Seal #1

Seal #2

Seal #3

Brendan White, P.Eng.
PBX Engineering Ltd.
Division 01 Specifications
Division 26 Specifications
Division 33 Specifications

NOTES:

Each Engineer that has applied a seal above shall indicate which sections of the specifications he or she is certifying and the engineering company they work for. Alternatively, the Engineer may indicate which engineering discipline he or she is certifying as long as the name of the engineering company they work for (the source) is shown on the applicable technical specifications.

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Revision History

Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
P1	April 26, 2024	Issued for Tender	AGD	BW

Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Not Used.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises electrical, mechanical, structural and civil work that covers the scope of the Sea to Sky EV Network expansion .

- .1 Main Street (4325-4343 Main St, Whistler, BC)
- .2 Whistler Conference Center parking lot (4010 Whistler Way, Whistler, BC)

.2 Work at each location includes but is not limited to:

- .1 Supply and installation of EVSE electrical power distribution kiosk and all internal elements including main circuit breakers, feeder circuit breakers, metering equipment, service panel, lighting, receptacles and heater as required.
- .2 Supply and installation of transformer.
- .3 Supply and installation of concrete junction boxes, extensions, and galvanized steel lids as required.
- .4 Supply and installation of electrical conduit and wiring as required.
- .5 Supply, installation and design of EVSE kiosk EVSE charging station concrete bases and all rebar as required.
- .6 Supply and installation of EV chargers by certified installer.
- .7 Coordination with BC Hydro for service connection where required.
- .8 Trenching and backfilling for conduits and ducts as required.
- .9 Supply and installation of bollards.
- .10 Cleaning and painting of line work and decals for parking stalls.
- .11 Supply and installation of signage.

.12 Provide arc flash study for electrical kiosk.

.3 Contractor shall obtain and pay for all permits required to perform the work outlined in the Contract Documents including but not limited to electrical and related trade permits.

1.3 WORK ENVIRONMENT

.1 The Work is located in Whistler, BC at two separate parking areas. Contractor shall include in Bid price all costs associated with transportation of equipment and personnel to the place of work.

.1 Include all costs associated with overnight accommodation and provision of meals for personnel.

1.4 CONTRACT METHOD

.1 Relations and responsibilities between Contractor and subcontractors and suppliers assigned by Owner are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:

.1 Furnish to Contractor, bonds covering faithful performance of subcontracted work and payment of obligations thereunder.

.2 Purchase and maintain general liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to Consultant.

.2 WorkSafeBC

.1 Within five (5) working days of execution of the Contract, provide written confirmation from the WorkSafeBC that the prime contractor and all subcontractors are registered in good standing with WorkSafeBC. No invoice will be payable until such confirmation has been received.

.3 Performance Assurance:

.1 Accepted Bidder must provide Performance and Labour and Materials Payment Bonds each in the amount of fifty percent (50%) of the Contract Price.

.2 Include cost of bonds in Bid Price.

.3 Obligee on bonds shall be the Owner.

.4 Provide these bonds within ten (10) Working Days of contract award. Maintain bonds in good standing until Contract fulfillment.

1.5 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Consultant.

.2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Consultant, in writing, any defects which may interfere with proper execution of Work.

1.6 FUTURE WORK

.1 Not Required.

1.7 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction. Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.

.3 Required stages:

.1 Perform work in phased manner as described in Contract Documents.

.4 Maintain fire access/control.

1.8 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work, storage, and access to allow:

.1 Owner occupancy.

.2 Work by other contractors.

.2 Co-ordinate use of premises under direction of Consultant.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant.

.6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.9 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.10 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants, and normal use of premises. Arrange with Consultant to facilitate execution of work.

1.11 EXISTING SERVICES

.1 Notify Consultant and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Owner 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.

.3 Provide alternative routes for pedestrian and vehicular traffic.

.4 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.

.5 Submit schedule to and obtain approval from Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.6 Provide temporary services when directed by Consultant to maintain critical building systems.

.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.10 Record locations of maintained, re-routed and abandoned service lines.

.11 Construct barriers in accordance with WorkSafeBC requirements.

1.12 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed Shop Drawings.

.5 List of Outstanding Shop Drawings.

.6 Change Orders.

.7 Other Modifications to Contract.

.8 Field Test Reports.

.9 Copy of Approved Work Schedule.

.10 Health and Safety Plan and Other Safety Related Documents.

.11 Other documents as specified.

Part 2 Products

.1 Not used.

Part 3 Execution

.1 Not used.

END OF SECTION

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Section 26 05 00S – Common Work Results.

1.2 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Project Manager and Consultant to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Owner will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Use only assigned elevators, stairwells, or paths of travel in existing in building for moving workers and material.

.1 Protect walls of passenger elevators, to approval of Project Manager and Consultant prior to use.

.2 Accept liability for damage, safety of equipment and overloading of existing equipment.

.6 Protect work temporarily until permanent enclosures are completed.

.7 Workers shall refrain from use of loud and vulgar language. Non- compliance to this policy will result in the specific worker(s) involved being required to immediately leave the site and to be permanently removed from any subsequent involvement on this project by the Contractor.

.8 Use of loud radios shall be prohibited.

.9 Pets are not allowed on site.

.10 Vehicles must be parked in designated areas.

.11 The Owner will designate storage areas for tools and equipment. The Contractor shall assign and coordinate storage facilities for sub-Contractors within these designated areas.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDINGS

.1 Execute work with least possible interference or disturbance to building operations, occupants, the public and normal use of premises. Arrange with Project Manager and Consultant to facilitate execution of work.

1.5 EXISTING SERVICES

.1 Notify Project Manager, Consultant, and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Project Manager, and Consultant a minimum of 5 working days of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for personnel and vehicular traffic.

.4 Construct barriers in accordance with WorkSafeBC, safety authority, Authority Having Jurisdiction, and Project Manager.

1.6 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.07S - Construction Progress Schedule - Bar (GANTT) Chart.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Carry out noise generating work outside of normal working hours or as specifically coordinated with the Project Manager and Consultant.

1.7 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

1.8 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is permitted only in approved areas as designated by the Owner.

1.9 ACCOMMODATIONS AND MEALS

.1 Contractor shall be responsible for all cost associated with accommodation and meals while performing work.

.2 Motel accommodation is available in Whistler.

.3 Contractor may provide trailers for accommodation of personnel.

END OF SECTION

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Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
P1	April 26, 2024	Issued for Tender	AGD	BW

Part 1 General

1.0 DOCUMENTS

.1 This Section supersedes Division 01 of the Master Municipal Construction Documents (MMCD) Platinum Edition.

1.1 RELATED SECTIONS

.1 Not Used.

1.2 DEFINITIONS

.1 Allowance: means Work which may be described in the Schedule of Quantities and Prices that will be undertaken and included in the Work at the election of the Owner.

1.3 GENERAL PRICE AND PAYMENT ITEMS

.1 Work completed under this Contract will be paid for at the prices in the Schedule of Quantities and Prices.

.2 Costs associated with finding and supplying of material and performance of all work specified herein, must be included in the prices set out in the Schedule. Include Contractor's overhead and profit.

.3 Claims for extra payment by the Contractor on grounds that costs could not be properly charged in accordance with the drawings and/or the specifications will NOT be approved by the Owner.

.4 Materials and Work performance costs not explicitly listed in the Schedule but included in the drawings and/or specifications by either direct mention or implication, must be included in items to which they pertain closest.

.5 Prorate costs of a general nature that do not pertain to any one item among all items.

.6 The lump sum items shall be generally paid monthly based on the amount of the work completed on that item in a given month as evaluated by the Contract Administrator.

.7 Payment for material and equipment only be made once the material/equipment has been incorporated into the work unless noted otherwise in Section 1.13.

.8 Applications for progress payment

.9 Make applications for payment on account on a monthly as Work progresses.

.10 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.

.11 Submit to Consultant, at least 14 days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of applications for payment.

.12 Supply the following general information and any additional information as may be requested by the Consultant as part of each Monthly Progress Claim. This information shall be supplied for each Subcontractor and the Prime Contractor.

.1 Indicate the labour cost and the material cost separately for each Item of Work within each division.

.2 Format for Monthly Progress Draws shall be approved by the Consultant prior to the first submission.

.3 For each Monthly Progress Draw, each change order shall be listed separately.

.4 Indicate both the Change Order number and title on the progress draw.

1.4 EVALUATION OF CONTRACT CHANGES

.1 Notwithstanding other provisions of the Contract, this Contractor shall supply detailed information for the valuation of all changes to the Contract. Such information shall include, but not necessarily be limited to, the following:

.1 Labour hours per unit of material or equipment to be added, deleted, or altered.

.2 Units of material or equipment to be added or deleted.

.3 Cost to the Contractor per unit of material, equipment and labour broken down by category of labour and type of material or equipment.

.4 Extensions of the above to arrive at total costs.

.5 Other miscellaneous and identifiable charges such as delivery, restocking, overhead, profit, etc.

.6 Include in the valuation of any change to the Contract the cost, if any, of recording such change on the record drawings as previously specified.

1.5 SCHEDULE OF VALUES

.1 Provide schedule of values supported by evidence as Consultant may reasonably direct and when accepted by Consultant, be used as basis for applications for payment.

.2 Include statement based on schedule of values with each application for payment.

.3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Consultant may reasonably require to establish value and delivery of products.

1.6 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

.1 Submit separate schedule of unit price items of Work requested in Bid form.

.2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:

.1 Cost of material.

.2 Delivery and unloading at site.

.3 Sales taxes.

.4 Installation, overhead and profit.

.3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.7 PROGRESS PAYMENT

.1 Consultant will issue to Owner, no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Consultant determines to be due. If Consultant amends application, Consultant will give notification in writing giving reasons for amendment.

.2 Owner will issue payment within 45 days of receipt of certificate for payment.

1.8 SUBSTANTIAL PERFORMANCE OF WORK

.1 Prepare and submit to Consultant comprehensive list of items to be completed or corrected and apply for a review by Consultant to establish Substantial Performance of Work or substantial performance of designated portion of Work when [Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion which Owner agrees to accept separately is substantially performed. Failure to include items on list does not alter responsibility to complete Contract.

.2 No later than 10 working days after receipt of list and application, Consultant will review Work to verify validity of application, and no later than 5 working days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

.3 Consultant: state date of Substantial Performance of Work or designated portion of Work in certificate.

.4 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Consultant, establish reasonable date for finishing Work.

1.9 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

.1 After issuance of certificate of Substantial Performance of Work:

.1 Submit application for payment of holdback amount.

.2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.

.2 After receipt of application for payment and sworn statement, Consultant will issue certificate for payment of holdback amount.

.3 Where holdback amount has not been placed in a separate holdback account, Owner shall, 10 working days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Owner and Contractor.

.4 Amount authorized by certificate for payment of holdback amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Where lien legislation does not exist or apply, holdback amount is due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between parties. Owner may retain out of holdback amount sums required by law to satisfy liens against Work or, if permitted by lien legislation applicable to Place of Work, other third party monetary claims against Contractor which are enforceable against Owner.

1.10 PROGRESSIVE RELEASE OF HOLDBACK

.1 Where legislation permits, if Consultant has certified that Work of subcontractor or supplier has been performed prior to Substantial Performance of Work, Owner shall pay holdback amount retained for such subcontract Work, or products supplied by such supplier, on day following expiration of holdback period for such Work stipulated in lien legislation applicable to Place of Work.

.2 In addition to provisions of preceding paragraph, and certificate wording, ensure that such subcontract Work or products is protected pending issuance of final certificate for payment and be responsible for correction of defects or Work not performed regardless of whether or not such was apparent when such certificates were issued.

1.11 FINAL PAYMENT

.1 Submit application for final payment when Work is completed.

.2 Consultant will, no later than [10] days after receipt of application for final payment, review Work to verify validity of application. Consultant will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.

.3 Consultant will issue final certificate for payment when application for final payment is found valid.

1.12 MAINTENANCE AND REVIEW OF FINANCIAL RECORDS

.1 You must maintain time records and books of account, invoices, receipts, and vouchers of all expenses incurred in relation to this Agreement, in form and content satisfactory to us and for a period of 7 years after completion of the Services.

.2 You must permit us at all reasonable times to audit, inspect and copy all accounting records, findings, software, data, specifications, drawings, reports, documents and other material, whether complete or not, that, as a result of this Agreement, are

.1 Produced by you or a subcontractor (the "Produced Material", which includes any material in existence prior to the start of the Term or developed independently of this Agreement, and that is incorporated or embedded in the Produced Material by you or a subcontractor (the "Incorporated Material")), or

.2 Received by you or a subcontractor from us or any other person (the "Received Material").

.3 If as a result of an audit carried out while the records referred to in section 7 must be maintained by you, there is any revision to charges, you must pay to us the full amount for any overcharge or we must pay the full amount of any shortfall, as the case may be.

1.13 DESCRIPTION OF PAYMENT ITEMS

.1 General

Item No.	Description	Payment Terms
1.1	Mobilization	This item includes all costs for mobilization and demobilization associated with the Contractor's equipment, site facilities, and services. Payment for mobilization and demobilization will be made at the lump sum price shown in the Schedule of Quantities and Prices. 50% of the lump sum price will be paid after the Contractor has established the operation and facilities specified. The remaining 50% is paid upon completion of the contract, removal of equipment, and cleanup of the work areas to the satisfaction of the Contract Administrator. The lump sum bid under this item cannot exceed 5% of the total tender.
1.2	Bonding and insurance	This item includes all costs for bonding and insurance for the complete Contract. Payment will be made at the lump sum price tendered in the Schedule of Quantities and Prices on the first progress payment after the submission of Bonding and Insurance coverage documentation. The lump sum tender under this item cannot exceed 2% of the total tender price.

.2 Main Street

Item No.	Description	Payment Terms
General Requirements		
2.1	Electrical Kiosk	This item includes all costs for the supply and installation of the electrical kiosk to support the EV charger's electrical equipment including all internal components, wiring, conduit and electrical systems. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.2	Electrical Kiosk Concrete Foundation	This item includes all costs for the installation and design of the kiosk concrete foundation including all excavation, ground remediation, formwork, rebar, and other miscellaneous materials required for the installation of the foundation. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.3	EV Charger Concrete Foundation	This item includes all costs for the installation and design of the EV charger concrete foundations

		including all excavation, ground remediation, formwork, rebar, and other miscellaneous materials required for the installation of the foundation. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.4	Power Unit Concrete Foundation	This item includes all costs for the installation and design of the Kempower Power Unit concrete foundation including all excavation, ground remediation, formwork, rebar, and other miscellaneous materials required for the installation of the foundation. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.5	Bollards	This item includes all costs associated with the supply and installation of the steel, concrete filled bollards installed to protect the EV chargers. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.6	Trenching, Backfilling and Surface Restoration	This item includes all costs associated with the trenching and backfilling required to support the conduit installation between the BC Hydro transformer and the electrical kiosk, the electrical kiosk and the EV chargers, and the electrical kiosk and the power unit. This item shall also include ground remediation and surface restoration in disturbed areas to the same or better than existing condition. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.7	Concrete Junction Boxes	This item includes all costs associated with the supply and installation of concrete junction boxes to support the underground conduit system. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.8	Conduit and Wiring	This item includes all costs associated with the conduit and wiring required to support the project between the BC Hydro transformer and the electrical kiosk, and the electrical kiosk and the EV chargers. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
2.9	EV Chargers	This item includes all costs associated with the supply and installation of the single Kempower C500 Power unit cabinet, Two Kempower 50kW power modules with dynamic power management, two Kempower single output satellite chargers and all associated equipment and accessories. The price shall also include the Kempower certification and training for the installation of the DC fast chargers.

		This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.

.3 Whistler Conference Center

Item No.	Description	Payment Terms
General Requirements		
3.1	Electrical Kiosk	This item includes all costs for the supply and installation of the electrical kiosk to support the EV charger's electrical equipment including all internal components, wiring, conduit and electrical systems. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.2	Electrical Kiosk Concrete Foundation	This item includes all costs for the installation and design of the kiosk concrete foundation including all excavation, ground remediation, formwork, rebar, and other miscellaneous materials required for the installation of the foundation. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.3	EV Charger Concrete Foundation	This item includes all costs for the installation and design of the EV charger concrete foundations including all excavation, ground remediation, formwork, rebar, and other miscellaneous materials required for the installation of the foundation. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.4	Bollards	This item includes all costs associated with the supply and installation of the steel, concrete filled bollards installed to protect the EV chargers. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.5	Trenching, Backfilling and Surface Restoration	This item includes all costs associated with the trenching and backfilling required to support the conduit installation between the BC Hydro transformer and the electrical kiosk, and the electrical kiosk and the EV chargers, and shall include ground remediation and surface restoration in disturbed areas to the same or better than existing. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.6	Concrete Junction Boxes	This item includes all costs associated with the supply and installation of concrete junction boxes to support the underground conduit system. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.7	Conduit and Wiring	This item includes all costs associated with the

		conduit and wiring required to support the project between the BC Hydro transformer and the electrical kiosk, and the electrical kiosk and the EV chargers. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.
3.8	EV Chargers	This item includes all costs associated with the supply and installation of the double Kempower C500 Power unit cabinet, eight Kempower 50kW power modules with dynamic power management, six Kempower single output satellite chargers and all associated equipment and accessories. The price shall also include the Kempower certification and training for the installation of the DC fast chargers. This item shall be paid at the lump sum price shown on the Schedule of Quantities and Prices.

Part 2 Products

.1 Not used.

Part 3 Execution

.1 Not used.

END OF SECTION

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P1	April 26, 2024	Issued for Tender	AGD	BW

Part 1 General

1.1 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.2 RELATED SECTIONS

.1 Not Used.

1.0 ADMINISTRATIVE

.1 Consultant shall schedule and chair meetings and record the meeting minutes.

.2 Consultant shall prepare agenda for meetings.

.3 Distribute written notice of each meeting to subcontractors four days in advance of meeting date.

.4 Provide physical space and make arrangements for meetings.

.5 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.1 PRECONSTRUCTION MEETING

.1 Within 30 days after award of Contract, Consultant will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.1 Attendance by Contractor and major Subcontractors is mandatory.

.2 Consultant, Owner, Contractor, and major Subcontractors, will be in attendance.

.3 Parties shall be notified a minimum of 5 days prior to meeting.

.1 Contractor shall be responsible for notifying and coordinating attendance of Subcontractors.

.2 Contractor shall prepare preliminary Schedule of Work for review at preconstruction meeting.

.3 Agenda will include but not be limited to:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00S - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00S - Construction Facilities.

.5 Delivery schedule of major equipment.

.6 Site security in accordance with Section 01 56 00S - Temporary Barriers and Enclosures.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.8 Owner provided products.

.9 Record drawings in accordance with Section 01 33 00S - Submittal Procedures.

.10 Maintenance manuals in accordance with Section 01 78 00S - Closeout Submittals.

.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00S - Closeout Submittals.

.12 Monthly progress claims, administrative procedures, photographs, hold backs.

.13 Appointment of inspection and testing agencies or firms.

1.2 PROGRESS MEETINGS

.1 During course of Work schedule progress meetings every two weeks.

.2 Contractor, major Subcontractors involved in Work Consultant and Owner are to be in attendance.

.3 Notify parties minimum one week prior to meetings as to who is required to attend from Consultant Team.

.4 Consultant shall perform the following duties:

.1 Prepare agenda for meetings.

.2 Preside at meetings.

.3 Record meeting minutes including significant proceedings and decisions.

.4 Reproduce and distribute copies of minutes within two days of meeting:

.1 To all participants at meeting.

.2 To all parties affected by decisions made at meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

Part 2 Products

2.0 NOT USED

.1 Not Used.

Part 3 Execution

3.0 NOT USED

.1 Not Used.

END OF SECTION

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Section 26 05 00S – Common Work Results

1.1 ADMINISTRATIVE

.1 Submit to Project Manager and Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Project Manager and Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Project Manager and Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Project Manager or Consultant's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Project Manager or Consultant's review.

.10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Canada where applicable.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 business days for Consultant's review of each submission.

.5 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Project Manager and Consultant prior to proceeding with Work.

.6 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Project Manager and Consultant in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

.9 After Project Manager and Consultant's review, distribute copies.

.10 Submit electronic copy in pdf format shop drawings for each requirement requested in specification and as Project Manager or Consultant may reasonably request.

.11 Submit electronic copy in pdf format of product data sheets or brochures for requirements requested in specification Sections and as requested by Project Manager or Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.1 Indicate exact model number and all options to be supplied on data sheet.

.12 Submit electronic copy in pdf format of test reports for requirements requested in specification Sections and as requested by Project Manager or Consultant.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copy in pdf format of certificates for requirements requested in specification Sections and as requested by Project Manager or Consultant.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copy in pdf format of manufacturer's instructions for requirements requested in specification Sections and as requested by Project Manager or Consultant.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copy in pdf format of Manufacturer's Field Reports for requirements requested in specification Sections and as requested Project Manager or Consultant.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copy in pdf format of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Project Manager or Consultant.

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.

.20 Indicate equipment numbers(s) or descriptions(s) on each submittal.

.21 If upon review by Project Manager and Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.22 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic of colour digital photography in jpg or tif format, standard resolution as directed by Project Manager and Consultant.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: to adequately capture the stages of existing equipment, equipment removal, equipment during construction, and final equipment replacement.

.4 Frequency of photographic documentation: as directed by Consultant.

END OF SECTION

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Section 26 05 00S – Common Work Results

1.2 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of British Columbia

.1 Workers Compensation Act, RSBC latest version.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00S - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation

.3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports as required by the authority having jurisdiction and provide a weekly update for the Consultant or Owner.

.4 Submit copies of reports or directions issued by health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with authority having jurisdiction

.7 Consultant or Owner will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant or Owner within 5 days after receipt of comments from Consultant or Owner.

.8 Consultant's or Owner's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant or Owner.

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.5 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.6 MEETINGS

.1 Schedule and administer Health and Safety meeting with Consultant or Owner prior to commencement of Work.

1.7 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Authority having jurisdiction.

1.8 PROJECT/SITE CONDITIONS

.1 Refer to hazardous materials report for facility appended to the specification for additional information.

1.9 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Consultant or Owner may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.10 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.11 COMPLIANCE REQUIREMENTS

.1 Comply with Workers Compensation Act, B.C. Reg.

.2 Comply with requirements of Authority Having Jurisdiction

1.12 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant or Owner verbally and in writing.

1.13 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with renovation and replacement of electrical distribution in existing buildings with the potential to have hazardous materials.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to and be under direction of site supervisor

1.14 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Consultant or Owner.

1.15 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Consultant or Owner.

.2 Provide Consultant or Owner with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Consultant or Owner may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 BLASTING

.1 Blasting or other use of explosives is not permitted

1.17 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from Consultant or Owner.

1.18 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

END OF SECTION

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Section 26 05 00S – Common Work Results – Electrical

1.2 INSPECTION

.1 Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Documents, or law of Place of Work.

.1 Due to remote location, provide a minimum of 14 days' notice to Consultant and Project Manager.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Consultant for purpose of inspecting and/or other portions of Work. Cost of such services will be borne by the Contractor.

.1 Refer to drawings and individual specification sections for specific independent testing agent requirements.

.2 Provide equipment required for executing inspection and testing by appointed agencies. Attend site and provide all support required by testing agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Consultant. Pay costs for retesting and re-inspection.

1.4 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

.1 Notify appropriate agency Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Consultant.

1.7 REPORTS

.1 Submit inspection and test reports in digital PDF format to Consultant.

.2 Provide copies to subcontractor of work being inspected or tested.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Consultant and may be authorized as recoverable.

1.9 MOCK-UPS

.1 Not Required.

1.10 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.11 EQUIPMENT AND SYSTEMS

.1 Refer to Divisions 26, 27, and 28 for electrical system requirements.

Part 2 Products

2.0 NOT USED

.1 Not Used.

Part 3 Execution

3.0 NOT USED

.1 Not Used.

END OF SECTION

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Part 1 General

1.0 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards.

.1 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.2 If there is question as to whether products or systems are in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance. Cost for such testing will be borne by Contractor in event of non-conformance.

1.1 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 All products, materials, equipment, and articles incorporated in Work shall bear CSA, cUL, or equivalent approval. Notify Consultant if specified products are not available with certification for use in Canada.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections or field reviews. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.3 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Consultant.

.9 Touch-up damaged factory finished surfaces Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.4 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for Contractor. Unload, handle and store such products.

1.5 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant will establish course of action.

.3 Improper installation or erection of products due to failure in complying with these requirements may cause Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.6 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Before installation, notify Consultant of any installation conflicts between trades. Install as directed by Consultant.

.3 Do not employ anyone unskilled in their required duties. Consultant and Project Manager reserve right to require dismissal from site, workers deemed incompetent or careless.

.4 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.7 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.8 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Consultant if there is interference. Install as directed by Consultant.

1.9 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Consultant of conflicting installation. Install as directed.

1.11 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.13 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval Consultant.

1.14 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and building occupants.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 Products

2.0 NOT USED

.1 Not Used.

Part 3 Execution

3.0 NOT USED

.1 Not Used.

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Not Used.

1.0 REFERENCES

.2 Not Used.

1.1 SURVEY REQUIREMENTS

.1 Not Required.

1.2 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.

.2 Perform BC One Call prior to digging in any common or public areas.

.3 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant.

.4 No documentation is available showing location of existing underground services. Buried services on the site include but are not limited to water, sewer, high voltage (25kV) distribution, low voltage (600 and 208V) distribution, and communications systems.

.5 Perform Ground Penetrating Radar scans of all areas to be excavated and/or where equipment is to be installed outdoors prior to commencing Work.

.1 Export results of drawings into CAD format and provide drawing to Consultant.

.2 Use survey paint to mark location of all services in areas to be excavated.

1.3 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 No accurate surveyed plan is available for the site. Location of all buildings, outdoor equipment, and proposed locations of new equipment are to be considered as approximate. Contractor shall verify exact locations on site.

.3 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.4 Inform Consultant of impending installation and obtain approval for actual location.

.5 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.4 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Contractor performing Ground Penetrating Radar scans to Consultant.

.2 On request of Consultant, submit documentation to verify accuracy of field engineering work.

1.6 SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

Part 2 Products

2.0 NOT USED

.1 Not Used.

Part 3 Execution

3.0 NOT USED

.1 Not Used.

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant or Project Manager. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.5 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.6 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.7 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.8 Debris and waste will be managed and disposed of in a proper manner as approved by the owner. Permits for waste handling and disposal will be obtained by the contractor.

1.2 FINAL CLEANING

.9 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.10 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.11 Prior to final review remove surplus products, tools, construction machinery and equipment.

.12 Remove waste products and debris other than that caused by Owner or other Contractors.

.13 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.

.14 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.15 Remove stains, spots, dust, marks and dirt from electrical equipment, walls, and floors.

.16 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.17 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

1.3 WASTE MANAGEMENT AND DISPOSAL

.18 Separate waste materials for recycling as required by the waste management service and in accordance with project documents

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Not Used.

1.2 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Consultant to review and discuss Waste Management Plan and Goals.

.2 Waste Management Goal is to divert all materials considered recyclable from landfill sites.

.3 Accomplish maximum control of solid construction waste.

.4 Preserve environment and prevent pollution and environment damage.

1.3 DEFINITIONS

.1 Class III: non-hazardous waste - construction renovation waste.

.2 Inert Fill: inert waste - exclusively asphalt and concrete.

.3 Recycled: ability of product or material to be recovered at end of its life cycle and reused.

1.4 DISPOSAL OF WASTES

.1 Debris and waste will be managed and disposed of in a proper manner as approved by the owner. Permits for waste handling and disposal will be obtained by the contractor.

.2 Do not bury rubbish or waste materials.

.3 Burning of any materials on site is prohibited.

.4 Do not dispose of waste, volatile materials, mineral spirits, oil, and paint thinner into waterways, storm, or sanitary sewers.

.5 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Reused or recycled waste destination.

.6 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.7 Dispose of Hazardous wastes at an approved facility only. Provide proof of proper disposal to Consultant.

1.5 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Provide temporary security measures approved by Consultant.

Part 2 PRODUCTS

2.0 NOT USED

Part 3 EXECUTION

3.0 APPLICATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.1 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean up work area as work progresses.

.3 Source separate materials to be reused/recycled in specific sort areas.

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1.0 DOCUMENTS

.1 This Section of the Specifications forms a part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Section 26 05 00S – Common Work Results

.2 Commissioning Oversight Operation & Maintenance Manual Review Checklist

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00S - Submittal Procedures and project documents.

.2 Two weeks prior to Substantial Performance of the Work, submit to the Project Manager, two final hard copies and one electronic copy of operating and maintenance manuals in English.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 O&M MANUAL FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide to scale CAD files in dwg format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

.6 Training: refer to Section 01 79 00S - Demonstration and Training.

.7 Refer to attached Commissioning Oversight Operation & Maintenance Manual Review Checklist for additional requirements for O&M manual submission.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, at site for Project Manager and Consultant one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction in secure location.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of drawings, and in copy of Project Manual, provided by Project Manager.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Changes made by change orders.

.2 Details not on original Contract Drawings.

.3 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, as required by individual specifications sections.

.7 Provide digital photos, if requested, for site records.

1.7 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.5 Include manufacturer's printed operation and maintenance instructions.

.6 Include sequence of operation by controls manufacturer.

.7 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.8 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.9 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.10 Additional requirements: as specified in individual specification sections.

1.8 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Project Manager

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Project Manager.

.2 Include approved listings in Maintenance Manual.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather, or temperature extremes in suitable weatherproof, heated or conditioned areas.

.4 Remove and replace damaged products at own expense and for review by Project Manager or Consultant.

1.10 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Warranty management plan to include required actions and documents to assure that Owner receives warranties to which it is entitled.

.3 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.4 Submit, warranty information made available during construction phase, to Project Manager for approval prior to each monthly pay estimate.

.5 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.6 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.7 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include electrical equipment.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 9 month post-construction warranty inspections.

.5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.8 Respond in timely manner to oral or written notification of required construction warranty repair work.

.9 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Owner to proceed with action against Contractor.

END OF SECTION

TABLE OF CONTENTS

Revision History

Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
P1	April 26, 2024	Issued for Tender	AGD	BW

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Technical Specification 26 05 00 Common Work Results - Electrical

.2 Technical Specification 26 05 02 Seismic Restraint

.3 Technical Specification 26 05 10 Testing and Commissioning

.4 Technical Specification 26 05 20 Wire and Box Connectors (0-1000V)

.5 Technical Specification 26 05 21 Wires and Cables (0-1000V)

.6 Technical Specification 26 05 28 Grounding - Secondary

.7 Technical Specification 26 05 29 Hangers and Supports for Electrical Systems

.8 Technical Specification 26 05 31 Splitters, Junction, Pull Boxes and Cabinets

.9 Technical Specification 26 05 32 Outlet Boxes, Conduit Boxes and Fittings

.10 Technical Specification 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings

.11 Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts

.12 Technical Specification 26 05 80 Fractional Horsepower Motors

.13 Technical Specification 26 05 81 Motors 0.746 to 149kW

.14 Technical Specification 26 09 24 Lighting Control Devices – Low Voltage

.15 Technical Specification 26 12 16 01 Dry Type Transformers up to 600V Primary

.16 Technical Specification 26 24 01 Service Equipment

.17 Technical Specification 26 24 02 Service Entrance Board

.18 Technical Specification 26 24 05 Switchboard TVSS Protection

.19 Technical Specification 26 24 16 01 Panelboards Breaker Type

.20 Technical Specification 26 24 19 Motor Control Centres

.21 Technical Specification 26 27 16 Electrical Cabinets and Enclosures

.22 Technical Specification 26 27 17 Programmable Logic Controller

.23 Technical Specification 26 27 26 Wiring Devices

.24 Technical Specification 26 28 16 02 Molded Case Circuit Breakers

.25 Technical Specification 26 28 23 Disconnect Switches – Fused and Non-Fused

.26 Technical Specification 26 29 01 Contactors

.27 Technical Specification 26 29 03 Control Devices

.28 Technical Specification 26 29 04 Transmitters and Indicators

.29 Technical Specification 26 29 05 Data Communications Infrastructure

.30 Technical Specification 26 29 10 Motor Starters to 600V

.31 Technical Specification 26 29 23 11 Variable Frequency Drive

.32 Technical Specification 26 32 13 01 Power Generation Diesel

.33 Technical Specification 26 33 53 Static Uninterruptible Power Supply

.34 Technical Specification 26 36 23 Automatic Transfer Switches

.35 Technical Specification 26 50 00 Lighting

.36 Technical Specification 26 52 00 Emergency Lighting

.37 Technical Specification 26 54 00 Heaters and Ventilation

1.2 REGULATORY REQUIREMENTS

.1 Definitions:

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in this Technical Specification, and on Contract Drawings, are those defined by IEEE SP1122.

.2 Reference Standards:

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

.2 CSA C22.2 No. 1-10, General Requirements - Canadian Electrical Code, Part 2, Current Edition.

.3 CAN3-C235-83, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, Current Edition.

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Master Municipal Construction Documents Association (MMCDA)

.1 Master Municipal Construction Documents, Current Edition (MMCD)

1.3 TECHNICAL SPECIFICATION INCLUDES

.1 This Technical Specification covers items common to the Divisions 26 Technical Specifications. This Technical Specification supplements requirements of Division 1.

.2 This Technical Specification 26 05 00 refers to those portions of the Work that are unique to the supply and installation of all electrical, control, and instrumentation and related appurtenances. This Technical Specification must be referred to and interpreted simultaneously with all other Technical Specifications pertinent to the works described herein.

1.4 SCOPE

.1 Work of this Contract comprises electrical, mechanical, structural and civil work that covers the scope of the Sea to Sky EV Network expansion.

.1 Main Street (4325-4343 Main St, Whistler, BC)

.2 Whistler Conference Center parking lot (4010 Whistler Way, Whistler, BC)

.2 Work at each location includes but is not limited to:

.1 Supply and installation of EVSE electrical power distribution kiosk and all internal elements including main circuit breakers, feeder circuit breakers, metering equipment, service panel, lighting, receptacles and heater as required.

.2 Supply and installation of transformer.

.3 Supply and installation of concrete junction boxes, extensions, and galvanized steel lids as required.

.4 Supply and installation of electrical conduit and wiring as required.

.5 Supply, installation and design of EVSE kiosk EVSE charging station concrete bases and all rebar as required.

.6 Supply and installation of EV chargers by certified installer.

.7 Coordination with BC Hydro for service connection where required.

.8 Trenching and backfilling for conduits and ducts as required.

.9 Supply and installation of bollards.

.10 Cleaning and painting of line work and decals for parking stalls.

.11 Supply and installation of signage.

.12 Provide arc flash study for electrical kiosk.

.3 Contractor shall obtain and pay for all permits required to perform the work outlined in the Contract Documents including but not limited to electrical and related trade permits.

1.5 WORK BY OTHERS

.1 The following work will be completed by the RMOW during or after completion of the project:

.1 Landscaping along the periphery of the work sites.

1.6 REMOVAL OF REDUNDANT MATERIAL AND EQUIPMENT

.1 Not used.

1.7 DEFINITIONS

.1 The word ‘Install’ means the Supply, delivery, and installation of device or equipment referenced to the level required to be complete and operational including unloading, unpacking, assembling, erecting, applying, finishing, protecting, and cleaning.

.2 The word ‘Supply’ means to obtain and deliver to the Site, ready for unpacking, assembly, and installation.

.3 AHJ: Governmental Authority having jurisdiction.

.4 Schematic or Elementary Diagram

.1 A schematic (elementary) diagram shows, by means of graphic symbols, the electrical connections and functions of a specific circuit arrangement. The schematic diagram facilitates tracing the circuit and its functions without regard to the actual physical size, shape, or location of the component devices or parts.

.5 Single-Line Diagram

.1 A single-line diagram shows, by means of single lines and graphical symbols, the course of an electrical circuit or system of circuits and the components, devices or parts used therein. Physical relationships are usually disregarded.

.6 Block Diagram

.1 A block diagram is a diagram of a system, instrument, computer, or program in which selected portions are represented by annotated boxes and interconnecting lines.

.7 Wiring Diagram or Connection System

.1 A wiring or connection diagram includes all of the devices in a system and shows their physical relationship to each other including terminals and interconnecting wiring in an assembly. This diagram may be (a) in a form showing interconnecting wiring only by terminal designation (wireless diagram), or (b) by panel layout diagram showing the physical location of devices plus the elementary diagram.

.8 Interconnection Diagram

.1 An interconnection diagram shows all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. References shall be shown to all connection diagrams which interface to the interconnection diagrams. Interconnection diagrams shall be of the continuous line type. Bundled wires shall be shown as a single line with the direction of entry/exit of the individual wires clearly shown. Wireless diagrams and wire lists are not acceptable. Each wire identification as actually installed shall be shown. The wire identification for each end of the same wire shall be identical. All devices and equipment shall be identified. Terminal blocks shall be shown as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Wires or jumpers shown on the equipment connection diagrams shall not be shown again on the interconnection diagram. Signal and DC circuit polarities and wire pairs shall be shown. Spare wires and cables shall be shown.

.9 Arrangement, Layout, or Outline Drawings

.1 An arrangement, layout, or outline drawing is one which shows the physical space and mounting requirements of a piece of equipment. It may also indicate ventilation requirements and space provided for connections or the location to which connections are to be made.

1.8 DRAWINGS, MEASUREMENTS, AND NOTATIONS

.1 Contract Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work.

.2 The Contract Drawings show approximate locations of equipment and apparatus, but the right is reserved to make such changes in location before installation or performance of the work as may be necessary to meet the exigencies of construction in any way. No extra will be allowed and conversely, no credit shall be expected for such changes unless for each item of work the distance moved exceeds 3m prior to final installation of same.

.3 Take field measurements where equipment and material dimensions are dependent upon building dimensions.

.4 The Contractor shall supply and install all electrical equipment. Standard notations are used on the Contract Drawings to assist the Contractor in identifying what work needs to be done. These standard notations are defined as follows:

.1 “All equipment is proposed unless noted otherwise” – This notation is used on Contract Drawings where the majority of the equipment on the drawing is to be supplied and installed by the Contractor. The notation means that the Contractor shall perform all work shown on the Contract Drawing except for equipment shown as existing (i.e. to remain).

.2 “All equipment is existing unless noted otherwise”: - This notation is used on Contract Drawings where the majority of the equipment is existing. The notation means that the Contractor shall perform only the Work identified on the Contract Drawings.

1.9 RESPONSIBILITY AND COORDINATION

.1 Provide all labour, materials, equipment, tools, and incidentals necessary to provide a complete electrical installation as indicated on the Contract Drawings and as set out in these Technical Specifications.

.2 Without relieving the Contractor of his responsibilities, the Technical Specifications have been divided into approximate trade sections for convenience. The use of these sections do not, however, limit the responsibility of the Contractor or any Subcontractor or Supplier. The onus of defining the extent of the Subcontractors' work remains with the Contractor, who, when awarding subcontracts, will ensure that the area of responsibility of any particular Subcontractor is set out in full detail.

.3 The Contractor shall advise the Contract Administrator of any specified material or equipment which is either no longer available from manufacturers or whose delivery is likely to exceed the requirements of the anticipated Work Schedule. Failure of the Contractor to perform the above shall cause the Contractor to supply, at his own expense, alternate material or equipment as selected by the Contract Administrator at a later date. Alternatively, the Contractor shall procure the specified material or equipment at his own additional expense by means of air freight or other special means of transportation.

.4 Advise the Contract Administrator of any specified equipment, material, or installation of same which appears inadequate or unsuitable or which is in violation of Laws, ordinances, rules, or regulations of Governmental Authorities having jurisdiction. Provide all labour and materials which are obviously necessary or reasonably implied to be necessary to complete the work as if the work was shown on the Drawings and/or described in the Specifications.

.5 Check drawings of all trades and coordinate the installation of all material and equipment to ensure adequate space and free access and to maintain headroom limitations for all proposed and indicated future work. Work out jointly, with all Subcontractors on the Site, solutions to interference problems. Coordinate all work before fabricating or installing any material or equipment. It is incumbent on all Subcontractors on the Site to ensure that all materials and equipment fit into the allocated spaces and that all equipment can be properly inspected, serviced, and replaced if and when required. Advise the Contract Administrator of space problems before fabricating or installing any material or equipment. Demonstrate to the Contract Administrator on completion of its work that all equipment and material installed by the Contractor can be properly and safely serviced and replaced. Make no deviations from the intent of the design, or any involving additional cost, without the Contract Administrator's written direction.

.6 Ensure that any building structure loaded during the installation is adequate to carry such load.

.7 A contractor is entitled to engage in the regulated work for which the contractor is licensed.

.1 A licensed contractor must not:

.1 Manage or do regulated work that is:

.1 Outside the scope of the license,

.2 Contrary to any term or condition of the license, or

.3 Contrary to any term or condition imposed by the regulations on the use of the license, or

.2 Permit regulated work to be undertaken by persons under the control of the licensed contractor if they are not authorized.

.2 A licensed contractor must:

.1 Maintain current knowledge of the Applicable Laws, relevant regulations, relevant directives, relevant safety orders and any other relevant material that the minister makes publicly available, and

.2 Ensure that individuals who do regulated work for the licensed contractor maintain similar current knowledge.

1.10 COMMON PRODUCT REQUIREMENTS

.1 All products and warranties shall be registered in the Owner's name.

.2 Products shall be purchased through authorized supply chains to ensure that all warranties and technical support remain valid in British Columbia following installation of the products.

.3 Any products installed that had their warranties or technical support voided for any reason shall be replaced at the Contractor's expense with an identical replacement product that has a valid warranty in British Columbia. Any resulting costs from complications that require remediation from products with voided warranties or technical support shall be borne solely by the Contractor to make the Work good.

.4 Contractor is responsible to ensure that all products are purchased from the OEM or an OEM authorized supply chain/channel such as an authorized distributor or reseller. Any non-OEM products installed shall be replaced at the Contractor's expense, even if non-OEM products are discovered after completion of the project. Any resulting costs from complications that require remediation from the use of non-OEM products shall be borne solely by the Contractor to make the Work good.

.5 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections or field reviews. Inspection does not relieve responsibility, but is precaution against oversight or error. Contractor to remove and replace defective products at own expense and is responsible for any delays and expenses caused by rejection.

.6 Contractor shall provide letters of assurance from the OEM manufactures identified throughout the specifications which assure that the products purchased as part of the project were purchased through an OEM authorized channel and that the products are new.

.1 Details on required letters of assurance from OEM manufacturers are provided in Section 1.19 Closeout Submittals.

1.11 TESTING, OPERATION AND SET-UP

.1 Testing in accordance with Technical Specification 26 05 10 Testing and Commissioning.

1.12 PERMITS, FEES, AND INSPECTIONS

.1 Before commencing work obtain and pay for all necessary approvals and permits. The Contract Administrator shall provide any documents required by the Authority Having Jurisdiction to obtain such permits.

.2 Arrange for inspection of the work at rough-in completion, prior to Substantial Completion, and as otherwise required by all applicable Authorities Having Jurisdiction.

.1 Notify Contract Administrator of any changes required by the Authorities Having Jurisdiction prior to proceeding with changes.

.3 Provide Contract Administrator with a certificate of unconditional approval for all electrical work from the appropriate Authorities Having Jurisdiction. Final payment to the Contractor shall not be made prior to submission of the inspection certificate.

1.13 EVALUATION OF CONTRACT CHANGES

.1 In accordance with Division 1 specifications.

1.14 MEASUREMENT AND PAYMENT

.1 Payment for all work performed under this Section will be Lump Sum per the Schedule of Quantities and Prices.

1.15 REVIEW OF WORK

.1 In accordance with the General Conditions.

1.16 SCHEDULING OF WORK

.1 Work shall be scheduled as required to coordinate with other Divisions and Owner’s work restrictions.

1.17 ACTION AND INFORMATIONAL SUBMITTALS

.1 In accordance with Division 1 specifications.

1.18 SHOP DRAWINGS

.1 Provide digital copies of shop drawings in PDF format. Organize and separate shop drawings per Technical Specification for review.

.2 The Shop Drawing will be retained by the Contract Administrator for their office use and a copy will be marked and returned to the Contractor for correction if necessary, further reproduction, and distribution as required.

.3 Accompany submissions with transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.4 Where specifically noted in other Technical Specifications in Division 26, submit drawings stamped and signed by Professional Engineer registered or licensed in British Columbia, Canada.

.5 Contractor shall review all Shop Drawings prior to submittal. All Shop Drawings shall be stamped and signed by the electrical Subcontractor engaged by the Contractor. Unstamped drawings will be marked “re-submit” (R3) without comment.

.6 All Shop Drawings shall use metric dimensions. Scaled drawings shall use metric scale.

.7 Each Shop Drawing shall clearly indicate the equipment ID and equipment type (e.g. Luminaire Type ‘A’, Panelboard SD-A) where applicable.

.8 Where manufactures’ brochures that include multiple equipment or device models are submitted, they shall be clearly labelled with the equipment model and options to be supplied. Submit relevant sections of manufacturer’s catalogues only. Submissions of complete catalogues will be rejected.

.9 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.10 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.11 Indicate on Shop Drawings clearance requirements for: operation, maintenance, and replacement of operating equipment devices.

.12 Submit complete Shop Drawing packages for each system. Partial submissions will be returned without comment.

.13 Review of Shop Drawings by the Contract Administrator is for the sole purpose of ascertaining conformance with the general design intent. The review shall not mean approval of the detail design inherent in the Shop Drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of its responsibility for errors or omissions in the Shop Drawings or of its responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all sub-trades.

.14 Shop Drawings stamped as “Revise and Resubmit” to be corrected and resubmitted by the Contractor within 10 days of the Shop Drawing review.

.15 Ensure that copies of all accepted Shop Drawings are available at the job site.

1.19 CLOSEOUT SUBMITTALS

.1 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.2 Operation and Maintenance Manuals:

.1 Provide draft version of Operations and Maintenance Manual to Contract Administrator two weeks prior to Substantial Performance Review.

.3 Upon completion of all electrical, control, and instrumentation work, submit Record Drawings, including all as-built information and changes.

.4 Manufacturer Letters of Assurance: Contractor shall provide letters of assurance for provided equipment.

As-Built Documents and Samples

.5 Maintain at Site for Contract Administrator one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.6 Store record documents and samples in field office apart from documents used for construction in secure location.

.7 Label record documents and file in accordance with section number listings in list of contents of this project manual.

.8 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.9 Keep record documents and samples available for inspection by Contract Administrator.

.10 Obtain and pay for three sets of white prints. As the project progresses, mark these prints to accurately indicate installed work. Have the white prints available for inspection at the Site at all times and present for scrutiny at each project meeting.

.11 Show on the Record Drawings the installed inverts of all services entering and leaving the building and the property. Dimension underground services at key points of every run in relation to the structure and building.

.12 Indicate exact location of all services for future work. Show and dimension all work embedded in the structure.

.13 Maintain in the site office in up-to-date condition, one (1) complete set of whiteprints of each of the electrical Contract Drawings and one (1) set of Technical Specifications, including revisions to the Contract Drawings, marked clearly and indelibly in red, indicating as-built conditions where such conditions deviate from the original directions of the Contract Documents, and indicating final installation of feeders and branch circuits.

.14 ”As-Built” markings shall include the following:

.1 All changes in circuiting.

.2 Size and routing of all conduits for branch circuits including power, lighting, and systems. Note that branch circuit wiring is generally not shown on Contract Drawings. Accurately record on "As-Built" drawings the size and routing of all installed raceways and cables.

.3 Number and size of conductors in raceways and cables

.4 Location of all junction and pull boxes

.5 Location of all access panels

.6 Location of all conduit or duct stubs, installed equipment, devices, and fixtures

.7 All changes to electrical installation resulting from Addenda, Change Orders, and Field Instructions (Architectural / Engineering Instructions)

.8 Exact location of all services left for future work

.9 Location by accurate horizontal and vertical dimensions of the routes and terminations of all raceways and cables installed underground beyond the building.

.10 Exact labeling of each communication system cable at each data outlet location. Locate label numbers adjacent each communication outlet indicated on Contract Drawings. Label numbers to match those at the communication room cable end.

.11 Where extensive changes have been made to an area to the point where it is not practical to update the original Contract Drawing, the area in question shall be enclosed with a heavy dotted line and reference made to the applicable Change Order, Instruction, and/or associated Revision Drawing.

.12 For each and every "As-Built" drawing, reference shall be neatly drawn inside the framed space above the title block, listing all Contemplated Change Orders, Instructions, and Revision Drawing Numbers applicable to the particular "As-Built" drawing in question.

.13 Each "As-Built" drawing as defined above shall bear the Contractor's identification and signature, the date of record, and the notation: "We hereby certify that these drawings represent the work as built."

.14 All Addenda and Revision Drawings not having their details transferred onto the submitted "As-Built" drawings shall be included in the submission using the same drawing format as previously described.

.15 Recording Information on Project Record Documents.

.1 Record information on set of Contract Drawings.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and Shop Drawings: mark each item to record actual construction, including:

.1 Changes made by Change Orders.

.2 Details not on original Contract Drawings.

.3 References to related Shop Drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed particularly optional items and substitute items.

.2 Changes made by Addenda and Change Orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, as required by Technical Specifications.

.7 Provide digital photos, if requested, for site records.

1.20 OPERATION AND MAINTENANCE MANUAL

.1 Submission:

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Contract Administrator's comments.

.3 Revise content of documents as required prior to final submittal.

.4 As a condition of Substantial Completion submit to the Contract Administrator, four final copies of operating and maintenance manuals in English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. The Contractor shall replace products at their own expense, with no increase to the Contract Price.

.8 Pay costs of transportation.

.2 Format

.1 Organize data in the form of an instructional manual.

.2 Provide a digital copy of the O&M manual in PDF format.

.3 Arrange content by systems under Technical Specification numbers and sequence of Table of Contents.

.4 Provide organized digital bookmarks for content by systems under Technical Specification Numbers and sequence of Table of Contents.

.3 Contents – Each Volume:

.1 Table of Contents: provide title of Project;

.1 Date of submission; names,

.2 Addresses, and telephone numbers of Engineer and Contractor with name of responsible parties;

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of Subcontractors and Suppliers, including local source of supplies and replacement parts.

.3 Product Data

.1 Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings

.1 Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text

.1 As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

.6 Guarantees, Warrantees and Bonds

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List Subcontractor, Supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by Subcontractors, Suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave the date of when the warranty begins blank until the Substantial Completion Date is determined. The beginning date of the warranty will then be updated to state the Substantial Completion Date.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.7 Equipment and Systems:

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.12 Additional requirements: As specified in the Contract Documents.

1.21 DELIVERY, STORAGE, AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.1 Except for equipment intended for installation outdoors, store equipment indoors in dry location.

.2 Store and protect equipment and materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.3 Packaging Waste Management: remove and dispose of all packaging waste materials.

.1 Where possible, return packaging materials to supplier for re-use.

.2 Divert all recyclable materials from landfill.

1.22 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with the Contract and the Division 1 Technical Specifications.

.2 Qualifications: electrical work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Electrical Safety Regulation within the Electrical Safety Act and the Building Code and By-Laws.

.1 Employees registered in provincial apprentices' program: permitted, under direct supervision of qualified licensed electrician, to perform installation tasks.

.2 Submit list showing names and qualifications of key supervisory personnel.

1.23 SAFETY AND PRECAUTION

.1 Safety practices shall include the following requirements:

.1 Compliance with safety requirements provided in the Contract Documents

.2 Workers' Compensation Board Regulations

.3 Municipal By-Laws

.4 Canadian Electrical Code

.5 Electrical Safety Act of BC

.6 Municipal, Provincial and Canadian Building Code

.2 Tests shall be performed with apparatus de-energized unless otherwise specified (e.g., rotation, phasing).

.3 Power circuits shall have conductors shorted to ground by an approved hotline grounded device.

.4 In all cases, work shall not proceed until the Contractor's safety representative has determined that it is safe to do so.

.5 The Contractor shall have sufficient protective barriers and warning signs available, where necessary, to conduct specified tests safely.

.6 The Project safety procedures shall be reviewed and accepted by the Contractor and all sub-trades.

1.24 CARE, OPERATION, AND START-UP

.1 Instruct Contract Administrator and operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.25 APPROVALS

.1 Without limiting or restricting the contents of the Contract Documents, requests for approval of the substitution of materials pertaining to electrical work must be submitted to the Contract Administrator and the Owner in accordance with the Review Procedure.

.2 All submissions shall include the following information:

.1 Name and identification of specified item.

.2 Manufacturer, brand name, and catalogue number of the alternative item proposed.

.3 Detailed technical data and characteristics of alternative item such as dimensions, voltage, power requirements, performance characteristics, etc.

.4 Request for lighting fixture substitutions must be followed by photometric data and Shop Drawings.

.5 A list of any and all changes to the installation which may be required as a result of the substitution.

.3 Materials, equipment, apparatus, light fixtures, or other products specified by manufacturers' brand name, type, or catalogue number are so specified in one of two ways:

.1 Specified item followed by the words “or equal” or “approved equal” or preceded by the words “equivalent to” or “equal to”; when the Technical Specification is so worded, it is intended to establish a specific standard of quality and style but the item may be substituted for, provided the Contract Administrator provides its written approval. It is the responsibility of the Contractor to assure the Contract Administrator that all features of the specified items are supplied as part of the substitute item. If the Contract Administrator does not provide its written approval for a substitute item, the item shall be supplied precisely as specified in the Contract Documents.

.2 Specified items not followed or preceded by any such qualifying phrases: When the Technical Specification is so worded, the item shall be supplied as specified and no approved equals or equivalents will be allowed.

.4 Review by the Contract Administrator of alternate materials as permitted above is only a general approval in principal and shall not relieve the Contractor of its responsibility to ensure that any approved alternate materials perform in the same manner and with the same intent as the originally specified material would have otherwise performed.

.5 Where such substitutions alter the design or space requirements indicated on the Contract Drawings, include all material, labour, design, and engineering costs for the revised design and construction including costs of all other trades affected and those incurred by the Owner and Contract Administrator.

.6 It is the Contractor's responsibility to ensure substituted products are approved and that Suppliers have written approval indicating conditions of any such approval. Alternate manufacturers who do not have such approval shall not be used in the work. If requested by the Contract Administrator, the Contractor for Division 26 shall submit for inspection, samples of both the specified and the proposed substitute items on short notice.

Part 2 Products

2.0 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates for control items in English.

2.1 MATERIALS AND EQUIPMENT

.1 Equipment and material shall be new and certified by a certification body accredited by the Standards Council of Canada (SCC). Where there is no alternative to supplying equipment which is not certified, obtain special approval and pay all associated fees. Notify Contract Administrator prior to supplying material that is not SCC approved.

.2 Factory assemble control panels and component assemblies.

.3 Substitution of Products

.1 After acceptance of the list of products, no substitution of any item will be permitted unless the approved item cannot be delivered in time to comply with the work schedule and the Contract Administrator accepts the change in items.

.2 To receive acceptance, proposed substitutes must equal or exceed the quality, finish and performance of those specified in the Contract Documents and/or shown in the Contract Drawings, and must not exceed the space requirements allotted on the Contract Drawings.

.3 Provide to the Contract Administrator documentary proof of equality, difference in price (if any) and delivery dates, in the form of certified quotations from suppliers of both specified items and proposed substitutions.

.4 Include costs for any required revisions to other structures and products to accommodate such substitutions.

2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated in the Technical Specifications and Contract Drawings.

2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction and Contract Administrator.

.2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify equipment cabinets with nameplates as follows:

.1 Nameplates:

.1 Lamicoid 3 mm thick plastic engraving sheet, lettering accurately aligned and engraved into core, mechanically attached with self-tapping screws or permanent self-adhesive.

.2 Nameplate colours as follows:

.1 Normal Power Systems: black face, white core

.2 Emergency/Standby Power Systems: red face, white core

.3 Life Safety Systems: red face, white core

.4 Colours for other equipment as specified by the Contract Administrator.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise in the Contract Drawings.

.3 Wording on nameplates to be approved by Contract Administrator prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

.8 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

.1 Refer to Technical Specification 26 05 21 – Wires and Cables (0-1000V).

2.7 CONDUIT AND CABLE IDENTIFICATION

.1 Refer to Technical Specification 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

2.8 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

.4 Repair or replace any equipment or structures damaged by the Work, to its original condition at no cost to the Owner.

Part 3 Execution

3.0 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Technical Specifications are acceptable for installation in accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Contract Administrator.

.3 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.1 INSTALLATION

.1 Complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise in the Contract Drawings.

3.2 NAMPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 plastic, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise in the Contract Drawings.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY CONTROL

.1 Refer to Technical Specification 26 05 10 Testing & Commissioning.

3.7 SUBSTANTIAL PERFORMANCE REVIEW

.1 Prior to the Contractor submitting an Application for Substantial Completion, the Contractor will submit written confirmation that:

.1 All wiring devices, cover plates, motor controls, lighting fixtures, and other equipment are operational, plumb, clean, and correctly labelled.

.2 All distribution equipment (cabinets, panels, distribution transformers, etc.) has been cleaned and vacuumed.

.3 All test reports have been submitted.

.4 All auxiliary systems have been tested as required and are in good and proper working order.

.5 All certificates of final acceptance from the authorities having jurisdiction have been received and submitted to the Contract Administrator.

.6 Factory finished equipment has been cleaned, touched up, or refinished as necessary to present a new appearance.

.7 All sealing of conduits, cables, cable trays, wireways, etc. at wall, ceiling, and floor penetrations have been completed.

.8 All lighting fixtures including lenses and reflectors have been properly cleaned as specified in the Contract Drawings.

.9 All loose equipment including spare parts and replacement parts have been turned over to the Owner and receipts obtained for same.

.10 The operations and maintenance manuals have been submitted.

.11 All demonstrations and instructions to the Owner have been completed.

.12 Verification letter from Seismic Engineer has been submitted.

.13 Signed and sealed drawings of all proposed concrete pads.

.2 Provision of the above shall not be construed as compliance with all administrative documentation required.

.3 Notwithstanding any other provisions of the Contract, failure if the Contractor fails to complete all of the requirements in this section 3.7 the Contract Administrator may refuse to issue a Certificate of Substantial Completion.

3.8 SYSTEM START-UP

.1 Arrange and pay for services of manufacturer's factory service representative to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.9 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Where work is performed in a phased manner, or Owner will take partial occupancy of the area of Work, perform final cleaning at the end of each Phase or prior to Owner taking occupancy of each area.

.4 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END SECTION

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Revision History

Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
P1	April 26, 2024	Issued for Tender	AGD	BW

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

.2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by the Specifications.

.3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.

.4 When manufacturer mounting requirements and seismic information are not available to suit the application, the Contractor will ensure that the total electrical seismic restraint design, field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements (the “Seismic Consultant”). Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Consultant. The Seismic Consultant will provide normal engineering functions as they pertain to seismic restraint of electrical installations.

.5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the Project. Any changes in conditions will not result in an increase to the Contract Price, unless otherwise stated in the Contract Documents.

.6 The Seismic Consultant shall provide detailed seismic restraint installation shop drawings to the Contractor when required. Copies of the shop drawings to be included in the Project Binder.

.7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs per manufacturer instructions or the Seismic Consultants direction as required.

.8 The Seismic Consultant shall provide inspections during and after installation when their services are required. The Contractor shall correct any deficiencies in accordance with the General Conditions of the Contract.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 29 Hangers and Supports for Electrical Systems

1.3 REGULATORY REQUIREMENTS

.1 Restraints shall meet the requirements of the latest edition of the British Columbia Building Code and amendments.

.2 The Contractor's seismic consultant shall submit original signed BC Building Code Letters of Assurance Schedules S-B and S-C to the Contract Administrator together with Shop Drawings submission.

.3 Importance Factor: 1.5.

.4 Use the Electrical Contractors Association of BC details in the absence of any local requirements.

.5 The above requirements shall not restrict or supplant the requirements of any Applicable Laws, including local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the Seismic Consultant.

.3 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Consultant.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 GENERAL

.1 Seismic Restraint Systems (SRS) shall be designed to avoid high impact loads.

.2 SRS shall restrain seismic forces in all directions.

.3 Fasteners and attachment points shall resist same load as seismic restraints.

.4 SRS utilizing cast iron and other brittle materials is not acceptable.

.5 Equipment assemblies required to be vibration/noise isolated shall be provided with seismic rated isolators and restraints which are certified as being rated for the specification application requirements.

.6 Seismic control measures shall not interfere with integrity of fire stopping.

2.1 SLACK CABLE SYSTEMS

.1 Slack shall prevent sway in a horizontal plane, rocking in a vertical plane, sliding and buckling in axial direction.

.2 Hanger rods shall withstand compressive loading and buckling forces.

.3 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.

.4 Coordinate requirements of slack cables with suppliers prior to installation.

Part 3 Execution

3.1 GENERAL

.1 All seismic restraints systems shall conform to Governmental Authorities, including local authority having jurisdiction and all Applicable Laws and applicable code requirements.

3.2 CONDUITS

.1 Provide restraint installation information and details on conduit and equipment as indicated in Section 3.2 of this Technical Specification:

.2 Vertical Conduit

.1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.

.2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m o.c.

.3 Riser joints shall be braced or stabilized between floors.

.3 Horizontal Conduits

.1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.

.4 Do not brace conduit runs against each other. Use separate support and restraint system.

.5 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.

.6 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.

.7 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.

.8 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.

.9 The Contractor will ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on Shop Drawings. The Contractor will review the Shop Drawings with Seismic Consultant and submit Shop Drawings to the Contract Administrator for their reference.

3.3 FLOOR MOUNTED EQUIPMENT

.1 Bolt all equipment, (including transformers, kiosks, switchgear, generators, motor control centres, free standing panelboards, control panels, capacitor banks) to the structure. Seismic Consultant shall design anchors and bolts.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for wire and box connectors.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 21 Wires and Cables (0-1000V)

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18.1-13, Metallic Outlet Boxes

.2 CAN/CSA C22.2 No. 18.2-06, Nonmetallic Outlet Boxes

.3 CAN/CSA C22.2 No. 18.3-12, Conduit, Tubing, and Cable Fittings

.4 CAN/CSA C22.2 No. 18.4-04, Hardware for the Support of Conduit, Tubing

.5 CAN/CSA C22.2 No. 65-18, Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y 2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2 No. 65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2 No. 65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y 2 to consist of:

.1 Connector body and stud clamp for copper conductors.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable and flexible conduit as required to comply with CAN/CSA C22.2 No. 18 (all subsections).

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant or provide photographic evidence of areas of concern.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No. 65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y 2.

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1.1 SCOPE

.1 Materials and installation for wire and cables.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 20 Wire and Box Connectors (0-1000V)

.3 Technical Specification 26 05 43 01 Installation of Cables in Trenches and Ducts

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 0.3-09, Test Methods for Electrical Wires and Cables

.2 CAN/CSA C22.2 No. 38-14, Thermoset-insulated wires and cables

.3 CSA C22.2 No. 49, Flexible Cords and Cables

.4 CSA C22.2 No. 51, Armoured Cables

.5 CSA C22.2 No. 52, Underground secondary and service-entrance cables

.6 CSA C22.2 No. 65, Wire Connectors

.7 CAN/CSA C22.2 No. 75, Thermoplastic insulated wires

.8 CAN/CSA C22.2 No. 127-15, Equipment and lead wires

.9 CSA C22.2 No. 131, Type TECK 90 Cable

.10 CAN/CSA C22.2 No. 131-17, Type TECK 90 Cable

.11 1.4.13 CSA C22.2 No. 174, Cables and Cable Glands for Use in Hazardous Locations

.12 CSA C22.2 No. 2556, Wire and Cable Test Methods

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 POWER WIRING

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG, unless noted otherwise.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Jacketed.

.3 Colour Code:

- .1 AC 3-Phase:
  - .1 Line 1: Red
  - .2 Line 2: Black
  - .3 Line 3: Blue
  - .4 Neutral: White
- .2 AC Single Phase:
  - .1 Hot: Black
  - .2 Hot (Secondary): Red
  - .3 Neutral: White

.4 Grounding conductors to be in accordance with requirements in Technical Specification 26 05 28 Grounding - Secondary.

2.1 TECK 90 CABLE

.1 Conductors:

- .1 Grounding conductor: copper.
- .2 Circuit conductors: copper, size as indicated.

.2 Insulation:

- .1 Cross-linked thermosetting polyethylene rated type RW90 XLPE.
- .2 Rating: 1000V

.3 Inner jacket: polyvinyl chloride material.

.4 Armour: interlocking aluminum.

.5 Overall covering: thermoplastic polyvinyl chloride.

.6 Connectors:

.1 Watertight approved for TECK Cable.

2.2 CONTROL AND INSTRUMENTATION CABLE

.1 Internal cabinet control wiring shall be TEW (tinned).

.1 Wire: to CAN/CSA C22.2 No. 127-15.

.2 Minimum Size (unless otherwise noted by Contract Drawings):

.1 120VAC: 14AWG.

.2 24VDC: 18AWG.

.3 Colour Code

.1 AC Hot: Black

.2 AC Hot (Secondary): Red

.3 AC Neutral: White

.4 DC Positive: Red

.5 DC Negative: Blue

.6 Generator Start: Yellow

.7 Ground: Green

.2 Analog instrumentation wiring:

.1 Cable: to CAN/CSA-C22.2 No. 75.

.2 Conductors:

.1 Circuit conductors: 7 strand tinned copper.

.3 Insulation:

.1 Cross-linked thermosetting polyethylene rated type RW90 XLPE.

.2 Rating: 300V and 600V, as required.

.4 Jacket: polyvinyl chloride material.

.5 Shield:

.1 Individual Foil

.2 Tinned copper drain wiring under and in contact with foil.

2.3 ETHERNET CABLES

.1 CAT6 (250MHz) rated, compatible with 1000BaseT networks.

.2 Outdoor rated, installation in conduit approved, UV resistance.

.3 Conductors:

.1 8 x 23 AWG solid copper conductors, arranged in 4 twisted pairs.

.2 RJ45 Termination: TIA 568A

.3 Straight-through (non-crossover) wiring, unless noted otherwise.

.4 Jacket:

.1 Oil and sunlight resistant PVC.

.2 Colour: Blue

2.4 ETHERNET PATCH CABLES

.1 CAT6 (250MHz) rated, compatible with 1000BaseT networks.

.2 8 x 23 AWG solid copper conductors, arranged in 4 twisted pairs.

.3 Straight-through (non-crossover) wiring, unless noted otherwise.

.4 RJ45 male connectors with molded boots.

.1 Termination: TIA 568A

.5 Colour: Blue

2.5 ARMOURED CONTROL AND INSTRUMENTATION CABLE

.1 Cable: to CAN/CSA-C22.2 No. 239-21.

.2 Conductors:

.1 Circuit conductors: 7 strand tinned copper.

.2 Conductor size per Contract Drawings.

.3 Insulation:

.1 Cross-linked thermosetting polyethylene rated type RW90 XLPE.

.2 Rating: 300V and 600V, as required.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride.

.7 Certification:

.1 FT-4 Flame Rated

.2 Temperature: 105°C dry, 75°C wet, and -40°C

.3 Suitable for installation in Class I, Zone 1 and Zone 2, and Class II, Division 1 and 2 Hazardous Locations.

.8 Connectors:

.1 Watertight approved for armoured control and instrumentation cable.

.2 Explosion proof in classified areas approved for armoured control and instrumentation cable.

2.6 TWISTED PAIR SHIELDED (TPSH) ARMOURED CABLES

.1 TPSH cables are to be constructed as follows:

.1 Compliance: CSA C22.2 - No. 38, No. 174 and No. 239

.2 Two copper conductors, stranded, tinned, minimum #16 AWG, PVC-insulated, twisted in nominal intervals of 50 mm. Conductor identification to be by black and white coloured insulation.

.3 100 percent coverage aluminum foil or tape shield and bare stranded, tinned copper drain wire, minimum #16 AWG for each pair.

.4 Separate bare stranded, tinned copper drain wire, minimum #16 AWG for each pair.

.5 Overall shield and bare stranded tinned copper drain wire for multi-pair cables.

.6 Insulated for 600 V, 90 degrees C.

.7 Interlocking aluminum armour.

.8 Overall flame-retardant PVC jacket rated to minus 40 degrees C and meeting low gas emission and FT4 flame test requirements as specified in CSA-C22.2 – No. 0.3 and IEEE 383, and sunlight (UV) resistant rated.

.9 Overall PVC jacket to be grey in colour.

.10 HL rating for hazardous location Class 1 Div. 1 or 2.

.11 Suitable for cable tray installation, indoor and outdoor, for direct burial, and for installations in conduits.

.12 Each pair of multiconductor TPSH cables to be individually shielded and continuously number coded.

2.7 TRIAD SHIELDED ARMOURED CABLES

.1 Triad shielded armoured cables constructed same as Twisted Pair Shielded cables except for:

.1 Three copper conductors per triad group.

2.8 FIBRE OPTIC CABLES

.1 Optic fibre cables to be aluminum clad armored.

.2 Trunk cable to conform with the following:

.1 ANSI X3.166.

.2 62.5/125 µm core/cladding (OM1).

.3 Dual-mode, 850/1300 nm.

.4 Graded-index glass.

.5 Gel-filled, loose-buffer construction.

.6 Bandwidth: 160/500 MHz-km at 850/1,300 nm.

.7 Attenuation: 3.5/1.5 dB/km @ 850/1,300 nm.

.8 Numerical aperture: 0.275.

.9 Strength member: Kevlar.

.10 Pulling tension: 2,000 N.

.11 Rating: Indoor/Outdoor Use, Tray Rated.

.12 Jacket: orange PVC for multimode optic fibre and yellow PVC for single mode optic fibre.

.3 Break-out cables and jumpers to be similar except tight-buffer construction. Jumper cables are to be supplied as factory assembled units.

.4 Optic fibre connectors are to be oven-cured aluminum/ceramic ST type.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

3.2 GENERAL CABLE INSTALLATION

.1 Install cable in trenches in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.

.2 Terminate cables in accordance with Technical Specification 26 05 20 Wire and Box Connectors - (0-1000 V).

.3 Conductor length for parallel feeders to be identical.

.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.5 All field wiring/communication cabling that maybe field installed directly onto any cabinet door mounted components shall be suitably routed and protected across the door hinge to prevent possible mechanical damage upon door opening and/or door closing.

3.3 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of cable.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

.5 Wire Labeling:

.1 Low voltage single and three phase power conductors shall be tagged with the following format: XXXX-X#, where:

.1 XXXX – Equipment tag number that is being supplied

.2 -X – L (for phase conductors) or N (for Neutral)

.3 # - Sequential Number, if necessary.

.4 Examples:

.1 VFD301-L1: VFD301 power conductor (red phase)

.2 VFD301-L2: VFD301 power conductor (black phase)

.3 VFD301-L3: VFD301 power conductor (blue phase)

.4 P1-L: Single-phase Pump 1 line conductor

.5 P1-N: Single-phase Pump 1 neutral conductor

.2 Field instrument and control wires shall be tagged with the following format: XXX###-XX##, where:

.1 XXX### – Field equipment tag number

.2 –XX## – Sequential Number or Voltage Identifier

.3 Examples:

.1 FIT110-2: Instrument field wiring to Flow Indicator Transmitter 110

.2 LSH003-1: Field control wire from Level Switch LSH003

.3 Panel wiring shall be tagged with the following format: XXX###-##XXX, where:

.1 XXX### – Upstream equipment tag

.2 –##XXX – PLC channel identifier, or Voltage Identifier and sequential number

.3 Panel wiring suffixes (xxx):

.1 24V – 24VDC Control Supply

.2 12V – 12VDC Control Supply

.3 0V – ELV return wire

.4 GND/SHD – Field instrument wire ground (or shield)

.5 AI+/AI- - Analog Signal wiring (control panel terminal to PLC/RTU)

.6 DI – Digital Input wiring (control panel terminal to PLC/RTU)

.7 DO – Digital output wiring (control panel terminal to PLC/RTU)

.4 Examples:

.1 LCP101-24V13: 24VDC supply wire in Local Control Panel 101

.2 PLC101-03AI+: Analog input signal wiring to PLC101, Channel 3

.3 RTU801-02DI: Digital (discrete) input signal wiring to RTU801, Channel 2

3.4 ANALOG SIGNALS

.1 Use twisted-pair shielded armoured (instrument TECK cable) as applicable, for low-level analog signals such as 4-20 mA, 1-5VDC, 0-10VDC, pulse type circuits 24VDC and under, and other signals of a similar nature.

.2 Use triad shielded armoured cable for connections between RTDs and transmitters or CDAC RTD inputs.

3.5 DIGITAL SIGNALS

.1 Use TPSH armoured cable for input and output signals 24 VDC and under and terminate in the marshalling panels.

.2 Use Control TECK cable or wire and conduit power to instruments, for 120 V signals other than those mentioned above and as otherwise shown in the Contract Drawings.

3.6 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.

3.7 INSTALLATION OF TECK90 CABLE (0-1000V)

.1 Install cabling as follows:

.1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.

.2 Install cable exposed, securely supported by straps or hangers.

.1 Group cables wherever possible on channels, individually strapped.

3.8 INSTALLATION OF ARMOURED CABLE

.1 Install cabling as follows:

.1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.

.2 Install cable exposed, securely supported by straps or hangers.

.1 Group cables wherever possible on channels.

3.9 INSTALLATION OF CONTROL AND INSTRUMENTATION CABLE

.1 Ground control cable shield at control cabinet only.

.2 Cut and heatshrink shield at terminations to field devices.

3.10 INSTALLATION OF ARMOURED CONTROL AND INSTRUMENTATION CABLE

.1 Install cabling as follows:

.1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.

.2 Install cable exposed, securely supported by straps or hangers.

.1 Group cables wherever possible on channels.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for secondary grounding.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 24 01 Service Equipment

1.3 REGULATORY REQUIREMENTS

.1 CSA C22.1 - Canadian Electrical Code, Part 1: Section 10 Grounding and Bonding

.2 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837-02, Qualifying Permanent Connections Used in Substation Grounding.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 EQUIPMENT

.1 Rod electrodes: copper clad steel, 19mm dia. by 3 m long.

.2 Plate electrodes: copper surface area minimum 0.2 m^3, 1.5mm thick, In accordance with the CEC.

.3 Grounding conductors: medium hard drawn, 7 strand, bare stranded copper, size as indicated on Contract Drawings.

.4 Insulated grounding conductors: green, size as indicated.

.5 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.6 Grounding rod inspection well:

.1 High density polyethylene construction

.2 Minimum 250mm top opening.

.3 Bolt down cover with skid resistant surface.

.7 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 type clamps.

.3 Bolted type conductor connectors.

.4 Bonding jumpers, straps.

.5 Pressure wire connectors.

Part 3 Execution

3.1 GENERAL INSTALLATION

.1 Install exterior buried grounding loop system as indicated on the Contract Drawings.

.2 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

.3 Install connectors in accordance with manufacturer's instructions.

.4 Protect exposed grounding conductors from mechanical injury.

.5 Make buried connections, and connections to conductive water main, electrodes, using permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.6 Use mechanical connectors for grounding connections to equipment provided with lugs.

.7 Soldered joints not permitted.

.8 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.9 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.10 Connect building structural steel and metal siding to ground by welding copper to steel.

.11 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

.12 Bond single conductor, metallic armoured cables to cabinet at supply end.

3.2 INSPECTION WELL

.1 Install grounding stud, electrode, size as indicated stranded copper conductor in each inspection well as indicated on Contract Drawings.

.2 Install ground rod in each inspection well so that top projects through bottom of maintenance hole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements (25 Ohms).

3.3 ELECTRODES

.1 Install rod electrodes and make grounding connections within inspection wells.

.2 Bond separate, combine multiple electrodes together, if separate.

.3 Size copper conductors for connections to electrodes, sized as indicated on Contract Drawings.

.4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.4 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutral secondary 120V system.

3.5 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.6 JUNCTION BOXES AND VAULTS

.1 Bond lids of in-ground junction boxes and vaults.

3.7 MASTER GROUND BUS

.1 Install copper grounding bus mounted on insulated supports on wall of electrical kiosk.

.2 Ground items of electrical equipment in electrical kiosk to ground bus with individual copper connections, sized as indicated on the Contract Drawings.

.3 Ground items of water system to ground bus with copper connections, sized as indicated on the Contract Drawings.

3.8 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00 Common Work Results – Electrical and Technical Specification 26 05 10 Testing and Commissioning.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Contract Administrator and Government Authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with the Contract Documents.

1.1 SCOPE

.1 Materials and installation for hangers and supports for electrical systems.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 02 Seismic Restraint

1.3 REGULATORY REQUIREMENTS

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837-02, Qualifying Permanent Connections Used in Substation Grounding.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 SUPPORT CHANNELS AND STANCHIONS

.1 Select channel as indicated in the Contract Drawings:

.1 U shape, stainless steel, size 41 x 41 mm, 2.5 mm thick, surface mounted and suspended with stainless steel hardware.

.2 All materials to assemble stanchions shall be from same manufacturer.

.2 Wire and cable ties: nylon ‘Ty-rap’ or approved equal for wiring and control cable. Velcro cable wraps for data cables.

Part 3 Execution

3.1 INSTALLATION

.1 Refer to Technical Specification 26 05 02 – Seismic Restraint.

.2 Contractor to note that the intent of this Technical Specification is for the Contractor to provide under the base contract all seismic restraint of electrical equipment.

.3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.1 One-hole stainless steel straps to secure surface conduits and cables 53 mm and smaller.

.2 Two-hole stainless steel straps for conduits and cables larger than 53 mm.

.4 For surface mounting of two or more conduits use channels at 1500 mm on centre spacing.

.5 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.6 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.7 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.8 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Contract Administrator.

.9 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for splitters, junction, pull boxes, and cabinets.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings

.3 Technical Specifications 26 27 16 Electrical Cabinets and Enclosures

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

.2 CSA C22.2 No. 76, Splitters.

.3 CSA-C22.2 No. 85, Rigid PVC Boxes and Fittings.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 SPLITTERS

.1 Compliance: CSA C22.2 No. 76, Splitters.

.2 Sheet metal enclosure with welded corners, and formed hinged gasketed cover suitable for locking in closed position.

.3 Main and branch lugs or connection bars to match required size and number of connecting conductors as specified.

.4 At least three spare terminals on each set of lugs in splitters.

2.1 JUNCTION AND PULL BOXES

.1 RPVC construction sized to suit. Screw on flat covers. All mounting hardware to be stainless steel.

.2 Internal dielectric barrier for separating controls and power terminations only where indicated on Contract Drawings.

2.2 EXPLOSION PROOF JUNCTION BOXES

.1 Aluminum construction sized to suit.

.2 Certification: Class 1, Division 1 & 2.

.3 Internal back panel for terminal block mounting.

.4 Gasketed, front cover.

.5 Stainless steel hardware.

2.3 TERMINAL AND PULL BOXES

.1 Intended for surface mounting, except as otherwise specified.

.2 Weatherproof, Style WP1

.1 Copper-free cast aluminum, Type 4.

.2 Hinged door if any one dimension exceeds 300 mm.

.3 Manufactured breather, designed to maintain weatherproof classification of enclosure.

.4 When used as terminal box, equipped with mounting pan and terminal strip.

.3 Weatherproof, Style WP2

.1 Same features as for Style WP1, except made of sheet aluminum, minimum 2.3 mm thick.

.2 Dripshield.

.4 Weather- and Corrosion-Proof, Style WP3

.1 Same features as for Style WP1, except Type 4X enclosure, made of 316 stainless steel.

.5 Weather- and Corrosion-Proof, Style WP4

.1 Same features as for Style WP1, except non-metallic, Type 4X fibreglass enclosure.

.2 Quick-release latches.

.6 Indoor Dry Location Non-process Area, Style GP5

.1 Welded steel or aluminum Type 12 enclosure.

.2 Hinged cover with quick-release latch or automotive handle, for enclosures that exceed 300 mm in width or height.

.7 Watertight, Style WT

.1 Same as weatherproof styles WP1 to WP 4, except without breather.

.2 Explosion-proof, Style XP

.3 Same features as for Style WP1, except, in addition to being weatherproof, also suitable for the hazardous location specified.

2.4 CABINETS

.1 Intended for surface mounting, except as otherwise specified.

.2 Enclosure rating is to be the higher rating of the rating shown in the drawings and the rating based upon location of installation.

.3 Single - or double-door construction with 316 stainless steel full-length hinge.

.4 Minimum standard: formed and welded Type 12 construction, of minimum 1.8 mm thick sheet steel, with automotive door handle.

.5 For process and outdoor areas and below-grade valve chambers: formed and welded Type 4X construction of minimum 2 mm thick sheet aluminum, with 316 stainless steel door clamps and hardware.

.6 Full-size equipment mounting pan of formed sheet metal.

Part 3 Execution

3.0 SPLITTERS

.1 Install splitters and mount plumb, true, and square to the building lines.

.2 Extend splitters full length of equipment arrangement except where specified otherwise.

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor, unless otherwise indicated.

.3 Install pole mount enclosures as indicated.

.4 Install equipment and terminal blocks as indicated in cabinets.

.5 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 Common Work Results - Electrical.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for outlet boxes, conduit boxes, and fittings.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 240V outlet boxes for 240V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

.7 Provide clear while-in-use gasketed cover for interior outlets, where indicated in Contract Drawings.

2.1 CONDUIT BOXES

.1 FD NEMA 4X RPVC boxes with factory-threaded hubs, mounting feet, and gasketed covers, where indicated in Contract Drawings.

.2 Provide clear while-in-use gasketed cover for interior outlets, where indicated in Contract Drawings.

2.2 WEATHER-PROOF OUTLET BOXES

.1 RPVC boxes for outlets rated for outdoor environments.

.2 Connected to TECK 90 cables as required, minimum size 102 x 54 x 48 mm.

.3 Provide weatherproof clear lockable while-in-use covers for all GFI locations, where indicated.

2.3 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.

Part 3 Execution

3.0 INSTALLATION

.1 Recess mount lighting and outlet boxes located on building exterior.

.2 Surface mount boxes located in building interior.

.3 Support boxes independently of connecting conduits.

.4 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of the work.

.5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

.6 Vacuum clean interior of outlet boxes before installation of wiring devices.

3.1 IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 Common Work Results - Electrical.

.2 Install identification labels indicating circuit, voltage, and phase.

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Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for conduits, conduit fastenings and conduit fittings.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 21 Wires and Cables (0-1000V)

.3 Technical Specification 26 27 16 Electrical Cabinets and Enclosures

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

.2 CAN/CSA C22.2 No.18.3 12, Conduit, Tubing, and Cable Fittings

.3 CAN/CSA C22.2 No.18.4-04, Hardware for the Support of Conduit, Tubing and Cable

.4 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid Tight Flexible Metal Conduit.

.5 CSA C22.2 No. 45.2-08, Electrical Rigid Metal Conduit – Aluminum, Red Brass, and Stainless Steel.

.6 CSA C22.2 No. 83-1-04 – Electrical Metallic Tubing

.7 CSA C22.2 No. 211.2 06, Rigid PVC (Unplasticized) Conduit.

.8 CAN/CSA C22.2 No. 227.2.1-04, Liquid Tight Flexible Nonmetallic Conduit.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 CONDUITS

.1 Rigid aluminum conduit: to CSA C22.2 No. 45.2.

.2 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

.4 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.2.1.

.5 Electrical metallic tubing (EMT) to CSA C22.2 No. 83-1-04.

2.1 CONDUIT FASTENINGS

.1 One hole stainless steel straps to secure surface conduits 53 mm and smaller. Two hole stainless steel straps for conduits larger than 53 mm.

.2 Seismic beam clamps to secure conduits and supports to exposed steel work.

.3 Channel type supports for two or more conduits at 1500 mm oc.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

.5 All conduit fastenings and supports shall be stainless steel.

2.2 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "elbows" where 90 degree bends are required for 27 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.3 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.4 PULL CORD

.1 Polypropylene

.1 Minimum tensile strength of 1.1kN.

.2 Mildew and rot resistant.

Part 3 Execution

3.0 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Use rigid PVC conduit underground.

.3 Use liquid tight flexible metal conduit for connection to devices, motors, or vibrating equipment with the exception of connections made using armoured cable.

.4 Install conduit sealing fittings in hazardous areas.

.1 Fill with compound.

.5 Minimum conduit size for lighting and power circuits: 21mm

.6 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 21 mm diameter.

.8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.9 Install polypropylene fish cord in empty conduits.

.10 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.11 Dry conduits out before installing wire.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Group conduits wherever possible on suspended or surface channels.

.3 Do not pass conduits through structural members except as indicated.

3.3 UNDERGROUND CONDUITS

.1 Refer to Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts for installation of cable procedures.

.2 The Contractor shall provide and install all necessary bends, couplings, reducers, bell end fittings, plugs, caps and adaptors of the same product material as the conduit to ensure a complete installation.

.3 All conduits shall drain towards junction boxes. Spacing between power and communications conduits for longitudinal runs shall be 300mm (unless concrete encased). The spacing may be reduced to 50mm at crossover points and where the conduits enter and exit junction boxes and pull pits.

.4 The Contractor shall not use any factory bends in the conduit runs except where shown on the Contract Drawings or as approved by the Contract Administrator. Where factory 90 degree bends are approved, the radius shall be greater than 900mm.

.5 All conduits shall be verified and cleaned using the following procedure:

.1 To verify integrity of conduit, pull through each conduit duct a hard rubber mandrel, not less than 300mm long and of a diameter 6mm less than the internal diameter of the duct, preceded by a swab of suitable diameter to remove sand, earth and other foreign materials.

.2 Notify Contract Administrator in the event of conduit failure.

.3 Clean ducts before laying. Cap both ends during Construction and after installation to prevent entry of any foreign materials.

.4 Install pull line.

.5 Terminate conduit ends in the junction box.

.6 Clean and vacuum junction boxes.

.7 Locations shall be laid out by the Contractor and field reviewed by the Contract Administrator prior to installation.

.6 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

.7 Trench Markers:

.1 Concrete type cable markers: Minimum 600 mm x 600 mm x 100 mm, with words: "cable," "conduit," or additional circuit identification if so directed by Engineer, impressed in top surface, with arrows to indicate change in direction of conduit runs.

.8 Warning Tape:

.1 Detectable by a pipe/cable locator or metal detector from above the undisturbed ground.

.2 Minimum 50 mm wide with an aluminum foil core laminated between two layers of 3.5 mil thickness polyester plastic.

.3 Plastic colour coding: red for electrical lines, orange for telephone lines, and orange for optic fibre cables.

.4 Imprint a warning continuously along the length, with message reading similar to: "CAUTION – BURIED ELECTRIC (TELEPHONE) LINE BELOW".

.9 Conduit Spacers:

.1 Preformed, rigid plastic spacers designed for direct burial and concrete encasement.

.2 Base and intermediate spacers to suit conduit trade size.

.3 Snap feature or non-metallic ties to obtain required configuration.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 28 Grounding – Secondary

1.2 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

1.3 SCOPE

.1 Installation of cables in trenches and in ducts.

.1 Wherever the term “duct” appears, it also applies equally to conduit; similarly, the term “cable” also means wires and conductors.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 NOT USED

Part 3 Execution

3.0 CABLE INSTALLATION IN DUCTS

.1 Install cables in ducts as indicated in Contract Drawings.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 Install instrumentation (4-20ma analog) cables in separate ducts from other cables as specified in the Contract Drawings.

.6 Install digital communication cables in separate ducts from other cables as specified in the Contract Drawings.

.7 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.8 Allow extra length of cable in loop form at splice boxes, pullpits and manholes as per good trade practice.

.9 Leave a pull rope in each conduit after installation of cables to permit installation of additional cables after the completion of the Work.

.10 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.11 After installation of cables, seal duct ends with duct sealing compound.

.12 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00 Common Work Results - Electrical.

.2 Perform tests using qualified personnel. Provide necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre acceptance tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Provide Contract Administrator with list of test results showing location at which each test was made, circuit tested and result of each test.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of transformers.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C9-02, Dry-Type Transformers

.2 CAN/CSA-C22.2 No. 47-13, Air-cooled Transformers (Dry Type)

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 DISTRIBUTION TRANSFORMER

.1 Use transformers of one manufacturer throughout the Project and in accordance with CAN/CSA C22.2 No. 47 and CSA C9.

.2 Design:

.1 Rating: As indicated on Contract Drawings.

.2 Configuration: As indicated on Contract Drawings.

.3 Type: ANN.

.4 Windings: Copper

.5 Voltage taps:

.1 Primary: 2.5%, 2 – FCAN, 2 – FCBN

.2 Secondary: Not Required

.6 K9 rated

.7 Insulation: Class 220º C, 130 º C temperature rise

.8 Basic Insulation Level (BIL): standard

.9 Hipot: standard

.10 Average sound level: standard

.11 Impedance at 170ºC: standard

2.1 CONTROL TRANSFORMER

.1 Use transformers of one manufacturer throughout the Project and in accordance with CAN/CSA C22.2 No. 47 and CSA C9.

.2 Design:

.1 Rating: As indicated on Contract Drawings.

.2 Configuration: As indicated on Contract Drawings.

.3 Panel mount.

.4 Molded terminal blocks for primary and secondary connections.

.5 Windings: Copper

.6 Voltage taps: standard

.7 Primary Protection: Control circuit breaker or fuses (as indicated on Contract Drawings).

.8 Secondary Protection: Control circuit breaker or fuses (as indicated on Contract Drawings).

.9 Insulation: Class 130º C, 80º C temperature rise

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 Common Work Results for Electrical.

.2 Label size: 7.

.3 Nameplate shall include equipment name, transformer kVA, primary and secondary voltage, upstream distribution panel and circuit.

.1 Confirm nameplate wording with Consultant prior to manufacture.

Part 3 Execution

3.0 INSTALLATION

.1 Mount dry type transformer as indicated in Contract Drawings.

.2 Ensure adequate clearance around transformer for ventilation.

.3 Install transformers in level upright position.

.4 Remove shipping supports only after transformer is installed and just before putting into service.

.5 Loosen isolation pad bolts until no compression is visible.

.6 Make primary and secondary connections in accordance with manufacturer's wiring diagram.

.7 Energize transformers after installation is complete.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of service equipment.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 28 Grounding - Secondary

1.3 REGULATORY REQUIREMENTS

.1 BC Hydro

.1 Refer to BC Hydro Requirements for Secondary Voltage Revenue Metering (https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/distribution/standards/ds-rmr-secondary-voltage-750v-and-less.pdf)

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Section 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 METER SOCKET

.1 Ratings as indicated in Contract Drawings.

.2 Supplied with screw type ring.

2.1 METER ENCLOSURE

.1 Rating: CSA Type 3R

.2 Construction:

.1 Material: stainless steel

.2 Flip-up padlockable cover

.3 Pole bracket designed for bolt or band-on installation

.4 Suitable for overhead or underground service

.3 Viewing Window: As required when indicated on Contract Drawings.

.1 Material: 1/2 inch thick lexan.

.4 Mount: As indicated on Contract Drawings.

2.2 METERING ANTENNA

.1 Include provision for exterior antenna per BC Hydro standards.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 - Common Work Results for Electrical.

.2 Label size: 2.

.3 Nameplate shall include equipment name, voltage, and phase.

.1 Confirm nameplate wording with Contract Administrator prior to manufacture.

Part 3 Execution

3.0 INSTALLATION

.1 Install service equipment as indicated on Contract Drawings.

.2 Connect to incoming service.

.3 Connect to outgoing load circuits.

.4 Make grounding connections in accordance with Technical Specification 26 05 28 Grounding - Secondary

.5 Make provision for BC Hydro's metering.

.6 Allow for BC Hydro coordination, supply and delivery of materials.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of the service entrance board.

1.2 RELATED SECTIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 02 Seismic Restraint

.3 Technical Specification 26 24 01 Service Equipment

.4 Technical Specification 26 28 23 Disconnect Switches

.5 Technical Specification 26 28 16 02 Molded Case Circuit Breakers

1.3 REGULATORY REQUIREMENTS

.1 BC Hydro

.1 Refer to BC Hydro Requirements for Secondary Voltage Revenue Metering (https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/distribution/standards/ds-rmr-secondary-voltage-750v-and-less.pdf)

.2 Distribution Standards: Underground Electrical: ES53

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 SERVICE ENTRANCE AND DISTRIBUTION BOARD

.1 Rating: As indicated on Contract Drawings.

.1 L-Box per BC Hydro standards.

.2 Horizontal bus assembly.

.3 Cable clamp assembly.

.4 Grounding assembly.

.5 Identify phases with colour coding.

.2 Cable pull section:

.1 Refer to BC Hydro metering to the Requirements for Secondary Voltage Revenue Metering (http://www.bchydro.com/ext/metering/).

.2 Refer to BC Hydro Distribution Standards: Underground Electrical: ES53.

.3 Each bus to have lugs to accept service conductors.

2.1 MAIN CIRCUIT BREAKER

.1 Solid State Electronic Trip Breaker as indicated on Contract Drawings.

.2 Common-trip breaker: with single handle for multi-pole applications.

.3 Moulded case circuit breaker to operate by means of solid state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long-time/short time/instantaneous tripping for short circuit protection.

.4 Programmable electronic solid state trip unit with separately adjustable long time, short time, and instantaneous settings.

.5 Circuit breaker with interchangeable trips as indicated.

.6 Minimum symmetrical RMS interrupting capacity rating: As indicated on Contract Drawings.

.7 Provide NEMA 1 enclosures for breakers where indicated.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 - Common Work Results for Electrical.

.2 Label size: 2.

.3 Nameplate shall include equipment name, voltage, and phase.

.1 Confirm nameplate wording with Contract Administrator prior to manufacture.

Part 3 Execution

3.0 INSTALLATION

.1 Install seismic restraint for all equipment. See Technical Specification 26 05 02 – Seismic Restraint.

.2 BC Hydro metering to be installed as indicated on Contract Drawings per Requirements for Secondary Voltage Revenue Metering.

.3 Connect main service to disconnect switch on service pole and feed to BC Hydro service meter.

.4 Connect load terminals of distribution breakers to feeders.

.5 Check factory made connections for mechanical security and electrical continuity.

.6 Run one grounding conductor bare copper sized per the Contract Drawings from neutral bus to ground bus to main ground.

.7 Check trip unit settings against co-ordination study to ensure proper working and protection of components.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of panelboards and circuit breakers.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 28 16 02 Molded Case Circuit Breakers

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 29-11, Panelboards and enclosed Panelboards.

.2

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 PANELBOARDS

.1 Panelboards based on CSA C22.2 No. 29.

.2 Product of one manufacturer.

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.3 Bus and breakers rated as indicated on the Contract Drawings. Symmetrical interrupting capacity as indicated on Contract Drawings but not less than 45kA.

.4 Sequence phase bussing with odd numbered breakers on the left and even numbered breakers on the right, with each breaker identified by permanent number identification as to circuit number and phase.

.5 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.6 Minimum of 2 flush locks for each panelboard.

.7 Two keys for each panelboard and key panelboards alike.

.8 Copper bus with neutral of same ampere rating as mains.

.9 Mains: suitable for bolt-on breakers.

.10 Trim with concealed front bolts and hinges.

.11 Trim and door finish: baked grey enamel.

.12 Isolated ground bus.

.13 Include grounding busbar with 3 of terminals for bonding conductor equal to breaker capacity of the panel board.

.14 Provide minimum additional space for future breakers in panelboards as follows:

.1 Panelboards 120/208V, up to 225A: minimum 10% space and 10% spare 15A breakers or as noted on the Contract Drawings

.2 Distribution boards greater than 208V: minimum 20% or as noted on the Contract Drawings

2.1 BREAKERS

.1 Breakers: in accordance with Technical Specification 26 28 16 02 Molded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker (where applicable): separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 Common Work Results for Electrical.

.2 Label size: 2.

.3 Nameplate shall include equipment name, voltage, and phase.

.1 Confirm nameplate wording with Contract Administrator prior to manufacture.

.4 Complete circuit directory with typewritten legend showing location and load of each circuit.

Part 3 Execution

3.0 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Mount panelboards to height specified in Technical Specification 26 05 00 Common Work Results – Electrical or as indicated on Contract Drawings.

.3 Connect loads to circuits.

.4 Connect neutral conductors to common neutral bus.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for equipment and components housed in cabinets and enclosures.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 05 31 Splitters, Junction, Pull Boxes and Cabinets

.3 Technical Specification 26 28 16 02 Molded Case Circuit Breakers

.4 Technical Specification 26 28 23 Disconnect Switches

.5 Technical Specification 26 29 03 Control Devices

.6 Technical Specification 26 50 00 Lighting

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

.2 C22.2 No. 94.1-15 - Enclosures for electrical equipment, non-environmental considerations

.3 C22.2 No. 94.2-15 - Enclosures for electrical equipment, environmental considerations.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250-2008, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 CONTROLS CABINET

.1 Application:

2.1 ELECTRICAL KIOSK

.1 Electrical Kiosk shall be rigid, free-standing, vandal resistant kiosk, rated CSA Type 3R and certified to CAN/CSA C22.2 No. 94.1-15 and CAN/CSA C22.2 No. 94.2-15.

.2 Kiosk dimensions on Contract Drawings are approximate only. Contractor to determine final kiosk dimensions to layout all of proposed equipment.

.3 All kiosk assemblies shall be from the same manufacturer, shall bear the CSA seal of approval, or other certification mark acceptable in the Province of British Columbia, and be manufactured by an electrical control panel manufacturer regularly engaged in this type of work.

.4 General Material Requirements:

.1 All materials shall be new.

.2 Equipment shall be fabricated from marine grade 5052-H32 sheet aluminum of a least 3.2 mm (1/8 in.) thickness.

.3 Use stainless steel hardware, unless otherwise noted.

.5 Connecting Hardware:

.1 Miscellaneous hardware other than screws, nuts, bolts and washers shall be stainless steel.

.2 Connecting hardware (i.e. screws, nuts, bolts and washers) 3/8" diameter or smaller and shall conform to the following:

.1 All hardware shall have unified national thread form (ANSI) and shall be stainless steel.

.2 All nuts and bolts 1/4-20 and large shall have unified national threads and hexagon heads, and shall bear suitable markings to identify their grade and origin of manufacture.

.3 All machine screws smaller than 1/4-20 (ex. 8-32 UNC, 10-24 UNC) shall be Robertson pan-head. All screw heads shall be sized so only one screwdriver is required when working on the panels.

.4 No sheet metal or self-tapping screws shall be used.

.6 Fabrication Mechanical Requirements

.1 The kiosk shall be fabricated with sufficient bracing to form a structure capable of withstanding transportation, wind, snow and ice loading. The kiosk manufacturer is responsible for obtaining certification from EGBC registered professional engineer.

.2 Recommended anchor locations shall be provided on Shop Drawings.

.3 Anchor requirements shall be provided based on wind, snow and seismic loading criteria for the geographic location of the installation.

.4 Importance factor of one (1) shall be considered for the installation.

.1 All exterior corners shall be rounded to a radius of 3.17mm (1/8 inch) minimum.

.2 All sharp edges shall be de-burred to a radius of 0.4mm (1/64 inch) minimum in order to reduce hazards to service personnel.

.5 Welding:

.1 All welds shall be in accordance with CAN/CSA W59.2 – Welded Aluminum Construction.

.2 All welding to be performed by Canadian Welding Bureau certified welders.

.3 The Supplier shall have suitable credentials to weld aluminum and shall adhere to all applicable ANSI standards. Project references shall be made available upon request.

.4 All exterior seams shall be of continuously welded construction. Exterior seams shall not be visible. All exterior welds shall be ground smooth.

.5 All welds shall be free of slag and spatter.

.6 Roof:

.1 The roof shall have a minimum 75 mm overhang with continuous rain gutters.

.2 Lifting eyes shall be secured to the frame or the kiosk on reinforced material and be removable after installation.

.7 Doors:

.1 Doors shall have internal bracing when required to prevent excessive distortion.

.2 Doors shall be at least 100mm above concrete pad.

.3 All kiosk doors are to be lockable. The latches must contain minimum 13 mm diameter hole to receive padlock. Door handles must contain provision for double padlock capability.

.4 All double doors to be overlapping with no center mullion.

.5 The door handle shall be galvanized steel and powder coated the same colour as the kiosk. Latch handle shall swing towards hinge side of door.

.6 Doors shall have three point latching devices with vertical bars that are riveted to actuator bar.

.7 Handles, latches and padlocks shall be installed recessed in a pocket such that they cannot be struck off or cut with a standard hacksaw.

.8 Handle shall not protrude from recessed pocket during operation.

.9 Door hardware to be mounted with tamper resistant hardware.

.10 Each door shall have a hydraulic dampener to hold the door in the open position at 90 degrees.

.11 Hinges shall be hidden and not accessible from the outside with the door closed. Hinge body to be aluminum with stainless steel hinge pin. Hinges to be of permanently lubricated design

.8 Door Gaskets:

.1 The gasket shall be of one continuous piece per side (ex. four strips per opening) and shall be permanently bonded to the metal.

.2 The gasket shall be of an appropriate length so as not to have gaps at gasket joints or to shrink over time.

.3 The surface of the gasket shall be covered with a silicon lubricant to prevent sticking to the mating surface.

.4 The hinge shall be designed to prevent binding of the gasket.

.9 Plan Pouch and Laptop Shelf

.1 Kiosk shall include a waterproof plan pouch (400mm high x 300mm wide minimum) on inside of door in the controls compartment. The pouch shall be secured using stainless steel fasteners.

.2 Kiosk shall include fold down door-mounted equipment/laptop shelf in the controls compartment. Shelf shall be mounted such that top of shelf is located 1100mm (36”) above the top of finished grade.

.7 Kiosk Finish

.1 General Requirements:

.1 The powder coating process shall be tested on at least one piece from a given batch of aluminum components to ensure a high quality coating for that type of component before the complete batch is powder coated. If there is uncertainty about the quality or appearance of the powder coating, the Contractor shall obtain the Owner's approval on the powder coating.

.2 Items to be powder coated shall be free of dents, scratches, weld burns, ripples, pits, and abrasion before powder coating.

.3 Removable components which may be damaged by the powder coating process shall be removed before powder coating and reassembled after powder coating.

.4 Mask all threaded hardware and tapped holes, as required.

.2 Pre-Treatment:

.1 The powder coating pre-treatment shall include the following steps in sequential order:

.1 Alkaline cleaning, or equivalent as required, to remove process oil, grease, and dirt.

.2 Rinsing, as required.

.3 Multi-metal iron phosphate coating or dried in place pre-treatment to increase corrosion resistance and improve paint adhesion. Follow chemical supplier's specifications. Chemical concentration, temperature, and timing specifications must be followed precisely.

.4 Rinsing, as required.

.5 Non-chrome, or equivalent, sealing coating to provide additional corrosion protection. Follow chemical supplier's specifications. Chemical concentration, temperature, and timing specifications must be followed precisely.

.3 Drying / Pre-Heating:

.1 All items to be powder coated must be completely dry and pre-heated as required to help prevent out-gassing before powder coat application.

.4 Application:

.1 Powder coat shall be of type Polyester-TGIC.

.2 Powder coat colour: RAL code to be provided by the Owner at the time of shop drawing review.

.3 For porous castings, a powder coat type shall be selected to help prevent out-gassing.

.4 Powder coat must be applied to meet the powder coat manufacturer's specifications.

.5 Powder coat thickness shall be applied to a total 2.5-3.5 mils thickness.

.6 Full-coverage of interior and exterior surfaces is required, with no light spots allowed on exterior surfaces.

.5 Final Appearance:

.1 All powder coatings shall be smooth, substantially free of contamination, flow lines, light spots, powder build-up, powder washout, streaks, sagging, runs, blisters, and other defects that would in any way impair serviceability or detract from the general appearance.

.2 The final product shall be free of thickness variations, poor adhesion, orange peel, blistering, pinholes, craters, powder puffs, drips, colour variations, clouding or grainy/wavy flow, dents, scratches, weld burns and abrasions harmful to its strength and general appearance.

.3 Contractor shall supply and install shrink-wrapped image around all sides of electrical kiosk, if applicable. Owner to provide image during shop drawing review process.

.8 Equipment Mounting Panels:

.1 The kiosk shall be provided with full height inside mounting panels.

.2 Panels shall be minimum 14 gauge galvanized steel painted white.

.3 Panels shall be removable and suitable for drilling and tapping in order to mount internal components.

.9 Kiosk Environmental Requirements

.1 General:

.1 Provide sufficient airflow to keep equipment temperature to below its maximum temperature rating to prevent overheating of the equipment under all prevailing temperature conditions for the area in which it will be installed.

.2 Provide positive pressure ventilation to ensure that dust does not enter the cabinets.

.2 Insulation:

.1 The Supplier shall insulate all sides, doors, and roof of the kiosk.

.2 Insulation shall be 25mm Polyisocyanurate Insulation Sheathing. All edges and seams to be sealed with foil tape.

.3 The insulation shall have a minimum R-rating of 4.5.

.4 On doors, insulation shall be concealed by full height 20 gauge aluminum plates.

.5 On sides and roof, insulation shall be located between outer shell and mounting panels.

.3 Ventilation:

.1 Refer to Section 26 54 00 Heaters and Ventilation.

.4 Kiosk Heating:

.1 Refer to Section 26 54 00 Heaters and Ventilation.

.5 Thermostat:

.1 Refer to Section 26 54 00 Heaters and Ventilation.

.10 Kiosk Lighting:

.1 Kiosk lights shall be LED in accordance with the requirements under Section 26 50 00 Lighting.

.2 Provide door switch in accordance with Section 26 27 26 Wiring Devices.

.11 Conduit and Wiring:

.1 Wiring between components within the kiosk shall be in EMT.

.2 Conduit to be in accordance with the requirements under Section 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings.

.3 Wiring to be in accordance with the requirements under Section 26 05 21 Wires and Cables (0-1000V)

.12 Electrical Assemblies:

.1 Equipment within the kiosk shall be within enclosures in accordance with the requirements under Section 26 05 31 Splitters, Junction, Pull Boxes and Cabinets.

.2 Enclosures shall be gray powder coat finish inside and out over pretreated surfaces.

.3 Additional equipment are listed in the Contract Drawings and in the electrical Technical Specifications.

Part 3 Execution

3.0 INSTALLATION

.1 Install cabinets as indicated in the Contract Drawings.

.2 Apply touch up paint as required.

.3 Make field power and control connections as indicated.

.4 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheet.

.5 Supply all necessary equipment and wiring to provide the points connected to the equipment as indicated on the Contract Drawings.

3.1 CONTROLS

.1 Refer to process narrative for programming requirements.

3.2 MAINTENANCE MATERIALS

.1 Provide:

.1 Any other components which the Contractor recommends to be kept as spares.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Ensure moving and working parts are lubricated where required.

.3 Operate system to prove satisfactory performance of complete system during 24 hour period.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

- .1 CSA C22.2 No. 42-10, General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA C22.2 No. 42.1-13, Cover Plates for Flush Mounted Wiring Devices (Bi national standard, with UL 514D).
- .3 CSA C22.2 No. 55-15, Special Use Switches.
- .4 CSA C22.2 No. 111-10, General Use Snap Switches (Bi national standard, with UL 20).
- .5 CSA-C22.2 No. 177-13, Clock-operated Switches
- .6 CSA-C22.2 No. 184-15, Solid-State Lighting Controls

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 SWITCHES

.1 15A, 120 V, single pole, specification grade switches to: CSA-C22.2 No. 55 and CSA-C22.2 No. 111.

.2 Manually-operated general purpose AC switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine moulding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 White toggle.

.3 Toggle operated fully rated for tungsten filament, fluorescent, and LED lamps, and up to 80% of rated capacity of motor loads.

.4 Provide switches with occupancy sensors for control of interior lighting.

.5 Switches will be of one manufacturer throughout the Project.

2.1 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R/20R as indicated, 125 V, 15/20 A as indicated, U ground, to: CSA-C22.2 No.42 with following features:

.1 White urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and riveted grounding contacts.

.2 Other receptacles with ampacity and voltage as indicated in Contract Drawings.

.3 Receptacles will be of one manufacturer throughout the Project.

.4 Ground fault interrupting capabilities as indicated in Contract Drawings.

.5 Ethernet Bulkhead Receptacle:

.1 Application: Feed-thru coupler

.2 Mounting: Jam nut panel mount

.3 Connector: Female RJ45

.4 Rating: IP67-weatherproof with attached cap.

2.2 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No. 42.

.2 Cover plates will be of one manufacturer throughout the Project.

.3 Stainless steel.

.4 Weatherproof RPVC cover plates for surface-mounted FS or FD Type boxes.

.5 Weatherproof clear, lockable, while-in-use cover plates for all GFI locations, as indicated in Contract Drawings.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Install identification labels indicating circuit, voltage, and phase.

Part 3 Execution

3.0 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height in accordance with Technical Specification 26 05 00 Common Work Results – Electrical or as indicated on the Contract Drawings.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height in accordance with Technical Specification 26 05 00 Common Work Results – Electrical or as indicated on the Contract Drawings.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Install GFI type receptacles as indicated on Contract Drawings.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.1 PROTECTION

.1 Protect installed products and components from damage during Construction.

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END SECTION

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Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
P1	April 26, 2024	Issued for Tender	AGD	BW

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials for molded-case circuit breakers.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 – Common Work Results for Electrical.

.2 Technical Specification 26 24 02 – Service Entrance Board

.3 Technical Specification 26 27 16 – Electrical Cabinets and Enclosures

.4 Technical Specification 26 24 16 01 – Panelboard Breaker Type

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International).

.1 CSA-C22.2 No. 5-16, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489 and NMX-J-266-ANCE).

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit documents to the Contract Administrator in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Submit trip unit datasheets and time-current characteristic curves for breakers to the Contract Administrator.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 BREAKERS GENERAL

.1 Molded case circuit breakers based on CSA C22.2 No. 5-16.

.2 Bolt-on molded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 deg C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.

.5 Circuit breakers in Panelboards to have minimum interrupting capacity ratings as indicated on the Contract Drawings.

2.1 THERMAL MAGNETIC BREAKERS

.1 Molded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.2 SOLID STATE ELECTRONIC TRIP BREAKERS

.1 Solid state electronic trip breakers as indicated on Contract Drawings.

.2 Common trip breakers: with single handle for multi pole applications.

.3 Molded case circuit breaker to operate by means of solid state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long-time/short time/instantaneous tripping for short circuit protection.

.4 Programmable electronic solid state trip unit with separately adjustable long time, short time, and instantaneous.

.5 Circuit Breakers to have auxiliary contact for PLC notification of breaker status (contact changes state when breaker is open), where indicated on Contract Drawings.

.6 Circuit breakers with interchangeable trips as indicated on Contract Drawings.

.7 Circuit breakers to have minimum interrupting capacity ratings as indicated on Contract Drawings.

.8 Contractor to provide arc flash study. Provide circuit breakers as required to achieve same.

.9 Standard of Acceptance: Eaton with DigiTrip 310+ (LSI) trip device.

2.3 MAIN CIRCUIT BREAKER

.1 Main Circuit Breaker in accordance with Technical Specification 26 24 02 – Service Entrance Board.

2.4 ENCLOSURE

.1 Provide enclosures for breakers as specified in Technical Specification 26 05 31 Splitters, Junction, Pull Boxes and Cabinets.

Part 3 Execution

3.0 INSTALLATION

.1 Manufacturer’s instructions to be followed for circuit breaker installation.

END SECTION

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results – Electrical

.2 Technical Specification 26 27 16 Electrical Cabinets and Enclosures

.3 Technical Specification 26 32 13 01 Power Generation – Diesel

1.2 REGULATORY REQUIREMENTS

.1 American National Standards Institute (ANSI)

.1 ANSI C78.374-2015 Light-Emitting Diode Package Specification Sheet for General Illumination Applications

.2 ANSI C78.377-2015 American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products

.2 Illuminating Engineering Society (IES)

.1 IES LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

.2 IES LM-80-15: Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules

.3 IES LM-82-12: LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature

.4 IES LM-84-14: Approved Method for Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires

.5 IES LM-85-14: Approved Method for Electrical & Photometric Measurements of High Power LEDs

.6 IES TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources

.7 IES TM-28-14: Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires

.8 IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

.3 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41.1-2002 (R2008), IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits

.2 ANSI/IEEE C62.41.2-2002, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits

.4 Canadian Standards Association (CSA International)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

.5 ICES-005-2016, Lighting Equipment

.6 National Electrical Manufacturers Association (NEMA)

.1 NEMA SSL 1-2010 Electronic Drivers for LED Devices, Arrays, or Systems

.7 Underwriters' Laboratories of Canada (ULC)

.1 UL 1449 (2014), Standard for Surge Protective Devices

1.3 SCOPE

.1 Materials and installation of lighting.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 LIGHT FIXTURE

.1 LED

.2 Power: As indicated in the Contract Drawings.

.3 Lumen Output: As indicated in the Contract Drawings.

.4 Colour temperature: As indicated in the Contract Drawings.

.5 Include all necessary connectors.

.6 Basis of design: As indicated in the Contract Drawings.

Part 3 Execution

3.0 INSTALLATION

.1 Locate and install luminaires as indicated in Contract Drawings.

3.1 WIRING

.1 Connect luminaires to lighting circuits:

.1 Install flexible or rigid conduit for luminaires as indicated in Contract Drawings.

3.2 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted individually parallel or perpendicular to building grid lines.

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Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 - Common Work Results – Electrical

.2 Technical Specification 26 05 10 – Testing and Commissioning

.3 Technical Specification 26 05 31 – Splitters, Junction, Pull Boxes and Cabinets

1.2 REGULATORY REQUIREMENTS

.1 Not Used

1.3 SCOPE

.1 Materials and installation for heating and ventilation systems.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

Part 2 Products

2.0 CONTROLS

.1 Refer to electrical Contract Drawings for details on heating and ventilation control.

.2 Provide control equipment as shown on electrical Contract Drawings. Devices to be industrial quality, line voltage (120/240 volts), single-pole, white unless otherwise indicated on the Contract Drawings.

.3 Provide clear plastic thermostat guard for all heating/cooling wiring devices: thermostats, astronomical time switch.

2.1 HEATERS

.1 Element: Durable tubular heating element with fins.

.2 Finish: Epoxy-polyester powdercoat

.3 Installation: Wall mounted with surface mounting box (included)

.4 Wattage & Voltage: As indicated on Contract Drawings

.5 Control: Built-in thermostat with control knob.

.6 Heaters shall be serviceable and replaceable without removing any component in the kiosk or area. Heaters shall be located to prevent burning of adjacent components.

.7 Heaters shall be suitably shielded to prevent accidental burning.

.8 There shall be no exposed electrical parts.

.9 Standard of Acceptance: Ouellet OVS Series or approved equal.

2.2 VENTILATION

.1 Kiosk Ventilation

.1 To ensure adequate heat dissipation.

.2 Forced-air ventilation shall have front intake and exhaust channels.

.3 Cooling fans shall be automatically controlled to operate based on the cooling air demands of the kiosk to maintain adequate internal temperature for electrical equipment.

2.3 THERMOSTAT

.1 Kiosks or enclosures shall be equipped with one or more 120/208VAC thermostats as indicated in the Contract Drawings.

.2 Thermostats shall be serviceable and replaceable without removing any component in the kiosk.

.3 There shall be no exposed electrical parts.

.4 Control of heater shall be from a wall-mount thermostat.

.5 Control of fan shall be from a wall-mount thermostat.

Part 3 Execution

3.0 INSTALLATION

.1 Mount heaters on kiosk wall as indicated on Contract Drawings.

.2 Electrically connect ventilation as shown in manufacturer’s installation instructions.

.3 Install control equipment in locations indicated on Contract Drawings.

.4 Make power and control connections.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 10 – Testing and Commissioning.

.2 Ensure that heaters, ventilation and controls operate correctly.

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P1	April 10, 2024	Issued for Tender	AGD	BW

Part 1 General

1.0 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 211. (latest edition), Rigid Types EBI and DB2/ES2 PVC Conduit.

.2 CSA C22.2 No. 211.3 (latest edition), Reinforced Thermosetting Resin Conduit (RTRC) and Fittings (Bi-national standard, with UL 1684).

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health and Welfare Canada for solvent cement. Indicate VOC content.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and Handle materials in accordance with Section 26 05 00 – Common Work Results Electrical

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Dispose of unused solvent cement at an official hazardous material collections sites as approved by Consultant. Do not dispose of unused solvent cement into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

Part 2 Products

2.0 PVC DUCTS AND FITTINGS

.1 Rigid PVC duct: to CSA C22.2 No. 211.1, type rigid PVC for direct burial with minimum wall thickness at any point of 2.8 mm. Nominal length: 3.0 m plus or minus 12 mm. Type DB2 (thinwall) PVC conduits unacceptable.

.2 Duct sizes per Drawings.

.3 Rigid PVC split ducts.

.4 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.

.5 Rigid PVC 90º and 45º bends.

.6 Rigid PVC 5º angle couplings.

.7 Use epoxy coated galvanized steel conduit for sections extending above finished grade.

.8 Expansion joints at transition to EMT at building entry.

2.1 SOLVENT WELD COMPOUND

.1 Solvent cement for PVC duct joints.

2.2 FIBREGLASS DUCTS

.1 Not Required

2.3 PLASTIC POLYETHYLENE PIPE

.1 Rigid plastic polyethylene pipe with approved couplings and fittings required to make complete installation.

2.4 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.5 MARKERS

.1 Markers on grade not required.

.2 150 mm wide, 4 mil, polyethylene marker tape in all trenches. Use red colored tape. Install at depth as per drawings.

Part 3 Execution

3.0 INSTALLATION

.1 Install duct in accordance with manufacturer's instructions.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5 m throughout duct length.

.4 Slope ducts with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 Pull through each duct wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end. Pull rope shall be left in spare ducts for future use.

.8 Install markers as required.

.9 Do not conceal conduits until written approval from Consultant is provided.

.10 Do not conceal mechanical protection until written approval from Consultant is provided.

END OF SECTION