, black with white core, mechanically attached (screwed or riveted) unless otherwise specified. Sizes 4" wide x 3" high.
- All equipment shall be approved prior to manufacture. Submit schedule of nameplates and wording.
- Allow for average of thirty-five (35) letters per nameplate.
- Identification shall be English.
- Complete identification of terminal cabinets and junction boxes shall indicate system and/or voltage characteristics.
- Use red nameplates with white lettering for emergency power.

18. LOCATIONS OF OUTLETS

- Outlet locations shall be reviewed on site with the City and Contract administrator prior to installation.
- Do not install outlets back-to-back in wall; allow minimum 16" horizontal clearance between boxes.
- Drawings are schematic only and do not indicate all architectural or structural elements.
- Change location of outlets at no extra cost or credit, providing distance does not exceed 10'-0" and information is provided prior to rough-in.
- Locate light switches on latch side of doors.

19. MOUNTING

- Mounting height of equipment is from the finished floor to the centerline of equipment unless specified or indicated otherwise.
- If mounting height of equipment is not indicated, verify with Contract administrator before proceeding with installation.
- Install electrical equipment at the following heights unless indicated or directed otherwise (to centre of outlet):
- General receptacles shall be mounted at 16" in vertical orientation.
- Panelboards : 78" to top.
- Floor mounted distribution equipment shall be mounted on a 4" concrete housekeeping pad extending at least 6" in front of equipment. The Electrical subcontractor shall be responsible for provision of these pads.

20. PROTECTION

- Protect exposed live equipment during construction for personnel safety.
- Shield and mark live parts "LIVE (_____) VOLTS", with appropriate voltage in English.
- Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision.
- Provide wire guards for all electrical equipment in areas subject to damage.

21. FIREPROOFING

- Where cables or conduits pass through floors, block or concrete walls and fire-rated walls, seal openings with fire-stopping material with intumescent properties.
- Fire proofing of electrical cables, conduits, trays, etc. passing through fire barriers shall conform to local codes and inspection authorities.
- Fire Stop materials shall be asbestos free and have been tested in accordance with ASTM E-84 and E-814 and ULC-1479.
- Approved Manufacturer: Nelson Firestop Products or Spec Seal.

22. CLEANING

- Do final cleaning in accordance with General Conditions.
- At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dirt and dust.
- Clean interiors of all panels.

23. DELIVERY, STORAGE AND HANDLING

- Co-ordinate all deliveries with on site supervisor prior to delivery.
- Deliver all materials to site in an orderly fashion.
- Store all materials in a clean and dry place, secure from vandalism or theft. All materials shall be left in shipping containers until required for use.
- Motor wiring - RW90 wiring in Liquid Light flux conduit or Teck 90. Where such is required to ensure protection of equipment.

24. SPARE PARTS

- The City/Contract Administrator to review and confirm spare breakers are provided as indicated on drawings upon completion of work.

25. 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 for the change. Contract Administrator shall reserve the right to review costing using accepted electrical subcontractor's Pricing Standards.

26. GROUNDING

- The entire installation shall be grounded in accordance with the Canadian Electrical Code.

27. WORKMANSHIP

- Install equipment, conduit and cables in a workmanlike manner to present a neat appearance to the satisfaction of the Contract Administrator. Install conduit and cable runs secure and perpendicular to building lines.
- Install neatly and group to present a tidy appearance. Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with adequate clearances and accessibility.
- Use the same size all requirements shown on the shop drawings or manufacturer's installation instructions. Replace work unsatisfactory to the Contract Administrator without extra cost.
- All conduit and cables must be clipped to structure by means of anchors or supported by Unistrut hangers as close to U/S as possible. Tie wraps for wire hanging or fastening is not acceptable, unless pre-authorized by the City and acceptable to Canadian Electrical Code. Perforated strapping is also unacceptable.

28. WORK IN EXISTING BUILDINGS

- Where existing systems such as electrical power, telephone, fire alarm, etc. are required to be disrupted and/or shutdown, coordinate the shutdowns with the City and carry out work at a time and in a manner acceptable to them. Carefully schedule all disruptions and/or shutdowns and ensure that the duration is kept to a minimum. Submit for approval, a written schedule of each disruption at least one week in advance of performing work and obtain the City's written consent prior to implementing.
- Should any connections be required to maintain services during work in the existing building, supply and install all necessary material and portable power equipment and provide all labour at no extra cost. Should any existing system be damaged, make full repairs without extra cost, and to the satisfaction of the City.

29. CASH ALLOWANCES

- Refer to General Conditions.

30. GUARANTEE

- The satisfactory operation of all work shall be guaranteed for a period of 12 calendar months after final acceptance of work.

PART 2 MATERIALS AND INSTALLATION

1. WIRING METHODS

- Conduits -
 - Rigid galvanized steel threaded conduit size as indicated.
 - Electrical metallic tubing (EMT) size as indicated.
 - Rigid PVC conduit on sheet metal boxes.
 - Flexible metal conduit (Flex) size as indicated.
 - Liquid-tite flexible metal conduit (Seal-tite) size as indicated.
- Conduit fastenings -
 - Two hole steel straps to secure surface conduits.
 - Beam clamps to secure conduits to exposed steel work.
 - Uni-strut channel type support for two or more conduits, surface or suspended.
 - 4 3/8" diameter threaded rods to support suspended channels.

2. CONDUIT FITTINGS

- Fittings manufactured for use with conduit specified.
- Manufactured elbows are required for conduits 2 1/2" or larger.
- Cost cast set screw connectors and couplings. Insulated throat liners on connectors.
- Right-angle connectors with O-rings for weatherproof or sprinklerproof applications.
- Expansion fittings with internal bonding jumper where required.

- Install conduits to conserve head room in exposed locations and cause minimum interference in spaces through which they pass. Conceal conduits, wherever possible, except in mechanical and service rooms. Surface conduit installations in finished areas shall be reviewed by Contract Administrator and the City prior to installation.
- Wiring home runs to panels and main branch wiring in ceiling spaces shall be run in conduit. Wiring drops from conduit systems into boxes for wiring devices in steel stud partitions may be wired in AC-90. Drops may not exceed 6 feet from box to partition.

- Use flexible metal conduit for transformers, motors or other equipment subject to vibration. Provide separate insulated grounding conductor within flexible conduit.
- Use rigid PVC conduit for underground services and installations. Provide separate insulated grounding conductor within PVC conduit.
- Bend conduit cold and replace conduit if kinked or flattened more than one-tenth of its original diameter. Dry conduits out before installing wire. Install polypropylene fish cord in empty conduits.
- Install two 1" spare conduits up to ceiling space above surface or recessed panels and terminated in 6"x6"x4" junction boxes. Where ceiling is exposed mount junction boxes on wall at 24" above panel top. Not required for suite loadcenters.

- Conduit Identification - Colour code coverplates of junction boxes in conduit systems as per the colour code listed below. Colour code by spray painting the coverplate on each junction box in conduit run. In addition to colour coding coverplates on junction boxes with power wiring, the circuits being run in the box shall be identified on the inside of the coverplate with permanent felt marker.
- 120/208V Normal Power: yellow
- 120/208V Emergency Power: fluorescent red
- 347/600V Normal Power: orange
- 347/600V Emergency Power: fluorescent orange
- Fire Alarm: red
- Ground: green

- Conductors in conduit - type RW90, solid copper #10 AWG or smaller, stranded copper #8 AWG or larger, minimum #12 AWG, cross link polyethylene (XLPE) 90 deg C, 1000V.
- 2 hour rated conductors in conduit - stranded copper Dura Lifetime RHW two hour rated conductors sized as indicated. Provide cable support every 50 feet of vertical run in conduit with Kellom grid in junction box. Electrical Subcontractor shall verify with authority having jurisdiction to confirm and verify type of feeders required prior to ordering and installation. Failure to do so does not constitute any extra costs to building owner/client.
- Armoured cable - type AC-90 (B/X) - solid copper #10 AWG or smaller, stranded copper #8 AWG or larger, minimum #14 in cables and #12 AWG in balance of facility, cross link polyethylene (XLPE), 90 deg C, 1000V, multi-conductor as required C/w bare CU ground wire, bare interlocked aluminum armour.
- Armoured Cable (Teck) - type Teck 90, solid copper #10 AWG or smaller, stranded copper #8 AWG or larger, minimum #12 AWG, cross link polyethylene (XLPE) 90 deg C, 1000V, multi-conductor as required C/w bare CU ground wire, inner jacket black PVC, armour interlocked aluminum, outer jacket black PVC with FT-4 flame spread rating. Wires to be colour coded black, red, blue and white in 4/C cable and numbered in cables of more than 4/C. Aluminium ACWU or aluminum Teck may be permitted for feeders larger than 150A.
- Fire alarm cable - FAS type cable (Securex) - Solid copper #16 or #18 AWG, multi-conductor (minimum of 4/C), 300V, colour coded, 105 deg C flame retardant PVC red jacketed.

P. Wiring Methods

- Service entrance feeders - parallel or single runs of ACWU C/w ground wire.
- CDP panel and panelboard feeders - parallel or single runs of RW90 wire in EMT conduit.
- Branch circuit or parallel or single runs of multi-conductor Teck cable.
- Branch wiring home runs - RW90 wire in EMT conduit.
- Branch circuit wiring concealed - AC90.
- Branch circuit wiring surface - RW90 wire in EMT conduit.
- Transfermer wiring - RW90 wiring in Flex conduit or Teck 90.
- Motor wiring - RW90 wiring in Liquid Light flux conduit or Teck 90.
- Fire Alarm wiring - Multi-conductor Securex in EMT conduit or Multi-conductor armoured Securex where permitted.

2. FASTENINGS AND SUPPORTS

- U-shape, galvanized steel uni-strut, sized 1.6" x 1.6" x 0.1" thick, surface mounted, suspended or set in poured concrete walls and ceiling as required. Acceptable manufacturers: Burnly, Electrowest, Unistrut, Pilgrim or Purley.
- Secure surface mounted equipment, conduit or cables on uni-strut channels using clips, spring bolts and nuts and cable clamps designed as accessories to basic channel members.
- Support suspended uni-strut channels with minimum 3/8" threaded rod hangers directly to building structure where possible.
- Secure equipment to solid masonry, tile and plaster surfaces with lead anchors or nylon shields.
- Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.