PART	1: ELECTRICAL SPECIFICATION GENERAL CONDITIONS	5.	Power Generation System.	, ,	to ensure protection of equipm
1.	GENERAL	C. D.	Carry out tests in presence of Contract Administrator where directed.  2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.		SPARE PARTS  City of Winnings and Contract
۸.	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.	F. G.	Megger circuits, feeders and equipment up to 350V with a 500V instrument.  Megger 350-600V circuits, feeders and equipment with a 1000V instrument.  Check resistance to ground before energizing.		City of Winnipeg and Contract of as indicated on drawings upon REQUEST FOR CHANGE
3.	Electrical installation shall be in accordance with the current edition of the Winnipeg Electrical By-law #77/2015, local jurisdiction having authority and/or City of Winnipeg and other code 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	s, <sup>12.</sup>	LOAD BALANCE AND PHASING  Measure phase current to panelboards with normal loads operating at time of measurement.	١.	All quotations in response to recost breakdown of all materials reserves the right to review co
	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		Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.	26.	GROUNDING
	electrical installation shall be as shown on the drawings and as specified.  Electrical installation shall be in accordance with the requirements of the electrical supply authority and local inspection authority.	В. С.	Phase balance existing single phase panelboards and CDP's across new three phase services.  Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.	١.	The entire installation shall be
	Electrical Subcontractor to be responsible for making all arrangements with hydro utility company for incoming service. This shall include but not necessarily be limited to submitting		Check phase rotation with phase rotation meter on all existing services to be replaced to ensure proper phase rotation on existing motors loads. Verify phase rotation prior to re-energizing of services.	<u>2</u> 7.	WORKMANSHIP  Install equipment, conduit and
	the utility electrical service application on behalf of the City of Winnipeg (as per the electric loads shown on the plans and specifications), coordinating the location of the service as per the preferred service location on the plans, confirming available fault current requirements for main distribution and supplying suitable equipment, and timely submission of required information to suit the construction schedule to ensure power is available to suit city of	r <sup>E.</sup>	Submit, at completion of Work, a report listing phase and neutral currents on panelboards, transformers, distribution boards and motor control centres, operating under normal load. State time and date on which each load was measured and voltage at time of test. Include load balance and voltage test results in Maintenance Mauals.	3.	to the satisfaction of the Cont perpendicular to building lines. Install neatly and group to pre requiring maintenance, adjustmaccessibility.
	Winnipeg requirements. The Contract Administrator shall provide autocadd drawings to the Electrical Subcontractor (upon written request) when required for submission to electrical utili company.	13. ty	VOLTAGE RATINGS C	<b>)</b> .	Include, in the Work, all require installation instructions. Replace
	SCOPE SCOPE	A. B.	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.	).	cost. All conduit and cables must be Unistrut hangers as close to U
	Provide all materials, labour, plant and equipment required for a complete and working installation and as shown and detailed on drawings.		Equipment shall operate in extreme operating conditions established in above standard without damage to equipment.		acceptable, unless pre—authoriz Electrical By—law. Perforated st
	The electrical installation shall be in accordance with the current edition of the Winnipeg Electrical By—law and local regulations.  Obtain all permits, approvals and pay all fees required for installation. Electrical Subcontractors	14.	INSPECTION 2	28.	WORK IN EXISTING BUILDINGS
	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.	" A. B.	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	<b>1.</b>	Where existing systems such a disrupted and/or shutdown, cocarry out work at a time and disruptions and/or shutdowns approval, a written schedule of
	WORK INCLUDED	15.	Subcontractor.  CARE, OPERATION AND START-UP	3.	work and obtain City of Winnip Should any connections be req
	Refer to detailed Scope of Work as detailed on drawings.  Provide all power and miscellaneous wiring and make all connections as indicated.	A.	Instruct the City of Winnipeg operating personnel in the operation, care and maintenance of		supply and install all necessary at no extra cost. Should any $\epsilon$ cost, and to the satisfaction of
	Provide all lighting and control equipment as indicated and make all connections.	В.	equipment. Arrangement of such instructional sessions shall be done at a time convenient to the City of Winnipeg.  Arrange and pay for services of Manufacturer's factory service engineer to supervise start—up	29.	CASH ALLOWANCES
	EXAMINATION  Prior to submitting a Bid, the Electrical Subcontractor shall examine all drawings and	<i>с</i> .	of installation, check, adjust, balance and calibrate components.  Provide these services for such a period and for as many visits as necessary to put		Refer to General Conditions.
	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.		equipment into operation, and ensure that operating personnel are conversant with all aspects 3 of its care and operation.	, , ,	GUARANTEE  The satisfactory operation of a
	Prior to submitting a Bid, the Electrical Subcontractor should examine the Site, local conditions and all existing apparatus if any is to be re—used and verify that the condition of	16. of A.	Da't 'adam an'talana and d'ab'tab'an analasana l'abb anna la FFNAC OV 1 Ordana	PART	months after final acceptance  MATERIALS AND INSTA
	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.	B. C.	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 paint exposed hangers, racks, fastenings to prevent rusting.	·	WIRING METHODS  Conduits –
	SUPERVISION  Supervise the Work at all times through a responsible and competent supervisor.	17.	EQUIPMENT IDENTIFICATION 2	<u>)</u> . K	Rigid galvanized steel threaded Electrical metallic tubing (EMT) Rigid PVC conduit size as indic
	Full cooperation shall be shown with other trades to facilitate installations and to avoid delay in carrying out the Work.	ys <mark>A.</mark> B. C.	Identify electrical equipment with lamicoid nameplates.  Identify circuit numbers on receptacles with "BRADY" Globemark tape.  Provide lamicoid nameplates, 1/8" thick plastic engraving sheet, black with white core,	,. l. j.	Flexible metal conduit (Flex) siz Liquid—tite flexible metal condu
	ACCURACY OF DATA  Drawings are schematic; exact locations, distances, levels and other dimensions shall be	D.	mechanically attached (screwed or rivetted) unless otherwise specified. Sizes 4" wide x 3" bigh.  Wording on nameplates shall be approved prior to manufacture. Submit schedule of	}. )	Conduit fastenings — Two hole steel straps to secur Beam clamps to secure condui
	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.	s E. F.	nameplates and wording.  Allow for average of thirty—five (35) letters per nameplate.  Identification shall be English.  Nameplates for terminal cabinets and junction boxes shall indicate system and/or voltage	<b>l</b> .	Uni-strut channel type support 4 3/8" diameter threaded rods
	Branch circuit wiring shall be installed with circuits arranged exactly as shown on drawings. Conduit and cable runs may be modified to suit installation.	н.	characteristics.  Use red nameplates with white lettering for emergency power.	,. ).	Fittings manufactured for use v Manufactured elbows are requir
	APPROVAL OF MATERIAL	18.	LOCATIONS OF OUTLETS 4	3. I.	Die cast set screw connectors Raintight connectors with O-rin
	Request for approval of electrical equipment as equals to be done in accordance with section $B7$ .	n Α.	Outlet locations shall be reviewed on site with City of Winnipeg and Contract Administrator prior to installation.	).	Expansion fittings with internal Install conduits to conserve he
	SHOP DRAWINGS	В. С	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.		in spaces through which they and service rooms. Surface co Contract Administrator and City
	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	F	Change location of outlets at no extra cost or credit, providing distance does not exceed E 10'-0" and information is provided prior to rough—in. Locate light switches on latch side of doors.	•	Wiring home runs to panels ar Wiring drops from conduit syst be wired in AC-90. Drops may Use flexible metall conduit for
	where required.  Include details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material. Where applicable, include wiring, single line and	19.			Provide separate insulated grou Use rigid PVC conduit for unde
	schematic diagrams.  Submit shop drawings of service equipment to Supply Authority.	А. В.	Mounting height of equipment is from the finished floor to the centerline of equipment unless specified or indicated otherwise.  H f mounting height of equipment is not indicated, verify with Contract Administrator before	1.	grounding conductor within PVC Bend conduit cold and replace original diameter. Dry conduits
	PROJECT RECORD DOCUMENTS	C.	proceeding with installation.  Install electrical equipment at the following heights unless indicated or directed otherwise (to I.	•	empty conduits. Install two 1" spare conduits u
	Keep a record set of drawings on the site at all times recording any changes that may occur.	a. h	centre of outlet). General receptacles shall be mounted at 16" in vertical orientation. Panelboards: 78" to top.		terminated in 6"x6"x4" junction at 24" above panel top.
	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 Administrato	D.	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.	l.	Conduit Identification — Colour the colour code listed below. O box in conduit run. In addition wiring, the circuits being run in
	upon completion. Record documents that are incomplete shall be returned to the Electrical Subcontractor for correction. The Contract Administrator shall recommend a suitable deficience		PROTECTION 1		with permanent felt marker. 120/208V Normal Power: yellov 120/208V Emergency Power: fl
	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.	A. B. C.	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	3. I.	Fire Alarm: red Ground: green
	OPERATION AND MAINTENANCE MANUALS  Provide three (3) bound copies of catalogue sheets and maintenance materials for complete	D.	equipment. Keep these doors locked except when under direct supervision.  Provide wire guards for all electrical equipment in areas subject to damage.	۸.	Conductors in conduit – type   AWG or larger, minimum #12 A Armoured cable – type AC-90
	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	21. A.	Where cables or conduits pass through floors, block or concrete walls and fire—rated walls, seal openings with fire—stopping material with intumescent properties.		#8 AWG or larger, minimum #1 polyetheylene (XLPE), 90 deg C wire, bare interlocked aluminum Armoured Cable (Teck) — type
	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,	ceB. C.	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.	ri.	#8 or larger, minimum #12 AW multi-conductor as required c/ interlocked aluminum, outer jac colour coded black, red, blue of
	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.	22.	CLEANING N	۱.	4/C. Aluminum ACWU or alumin Fire alarm cable — FAS type c
	Include names and addresses of local suppliers for items included in Maintenance Manuals. <u>TESTS</u>	A. B.	Do final cleaning in accordance with General Conditions.  At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that		multi-conductor (minimum of jacketed.
	The electrical installation shall be completely tested demonstrating that the equipment and	С.	have been exposed to construction dirt and dust.  Clean interiors of all panels.		Wiring Methods — Service entrance feeders — par
	systems installed perform in the manner intended.  Conduct and pay for tests including, but not limited to, the following systems:	23.	DELIVERY, STORAGE AND HANDLING  3	<u>′</u> . 3.	CDP panel and panelboard feec parallel or single runs of multi- Branch wiring home runs — RW
	Power Distribution system.  Circuits originating from branch distribution panels.  Grounding systems.	A. B. C	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	ļ. 5.	Branch circuit wiring concealed Branch circuit wiring surface — Motor wiring — RW90 wiring in
	A CONTROL OF THE PARTY OF THE P	v.	- See on materials in a cloud and are place, secure from validation of their. All materials - A	1	MOLOR WIRING - RWG() Wiring in

ensure protection of equipment.	2.	FASTENINGS AND SUPPORTS M. N.		Connect loads to circuits as indicated and provide a separate neutral for each branch circui Mount panelboards at 78" AFF to top of panelboard.	F. The complete installation of the
<u>PARE PARTS</u> ty of Winnipeg and Contract Administrator to review and confirm spare breakers are provide	A.	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: 10. Burndy, Electrovert, Unistrut, Pilgrim or Pursley.	). !	CIRCUIT BREAKERS	conformance with CAN/ULC-S537-M Administrator. Copies of the Verificat and shall be included in the Mainten
indicated on drawings upon completion of work.	В.	Secure surface mounted equipment, conduit or cables on uni—strut channels using clips,  A. spring bolts and nuts and cable clamps designed as accessories to basic channel members.		Submit shop drawings in accordance with section 1.08. Provide time—current characteristic curves for breakers with ampacity fo 800A and over, or with interrupting capacity of 25,000	
<u>QUEST FOR CHANGE</u> quotations in response to request for change shall be submitted complete with an itemize	C.	Support suspended uni-strut channels with minimum 3/8" threaded rod hangers directly to building structure where possible.  B.	1	symmetrical RMS amps and over at system voltage.  Bolt—on moulded case breaker, quick—make, quick—break type, for manual and automatic	
st breakdown of all materials and labour required for the change. Contract Administrator serves the right to review costing.	сч). Е.	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.	1	operation with temperature compensation for 40 deg C (140 deg F). Common—trip breakers with single handle for multi—poke applications Magnetic instantaneous trip elements in circuits to operate only when the value of current reaches setting. Trip settings on breakers with	s,
<u>ROUNDING</u>	F.	Fasten exposed conduit or cables to building construction or support system using straps:		adjustable instantaneous trips to range from 3—10 times current rating. Provide LSI trip unit for all breakers 300—amps and higher.	S
e entire installation shall be grounded in accordance with the Winnipeg Electrical By—law.	1. 2.	Two hole steel straps to secure surface conduits.  Beam clamps to secure conduit exposed steel work.		Moulded case circuit breaker shall operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping under overload conditions and instantaneous magnetic tripping for short circuit protection.	
<u>DRKMANSHIP</u> stall equipment, conduit and cables in a workmanlike manner to present a neat appearance	G.	Support conduit and cables at spacing of no more than 48" except for surface conduit rooms and corridors.	,	Acceptable manufacturers: Cutler—Hammer, Square D, Siemens and GE.	
the satisfaction of the Contractor Administrator. Install conduit and cable runs parallel and rpendicular to building lines.		Provide metal brackets, frames, hangers, clamps and related types of support structures  11.  where indicated or as required to support conduit and cable runs.  Ensure adequate support for raceways and cables dropped vertically to equipment where there A.		<u>UTILITIES UNDERGROUND SERVICE</u> Make all arrangements and co-ordinate with Hydro supply authority to ensure availability of	
stall neatly and group to present a tidy appearance. Install equipment and apparatus quiring maintenance, adjustment or eventual replacement with adequate clearances and accessibility.	 J.	is no wall support.  Do not use wire lashings, perforated pipe straps or tye—wraps to support or secure raceways B.	;	service when required. Submit all required drawings to supply authority for their approval.	
cessibility. Slude, in the Work, all requirements shown on the shop drawings or manufacturer's stallation instructions. Replace work unsatisfactory to the Contract Administrator without extr	K. raj	or cables. C.  Do not use supports or equipment installed for other trades for conduit or cable support.  Run conduit and cable support systems path perpendicular and parallel to building lines. D.	1	Refer to Section 01001, 1.2 for cash allowance requirements associated with electrical servic by the supply authority. Pole mounted transformers and primary underground cabling to CSTE shall be supplied and	e
st.  conduit and cables must be clipped to structure by means of anchors or supported by		CUTTING AND PATCHING E.	i 	installed by supply authority, unless otherwise indicated. Provide customer CSTE, 400A, 120/208V, 3phase, 4W c/w grounding as indicated.	
istrut hangers as close to U/S as possible. Tye wraps for wire hanging or fastening is no ceptable, unless pre—authorized by City of Winnipeg and acceptable to the Winnipeg ectrical By—law. Perforated strapping is also unacceptable.	л А. В.	Pay the costs of all cutting and patching required for the installation of electrical work.  Obtain the approval of the Contract Administrator and City of Winnipeg before arranging for		Provide secondary cables from CSTE to main distribution as indicated. Allow adequate conductor length for termination.	
ORK IN EXISTING BUILDINGS		any cutting. Patching shall restore the affected area to the original condition.		SERVICE ENTRANCE SWITCHBOARD	
nere existing systems such as electrical power, telephone, fire alarm, etc. are required to b srupted and/or shutdown, coordinate the shutdowns with City of Winnipeg representative and		EXCAVATION AND BACKFILLING  A.  Excavate and backfill as required for underground electrical services as indicated. Provide	1	Service entrance switchboard incorporates service entrance cable connection section, main breaker and, sub—feeder distribution section and customer metering section, factory assemble in one enclosure.	ed
rry out work at a time and in a manner acceptable to them. Carefully schedule all sruptions and/or shutdowns and ensure that the duration is kept to a minimum. Submit fo		protective materials around and over services and be present at all times during the excavation and backfilling to supervise Work. Backfilling shall restore the excavated area to C.	:	Submit shop drawings in accordance with section 1.08. Service Entrance board: to CSA 22.2 No. 31.	
proval, a written schedule of each disruption at least one week in advance of performing ork and obtain City of Winnipeg written consent prior to implementing. ould any connections be required to maintain services during Work in the existing building,		the original condition and shall include sodding, compacting, paving and asphalt finish where D. required. As underground services shall be dimensioned on electrical "Record Drawings" and E. shall be referenced to established survey bench marks.	1	Moulded case circuit breakers: to CSA 22.2 No. 5. Power supply to service entrance board: 120/208V, 3 phase, 4 wire, grounded neutral, 60 H short circuit current rated at minimum 25kA RMS symmetrical.	z,
pply and install all necessary material and portable power equipment and provide all labour no extra cost. Should any existing system be damaged, make full repairs without extra	r B.	Work shall be in accordance with the current CSA bulletin.  Include all costs for excavation, backfilling and surface restoration, for any secondary  1.	:	Service entrance switchboard to have ampere rating as indicated with enclosure as follows:  Wall mounted, totally enclosed sheet steel enclosure with steel frame.	
st, and to the satisfaction of City of Winnipeg.  SH ALLOWANCES	D.	underground electrical installation.  Obtain all clearances for Hydro, water, sewer, MTS, cable prior to digging.  3. Electrical Subcontractor shall conduct a private utilities line locate for existing utilities prior to 4.		Sheet steel barriers to separate adjoining sections. Distribution section. Hinged access panels with captive knurled thumbscrews.	
fer to General Conditions.	E.	any excavation work commencing.  5.	-	High conductivity aluminum bus. Bus form load terminals of main.	
<u>IARANTEE</u>	5.	ACCESS DOORS 7.		Identify phases with color coding.	
e satisfactory operation of all work shall be guaranteed for a period of 12 calendar onths after final acceptance of work.	A.	Access doors shall be minimum #12 gauge prime coat painted bonderized steel. Each shall J. be complete with a heavy flush frame and anchor, concealed hinges, positive locking screwdriver lock, and mounting and finishing provisions to suit the finish material for which	-	The main circuit breaker shall be manually operable, fixed mounted electronic circuit breaker. Breaker shall be constructed in accordance with the following standards: UL489, NEMA AB1—1986, CSA 22.5 No. 5. Breaker shall be complete with a microprocessor based, RMS	•
MATERIALS AND INSTALLATION		they are supplied. Access doors in fire rated ceilings, walls, partitions, structures, etc. shall be ULC listed and labelled and of a rating to maintain the integrity of the fire separation.	;	sensing trip system and shall be fully adjustable LSI elements to provide time/current curve shaping adjustments. Local visual indication for overload, short circuit and ground fault trip	
RING METHODS	6.	JUNCTION AND PULL BOXES		occurrences. Breaker shall be equipped with test port for use with manufacturer's test set enabling testing of all trip functions (without actual tripping of breaker) and without disassembly of breaker.	
onduits — gid galvanized steel threaded conduit size as indicated.	A.	Sheet steel construction with screw—on flat covers for surface or recessed mounting. Covers $\kappa$ with 1" minimum extension all around, for flush—mounted pull and junction boxes.	(	aisasserinity of breaker. Copper ground bus extending full width of cubicles and located at bottom. Lugs at each end sized for grounding cable. Bond non—current carrying parts to ground bus.	Ė
ectrical metallic tubing (EMT) size as indicated.  gid PVC conduit size as indicated.  public metal conduit (Flor) size as indicated.	B. C.	Cast—type with gasketted covers where exposed to weather.  Install pull boxes in inconspicuous but accessible locations.  Provide pullboxes in conduit runs at maximum 100' engains.		Distribution Section — The distribution section to consist of a CDP type panel with moulded case circuit breakers. Each breaker shall be manually operated, fixed type with trip ratings a second or devices. Minimum intervalies against to be 25,000 areas automatical. Distribution	
exible metal conduit (Flex) size as indicated. quid—tite flexible metal conduit (Seal—tite) size as indicated.	о. Е. F.	Provide pullboxes in conduit runs at maximum 100' spacing.  Boxes shall be installed plumb and square to building lines.  Install junction and pullboxes clear of all mechanical duct work and piping.  M.	;	shown on drawings. Minimum interrupting capacity to be 25,000 amps symmetrical. Distribution section to be provided with spare breakers as indicated on drawings.  Service entrance switchboard finish shall be exterior grey and treated to inhibit rust. Provide	
onduit fastenings — to hole steel straps to secure surface conduits.	G. H.	Junction and pullboxes to be sized as per C.E.C. Identify junction and pullboxes as per voltage, system and circuit.  N.	-	two spray cans of touch—up enamel.  Provide identification as per section 1.17. Provide lamicoid on switchboard indicating voltage, phase, wire, amperage and frequency and mount at top of main entry section. Provide	
ram clamps to secure conduits to exposed steel work.  ii—strut channel type support for two or more conduits, surface or suspended.  3/8" diameter threaded rods to support suspended channels.		0.	į	lamicoids on sub-breakers indicating loads controlled.  Acceptable manufacturers; Cutler—Hammer, Square D, Siemens and GE.	
onduit fittings —	7.	OUTLET BOXES AND FITTINGS  P.		Provide Arc Fault Rating labels on all electrical distribution equipment as per Canadian Electrical Code. Locate service entrance switchboard where indicated. Connect main secondary service entranc	
tings manufactured for use with conduit specified.  Inufactured elbows are required for conduits 2 ½" or larger.  E cast set screw connectors and couplings. Insulated throat liners on connectors.	А. В.	4" square outlet boxes with extension and plaster rings, flush mounting devices in finished Qplaster and tile walls.  Cast FS or FD feraloy boxes with factory threaded hubs and mounting feet for surface wiring		cable to line terminals of switchboard. Connect load terminals of distribution breakers to outgoing feeders as indicated. Check factory made connections for mechanical security and	ie
intight connectors with 0—rings for weatherproof or sprinklerproof applications.  pansion fittings with internal bonding jumper where required.	C.	of outlets where exposed to moisture.  Bushings and connectors with nylon insulated throats. Double locknuts and insulated bushings R.	1	electrical continuity. Megger test board prior to energization.  Manufacturer to provide test equipment and field test thermal, magnetic and ground fault tripping. Include test report in Maintenance Manual.	
stall conduits to conserve head room in exposed locations and cause minimum interference spaces through which they pass. Conceal conduits,wherever possible, except in mechanical		on sheet metal boxes.  Sectional boxes will be accepted.  Support boxes independently of connecting conduits  13.		GROUNDING	
d service rooms. Surface conduit installations in finished areas shall be reviewed by intract Administrator and City of Winnipeg prior to installation.	F.	For flush installations, mount outlets flush with finished wall using plaster rings to permit wall finish to come within $1/4$ " of opening.		Grounding conductors system, circuit and equipment grounding to be bare stranded copper,	
ring home runs to panels and main branch wiring in ceiling spaces shall be run in conduit ring drops from conduit systems into boxes for wiring devices in steel stud partitions may wired in AC—90. Drops may not exceed 6 feet from box to partition.		Provide correct size of openings in boxes for conduit and cable connections. Use of reducing washers will not be allowed.  Boxes shall be mounted plumb and square to building lines.	1	sized in accordance with the Winnipeg Electrical By—law. Non—corroding accessories necessary for grounding system, type, size, material as indicated including but not necessarily limited to: .1 grounding and bonding bushings, .2 protective typ	e
e flexible metall conduit for transformers, motors or other equipment subject to vibration. ovide separate insulated grounding conductor within flexible conduit.	8.	WIRING DEVICES	- 1	clamps, .3 bolted type conductor connectors, .4 compression type conductor connectors, .5 bonding conductors, straps, .6 pressure wire connectors.	
re rigid PVC conduit for underground services and installations. Provide separate insulated ounding conductor within PVC conduit.  Find conduit cold and replace conduit if kinked or flattened more than one—tenth of its	A.	Duplex receptacles — premium specification grade NEMA 5—15R, 125VAC, 15A U—ground, nylon face white, suitable for #10 AWG back and side wiring, break off links for split wiring, double		Install complete permanent, continuous, system and circuit, grounding systems including electrodes, conductors, connectors and accessories to conform to requirements of local authority having jurisdiction over installation.	
iginal diameter. Dry conduits out before installing wire. Install polypropylene fish cord in apply conduits.		wipe contacts and rivetted grounding contacts. Acceptable Manufacturers shall be Hubbell, Bryant, Leviton, Pass & Seymour, Arrow Hart and Woodhead. Duplex receptacles of one	1	Install connectors to manufacturer's instructions.  Protect exposed grounding conductors from mechanical injury.	
stall two 1" spare conduits up to ceiling space above surface or recessed panels and rminated in 6"x6"x4" junction boxes. Where ceiling is exposed mount junction boxes on wal		manufacturer throughout project. Mount receptacles vertically at 16" AFF unless otherwise hoted. Provide premium specification Hospital grade receptacles in all basic care areas or as Gindicated on drawings. Provide separate insulated ground wire for all circuits to Hospital grade	١	Make buried connections using Burndy "HYPRESS" connectors.  Use mechanical connectors for grounding connections to equipment provided with lugs.  Soldered joints not permitted.	
24" above panel top.  Induit Identification — Colour code coverplates of junction boxes in conduit systems as per	В.	receptacles. H. Corridor receptacles — premium specification grade NEMA 5—15RA, 125VAC, 20A U—ground		The main public metallic water service to the facility shall be utilized as the main ground electrode. Where such a service does not exist, an artificial grounding electrode shall be	
e colour code listed below. Colour code by spray painting the coverplate on each junction x in conduit run. In addition to colour coding coverplates on junction boxes with power	q	T—slot nylon face white. Acceptable Manufacturers as per duplex receptacles.  I. PANELBOARDS	į	provided to suit the requirements of the local inspection authorities.  Install bonding wire for flexible conduit, connected to both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of	
ring, the circuits being run in the box shall be identified on the inside of the coverplate the permanent felt marker.  0/208V Normal Power: yellow	э. А.	Submit shop drawings in accordance with section 1.08. Drawings shall include electrical detail J.		flexible conduit. Make grounding connections in radial configuration only, with connections terminating at singl	e
0/208V Emergency Power: fluorescent red e Alarm: red		of panel, branch breaker type, quantity, ampacity and enclosure dimension. Factory install circuit breakers in panelboards before shipment. In addition to CSA requirements,  manufacturer's nameplate shall show fault current that panel, including breakers, has been	-	grounding point. Avoid loop connections. Provide separate ground conductors in PVC conduit, plastic or fibreglass raceways. Install system and circuit grounding connections to neutral points of 600V and 208V systems	3.
ound: green onductors in conduit — type RW90, solid copper #10 AWG or smaller, stranded copper #8	В.	built to withstand.  M. Panelboards built to CSA C22.2 No. 29—M1989 and shall be of one manufacturer throughout	;	Install grounding connections to typical equipment including, but not necessarily limited to: service equipment, transformers, frames of motors, building steel work.	
WG or larger, minimum #12 AWG, cross link polyethylene (XLPE) 90 deg C, 1000V.  MG or larger, minimum #12 AWG, cross link polyethylene (XLPE) 90 deg C, 1000V.  MG or larger, minimum #12 AWG, cross link polyethylene (XLPE) 90 deg C, 1000V.	C.	project Minimum 42 circuit, 200A unless otherwise noted.  CDP panels built to CSA C22.2 No. 29—M1989 and shall be manufactured to allow installation of two 200A frame breakers adjacent to each other — horizontally. CDP panels to be of one		Perform ground continuity and resistance tests using method appropriate to Site conditions and to approval of the local inspection authority. Perform tests before energizing electrical system. Disconnect ground fault indicator, if provided, during tests. A report shall be	
B AWG or larger, minimum #14 in suites and #12 AWG in balance of facility, cross link lyetheylene (XLPE), 90 deg C, 1000V, multi-conductor as required c/w bare CU ground	D.	manufacturer throughout project.  Panelboards and CDP panels bus and breakers to be rated for short circuit withstand	;	submitted to the Contract Administrator from the testing agency.	
re, bare interlocked aluminum armour.  moured Cable (Teck) — type Teck 90, solid copper #10 AWG or smaller, stranded copper		ampacity as indicated on drawings but in no case shall be less than 10kA for 250V branch panelboards, 25kA for 250V CDP panels, 18kA for 600V panels and 22kA for 600V CDP panels.		LIGHTING Submit shop drawings in accordance with section 1.08.	
B or larger, minimum #12 AWG, cross link polyethylene (XLPE) 90 seg C, 1000V, ulti—conductor as required c/w bare CU ground wire, inner jacket black PVC, armour terlocked aluminum, outer jacket black PVC with FT—4 flame spread rating. Wires to be	E.	Panelboards and CDP panels shall have copper bus with full size neutral (where required), copper ground bus, keyed alike locks with two keys for each, flush or surface mounted tubs	1	Provide luminaires as specified on drawings or equal c/w lamps. Provide two spare lamps and one spare ballast for each type of luminaire onsite. All ballasts shall be electronic	
lour coded black, red, blue and white in 4/C cable and numbered in cables of more than C. Aluminum ACWU or aluminum Teck may be permitted for feeders larger than 150A.	l	as shown, finish trim and door baked grey enamel. <u>Provide fully hinged, lockable front panel covers for all Panelboards and CDP panels.</u> Provide spare breakers and spaces as indicated		premium gold label approved by Manitoba Hydro for Power Smart Rebate. Electrical Subcontractor shall be responsible for providing complete ballast information and completion of application for Power Smart rebate on behalf of client.	
re alarm cable — FAS type cable (Securex) — Solid copper #16 or #18 AWG, ulti-conductor (minimum of 4/C), 300V, colour coded, 105 deg C flame retardant PVC rec	F. G.	on drawings Breakers to section 2.10.  Main breaker: mounted on top or bottom of panel to suit cable entry. Reverse fed branch	:	Suspend luminaires from building structure on T10 jack chain and ensure that they are parallel and perpendicular to building lines.	
ring Methods —	Н.	bus mounted main breakers will not be accepted.  Provide lock—on devices for 5% of 15A branch breakers installed and for fire alarm,		Replace all defective ballasts and lamps for a period of 12 months after substantial completion of project.	
rvice entrance feeders — parallel or single runs of ACWU c/w ground wire. IP panel and panelboard feeders — parallel or single runs of RW90 wire in EMT conduit o	l. or	location and load of each circuit. Provide lamicoids nameplate beside each breaker in CDP A.		FIRE ALARM  Existing Fire Alarm System is an Edwards non-addressable conventional system, zoned and	
rallel or single runs of multi—conductor Teck cable. anch wiring home runs — RW90 wire in EMT conduit. anch circuit wiring concealed — AC90.	J.	panels.  Accordable manufacturers: Cutter_Hammer, Square D. Siemens, and CE.  B.		rally supervised.  Re—use existing supervisory module or provide new module to match existing FACP for ring of new CO detection system in Garage.	
anch circuit wiring conceded — AC90. anch circuit wiring surface — RW90 wire in EMT conduit. otor wiring — RW90 wiring in Liquid tight flex conduit or Teck 90.	ĸ. L.	Locate panelboards and CDP panels as indicated and mount securely, plumb, true and square, of adjoining surfaces.  Install surface mounted panelboards and CDP panels on uni—strut except for surface panels D.		Demount and reinstall existing heat detector in kitchen and reverify device and zone wiring.	
		in corridors or finished areas which shall be mounted directly to wall.		Installation of Fire Alarm equipment shall be in accordance with CAN/ULC-S524-M06 and al	l 



REV	DESCRIPTION	DWN	APP	REV DATE
Ø	ISSUED FOR QS ONLY	PY	TJ	JUN 17 2016
1	ISSUED FOR TENDER/CONSTRUCTION	PY	DA	JUN 28 2016
2	ISSUED FOR ADDENDUM#1	PY	TJ	OCT 13 2016



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PERMIT TO PRACTICE

THE CITY OF WINNIPEG GREENDELL PARK C.C.

F. The complete installation of the Fire Alarm equipment and system shall be tested in

and shall be included in the Maintenance Manuals.

conformance with CAN/ULC-S537-M06 and shall be performed in the presence of the Contract Administrator. Copies of the Verification Certificate shall be submitted to the Contract Administrator

HVAC ELECTRICAL UPGRADES

SHEET TITLE

ELECTRICAL SPECIFICATIONS

DRAWN BY N.T.S. DSA DESIGNED BY JOB NUMBER REVISION NO TJ JUN 12 2016