BC Hydro
Power smart

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

SUPPLY OF LATTICE TOWERS FOR SITE C

REFERENCE NO. RFP 5710

CONTRACT DOCUMENTS

SUPPLIER:

SA-RA ENERGY, CONSTRUCTION, TRADE & INDUSTRY INC.

CONTENTS

MAY 2017

AGREEMENT

SUPPLY

THIS AGREEMENT (this "**Agreement**") made effective as of the 2nd day of May, 2017 (BC Hydro Reference # RFP 5710)

BETWEEN:

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY, a British Columbia Crown Corporation having its head office at 333 Dunsmuir Street, Vancouver, B.C. V6B 5R3

("**BC Hydro**")

AND:

SA-RA ENERGY, CONSTRUCTION, TRADE & INDUSTRY INC.
[redacted]

(the "**Supplier**")

WHEREAS:

A. BC Hydro intends to purchase galvanized steel lattice towers for the Site C Clean Energy Project for delivery to the Delivery Point(s) and wishes to enter into a formal contract for the performance of Services; and

B. the Supplier wishes to enter into a formal contract with BC Hydro for the performance of the Services.

NOW THEREFORE in consideration of the mutual covenants and conditions contained in the Contract, BC Hydro and the Supplier agree as follows:

1.0 THE SERVICES

1.1 Scope of Services

The services to be supplied under the Contract are the following, all as more particularly set out in the Contract Documents (the "**Services**"):

(a) Supply and delivery of the Equipment in accordance with the Contract Documents; and

(b) Performance of the other related services described in the Contract Documents.

The Supplier will provide all labour, materials and equipment necessary for the complete performance of the Services. The Supplier will perform the Services in accordance with the requirements of the Contract Documents, including Appendix D – Scope of Services, Appendix G – Specifications and Appendix J – Drawings.

1.2 Initial Supply Schedule

Attached at Appendix F – Supply Schedule is the initial schedule for the performance of the Services. The Supplier will revise and expand the initial schedule as required in Appendix A – General Conditions (Supply).

2.0 INTERPRETATION

2.1 Definitions

In this Agreement, unless the context otherwise requires, capitalized terms have the meanings set out in Appendix A – General Conditions (Supply).

2.2 Contract Documents

The following are the "**Contract Documents**":

(a) this Agreement;

(b) Appendix A – General Conditions (Supply);

(c) Appendix B – Supplementary General Conditions;

(d) Appendix C – BC Hydro's Policies and Procedures;

(e) Appendix D – Scope of Services;

(f) Appendix E – Schedule of Quantities and Prices;

(g) Appendix F – Supply Schedule;

(h) Appendix G – Specifications;

(i) Appendix H – Quality Requirements;

(j) Appendix I – Aboriginal Inclusion and Reporting Requirements;

(k) Appendix J – Drawings;

(l) Appendix K – Key Personnel, Manufacturing and Testing Facilities and Subsupplier; and

(m) Appendix L – Technical Data Table

3.0 CONTRACT PRICE

3.1 Contract Price

As payment for the performance of the Services, BC Hydro will pay the Supplier [redacted] as may be adjusted in accordance with the Contract Documents (the "**Contract Price**"), plus GST and PST where applicable.

3.2 Entire Compensation

The Contract Price will be the entire compensation owing to the Supplier for the complete performance of the Services and this compensation will cover and include all profit and all costs of supervision, labour, material, equipment, transportation and delivery, overhead, financing and all other costs and expenses whatsoever incurred by the Supplier in performing the Services.

4.0 REPRESENTATIVES

For the purposes of GC.2.1 and GC.3.1, the following are the initial Representatives of the parties:

Hydro's Representative: [redacted]

Supplier's Representative: [redacted]
Business Development and Sales Department Manager

If no names or contact details are included in this Section 4.0 as of the Effective Date, then each party will promptly give written notice to the other party of their respective Representative in accordance with GC.2.1 and GC.3.1, as applicable. Either party may, at any time and from time to time, change its Representative in accordance with GC.2.1 and GC.3.1, as applicable.

5.0 NOTICES

5.1 Address for Notice

Unless otherwise expressly required to be given to Hydro's Representative or the Supplier's Representative pursuant to the Contract Documents, any notice or communication required or permitted to be given under the Contract will be in writing and will be considered to have been sufficiently given when delivered by registered mail, by hand or by email to the address of the applicable party set out below:

(a) if to BC Hydro:

BC Hydro and Power Authority
6911 Southpoint Drive, Burnaby B.C. V3N 4X8

Attention: [redacted]
Project Manager
BC Hydro Reference # RFP 5710
Email: [redacted]

(b) if to the Supplier:

SA-RA Energy, Construction, Trade & Industry Inc.
[redacted]

Attention: [redacted]
Business Development and Sales Department Manager
Email: [redacted]; or

(c) to such other address as either party may, from time to time, designate in the manner set out above, provided that the Supplier may not change its address under this Section 5.1 to an address other than one in British Columbia without BC Hydro's prior written consent.

5.2 Delivery of Email

For the purposes of Section 5.1, unless otherwise agreed in writing between Hydro's Representative and the Supplier's Representative, an email is deemed to have been delivered when:

(a) it enters an information processing system that the recipient has designated or uses for the purpose of receiving email or information of the type sent and from which the recipient is able to retrieve the email; and

(b) it is in a form capable of being processed by that system.

An email is deemed to be delivered under this Section 5.2 even if no individual with the recipient is aware of its delivery.

6.0 LANGUAGE

All documents to be given under the Contract will be provided in English and the Supplier's Representative and key personnel will be fluent in English.

7.0 AMENDMENTS

No amendment to the terms of the Contract will be binding on BC Hydro or the Supplier, unless made in writing and signed by an authorized representative of each party.

8.0 ENTIRE AGREEMENT, WAIVERS AND CONSENTS IN WRITING

The Contract Documents, and the instruments and documents to be executed and delivered pursuant to the Contract Documents, constitute the entire Contract between the parties, expressly superseding all prior agreements and communications (both oral and written) between the parties with respect to all matters contained in the Contract Documents and such instruments and documents, and contains all the representations and warranties of the respective parties. In addition:

(a) no waiver of any provision of the Contract; and

(b) no consent required pursuant to the Contract Documents,

is binding or effective unless it is in writing and signed by an authorized signatory of the party providing such waiver or consent.

9.0 ASSIGNMENT

Neither party may assign the Contract, in whole or in part, without the prior written consent of an authorized representative of the other party, which consent may not be unreasonably withheld. Notwithstanding the foregoing, BC Hydro may assign the Contract to any of its Affiliates or to any third party that amalgamates or merges with BC Hydro or which acquires all or substantially

all of the assets of BC Hydro or which was, immediately prior to the assignment, a part of BC Hydro, conditional upon the successor covenanting and agreeing with the Supplier to be bound to the Supplier by the provisions of the Contract. Subject to the foregoing, the Contract will enure to the benefit of and be binding upon the parties and their respective successors and permitted assigns.

10.0 FURTHER ASSURANCES

Each party will do, execute and deliver, or will cause to be done, executed and delivered, all such further acts, documents (including certificates, declarations, affidavits, reports and opinions) and things as the other party may reasonably request for the purpose of giving effect to the Contract or for the purpose of establishing compliance with the representations, warranties and obligations of the Contract.

11.0 GOVERNING LAW

The Contract will be governed by and construed in accordance with the Laws of the Province of British Columbia and the federal Laws of Canada applicable in British Columbia.

12.0 COUNTERPARTS

This Agreement may be executed and delivered in several counterparts, including by facsimile (or other similar electronic means, including via pdf), each of which when so executed and delivered will be deemed to be an original and such counterparts together will be one and the same instrument.

IN WITNESS WHEREOF the parties hereto have executed this Agreement as of the day and year first above written.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

Per: [redacted]
Authorized Signatory

SA-RA ENERGY, CONSTRUCTION, TRADE & INDUSTRY INC.

Per: [redacted]
Authorized Signatory

APPENDIX A – GENERAL CONDITIONS (SUPPLY)

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GC.1 INTERPRETATION

1.1 Definitions

In the Contract, unless the context otherwise requires:

"**Aboriginal**" means Indian (as defined in the *Indian Act* (Canada)), Metis or Inuit;

"**Aboriginal Business**" means:

(a) a sole proprietorship, wholly owned by an Aboriginal person;

(b) a corporation with at least 51% of the equity, including common or voting shares, directly owned by one or more Aboriginal Businesses or Aboriginal persons;

(c) a partnership or joint venture (between two or more Aboriginal Businesses or between one or more Aboriginal Business(es) and one or more non-Aboriginal Business(es)) with at least 51% of the ownership rights, including any voting rights, directly owned by one or more Aboriginal Businesses or Aboriginal persons; or

(d) any other business with a substantial amount of ownership rights held by one or more Aboriginal Businesses or Aboriginal persons, as determined by BC Hydro, acting reasonably;

"**Affiliate**" means, with respect to any Person, any other Person directly or indirectly controlling, controlled by, or under direct or indirect common control of, such Person, and a Person will be deemed to control another Person if such Person possesses, directly or indirectly, the power to direct or determine the direction of the management and policies of such other Person, whether through ownership of voting securities, by contract or otherwise;

"**Agreement**" means the form of agreement which is signed by the parties and included in the Contract Documents;

"**BC Hydro**" means the entity identified as "BC Hydro" on the first page of the Agreement;

"**BC Hydro Property**" means any design, facilities, property, equipment, including construction equipment and small tools, replacement parts, furnishings, materials and supplies of any kind provided to the Supplier by BC Hydro or by a third party at the direction of BC Hydro for the performance of the Services and whether or not incorporated into the Services or the Equipment;

"**BCICAC**" has the meaning set out in GC.12.8(a);

"**Change**" has the meaning set out in GC.7.1;

"**Change Directive**" has the meaning set out in GC.7.2;

"**Change Order**" has the meaning set out in GC.7.1;

"**Claim**" means any claim, demand, action, cause of action, suit or proceeding, whether for damages, contribution, indemnity or any other relief;

"**Claim Costs**" means any and all losses, damages, costs, penalties and expenses arising from or related to a Claim, including actual legal (on a solicitor and his own client basis), accounting and expert costs and expenses incurred in the investigation, defence or settlement of a Claim;

"**Confidential Information**" has the meaning set out in GC.14.1;

"**Consequential Damages**" has the meaning set out in GC.18.2;

"**Contemplated Change**" has the meaning set out in GC.7.3;

"**Contract**" means the agreement between BC Hydro and the Supplier as defined and described in the Contract Documents, as may be amended, supplemented or restated from time to time;

"**Contract Documents**" means the documents listed and described in Section 2.2 of the Agreement;

"**Contract Price**" has the meaning set out in Section 3.1 of the Agreement;

"**Dangerous Goods**" has the meaning set out in the *Transportation of Dangerous Goods Act* (Canada);

"**Default Costs**" has the meaning set out in GC.9.3(c)(i);

"**Delivery Point(s)**" means the locations set out or described in the Contract Documents where the Equipment is to be delivered;

"**Deposit Application**" has the meaning set out in GC.6.1;

"**Dispute**" has the meaning set out in GC.12.1;

"**Dispute Notice**" has the meaning set out in GC.12.3;

"**Dispute Resolution Procedure**" means the dispute resolution procedure set out in GC.12;

"**Effective Date**" means the effective date of the Contract as set out on the first page of the Agreement;

"**Equipment**" means the equipment (including all components) as expressly identified in the Contract Documents, plus all other ancillary equipment, articles, goods, consumables, products materials, supplies, commodities, machinery and fixtures, if any, required by necessary inference;

"**First Tier Subcontractor**" means a Subcontractorr having a direct contract with the Supplier;

"**FOIPPA**" means the *Freedom of Information and Protection of Privacy Act* (British Columbia);

"**Force Majeure**" means an event beyond the reasonable control of a party and includes any work stoppage (including strike, lock-out, picket or other labour dispute) that is not described by GC.8.3, war, invasion, insurrection, civil or social unrest, riot, armed conflict, act of foreign enemy, revolution, terrorist act, interference by military authorities, nuclear explosion, contamination by ionizing radiation, epidemic or quarantine restriction, earthquake, tidal wave or other natural calamities, that prevents, delays or interrupts the performance of any obligation

under the Contract, provided such event does not occur by reason of: (i) the negligence of the party claiming Force Majeure (or those for whom it is in law responsible); or (ii) any act or omission of the party claiming Force Majeure (or those for whom it is in law responsible) that is in breach of the provisions of the Contract, but Force Majeure does not include: (x) a party's lack of funds; (y) the bankruptcy or insolvency of any Subcontractor; or (z) a shortage or unavailability of labour, equipment or materials unless such shortage or unavailability is caused by a Force Majeure;

"**Good Industry Practice**" means the standards, practices, methods and procedures to a good professional and commercial standard, conforming to Laws and exercising that degree of skill, care, diligence, prudence and foresight which would reasonably and ordinarily be expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances;

"**Governmental Authority**" means any federal, provincial, territorial, regional, municipal or local authority, quasi-governmental authority, court, government, or self-regulatory organization, commission, board, tribunal, organization, or any regulatory, administrative or other agency, or any political or other subdivision, department or branch of any of the foregoing, having jurisdiction in any way over or in respect of any aspect of the performance of the Contract;

"**GST**" means the tax imposed in British Columbia pursuant to Part IX of the *Excise Tax Act* (Canada);

"**Hazardous Substance**" means any substance, mixture of substances, product, waste, organism, pollutant, material, chemical, contaminant, dangerous good, constituent or other material which is or becomes listed, regulated or addressed under any Law respecting the use, manufacture, importation, handling, transportation, storage, disposal and treatment of the substance, mixture of substances, product, waste, organism, pollutant, material, chemical, contaminant, dangerous good, constituent or other material;

"**Hydro's Representative**" has the meaning set out in GC.3.1;

"**Indemnified Parties**" has the meaning set out in GC.17.1;

"**Indemnified Party**" has the meaning set out in GC.17.1;

"**Key Personnel**" means those individuals expressly identified in the Contract Documents, if any;

"**Laws**" means all valid laws, including common law, federal, provincial, and municipal statutes, bylaws, and other local laws, orders, rules, regulations, approvals and policies of any Governmental Authority, including those related to occupational health and safety, fire, employment insurance, workers' compensation, the transportation and handling of Hazardous Substances, the transportation and handling of dangerous goods, environmental protection, standards, building codes and other governmental requirements, work practices and procedures, that are applicable to the discharge of obligations set out in the Contract Documents, including the performance of the Services;

"**Optional Work**" means Services which may be described in Appendix D – Scope of Services and Appendix E – Schedule of Quantities and Prices that will be undertaken and included in the Services at the election of BC Hydro;

"**Other Supplier**" has the meaning set out in GC.5.3;

"**Payment Request**" has the meaning set out in GC.6.2(a);

"**Performance Security Holdback**" has the meaning set out in GC.6.6;

"**Permits**" means all permissions, consents, approvals, registrations, certificates, permits, licences, statutory agreements and authorizations required from any Governmental Authority, and all necessary consents and agreements from any third parties, needed to carry out the Services in accordance with the Contract Documents;

"**Person**" means any individual, sole proprietorship, corporation, company, partnership, unincorporated association, association, institution, entity, party, trust, joint venture, estate, cooperative or other judicial entity;

"**Personal Information**" means recorded information about an identifiable individual, other than contact information (as defined in FOIPPA), collected, created or otherwise acquired by the Supplier as a result of the Contract or any previous agreement between BC Hydro and the Supplier dealing with the same subject matter as the Contract;

"**Prime Rate**" means the floating annual rate of interest established by the Bank of Montreal from time to time as its reference rate of interest, to determine the interest rate it will charge for loans in Canadian dollars to its customers in Canada and designated as its "Prime Rate";

"**Professional Engineer**" means a person who is registered or licensed as a professional engineer under the *Engineers and Geoscientists Act* (British Columbia);

"PST" means the tax imposed in British Columbia pursuant to the *Provincial Sales Tax Act* (British Columbia);

"**Quotation**" has the meaning set out in GC.7.3;

"**Representative**" means either Hydro's Representative or the Supplier's Representative, as the case may be;

"**Services**" has the meaning set out in Section 1.1 of the Agreement;

"**Settlement Agreement**" has the meaning set out in GC.12.5;

"**Site**" means the location where the Equipment is to be finally or permanently located or installed;

"**Subcontractor**" has the meaning set out in GC.5.7;

"**Submittal**" has the meaning set out in GC.5.14;

"**Submittal Schedule**" has the meaning set out in GC.5.14(a);

"**Supplier**" means the entity identified as "Supplier" on the first page of the Agreement;

"**Supplier Duties**" has the meaning set out in GC.22.5;

"**Supplier Quality Plan**" has the meaning set out in GC.5.5(a);

"**Supplier Taxes**" has the meaning set out in GC.22.5;

"**Supplier's Representative**" has the meaning set out in GC.2.1;

"**Supply Schedule**" has the meaning set out in GC.5.6(a);

"**Total Completion**" has the meaning set out in GC.6.10; and

"**Warranty Period**" has the meaning set out in GC.19.3.

Any words or phrases defined elsewhere in the Contract will have the particular meaning assigned to such words or phrases.

1.2 Interpretation

Except as expressly set out otherwise in the Contract Documents or the context otherwise requires, the following will apply to the interpretation of the Contract:

(a) where there is a reference in any Contract Document to:

(i) "Supplier", it will be read as a reference to "the Supplier"; and

(ii) "Work", it will be read as a reference to "the Services" as a whole or the applicable portion of the Services, as the context requires;

(b) headings are for convenience and reference only and will not affect the interpretation of the Contract;

(c) all dollar figures will mean Canadian dollars;

(d) any notice or communication required or permitted to be given under the Contract will be in writing;

(e) words importing the singular include the plural, and vice versa;

(f) words importing gender include all genders;

(g) where a reference is made to a "day", "week", "month" or "year", the reference is to the calendar period;

(h) where the date for any delivery or response falls on a Saturday, Sunday or statutory holiday observed in British Columbia, the date for such delivery or response will be extended to the next following day which is not a Saturday, Sunday or statutory holiday observed in British Columbia;

(i) in the calculation of time, the first day will be excluded and the last day will be included;

(j) the words in the Contract Documents will bear their natural or defined meaning;

(k) the word "including" is deemed to be followed by "without limitation";

(l) any reference to a statute will include such statute and its corresponding regulations, together with all amendments made to such statute and regulations and in force from time to time, and any statute or regulation that may be passed which has the effect of amending, supplementing or superseding the statute referred to or such statute's corresponding regulations; and

(m) the parties confirm that they each have obtained independent legal advice, or elected not to obtain such advice, and accordingly agree that any rule of construction to the effect that any ambiguity is to be resolved against the drafting party will not be applicable in the interpretation of the Contract.

1.3 Priority of Contract Documents

If there is any inconsistency or conflict between provisions of the Contract Documents, then:

(a) the order of priority between the Contract Documents, from highest to lowest with the Agreement having the highest priority, is as follows:

(i) the Agreement;

(ii) Appendix B – Supplementary General Conditions;

(iii) Appendix A – General Conditions (Supply);

(iv) Appendix D – Scope of Services;

(v) Appendix E – Schedule of Quantities and Prices;

(vi) Appendix F – Supply Schedule;

(vii) Appendix J – Drawings;

(viii) Appendix G – Specifications;

(ix) Appendix H – Quality Requirements;

(x) Appendix I – Aboriginal Inclusion and Reporting Requirements;

(xi) Appendix C – BC Hydro's Policies and Procedures;

(xii) Appendix K – Key Personnel, Manufacting and Testing Facilities and Subsupplier; and

(xiii) Appendix L – Technical Data Table.

(b) drawings of a larger scale have priority over drawings of a smaller scale;

(c) figured dimensions on a drawing will govern over scaled measurements on the same drawing; and

(d) documents of a later date will always supersede a similar type of document of an earlier date.

GC.2 SUPPLIER'S REPRESENTATIVE

2.1 Appointment of Supplier's Representative

The Supplier will, upon executing the Agreement, designate in writing an individual (the "**Supplier's Representative**") to be the Supplier's representative and single point of contact with respect to the Contract. The Supplier will give prompt written notice of such appointment to Hydro's Representative. If, for any reason, the appointed Supplier's Representative's appointment is discontinued, then the Supplier will, as soon as practicable, appoint a replacement and give prompt written notice to Hydro's Representative of such replacement. If, at any time, Hydro's Representative, acting reasonably, objects to the Supplier's Representative, then the Supplier will give consideration to replacing the Supplier's Representative with a Person acceptable to Hydro's Representative. The Supplier's Representative may, at the Supplier's election, be an employee of the Supplier, or be a consultant or other third party.

2.2 Authority of Supplier's Representative

The Supplier's Representative will have full authority to act on behalf of and bind the Supplier under the Contract and be the Supplier's representative and agent to protect the Supplier's interests under the Contract. The Supplier's Representative may consult with other representatives of the Supplier before giving any response, direction or consent as may be required under the Contract.

2.3 Delegation of Supplier's Representative's Authority

The Supplier's Representative may, by written notice to Hydro's Representative with details of the nature and extent of the delegation, delegate to others some or all of the Supplier's Representative's authority under the Contract.

GC.3 HYDRO'S REPRESENTATIVE

3.1 Appointment of Hydro's Representative

BC Hydro will appoint an individual ("**Hydro's Representative**") to be BC Hydro's single point of contact with respect to the Contract. BC Hydro will give prompt written notice of such appointment to the Supplier. If, for any reason, the appointed Hydro's Representative's appointment is discontinued, then BC Hydro will, as soon as practicable, appoint a replacement and give prompt written notice to the Supplier of such replacement. If, at any time, the Supplier's Representative, acting reasonably, objects to Hydro's Representative, then BC Hydro will give consideration to replacing Hydro's Representative with a Person acceptable to the Supplier's Representative. Hydro's Representative may, at BC Hydro's election, be an employee of BC Hydro, or be a consultant or other third party.

3.2 Authority of Hydro's Representative

Hydro's Representative will have authority to act on behalf of BC Hydro only to the extent expressly set out in the Contract Documents, including as described in GC.3.4, but otherwise Hydro's Representative will not have the authority to execute or agree to any amendments to the Contract or to waive any of BC Hydro's rights under the Contract. Hydro's Representative's authority, as set out in the Contract Documents, will not relieve the Supplier of any of its duties,

obligations or responsibilities under the Contract to perform the Services in accordance with the requirements of the Contract Documents, and Hydro's Representative will not be responsible for or have control of the performance of the Services. Hydro's Representative will not be responsible for or have control over the acts or omissions of the Supplier, Subcontractors, or their employees or other Persons engaged by or through them.

3.3 Delegation of Hydro's Representative's Authority

Hydro's Representative may, by written notice to the Supplier with details of the nature and extent of the delegation, delegate to others some or all of Hydro's Representative's authority under the Contract.

3.4 Role of Hydro's Representative

The role of Hydro's Representative will be to:

(a) provide administration of the Contract as described in the Contract Documents;

(b) provide the Supplier with additional instructions in the form of specifications, drawings, samples, models or other written instructions, to supplement the previously issued Contract Documents, as may be necessary for the performance of the Services;

(c) without derogating from or negating any of Hydro's Representative's other obligations set out in the Contract, act as BC Hydro's representative and agent to protect BC Hydro's interests under the Contract;

(d) make all commercially reasonable efforts to respond promptly to the Supplier's requests for additional instructions, and, if it becomes apparent that a number of additional instructions will be required, then cooperate with the Supplier to establish a schedule for the issuance of such additional instructions;

(e) in accordance with the requirements of the Contract Documents, review and take appropriate action upon receiving Submittals, including:

    (i) shop drawings, product data and samples; and

    (ii) written guarantees, warranties and manuals to be provided by the Supplier;

(f) except as expressly set out otherwise in the Contract Documents, when required, set out or cause to be set out survey monuments or control points at the Site, sufficient to enable the Supplier to determine the required lines and grades for the performance of the Services;

(g) prepare, sign and issue Change Orders, Change Directives and Contemplated Changes in accordance with the requirements of GC.7;

(h) review supporting documentation as required to determine the amounts owing to the Supplier under the Contract and perform the tasks relating to payment as required under GC.6;

(i) perform inspections of the Equipment and the Services and the performance of the Services; and

(j) undertake all other duties of Hydro's Representative as described in the Contract Documents.

3.5 Contract Interpretation

Hydro's Representative will be, in the first instance, the interpreter of the Contract Documents and the judge of the performance of BC Hydro and the Supplier. Hydro's Representative's interpretations and judgments will be consistent with the Contract Documents and, in making such interpretations and judgments, Hydro's Representative will not show partiality to either party. With respect to interpretation of the Contract Documents:

(a) either party may, at any time, by written request, refer any question relating to the Contract, including questions regarding claims relating to the performance of the Services or questions regarding the interpretation of the Contract Documents, to Hydro's Representative for a written interpretation;

(b) Hydro's Representative will, within ten days of a written request, or such other period of time (longer or shorter) as reasonably required in the circumstances, deliver a written interpretation to each of BC Hydro and the Supplier's Representative; and

(c) if a party disputes an interpretation of Hydro's Representative, then the disputing party may deliver a Dispute Notice to have the matter dealt with as a Dispute pursuant to GC.12.

The Supplier will proceed with the performance of the Services without delay in accordance with any written direction, instruction or decision given by Hydro's Representative with respect to a requested interpretation, without prejudice to the Supplier's rights to dispute the interpretation, or the written direction, instruction or decision, pursuant to GC.3.5(c).

GC.4 SERVICES

4.1 Performance of Services

The Supplier will perform the Services, including without limitation the supply and delivery of the Equipment, in accordance with the Contract Documents.

4.2 Design of Equipment

Except only, and to the extent, as may be expressly provided otherwise in Appendix B – Supplementary General Conditions, the Supplier will perform and be responsible for the complete design of the Equipment.

4.3 Notification of Packaging

The Supplier will give BC Hydro written notice of not less than 10 days of the place at which any of the major or critical items of the Equipment are to be packaged for shipment. Prior to shipping a major or critical item of the Equipment, the Supplier will give BC Hydro written notice of the date of delivery to the Delivery Point(s) in accordance with the Contract, and, where applicable,

the type of transport used and the name and address of the carrier, freight forwarder, and/or agent.

4.4 Packaging

The Supplier will take steps as required so that all the Equipment is properly prepared for shipment and securely packaged in such packing and containers or otherwise which will in every way be adequate and sufficient to withstand exposure to the elements and rough handling during shipment. Such packing will be sufficient to ensure safe arrival and off-loading at the Delivery Point(s) and to fully cover hazards, including extreme temperature. Any Equipment loss, damage or repair cost resulting from inadequate or defective packing will be the Supplier's sole responsibility.

4.5 Delivery

The Supplier will deliver the Equipment to the Delivery Point(s) Delivery Duty Paid as per Incoterms 2010 ICC Publication No. 715.

4.6 Right to Reject Equipment

Notwithstanding the transfer of title pursuant to GC.4.8 or the transfer of risk of loss pursuant to GC. 4.9, BC Hydro may reject any Equipment that is not in accordance with the Contract, including because the Equipment does not meet the requirements of Appendix G – Specifications, or because of damage to the Equipment resulting from improper packing, transportation or otherwise. BC Hydro will notify the Supplier in writing of the rejection of any of the Equipment. Any rejected Equipment, if BC Hydro has taken possession and control of the Equipment, will be held by BC Hydro at the sole risk of the Supplier and the Supplier will promptly remove or cause to be removed the rejected Equipment. The Supplier will be responsible for all costs of the removal and disposition of any rejected Equipment. Any costs or expenses incurred by BC Hydro on account of any rejected Equipment will, upon written demand by BC Hydro, be immediately due and payable by the Supplier, and BC Hydro may set-off such costs and expenses against any payment owing by BC Hydro to the Supplier.

Promptly after receiving a notice of rejection, the Supplier will deliver to Hydro's Representative in accordance with GC.5.14 a plan describing the steps the Supplier will take and implement to deliver Equipment that is in accordance with the Contract, and describing any impacts on the Supply Schedule.

4.7 Marketable Title

The Supplier warrants that it has or will at the time of the transfer of title as described in GC.4.8 have good and marketable title to the Equipment, free and clear of any and all liens, restrictions, reservations or Claims of any kind and that it will defend BC Hydro's title to the Equipment.

4.8 Transfer of Title

Title and all other property rights in and to all tangible personal property, and in and to all parts of tangible personal property that are or are intended to be part of the Equipment or are otherwise provided to the Delivery Point(s) by or on behalf of the Supplier under the Contract, including all consumables, products, materials, equipment, tools, supplies and other items, but not the risk of loss with respect to such tangible personal property, the risk of which will remain

with the Supplier until such time as specified in GC.4.9, will pass to BC Hydro free and clear of all encumbrances at the earlier of the following:

(a) the time, if any, when full payment (less holdbacks) is made by BC Hydro for specified tangible personal property in the payment; and

(b) the time when BC Hydro takes possession and control of the tangible personal property.

4.9 Risk of Loss

Notwithstanding the transfer of title pursuant to GC.4.8, risk of loss with respect to the Equipment will remain with the Supplier and will not transfer to BC Hydro unless and until BC Hydro takes possession and control of the Equipment.

GC.5 EXECUTION OF THE SERVICES

5.1 Standard of Services

The Supplier will perform the Services in accordance with:

(a) the Contract Documents;

(b) Laws and Permits; and

(c) Good Industry Practice.

If more than one standard, including building codes, other governmental requirements, work practices and procedures, and specifications, applies to the performance of the Services, then the strictest of such will apply.

5.2 Documents at Manufacturing Facility

BC Hydro will provide the Supplier, without charge, one copy of the Contract Documents. The Supplier will, at all times, keep and maintain one copy of a complete set of the current Contract Documents and all drawings, record drawings, accepted shop drawings, revised or supplementary drawings or specifications and other design details, that have been issued by Hydro's Representative, the Supplier or any Subcontractor, at all locations where the Services, the Equipment or any components are being fabricated or manufactured, in good order and available for review by Hydro's Representative.

5.3 Work by Other Suppliers or BC Hydro

BC Hydro reserves the right to engage other Suppliers (each, an "**Other Supplier**") and to use BC Hydro's own forces to perform work at the Delivery Point(s) or the Site during the time for the performance of the Services. With respect to any work performed, or to be performed, at the Delivery Point(s) or the Site by Other Suppliers or BC Hydro's own forces:

(a) the Supplier will coordinate the performance of the Services with the work of all Other Suppliers and BC Hydro's own forces, and perform the Services to connect to such other work as specified or shown in the Contract Documents. If such coordination and connection directly causes the Supplier to incur costs or delays or both that could not have been reasonably anticipated by the Supplier as of the Effective Date, then the

Supplier will be entitled to claim a Change pursuant to the provisions of GC.7.4, except that the Supplier's notice obligation under GC.7.4(a)(i) will be to give written notice of such claim to Hydro's Representative promptly upon the Supplier becoming aware of such circumstances, or, in any event, promptly after the date when the Supplier should reasonably have become aware of such circumstances; and

(b) if the Supplier discovers any deficiencies in the work of an Other Supplier or BC Hydro's own forces that may affect the Services, then the Supplier will immediately, and before proceeding with the affected Services, report such deficiencies to Hydro's Representative and then confirm such report in writing if the initial report was not in writing.

5.4 Errors in Contract Documents

The Supplier will review the Contract Documents and promptly report to Hydro's Representative any discovered error, inconsistency or omission. If the Supplier discovers any error, inconsistency or omission in the Contract Documents, then the Supplier will not proceed with the supply of Equipment or the Services affected by such error, inconsistency or omission without first receiving directions or clarifications from Hydro's Representative. If the Supplier has not received such directions or clarifications within ten days of written notice of the error, inconsistency or omission to Hydro's Representative, then the Supplier will be entitled to claim an adjustment to the Contract Price or the time for the performance of the Services or both with respect to any delay after the seven day period in receiving directions or clarifications. If the Supplier proceeds with such affected supply or Services after becoming aware of an error, inconsistency or omission, or, in any event, after the time when a qualified and experienced supplier should reasonably have become aware of the error, inconsistency or omission, without first receiving directions or clarifications from Hydro's Representative, then the Supplier will, at the Supplier's sole cost and expense, remove, replace or make good any supply or Services which fail to meet the requirements of the Contract Documents. Subject to the above provisions of this GC.5.4, in conducting such review, the Supplier will not be responsible or liable to BC Hydro to discover all errors, inconsistencies or omissions.

5.5 Supplier Quality

The Supplier will:

(a) within ten days of the Effective Date, or by such later date as Hydro's Representative may agree to in writing, prepare and submit to Hydro's Representative a quality control plan (the "**Supplier Quality Plan**") satisfactory to Hydro's Representative, acting reasonably, that is based on the attached Appendix H – Quality Requirements and covering all aspects of the performance of the Services;

(b) perform all Services in compliance with the Supplier Quality Plan; and

(c) revise and submit to Hydro's Representative an updated Supplier Quality Plan as required to reflect any changes to the Services, to the satisfaction of Hydro's Representative, acting reasonably,

provided that compliance with the Supplier Quality Plan will not relieve the Supplier of any of its duties, obligations or responsibilities under the Contract to perform the Services in accordance with the requirements of the Contract Documents.

5.6 Supply Schedule

The Supplier will:

(a) within seven days of the Effective Date, or by such later date as Hydro's Representative may agree to in writing, prepare and submit to Hydro's Representative a revised and expanded supply schedule (the "**Supply Schedule**"), satisfactory to Hydro's Representative, acting reasonably, that is based on the attached Appendix F – Supply Schedule and complies with the milestone dates, if any, as set out in the Contract Documents, and that includes the planned order and duration of the major activities of the Services, including all critical path activities. The Supply Schedule will contain sufficient detail to permit Hydro's Representative to be able to understand and monitor the progress of the Services;

(b) update the Supply Schedule to the satisfaction of Hydro's Representative, acting reasonably, on no less than a monthly basis (or as otherwise expressly required by the Supply Schedule) so as to incorporate any time adjustments as permitted under the Contract Documents; and

(c) perform the Services in compliance with the then current Supply Schedule, as may be updated under GC.5.6(b). If, for any reason, the performance of the Services falls behind the schedule for the Services set out in the then current Supply Schedule, then:

(i) if, in accordance with the Contract Documents, the delay entitles the Supplier to an extension of the time for the performance of the Services, then the Supplier will, as part of the Services, include such extension in the next update to the Supply Schedule as provided under GC.5.6(b); or

(ii) if, in accordance with the Contract Documents, the delay does not entitle the Supplier to an extension of the time for the performance of the Services, then the Supplier will, as part of the Services, take all such steps as are required to bring the Services back into conformity with the then current Supply Schedule.

Failure to comply with the requirements of this GC.5.6 will be deemed to be a default under the Contract to which the provisions of GC.9.1 will apply.

5.7 Subcontractors

The following will apply with respect to all subcontractors, sub-consultants, suppliers, manufacturers and vendors (each, a "**Subcontractors**" and the term "Subcontractors" will be deemed to include all further subcontractors, sub-consultants, suppliers, manufacturers and vendors engaged below a Subcontractors) engaged to perform a portion of the Services:

(a) the Supplier will not, in the aggregate, subcontract more than 75% of the Services (such that no more than 75% of the Contract Price will be in payment for Services performed by Subcontractor(s)) without the prior written consent of Hydro's Representative, which consent may be arbitrarily withheld;

(b) unless the Contract Documents identify a specific Subcontractors, the Supplier will not directly or indirectly engage or permit the engagement of a Subcontractor to perform a

material portion of the Services without the prior written consent of Hydro's Representative, which consent may be arbitrarily withheld;

(c) if and to the extent the Contract Documents identify a specific Subcontractor, then the Supplier will not change any such specified Subcontractor without the prior written consent of Hydro's Representative, which consent may be arbitrarily withheld;

(d) notwithstanding any approval or consent given by Hydro's Representative to the engagement of a Subcontractor, if any event occurs or circumstance arises in relation to a Subcontractor that would, if it occurred or arose with respect to the Supplier, entitle BC Hydro to terminate the rights of the Supplier pursuant to the Contract, then Hydro's Representative may, by written notice to the Supplier's Representative, require the Supplier to discharge or cause to be discharged the Subcontractors and to cancel and terminate or cause to be cancelled and terminated the applicable agreement with the Subcontractor, all without liability to BC Hydro;

(e) notwithstanding any other provision in the Contract, and in addition to BC Hydro's rights described in GC.5.7(d), Hydro's Representative may, by written notice to the Supplier's Representative object to any Subcontractor engaged to perform a portion of the Services for any reason. Upon receipt of any such notice, the Supplier will immediately cause such Subcontractor to be removed from the performance of the Services and promptly replaced by a Subcontractor with suitable qualifications and experience. If Hydro's Representative exercises its authority under this GC.5.7(e), the Supplier will be entitled to claim a Change pursuant to the provisions of GC.7.4, except that the Supplier's notice obligation under GC.7.4(a)(i) will be to give written notice of such claim to Hydro's Representative promptly upon the Supplier becoming aware of the identity of the replacement Subcontractor. Notwithstanding any other provision in this GC.5.7(e), the Supplier will retain all authority and control over its Subcontractor;

(f) the Supplier will:

(i) require all First Tier Subcontractors to perform their work in accordance with the Contract Documents;

(ii) incorporate the terms and conditions of the Contract Documents into all agreements with First Tier Subcontractors, including GC.5.7(d);

(iii) make commercially reasonable efforts to have the terms and conditions of the Contract Documents incorporated into all agreements with Subcontractors below First Tier Subcontractors to the extent the terms and conditions of the Contract Documents are applicable to the Services being undertaken by such Subcontractors; and

(iv) the Supplier will be fully responsible for the acts, omissions, errors and defaults of a Subcontractors, its employees or other Persons engaged by or through that Subcontractors as if such acts, omissions, errors and defaults were those of the Supplier, and neither the engagement of a Subcontractors by the Supplier nor the approval or consent by Hydro's Representative of or to a Subcontractors will in any way reduce or amend or otherwise alter the Supplier's responsibility for the performance of the Services as set out in the Contract Documents; and

(g) nothing in the Contract will be construed as creating any contractual relationship between BC Hydro and any Subcontractor or any other Persons engaged or through a Subcontractor.

5.8 Skilled Workers

The Supplier will employ or engage, and cause all Subcontractors to employ or engage, a sufficient number of skilled and qualified workers to perform the Services in accordance with the Contract Documents.

5.9 Aboriginal Inclusion and Reporting Requirements

The Supplier will perform the Services in accordance and in compliance with Appendix I – Aboriginal Inclusion and Reporting Requirements.

Failure to comply with the requirements of this GC.5.9 will be deemed to be a default under the Contract to which the provisions of GC.9.1 will apply.

5.10 BC Hydro Property

If BC Hydro provides any BC Hydro Property to the Supplier, then:

(a) Hydro's Representative will, within seven days of providing such BC Hydro Property to the Supplier, provide the Supplier with a schedule of values showing the replacement value of such BC Hydro Property;

(b) the Supplier will have care, custody and control of all such BC Hydro Property, but BC Hydro will retain ownership of all BC Hydro Property;

(c) the Supplier will, at all times, maintain, and make available to Hydro's Representative upon request, a current inventory of all such BC Hydro Property and a description and the location of all such BC Hydro Property, in sufficient detail to permit Hydro's Representative to readily identify and verify the location and condition of all such BC Hydro Property; and

(d) the Supplier will use such BC Hydro Property only for the performance of the Services, and only for the purposes expressly set out in the Contract Documents or for the purposes such BC Hydro Property is typically used.

5.11 Training

The Supplier will provide all training and related services as required under the Contract, including as set out in Appendix G – Specifications. BC Hydro will determine which of its staff will receive such training.

5.12 Manuals and Specifications

The Supplier will provide all manuals and specifications as required under the Contract, including as set out in Appendix G – Specifications.

5.13 Tests and Inspections

Hydro's Representative and Hydro's Representative's delegates will have access to the Equipment and the Services at all times, including Equipment being fabricated and Services being performed at a location other than the Site, for the purpose of testing and inspecting the Services so as to remain familiar with the progress and quality of all aspects of the Services, and to be able to determine that the Services are proceeding in conformance with the requirements of the Contract Documents. With respect to all such tests and inspections:

(a) the Supplier will incorporate or cause to be incorporated all such testing and inspection rights in all applicable agreements with Subcontractors, and will take all necessary steps to facilitate such testing and inspection, including maintaining easy access to where the Equipment is to be tested and inspected;

(b) Hydro's Representative will conduct, in a timely manner, any testing or inspections of the Services, including the Equipment that the Contract Documents require Hydro's Representative to conduct;

(c) if testing or inspections of the Services, including the Equipment, are required by the Contract Documents to be conducted by Hydro's Representative or are required by Law to be conducted by a Governmental Authority, the Supplier will, in accordance with the then current Supply Schedule but, in any event, with no less than 14 days notice, notify Hydro's Representative and the applicable Governmental Authority in writing of the date on and the place at which any such testing or inspections can be conducted;

(d) Hydro's Representative will be entitled to observe all quality tests and inspections, results and data pertaining to the Services and the Equipment, including factory or other tests performed at a location other than the Site, and the Supplier will give written notice to Hydro's Representative of such tests and inspections, results and data in accordance with GC.5.13(c);

(e) the Supplier will submit to Hydro's Representative copies of all certificates, inspection reports, reports and quality documentation (all in a format agreed by Hydro's Representative in writing) relating to the Services, promptly after receiving or preparing such certificates, reports and quality documentation;

(f) in addition to BC Hydro's right to reject the Equipment under GC.4.6, Hydro's Representative or its delegate has the authority to reject any of the Services or any of the Equipment that does not conform to the requirements of the Contract Documents, and the Supplier will, at its sole cost and expense, correct such non-compliant Services or Equipment, subject to the Supplier's right to dispute under GC.12;

(g) Hydro's Representative has the authority to stop the Services where such Services are not being performed in accordance with the Contract Documents, or where there is a threat, whether or not imminent, to the safety of anyone or anything at the affected area or to the environment;

(h) Hydro's Representative's authority to order testing, inspect, reject, or otherwise review the Services will be for the benefit of BC Hydro, and such authority will not give rise to any duty or responsibility on Hydro's Representative or BC Hydro to the Supplier,

Subcontractors, or their agents, employees or other Persons performing any of the Services, to order testing, inspect, reject, or otherwise review the Services;

(i) the Supplier will pay for the cost of making any test or inspection, including the cost of samples, if the test or inspection is designated in the Contract Documents to be performed by the Supplier or is required by Law; and

(j) if the Supplier covers or permits to be covered Services or the Equipment that has been designated in the Contract Documents or by Law for tests, inspections or approvals, before such tests, inspections or approvals are made, given or completed, then Hydro's Representative may direct the Supplier to uncover such Services or Equipment, as required, so that such tests, inspections or approvals may be completed or given to the satisfaction of Hydro's Representative, acting reasonably. The Supplier will uncover and make good such Services or Equipment and any other removed or damaged property at the Supplier's sole cost and expense.

The Supplier will perform or cause to be performed all tests and inspections as are called for or required under the Contract Documents, including any tests and inspections required by Law, for the performance of the Services. The tests and inspections required by the Contract Documents or by Law are for BC Hydro's benefit and acceptable test and inspection results will not relieve the Supplier of any of its duties, obligations or responsibilities under the Contract to perform the Services and to correct defects or deficiencies in the Services, all in accordance with the requirements of the Contract Documents.

5.14 Submittals

If the Supplier is required under the Contract Documents to submit drawings or other documents (each, a "**Submittal**") to Hydro's Representative, then:

(a) the Supplier will prepare and submit a schedule (the "**Submittal Schedule**") satisfactory to Hydro's Representative, acting reasonably, setting out and describing:

(i) all submissions, drawings or other information that the Supplier is required under the Contract Documents to submit to BC Hydro, including:

(A) the subject matter and scope of information to be addressed in each Submittal;

(B) the background information, including information that may be proprietary to the Supplier or a Subcontractor, required in order for Hydro's Representative to understand and review the Submittal; and

(C) the form of each Submittal (such as a drawing or specification); and

(ii) the order and scheduling requirements of each Submittal in relation to the Supply Schedule, including reasonable times for review and comment on a Submittal by Hydro's Representative, such review times to be no less than 14 days after Hydro's Representative receives a Submittal, or shorter time as agreed by Hydro's Representative in writing;

(b) either party's Representative may from time to time recommend to the other party's Representative that adjustments are required to update the Submittal Schedule so that it is consistent with the then current Supply Schedule, and the Representatives will cooperate to reach agreement on such adjustments. Upon such agreement, the Supplier will provide an updated Submittal Schedule;

(c) Hydro's Representative will review a Submittal within the times described in the Submittal Schedule, or such other period of time (longer or shorter) as reasonably required in the circumstances, and return the Submittal to the Supplier stamped or otherwise noted with one of the following three notations:

(i) "Acceptable" – which will be deemed to mean that Hydro's Representative did not observe any aspect or element of the Submittal that did not comply with the Contract Documents;

(ii) "Acceptable with Modifications" – which will be deemed to mean that, subject to the amendments or corrections as noted in writing by Hydro's Representative, the Submittal is Acceptable, as defined in GC.5.14(c)(i); or

(iii) "Not Acceptable" – which will be deemed to mean that Hydro's Representative is of the opinion that the Submittal does not comply with the Contract Documents.

If a Submittal is noted as "Acceptable with Modifications" or "Not Acceptable", then Hydro's Representative will provide written justification for such notation;

(d) if a Submittal is returned to the Supplier with the notation "Acceptable with Modifications" or "Not Acceptable", then, subject to the Supplier's rights under GC.12, the Supplier will promptly revise such Submittal, taking into account the comments provided by Hydro's Representative, and resubmit the revised Submittal to Hydro's Representative for further review;

(e) any revised Submittal submitted to Hydro's Representative pursuant to GC.5.14(d) will be reviewed by Hydro's Representative in accordance with GC.5.14 within a further period of time equal to the original time Hydro's Representative had for review and comment of the initial Submittal;

(f) if Hydro's Representative, for any reason, fails to return a Submittal to the Supplier within the times described in GC.5.14(c) and GC.5.14(e), as applicable, then such Submittal will be deemed to have been given the notation "Acceptable";

(g) if the Submittal is, in accordance with applicable Law or Good Industry Practice, required to be prepared by or under the supervision of a qualified Professional Engineer, then Hydro's Representative may require a Submittal be stamped by a qualified Professional Engineer with appropriate skill, qualification and knowledge indicating that the Submittal has been prepared in compliance with Laws, Permits, applicable design standards and Good Industry Practice;

(h) except as expressly set out otherwise in the Contract Documents, Hydro's Representative's authority to review a Submittal will be for the benefit of BC Hydro, and such authority will not give rise to any duty or responsibility on Hydro's Representative or BC Hydro to the Supplier, Subcontractors, or their agents, employees or other Persons

performing any of the Services, to review the Services or the Equipment, and no such review, or authority to perform such review, will relieve the Supplier of any of its duties, obligations or responsibilities under the Contract to perform the Services and to correct any defects or deficiencies in the Services, all in accordance with the requirements of the Contract Documents; and

(i) the Supplier will not proceed with the performance of any Services for which a Submittal was made unless and until the Submittal is returned to the Supplier with the notation "Acceptable" or the Submittal is deemed to have been given the notation "Acceptable". If the Supplier proceeds with such Services prior to receiving the "Acceptable" notation and such Services are covered, then Hydro's Representative may direct the Supplier to uncover and make good such Services at the Supplier's sole cost and expense and the provisions of GC.5.13(j) will apply.

5.15 Electronic Data Site

If:

(a) BC Hydro establishes an electronic data site to contain information relating to the Services; and

(b) BC Hydro gives notice to the Supplier of such electronic data site and provides the Supplier with access to such electronic data site,

then the Supplier will be deemed to have received all such electronic information when posted, and, as part of the Services, during the performance of Services, the Supplier will monitor the electronic data site.

GC.6 CONTRACT PRICE AND PAYMENT

6.1 Direct Deposit Application Form

The Supplier will submit to Hydro's Representative, concurrently with the delivery of the Agreement, a completed Direct Deposit Application Form in the form provided by Hydro's Representative (the "**Deposit Application**"). The following will apply to the information contained on the Deposit Application:

(a) BC Hydro will be entitled to rely on such information without further enquiry or investigation;

(b) BC Hydro reserves the right (but not the obligation), in its sole discretion, to require the Supplier's Representative to provide evidence as to the accuracy of such information; and

(c) the Supplier will, at no cost to BC Hydro, promptly provide such evidence to Hydro's Representative.

If, at any time, the Supplier requires to change any information contained on its completed Deposit Application, the Supplier's Representative must submit to Hydro's Representative a revised Deposit Application.

6.2 Application for Payment

The Supplier will make application for payment as follows:

(a) upon achieving a payment milestone if the Contract Documents define a milestone payment regime, or otherwise within ten days before the end of a month, the Supplier's Representative will submit to Hydro's Representative a payment request (the "**Payment Request**") in the form provided by Hydro's Representative with:

(i) all supporting documents as expressly required by the Contract Documents;

(ii) a copy of the updated Supply Schedule prepared in accordance with GC.5.6(b);

(iii) copies of all Vendor Aboriginal Inclusion Reporting Forms required by Appendix I – Aboriginal Inclusion and Reporting Requirements; and

(iv) other documents required by Hydro's Representative, acting reasonably.

(b) within seven days after receipt of such material, Hydro's Representative will, in consultation with the Supplier's Representative, review the Payment Request and either:

(i) if Hydro's Representative agrees with the amount claimed by the Supplier on a Payment Request, then Hydro's Representative will return the Payment Request to the Supplier's Representative with a written notice confirming such agreement; or

(ii) if Hydro's Representative disagrees with any amount claimed by the Supplier on a Payment Request, then Hydro's Representative will return the Payment Request to the Supplier's Representative with a written notice setting out:

(A) the amount, if any, Hydro's Representative agrees is payable; and

(B) the reasons for the disagreement and, if available, the amount disputed; and

(c) within ten days after receipt of the Payment Request under GC.6.2(b)(i) or GC.6.2(b)(ii), as the case may be, the Supplier's Representative will submit to BC Hydro an original invoice in the amount that Hydro's Representative has indicated under GC.6.2(b) is payable dated the date the Payment Request was returned by Hydro's Representative under GC.6.2(b), with a copy of the invoice to Hydro's Representative. The original invoice will be submitted as follows:

(i) if the Supplier is set up to do so, to BC Hydro's third party invoice processing provider. The Supplier will, at BC Hydro's request and at no cost to BC Hydro, implement the necessary invoice processing system to transact all orders and invoicing with respect to the Contract; or

(ii) otherwise, by email to [redacted], or by hard copy to BC Hydro Accounts Payable, 6911 Southpoint Drive, Burnaby, BC V3N 4X8, both in accordance with any additional invoicing instructions provided by Hydro's Representative.

6.3 Application for Payment Not a Waiver

The Supplier's application for payment under GC.6.12 will be without prejudice to the Supplier's rights to dispute under GC.12.

6.4 Payment

Payment will be made to the Supplier as follows:

(a) BC Hydro will pay the Supplier the amount of each invoice prepared and submitted in accordance with GC.6.2(c), less any holdbacks, 30 days after receipt of the invoice; and

(b) all amounts due and owing as determined in accordance with GC.6.4(a) will be paid:

(i) if the Contract Price is in Canadian dollars and the Supplier has designated an account at a Canadian financial institution in its then current Deposit Application, by direct deposit using an Electronic Funds Transfer to that account; or

(ii) in any other case, either by wire transfer to the account the Supplier has designated in its then current Deposit Application or by cheque or bank draft, in BC Hydro's sole discretion.

Any fees charged by the receiving or any intermediary institution(s) related to accepting or processing an Electronic Funds Transfer or a wire transfer will be the responsibility of the Supplier.

6.5 Payment Not a Waiver

No payment made to the Supplier by BC Hydro will at any time constitute approval or acceptance of any Equipment or Services under the Contract, nor be considered a waiver by BC Hydro of any of the terms of the Contract, nor relieve the Supplier of any of its duties, obligations or responsibilities under the Contract to perform the Services in accordance with the requirements of the Contract Documents.

6.6 Performance Security Holdback

BC Hydro will retain 5% of the amount of any payment due to the Supplier (the "**Performance Security Holdback**") as security for the performance of the Services in accordance with the Contract Documents. BC Hydro may, from time to time, draw upon (in whole or in part) the Performance Security Holdback to pay for the correction of any defaults pursuant to GC.9.1(g) and GC.9.1(h).

6.7 Performance Security Holdback Release

Subject to BC Hydro's right to retain any amounts due to the Supplier, BC Hydro will pay to the Supplier the amount remaining, if any, of the Performance Security Holdback upon Total Completion**.**

6.8 Right of Set-off

BC Hydro may set-off, as against any amounts due to the Supplier, any amount owing from the Supplier to BC Hydro, including liquidated damages and other amounts as payable under the

Contract Documents, and including amounts payable under other agreements between BC Hydro and the Supplier or an Affiliate of the Supplier.

6.9 Application for Total Completion

When the Supplier judges that the Services are fully complete, the Supplier may apply to Hydro's Representative for a certificate of Total Completion. The application will be in writing and will include the following:

(a) evidence that all Services are fully complete and that there are no deficiencies in the Services; and

(b) a statement as to the status of amounts owing to First Tier Subcontractors and as to any unresolved claims made by Subcontractors against the Supplier or another Subcontractor.

6.10 Total Completion

Hydro's Representative will, as soon as practicable after receipt of an application under GC.6.9, inspect the Services to verify the validity of the application and, when all Services are complete in accordance with the requirements of the Contract Documents ("**Total Completion**"), issue the certificate of Total Completion.

6.11 Limitation of Certificates

Neither Hydro's Representative nor BC Hydro, by issuing any certificate, including a certificate of Total Completion, guarantees, or otherwise becomes liable or responsible in any way for, the completeness or correctness of the Services, and no certificate will make Hydro's Representative or BC Hydro in any way responsible or liable for the performance of the Services.

6.12 Waiver of Claims

As of the date of the Supplier's application for Total Completion, the Supplier expressly waives and releases the Indemnified Parties from any and all Claims which, as of the date of the application, the Supplier has or reasonably ought to have known the Supplier has against the Indemnified Parties, or any one of them, with respect to the Services or with respect to the Contract, including those arising from the negligence of or breach of the Contract by an Indemnified Party, or any other representative of BC Hydro, except for Claims set out in writing and delivered to Hydro's Representative prior to the delivery by the Supplier of the application and still unsettled.

6.13 Provisional Sums

If BC Hydro has included a provisional sum on Appendix E – Schedule of Quantities and Prices, then BC Hydro will pay any such sum or portion of such sum pursuant to a Change Order agreed by BC Hydro and the Supplier under GC.7.1.

GC.7 CHANGES

7.1 Changes

BC Hydro may, without invalidating the Contract, make changes to the Services by altering, adding to, or deducting from the Services (a "**Change**"), with adjustments, if any, to the Contract Price or the time for the performance of the Services or both as set out in GC.7. When the adjustments, if any, to the Contract Price or the time for the performance of the Services or both are agreed by BC Hydro and the Supplier, Hydro's Representative will issue a written approval (a "**Change Order**") setting out:

(a) a description of the Services covered by the Change;

(b) the price or method of valuation for such Services;

(c) the total adjustment, if any, to the Contract Price (excluding only GST) on account of the Change and, for certainty, will be deemed to include all claims for compensation on account of all related costs, including all direct, indirect or "impact", overhead, and all other costs, and all markups and profits, even if the Change Order does not specifically mention such items; and

(d) the net effect on the time for the performance of the Services on account of the Change and, for certainty, will be deemed to include all effects on the time for the performance of the Services, and if there is no mention in the Change Order of a required adjustment to the time for the performance of the Services, then the Change Order will be interpreted to mean that the Supplier will complete the Services covered by the Change Order without any adjustment to the time for the performance of the Services.

Hydro's Representative and the Supplier's Representative will sign the Change Order to confirm agreement and, upon receipt of a signed Change Order, the Supplier will proceed with the Change without delay.

7.2 Change Directive

If BC Hydro determines that the Supplier is to proceed with a Change prior to the issuance of a Change Order, then Hydro's Representative may, without invalidating the Contract, sign and issue a written order (a "**Change Directive**") instructing the Supplier to proceed with a defined Change. Notwithstanding that the parties have not reached agreement on any adjustment to the Contract Price or the time for the performance of the Services or both, upon receipt of a Change Directive, the Supplier will proceed with the Change without delay, without prejudice to the Supplier's right to claim such adjustments. Any disputes relating to such adjustments will be resolved in accordance with GC.12, having regard to the provisions of GC.7.

7.3 Contemplated Change

Hydro's Representative may, at any time, give the Supplier's Representative a written request to provide price and schedule information (collectively, a "**Quotation**") relating to a potential Change being considered by BC Hydro (a "**Contemplated Change**"), and the following will apply:

(a) Quotation: Within seven days of a written request for a Quotation (or such longer time as is reasonable in the circumstances), the Supplier will, as part of the Services, prepare and deliver a written Quotation for a Contemplated Change to Hydro's Representative;

(b) Quotation to Cover all Costs and Time: Any Quotation submitted by the Supplier's Representative for a Contemplated Change will, except as expressly set out otherwise in the Quotation, be interpreted to represent the proposed total adjustment to the Contract Price (excluding only GST) and the net effect on the time for the performance of the Services on account of such Contemplated Change, and, for certainty, will be deemed to include:

(i) all claims for compensation on account of all related costs, including all direct, indirect or "impact", overhead, and all other costs, and all markups and profits, even if the Quotation does not specifically mention such items; and

(ii) all effects on the time for the performance of the Services, and if there is no mention in the Quotation of a required adjustment to the time for the performance of the Services, then the Quotation will be interpreted to mean that the Supplier will complete the Services as covered by the Quotation without any adjustment to the time for the performance of the Services.

If Hydro's Representative accepts the Quotation in response to a Contemplated Change or the parties otherwise agree to proceed with the Contemplated Change on terms different from those in the Quotation, then the Quotation or such other agreed to terms will be recorded in a Change Order, signed by the parties and issued pursuant to GC.7.1;

(c) Third Party Costs to Prepare Quotation: If the Supplier requires third party consultants or Suppliers to prepare a Quotation, and if the Supplier wishes to be reimbursed for the costs of such third parties pursuant to GC.7.3(d), then the Supplier will only be entitled to make a claim for such costs if the Supplier obtains Hydro's Representative's prior written approval to retain such third parties;

(d) Supplier's Costs to Prepare Quotation: If, following receipt of a Quotation:

(i) BC Hydro elects to proceed with the Contemplated Change, then all costs incurred by the Supplier to prepare the Quotation will be paid by the Supplier, and the Change Order issued with respect to the Contemplated Change will be deemed to be the entire compensation payable by BC Hydro for such Change; or

(ii) BC Hydro, for any reason, elects not to proceed with a Contemplated Change, then:

(A) if the Supplier retained third parties pursuant to GC.7.3(c), then BC Hydro will pay the Supplier for the reasonable and substantiated direct costs paid to all such third parties who were approved in advance by Hydro's Representative; and

(B) the Supplier will bear all other costs incurred by the Supplier to prepare the Quotation.

7.4 Claim for a Change

The following applies where the Supplier wishes to claim that a Change has occurred:

(a) if the Supplier receives a direction, instruction or decision from Hydro's Representative for which a Change Order or Change Directive was not given, then the Supplier may only claim an adjustment to the Contract Price or the time for the performance of the Services or both as follows:

(i) prior to proceeding with such direction, instruction or decision, the Supplier will give written notice to Hydro's Representative of its intention to make such a claim with sufficient detail to permit Hydro's Representative to be able to understand the basis for the claim as well as the anticipated impact on the Contract Price, if any, and the time for the performance of the Services, if any; and

(ii) the Supplier will maintain daily records of the resources used in connection with the claimed Change, including labour, equipment and materials prepared contemporaneously with the performance of the affected Services, and submit such records, together with the amount claimed for such Services, to Hydro's Representative on a rolling two business day basis;

(b) upon receipt of a notice under GC.7.4(a)(i) from the Supplier, Hydro's Representative will promptly investigate the conditions giving rise to the claimed Change;

(c) in no event will the Supplier be entitled to, nor will the Supplier make any claim for, an adjustment to the Contract Price or the time for the performance of the Services on account of any circumstance, condition or event that entitles the Supplier to make a claim under GC.7.4:

(i) that occurs more than seven days prior to the notice delivered by the Supplier to Hydro's Representative as provided by GC.7.4(a)(i); or **(amended – see SGC.6)**

(ii) notwithstanding GC.7.4(c)(i), to the extent BC Hydro is materially prejudiced by any delay in the Supplier complying with its obligations under GC.7.4(a)(i); and

(d) in no event will the Supplier be entitled to, nor will the Supplier make any claim for, an adjustment to the Contract Price on account of any circumstance, condition or event that entitles the Supplier to make a claim under GC.7.4 for which the Supplier has not kept, nor made available to Hydro's Representative, the records as required under GC.7.4(a)(ii).

If Hydro's Representative refuses the Supplier's request for a Change Order or Change Directive, then the Supplier may dispute such refusal under GC.12.

7.5 Valuation of a Change

The adjustment to the Contract Price on account of any Change will be determined by one or more of the following methods, the choice of which will be determined by BC Hydro:

(a) as set out in a Quotation and accepted by Hydro's Representative pursuant to GC.7.3;

(b) by a lump sum as agreed by the parties; or

(c) by applicable unit prices.

7.6 Net Valuation of Cost of a Change

In determining any adjustment to the Contract Price resulting from a Change, such adjustment will be determined on the basis of the Supplier's reasonable and substantiated direct costs and savings attributable to the Change. If the Change results in a net increase in the Supplier's reasonable and substantiated direct costs, then the Contract Price will be increased by an amount equal to the net increase in such costs. If the Change results in a net decrease in the Supplier's reasonable and substantiated direct costs, then the Contract Price will be decreased by an amount equal to the net decrease in such costs. For certainty, a Change Order issued pursuant to GC.7.1 will be deemed to be a net adjustment as required by this GC.7.6.

7.7 Adjustments to Time for the Performance of the Services

Subject always to the Supplier's duties under GC.25.2, the time for the performance of the Services will be adjusted on account of a Change by the net amount of time reasonably required by the Supplier to accommodate and perform the Change, taking account of any impacts that require more time, and any impacts, including deletions of Services, that result in time savings, as follows:

(a) as set out in a Quotation and accepted by Hydro's Representative pursuant to GC.7.3;

(b) as otherwise agreed in writing by the parties; or

(c) in the absence of an agreement, in accordance with GC.12.

7.8 No Change Without Written Order

Subject to GC.7.4 and except as expressly set out otherwise in the Contract Documents, the Supplier will not proceed with any Change prior to the receipt of a written Change Order or Change Directive. No claim for an adjustment to the Contract Price or the time for the performance of the Services may be made without such written order. The Supplier will not be entitled to, nor will the Supplier rely on any oral representation (except in an emergency), meeting discussion or minutes, or other communication as approval for a Change.

7.9 Optional Work

Optional Work may be included in the Services at the sole election of BC Hydro. Optional Work will only be included in the Services if Hydro's Representative so directs in writing delivered to the Supplier's Representative, and in such event:

(a) Hydro's Representative will issue a Change Order for the Optional Work; and

(b) the Supplier will perform the Optional Work as part of the Services.

GC.8 DELAYS AND ACCELERATION

8.1 Delay by BC Hydro

If the Supplier is delayed in the performance of the Services by an act or omission of Hydro's Representative, BC Hydro, or a Person for whom BC Hydro is in law responsible (other than the Supplier and those engaged by or through the Supplier, including Subcontractors), contrary to the provisions of the Contract Documents, then, on written notice as required by GC.8.6 and subject to the Supplier's duties to mitigate under GC.25.2, the Supplier will be entitled to:

(a) an extension of the time for the performance of the Services equal to the impact of such delay; and

(b) reimbursement from BC Hydro for directly related out of pocket additional costs reasonably and necessarily incurred by the Supplier as a result of such delay. No payment will be owed by BC Hydro to the Supplier for Consequential Damages.

8.2 Delay by Supplier

If the Supplier is delayed in the performance of the Services by its own acts or omissions, or by a Person for whom the Supplier is in law responsible, then the Supplier will not be entitled to, nor will the Supplier make any claim for, an adjustment to the Contract Price or the time for the performance of the Services, in either case, on account of such delay.

8.3 Labour Disputes

Any work stoppage, strike, lock-out, picket or other labour dispute by any personnel engaged by BC Hydro or any Other Supplier will be deemed to be a delay under GC.8.1. Any work stoppage, strike, lock-out, picket or other labour dispute by any personnel engaged by the Supplier or any Subcontractor, including any financial and jurisdictional disputes involving unionized and non-unionized workers, will be deemed to be a delay under GC.8.2.

8.4 Force Majeure

If either the Supplier or BC Hydro is delayed in the performance of any of their obligations under the Contract as a result of an event of Force Majeure, then the party claiming the delay will be excused from performance of such obligations, provided that party gives written notice in accordance with GC.8.6, and mitigates the effect of the delay in accordance with GC.25.2,as applicable. The party delayed by an event of Force Majeure will be entitled to an extension of the time for the performance of the affected obligations equal to the impact of the delay caused by the event of Force Majeure, but will not be entitled to, nor will such party make any claim for, reimbursement or the payment of any costs suffered by that party as a result of the event of Force Majeure.

8.5 Concurrent Delay

With respect to concurrent delays:

(a) if two or more events occur concurrently that each entitle the Supplier to an extension of the time for the performance of the Services under the Contract Documents, then for the

period of any concurrency the Supplier will be entitled to claim an extension with respect to only one of the concurrent events;

(b) if an event as described in GC.8.1 occurs concurrently with an event as described in GC.8.4, then during the period of any concurrency the Supplier will be entitled to claim an extension with respect only to the event described in GC.8.4;

(c) if an event as described in GC.8.1 occurs concurrently with an event as described in GC.8.2, then during the period of any concurrency the Supplier will not be entitled to claim, nor will the Supplier make any claim for, an extension with respect to the event described in GC.8.1; and

(d) if an event as described in GC.8.4 occurs concurrently with an event as described in GC.8.2, then during the period of any concurrency the Supplier will not be entitled to claim, nor will the Supplier make any claim for, an extension with respect to the event described in GC.8.4.

8.6 Notice of Delay

With respect to any event of delay:

(a) regardless of the cause of a delay, the party claiming delay will give written notice of the delay to the other party's Representative with sufficient detail to permit the other party's Representative to be able to understand the basis for the claim as well as the anticipated impact on the Contract Price, if any, and the time for the performance of the Services, if any. Such notice will be given promptly after the party claiming delay is aware of an impact on the Contract Price or the time for the performance of the Services, or, in any event, promptly after the time when the party claiming delay should reasonably have become aware of the impact on the Contract Price or the time for the performance of the Services, provided, however, that in the case of a continuing cause of delay only one written notice of delay will be necessary;

(b) if the Supplier gives notice of delay in accordance with GC.8.6(a), then, as part of the Services, the Supplier will keep and provide to Hydro's Representative records in the same detail and manner as described in GC.7.4(a)(ii);

(c) upon receipt of a notice of delay from the Supplier, Hydro's Representative will promptly investigate the conditions giving rise to the claimed delay in order to satisfy himself as to the validity of the claimed delay;

(d) in no event will the Supplier be entitled to, nor will the Supplier make any claim for, an adjustment to the Contract Price or the time for the performance of the Services on account of any delay or portion of a delay:

(i) that occurs more than seven days prior to the notice delivered by the Supplier to Hydro's Representative as provided by GC.8.6(a); or **(amended – see SGC.7)**

(ii) notwithstanding GC.8.6(d)(i), to the extent BC Hydro is materially prejudiced by any delay in the Supplier complying with its obligations under GC.8.6(a); and

(e) in no event will the Supplier be entitled to, nor will the Supplier make any claim for, an adjustment to the Contract Price on account of any delay costs for any delay or portion of a delay for which the Supplier has not kept, nor made available to Hydro's Representative, the records as required under GC.8.6(b).

8.7 Acceleration to Recover Supplier Delays

If, at any time, Hydro's Representative, acting reasonably, determines that the then current Supply Schedule is not being met due to an act, error or omission of the Supplier or any Subcontractor, then Hydro's Representative may deliver written notice to the Supplier directing the Supplier to accelerate the performance of the Services, at the Supplier's sole cost and expense, so as to bring the Services back into conformity with the then current Supply Schedule.

8.8 Acceleration for BC Hydro's Convenience

Hydro's Representative may, at any time, deliver written notice to the Supplier to accelerate the performance of the Services at BC Hydro's convenience and any such acceleration will be a Change under GC.7.

GC.9 SUPPLIER DEFAULT

9.1 Failure to Perform

If:

(a) the Supplier should fail or neglect to undertake the performance of the Services properly and expeditiously;

(b) the Supplier should otherwise fail to comply with the requirements of the Contract to a substantial degree; or

(c) the aggregate liability of the Supplier to BC Hydro exceeds the maximum aggregate liability as set out in GC.18.1,

then Hydro's Representative may provide the Supplier with written notice stating the nature of the Supplier's default and instructing the Supplier to correct the default within seven days after receipt of such notice. If the Supplier cannot correct the default in such seven days, then the Supplier will be in compliance with Hydro's Representative's instructions if the Supplier:

(d) takes all reasonable steps to begin to correct the default within such seven days;

(e) provides Hydro's Representative with a schedule reasonably acceptable to Hydro's Representative for such correction; and

(f) completes the correction in accordance with such schedule.

If the Supplier fails to correct the default in the time specified or subsequently agreed in writing, or, if, for any reason, the default cannot be corrected, including if the default is as described in GC.9.1(c) and no new agreement is reached between the parties regarding the Supplier's

maximum aggregate liability, then BC Hydro may, without prejudice to any of its other rights or remedies:

(g) correct such default to the extent BC Hydro is able to correct the default and set-off from any payment then or thereafter due to the Supplier all additional costs reasonably incurred by BC Hydro to correct the default, including the cost of other suppliers and BC Hydro's own forces;

(h) deduct any portion of the outstanding Services from the Contract as BC Hydro may, in its sole discretion, decide and adjust the Contract Price on account of such deduction and set-off from any payment then or thereafter due to the Supplier all additional costs reasonably incurred by BC Hydro to complete the Services, including increased costs of construction, the costs of other suppliers, any administrative costs, the cost of BC Hydro's own forces and resources and the cost to BC Hydro of Hydro's Representative; or

(i) terminate the Contract.

9.2 Bankruptcy

BC Hydro may, without prejudice to any of its other rights or remedies, terminate the Contract by giving written notice to the Supplier or any other applicable Person, if:

(a) the Supplier makes an assignment for the benefit of its creditors, is declared bankrupt or commits an act of bankruptcy, becomes insolvent, makes a proposal for relief under the *Bankruptcy and Insolvency Act* (Canada) or similar legislation in any jurisdiction, or becomes involved in any other type of insolvency proceedings being commenced by or against the Supplier under the *Bankruptcy and Insolvency Act* (Canada) or otherwise;

(b) a receiver, receiver manager or other encumbrance holder takes possession of or is appointed over, or any distress, execution or other process is levied or enforced upon, the whole or any material part of the assets of the Supplier;

(c) any arrangement or composition with or for the benefit of creditors is entered into by or in relation to the Supplier;

(d) any proceedings with respect to the Supplier is commenced under the *Companies' Creditors Arrangement Act* (Canada);

(e) the Supplier ceases to carry on business; or

(f) a petition is filed (and not being contested in good faith, using all commercially reasonable efforts), or a resolution is passed or an order is made for the winding up, liquidation or dissolution of the Supplier.

9.3 Termination for Cause

If BC Hydro terminates the Contract under GC.9.1 or GC.9.2, then BC Hydro will, while making all commercially reasonable efforts to mitigate costs and delays:

(a) be entitled to take possession of the Equipment, including any BC Hydro Property, located at the Site or elsewhere and intended for incorporation into or use in the performance of the Services, and to utilize such Equipment and materials, subject to the rights of third parties, and complete the Services by whatever method BC Hydro may consider expedient;

(b) be entitled to withhold any amounts owing to the Supplier;

(c) upon Total Completion, be entitled to retain from any amounts withheld from the Supplier:

(i) the total of any additional costs (the "**Default Costs**") in excess of the Contract Price BC Hydro incurred to achieve Total Completion because of the Supplier's default, including the costs of other suppliers, any administrative costs, the cost of BC Hydro's own forces and resources and the cost to BC Hydro of Hydro's Representative; plus

(ii) a reasonable allowance to cover the cost to BC Hydro of undertaking such completion,

and pay the balance of any amounts withheld from the Supplier, if any, to the Supplier. If the total of the Default Costs and the costs to cover corrections during the Warranty Period exceeds the total of the amounts BC Hydro has withheld, then such excess will be immediately due and owing by the Supplier to BC Hydro upon receipt of an invoice from BC Hydro for such excess; and

(d) on expiry of the Warranty Period retain, from any amounts owing to the Supplier, the cost of any corrections made to the Services during the Warranty Period and pay the balance, if any, to the Supplier. If the total of the costs of such corrections exceeds the amounts owing to the Supplier, then such excess will be immediately due and owing by the Supplier to BC Hydro upon receipt of an invoice from BC Hydro for such excess.

If the Contract is terminated for any reason, including pursuant to GC.11.1, the Supplier's obligations described in the Contract Documents as to quality, correction and warranty will continue in full force and effect after such termination with respect to the Equipment supplied and Services performed by the Supplier up to the time of termination.

GC.10 BC HYDRO DEFAULT

10.1 Failure to Perform

If BC Hydro fails to:

(a) pay the Supplier payments when due in accordance with the provisions of the Contract;

(b) provide the Supplier with adequate directions or instructions so as to prevent the Supplier from performing any of the Services in accordance with the Contract; or

(c) resume the Contract, in whole or in part, within one year of the effective date of the suspension of the Contract under GC.11.1,

then the Supplier may provide Hydro's Representative with written notice stating the nature of BC Hydro's default and instructing BC Hydro to correct the default within 30 days after receipt of such notice. If BC Hydro cannot correct the default in such 30 days, then BC Hydro will be in compliance with the Supplier's instructions if BC Hydro:

(d) takes all reasonable steps to begin to correct the default within such 30 days;

(e) provides the Supplier with a schedule acceptable to the Supplier, acting reasonably, for such correction; and

(f) completes the correction in accordance with such schedule.

If BC Hydro fails to correct the default in the time specified or subsequently agreed in writing, then the Supplier may, without prejudice to any of its other rights or remedies, terminate the Contract.

10.2 Termination for Cause

If the Supplier terminates the Contract under GC.10.1, then BC Hydro will, in full satisfaction of all claims the Supplier may have, pay the Supplier:

(a) all compensation owed in accordance with the Contract for all Services completed in accordance with the Contract Documents up to the date of the termination; and

(b) all third party cancellation charges, if any, incurred by the Supplier to the date of termination, provided such charges could not have been reasonably avoided or mitigated by the Supplier.

For greater certainty, the Supplier will not be entitled to, nor will the Supplier make a claim for, Consequential Damages.

GC.11 SUSPENSION OR TERMINATION OF CONTRACT OTHER THAN FOR DEFAULT

11.1 Suspension or Termination for Convenience

BC Hydro may, by written notice to the Supplier's Representative, at any time at BC Hydro's convenience and in its sole discretion, suspend or terminate the Contract, in whole or in part, stating the extent and effective date of such suspension or termination, and, upon receipt of such written notice, the Supplier will:

(a) wind down all suspended or terminated Services in a manner such that BC Hydro receives the benefit of all completed Services;

(b) with respect to the terminated portions of the Services, if any, on the written direction of Hydro's Representative:

(i) deliver to BC Hydro in accordance with the Contract Documents, any Equipment for which the Supplier has received or receives payment from BC Hydro;

(ii) assign to BC Hydro, in the manner and to the extent directed, all of the Supplier's rights under purchase orders and agreements with any First Tier Subcontractors as identified by BC Hydro; and

(iii) terminate purchase orders and agreements with First Tier Subcontractors, to the extent that they are not assigned to BC Hydro;

(c) take any necessary action, including re-possession, to protect property in the Supplier's possession in which BC Hydro has or may acquire an interest, including any BC Hydro Property;

(d) continue and complete performance of the continuing portion of the Services, if any, in accordance with the Contract Documents;

(e) provide suggestions to BC Hydro as to the best methods of mitigating any Claims, costs or delays arising from the termination of portions of the Services;

(f) provide all records and documents, as required by the Contract, to BC Hydro relating to the terminated portion of the Services; and

(g) take any other action in relation to the termination of the Services which BC Hydro may reasonably direct.

11.2 Rights upon Termination for Convenience

In the event of termination under GC.11.1, BC Hydro will, in full satisfaction of all claims the Supplier may have, pay the Supplier:

(a) all compensation owed in accordance with the Contract for all Services completed in accordance with the Contract Documents up to the date of the termination; and

(b) all third party cancellation charges, if any, incurred by the Supplier to the date of termination, provided such charges could not have been reasonably avoided or mitigated by the Supplier.

For greater certainty, the Supplier will not be entitled to, nor will the Supplier make any claim for, Consequential Damages.

11.3 Obligations During Suspension

At any time after the commencement of a period of suspension, BC Hydro may give written direction to the Supplier to resume performance of the suspended Services, and, upon receipt of such direction, the Supplier will resume the Services within the time specified in such direction by Hydro's Representative, acting reasonably. In the event of suspension under GC.11.1, and provided that such suspension is not due to a default of the Supplier, BC Hydro

will, in full satisfaction of all claims the Supplier may have, reimburse the Supplier for the Supplier's reasonable and substantiated direct costs, including reasonable stand-by equipment rental rates, incurred in complying with the requirements of this GC.11.3.

For greater certainty, the Supplier will not be entitled to, nor will the Supplier make any claim for, Consequential Damages.

11.4 Termination for Force Majeure

Either party may, on 14 days written notice to the other party, terminate the Contract if an event of Force Majeure has caused a suspension of the Contract for a period greater than two years. Any termination pursuant to this GC.11.4 will be deemed to be a termination under GC.11.1.

GC.12 DISPUTES

12.1 Dispute Resolution

Except as expressly set out otherwise in the Contract Documents, all disputes relating to or arising out of the Contract (each, a "**Dispute**") will be resolved in accordance with GC.12.

12.2 Good Faith Efforts to Resolve any Dispute

Without in any way limiting the parties' rights under the Contract, BC Hydro will encourage and support Hydro's Representative and the Supplier will encourage and support the Supplier's Representative to use good faith efforts to resolve any Dispute promptly upon becoming aware of the Dispute, and the Representatives will continue to use such efforts after the delivery of a Dispute Notice, including the early full disclosure and exchange of all documents and information that may be relevant to the Dispute.

12.3 Dispute Notice

A party with a Dispute may, at any time, deliver written notice to the other party, with a copy to Hydro's Representative or the Supplier's Representative, as applicable, describing the Dispute (the "**Dispute Notice**"). A Dispute Notice will include, at a minimum:

(a) a summary of the facts relevant to the Dispute;

(b) the applicable provisions of the Contract relevant to the Dispute or other basis for the claim upon which the disputing party relies;

(c) additional supporting documentation, if any, as may be relevant to the dispute and available; and

(d) a clear statement of the resolution to the Dispute being sought by the disputing party.

12.4 Initial Settlement Meeting

Within 45 days of delivery of a Dispute Notice, or such other time as the parties may agree in writing, the Dispute will, if not already settled, be referred to a representative(s) of each of the parties who, to the extent reasonably practicable, have not been previously involved in the events leading to the Dispute for a settlement meeting to occur within such 45 day period.

12.5 Additional Settlement Meetings

If a Dispute is not settled by a written agreement (a "**Settlement Agreement**") signed by authorized representatives of both parties after an initial settlement meeting held in accordance with GC.12.4, then, without extending the time limit set out in GC.12.7(b), BC Hydro may, in its sole discretion, direct in writing that an additional settlement meeting or meetings be convened at which BC Hydro will be represented by a new representative(s). BC Hydro will give consideration to a request from the Supplier for an additional settlement meeting or meetings and for specific BC Hydro representatives to be in attendance at such meetings, but BC Hydro will not be obligated to agree to convene a requested additional settlement meeting nor to bring the requested individuals.

12.6 Representatives at Settlement Meetings

The parties will send representatives to the settlement meeting(s) as described in GC.12.4 and GC.12.5, in each case with authority to enter into a Settlement Agreement that is binding on the parties, and with instructions to use all commercially reasonable efforts to resolve the Dispute without delay. Except with the express written consent of the Supplier, BC Hydro's representative(s), in the meetings held pursuant to GC.12.4 or GC.12.5, will include a person(s) other than Hydro's Representative. Notwithstanding any other provision in GC.12, the parties may have any individuals in attendance at any settlement meeting, including their respective Representatives.

12.7 Ultimate Time for Settlement

If a Dispute is not:

(a) referred to the parties' representatives within the time period specified in GC.12.4; or

(b) settled by a Settlement Agreement within 90 days after receipt of the Dispute Notice, or such other time as the parties may agree in writing,

then upon written notice of either party delivered to the other party, the unresolved Dispute will be submitted to arbitration pursuant to GC.12.8.

12.8 Arbitration

A Dispute submitted to arbitration will be conducted as follows:

(a) the parties will, within ten days of submission, mutually agree upon a single arbitrator who is available and not in a conflict of interest to act as arbitrator in the Dispute. Such arbitrator will be chosen from the panelist of arbitrators maintained by the British Columbia International Commercial Arbitration Centre (the "**BCICAC**");

(b) if the parties cannot agree on an arbitrator within such ten day period, then either party may apply to a judge of the Supreme Court of British Columbia to have a single arbitrator appointed;

(c) the arbitration will be conducted in accordance with the appropriate rules of the BCICAC, and in accordance with the *Arbitration Act* (British Columbia);

(d) the arbitration will be conducted in English and in Vancouver, British Columbia;

(e) the arbitrator will endeavour to convene a hearing within 30 days of being nominated, and to complete the arbitration and render an award within 60 days of such nomination. The arbitrator may, in his or her discretion, on application of either party or on the motion of the arbitrator, extend either or both of the time periods referred to in this GC.12.8(e), and such discretion may be exercised both before and after any such time period, or extended time period, has expired;

(f) the arbitrator will conduct the arbitration in a cost effective manner and on an expedited basis, having regard for the subject matter of the Dispute;

(g) subject to the arbitrator's ruling on costs:

(i) the cost of the arbitrator and other administrative costs of the arbitration will be shared equally between the parties; and

(ii) each party will bear its own costs incurred in participating in the arbitration;

(h) except as expressly set out otherwise in the Contract Documents, any decision by the arbitrator will be final and binding upon the parties and may not be appealed by either party on any grounds;

(i) a decision of the arbitrator may be filed in any court of competent jurisdiction, and may be enforced by either party as a final judgment of such court as permitted by Law in the jurisdiction in which enforcement is sought;

(j) the arbitration proceedings, evidence at the arbitration proceedings, and, subject to GC.12.8(i), the decision of the arbitrator, will be treated as strictly confidential, and not disclosed to any third party without the prior written consent of the parties, and the parties will jointly instruct the arbitrator to maintain the strictest confidentiality of the proceedings, evidence and his or her decision; and

(k) if a Dispute that is subject to arbitration under GC.12 is pending concurrently with a related dispute(s) which is subject to separate arbitration(s), then the parties consent to the consolidation of all related arbitration proceedings before one arbitrator if such consolidation of proceedings is feasible.

12.9 No Influence

The parties expressly acknowledge that the Dispute Resolution Procedure is to encourage timely resolution of Disputes, and that for it to have the best opportunity for success the procedures should be respected and, accordingly, neither party will make efforts to influence the parties' representatives by making contact with senior representatives of the other party, or the government, or any third party for the purpose of attempting to influence the terms of a resolution of a Dispute, and, for certainty, the parties agree that any such contact will be a breach of the Contract.

12.10 Interest

Subject to any express direction in the arbitrator's decision, interest will be owing on any amount payable pursuant to the arbitrator's decision from the date specified for payment in the decision. Interest will be calculated at the Prime Rate established as of the date such amounts became payable, plus 1%, calculated monthly, interest accruing on interest.

12.11 Must Continue

Notwithstanding any Dispute, the parties will continue to fulfill their obligations pursuant to the Contract, without interruption to the performance of the Services by the Supplier, without prejudice to either party's rights relating to the Dispute.

12.12 Injunctions

Notwithstanding any other provision in GC.12 or any other provision of the Contract, a party may apply to court for injunctive relief if the party determines that, in the circumstances, such relief is required to protect its interests or the interests of the public.

GC.13 PROTECTION OF PERSONS, PROPERTY AND THE ENVIRONMENT

13.1 Site Safety

To the extent any of the Services are performed on the Site, the Supplier will comply with any Site safety requirements.

13.2 Hazardous Substances

The Supplier will not, and will ensure that the Subcontractors will not, use, store, transport, remove, dispose of or destroy any Hazardous Substances at the Delivery Point(s) or the Site, except with the prior written approval of Hydro's Representative. All Hazardous Substances used, stored, transported, removed, disposed of or destroyed will be dealt with in accordance with Law and the Contract Documents.

13.3 Dangerous Goods

All Dangerous Goods used, stored, transported, removed, disposed of or destroyed will be dealt with in accordance with Law and the Contract Documents. The Supplier will bring to the Delivery Point(s) or on to the Site only those Dangerous Goods that are required for the performance of the Services. Dangerous Goods will not be brought to the Delivery Point(s), or on to, used or stored on the Site without the prior written approval of Hydro's Representative. The Supplier will make material safety data sheets for such goods immediately accessible by Subcontractors and Hydro's Representative at the Delivery Point(s) or on the Site, as applicable, at all times.

13.4 Dangerous Goods Occurrence

If, during the performance of the Services or in the course of transporting Dangerous Goods to or from the Delivery Points(s) or the Site, the Supplier is involved in a Dangerous Goods Occurrence, as defined in the *Transportation of Dangerous Goods Act* (Canada), the Supplier will immediately notify Hydro's Representative in writing.

GC.14 CONFIDENTIALITY

14.1 Confidential Information

Each party will keep confidential all matters respecting technical, commercial, financial and legal issues relating to or arising out of the Contract or the performance of the Services (the "**Confidential Information**") and will not disclose Confidential Information. Notwithstanding the preceding sentence, disclosure of Confidential Information may be made:

(a) with the prior written consent of the applicable Representative;

(b) in strict confidence to the party's professional advisors;

(c) in the case of the Supplier, to Subcontractor, or, in the case of BC Hydro, to Other Suppliers or other Suppliers, who, in each case, need to know the applicable Confidential Information for the purposes of supplying the Equipment or performing the Services;

(d) as otherwise required by Law or permitted by the Contract Documents.

The Supplier will require all Subcontractors to enter into an agreement with the Supplier containing provisions in the same form as those found in GC.14.

14.2 Exceptions to Confidentiality Obligations

The obligations of confidentiality described in GC.14.1 will not apply to:

(a) information that is, or subsequently becomes, publicly available other than through a breach of the Contract or through a breach of a confidentiality agreement which another Person has entered into concerning the Confidential Information;

(b) information which the party already possessed before commencing the Services;

(c) information which is rightfully received from a third party without breach of any obligation of confidence by such third party; or

(d) information which is independently developed without the use of the Confidential Information.

GC.15 RECORDS AND AUDIT

15.1 Retention of Documents

The Supplier will, during the performance of the Services and for a period of ten years after termination of the Contract, keep and maintain proper and accurate accounts and records, including all agreements with Subcontractors, invoices, statements, Permits, manifests, receipts, vouchers, calculations, reports, data, time and material costing records with respect to the Services undertaken on a time and materials or cost-plus basis, drawings, plans and other documents, including substantiation of any engagement of Aboriginal Businesses or Aboriginal persons in the Services and statements made on any Vendor Aboriginal Inclusion Reporting Form – Spend Forecast or Actual Commitment, and verification of the status of any Aboriginal

Business or Aboriginal person engaged in the Services, in hard or electronic form, in respect of the Services, in accordance with Good Industry Practice.

15.2 Audit

The Supplier will, upon reasonable written notice, make all information described in GC.15.1 available to Hydro's Representative and any of his or her nominees during the performance of the Services and for the ten year period described in GC.15.1 for review and audit. The Supplier will, upon written request from Hydro's Representative within such time period, and in any event prior to disposal of such information, provide Hydro's Representative with a copy of any such information in a form satisfactory to Hydro's Representative, acting reasonably.

15.3 Audit Not a Waiver

No audit conducted by Hydro's Representative or BC Hydro or any of their nominees will at any time constitute approval or acceptance of any Equipment or the Services under the Contract, nor be considered a waiver by BC Hydro of any of the terms of the Contract, nor relieve the Supplier of any of its duties, obligations or responsibilities under the Contract to perform the Services in accordance with the requirements of the Contract Documents.

GC.16 INSURANCE

16.1 Supplier Provided Insurance Coverage

Without limiting any of the Supplier's obligations or liabilities under the Contract and prior to commencing any Services, the Supplier will, at its sole cost and expense, obtain and maintain during the performance of the Services policies in respect of the following insurances:

(a) Workers' Compensation coverage for all employees engaged in the Services in accordance with the *Workers Compensation Act* (British Columbia);

(b) Personal Optional Protection coverage available through the Workers' Compensation Board of British Columbia for all employees engaged in the Services who are not covered by the *Workers Compensation Act* (British Columbia);

(c) Commercial General Liability Insurance, including bodily injury, death and property damage, in an amount of $5,000,000 per occurrence and annually in the aggregate. Such coverage to include, but not be limited to, blanket Contractual Liability, including liability assumed under the Contract, Tortious Liability, Contractual Liability, Suppliers Protective Liability, Non Owned Automobile Liability, Attached Equipment Cross Liability, Broad Form Property Damage Liability, Products and Completed Operations Liability, and, when applicable to the Services, Hook Liability, Sudden and Accidental Pollution Liability and Explosion, Collapse and Underground Damage Liability and Forest Fire Fighting Expense Liability, and, in any event, such Commercial General Liability Insurance will provide coverage not less than the insurance required by IBC Form 2100 or its equivalent replacement. This policy will respond to property damage to BC Hydro's existing facilities and property, including consequential damages;

(d) Automobile Liability Insurance for owned, non owned, leased, operated or licensed automobiles, trucks, trailers, tractors and all-terrain vehicles with limits of $5,000,000 for

accidental injury to or death of one or more Persons or damage to or destruction of property as a result of one accident or occurrence;

(e) Equipment Insurance covering loss or damage to all equipment, materials and property that is owned, leased, or rented by and used by the Supplier in performing the Services but which does not form part of the permanent construction;

(f) if aircraft or watercraft or both are used in connection with the Services, then the Supplier will carry Aircraft Liability and Watercraft Liability Insurance, as applicable, covering all aircraft and watercraft owned or non owned and licensed by the Supplier with limits of liability of $10,000,000 for aircraft liability and $5,000,000 for watercraft liability, for bodily injury or death of one or more Persons or damage to or destruction of property as a result of one accident or occurrence;

(g) if the Services include the transportation to the Site of any single delivery valued at $1,000,000 or higher, then the Supplier will carry Cargo/Marine Cargo Insurance (as applicable) covering all insurable risks of loss or damage to equipment, parts and materials that comprise or are intended to comprise the Services, including the Equipment. Such coverage to attach at the commencement of loading at the manufacturer's facility and be maintained throughout the course of transport, including while the insured property is in trans-shipment, customs or interim storage, until arrival at and completion of unloading at the Site. Such policy will be in an amount not less than the total replacement cost of the insured property, and the scope of coverage will be not less than that provided by the Institute Cargo Clauses ("All Risks") or equivalent, and will specifically include coverage for war, strikes, riots and civil commotions; and

(h) such additional coverage as may be required by Law, by BC Hydro or which the Supplier considers necessary.

16.2 Requirements for Supplier Insurance

The insurance provided by the Supplier will be provided in accordance with the following terms and conditions:

(a) the Supplier will provide Hydro's Representative with evidence of compliance with the *Workers Compensation Act* (British Columbia) and coverage under that Act prior to commencing any Services, and the Supplier will:

(i) upon request, at any time, from Hydro's Representative, provide such evidence to Hydro's Representative within five days of such request; and

(ii) immediately notify Hydro's Representative in writing of any change with respect to such compliance or coverage;

(b) certificates of insurance for the policies described in GC.16.1 will be submitted to Hydro's Representative prior to commencing any Services. All such policies will be placed with insurers acceptable to Hydro's Representative and be in a policy form acceptable to Hydro's Representative. The approval or non-approval of any such policy by Hydro's Representative will in no way relieve the Supplier of its obligations to provide the insurance required by the Contract. Hydro's Representative may request, at any

time, certified copies of the Supplier's insurance policies and the Supplier will provide such certified copies to Hydro's Representative within five days of such request;

(c) all insurance provided by the Supplier will be considered primary, non-contributory and not excess to any insurance carried by BC Hydro; and

(d) all insurance, except for automobile liability insurance and workers compensation insurance, provided by the Supplier will:

(i) include BC Hydro and its directors, officers, employees and agents as additional insureds (but this requirement will not apply to equipment insurance described in GC.16.1(e));

(ii) contain a waiver of subrogation against BC Hydro and its directors, officers, employees and agents;

(iii) contain a cross liability or severability of interest clause; and

(iv) contain a provision that the insurance cannot be cancelled without at least 30 days written notice to BC Hydro.

16.3 Minimum Amount No Limit on Recovery

All policy limits and types of insurance specified by the Contract to be obtained and maintained by the Supplier are the minimum policy limits and types of insurance that are to be provided. The Supplier will be solely responsible for determining whether the policy limits and types of insurance are adequate and for placing any excess insurance and any additional insurance which it considers necessary to protect and indemnify itself.

Subject to GC.18.1, the Supplier will be liable to BC Hydro for all Claims and Claim Costs excluded by, or in excess of the policy limits of, applicable insurance policies.

16.4 BC Hydro's Right to Maintain

If, at any time, any insurance required to be obtained and maintained by the Supplier under the Contract has its policy limits reduced by the applicable insurance provider or the Supplier, from the policy limits required by the Contract, or is no longer in force, then, without limiting BC Hydro's rights in respect of any default that arises as a result of such occurrence, BC Hydro may, at its option, obtain and maintain the applicable insurance or portion of such insurance. In such event, BC Hydro may withhold and set-off the cost of insurance premiums expended for such insurance from any payments due to the Supplier.

16.5 Subcontractor Insurance

Without duplication of insurance coverage with respect to where the Supplier's Commercial General Liability Insurance policy in place for the Services is on a wrap-up basis, the Supplier will require all First Tier Subcontractors to enter into an agreement with the Supplier containing provisions in the same form as those found in GC.16.1 and GC.16.2, as applicable to the Services being undertaken by such Subcontractors. The Supplier will provide to Hydro's Representative, upon request, certificates of insurance for the insurance policies the Supplier has obtained from such Subcontractors and a copy of the agreement entered into with such

Subcontractors setting out the insurance requirements of such Subcontractors, without reference to commercial terms.

16.6 Deductibles

Deductibles for insurance policies required under GC.16.1 will be no more than $100,000.

The Supplier will be responsible for the payment of all deductibles for the insurance policies described in GC.16, except with respect to damage arising out of the negligent acts or omissions of BC Hydro or any Person for whom BC Hydro is in law responsible (other than the Supplier and those engaged by or through the Supplier, including Subcontractors), BC Hydro will pay the proportion of the deductible that represents the proportionate fault of BC Hydro for the loss which gave rise to the damage.

16.7 Liability of Supplier

Neither the providing of insurance by the Supplier in accordance with the requirements of GC.16, nor the insolvency, bankruptcy or the failure of any insurance company to pay any claim occurring will be held to relieve the Supplier from any other provisions of the Contract with respect to liability of the Supplier or otherwise.

16.8 Notice of Occurrence

Hydro's Representative and the Supplier's Representative will immediately notify, in writing, each other and the relevant insurer of any occurrence or incident likely to give rise to a claim under the policies or insurance coverage referred to in GC.16 whether or not such occurrence or incident arises under the Contract, and of any other matter or thing in respect of which notice should be given by BC Hydro or the Supplier to the relevant insurers. In addition, both BC Hydro and the Supplier will give all such information and assistance as may be reasonably practicable in all the circumstances.

16.9 Claims Cooperation

With respect to any Claim against BC Hydro, whether insured or otherwise, the Supplier will cooperate with BC Hydro, BC Hydro's insurers, claims adjusters and other representatives to mitigate any impact of any investigations relating to the Claim on BC Hydro's operations, including the performance of the Services.

GC.17 INDEMNIFICATION

17.1 Supplier Indemnity

The Supplier will indemnify, save harmless and assume the defence of, BC Hydro, its directors, officers, employees, consultants and agents, including Hydro's Representative (each, an "**Indemnified Party**" and, together, the "**Indemnified Parties**") from and against all third party Claims, including Claim Costs, at any time suffered or incurred by, or brought or made against, the Indemnified Parties, or any one of them, relating to or arising out of the errors, omissions or negligent acts, willful misconduct, or fraudulent or criminal acts, or breach of the Contract, of or by the Supplier, the Supplier's Affiliates or any Subcontractors, or those for whom such Persons may in law be responsible, except for the portion of any Claim arising from the negligence or willful misconduct of an Indemnified Party.

17.2 Conduct of Claims

Without limiting GC.17.1, if an Indemnified Party becomes a party to a Claim for which indemnity may be sought under GC.17.1, then the Supplier will conduct the defence of such Claim, at the Supplier's sole cost and expense, and on such terms and conditions as BC Hydro may direct. Notwithstanding the preceding sentence, if the Supplier fails to commence or carry out such defence in a manner that is acceptable to BC Hydro, BC Hydro has the right, but not the obligation, upon prior written notice to the Supplier, to assume the defence of such Claim. BC Hydro may settle or resolve such Claim after consultation with the Supplier, without relieving the Supplier of its obligations under GC.17. If BC Hydro exercises its rights under this GC.17.2, then the Supplier will reimburse BC Hydro all of BC Hydro's costs and expenses incurred as a result of such exercise.

17.3 Separate Counsel

Where the Supplier has conduct of the defence of a Claim under GC.17, each applicable Indemnified Party may retain its own counsel, at the Indemnified Party's sole cost and expense, for the purpose of monitoring the Supplier's conduct of the Claim.

17.4 Limitation on Settlement

Notwithstanding any other provision in the Contract, where the Supplier has conduct of the defence of a Claim, the Supplier will not conclude or agree to the settlement or resolution of such Claim without the prior written approval of Hydro's Representative. Where the Supplier concludes or agrees to the settlement or resolution of a Claim without the prior written approval of Hydro's Representative, the Supplier will be liable for the entire amount of such settlement or resolution, including any amount in excess of its indemnity obligations under the Contract, and will have no right to claim reimbursement, set-off or payment from BC Hydro, or any other Indemnified Party, with respect to any such excess amount.

17.5 Intellectual Property Indemnification

The following will apply with respect to any actual or alleged unauthorized disclosure, use or infringement of a third party's patent or intellectual, proprietary or industrial property rights:

(a) the Supplier will indemnify, hold harmless and assume the defence of, the Indemnified Parties in accordance with the provisions of GC.17, from and against all third party Claims, including Claim Costs, at any time suffered or incurred by, or brought or made against, the Indemnified Parties, or any one of them, relating to or arising out of any actual or alleged unauthorized disclosure, use or infringement of a third party's patent or intellectual, proprietary or industrial property rights relating to or arising out of the performance of the Services, including the supply of the Equipment, or the actions or omissions of the Supplier, the Supplier's Affiliates or Subcontractors, or those for whom such Persons may in law be responsible, or otherwise asserted against the Indemnified Parties, or any one of them, and for any other consequences arising out of the breach by the Supplier of GC.24; and

(b) without limiting the Supplier's obligations under GC.17.5(a), if any part of the Services or the Equipment uses any patent or intellectual, proprietary or industrial property rights or anything else which infringes the rights of others or which is alleged to infringe the rights of others, the Supplier will, at its own cost and expense, immediately:

(i) procure for BC Hydro an irrevocable, perpetual, nonexclusive, fee-free, royalty-free, assignable license for BC Hydro to use such patent or intellectual, proprietary or industrial property rights;

(ii) replace or alter the infringing or allegedly infringing parts with non-infringing parts of equal or better quality so as to meet or exceed the requirements of the Contract; or

(iii) if permitted by BC Hydro in writing, forthwith refund the amount paid by BC Hydro to the Supplier under the Contract with respect to the infringing or allegedly infringing parts.

GC.18 LIMITATION OF LIABILITY

18.1 Limitation of Liability

Notwithstanding any other provision in the Contract, but subject to GC.18.2 and GC.18.3, the Supplier's maximum aggregate liability to the Indemnified Parties for Claims relating to or arising out of the Contract, whether or not terminated, and whether arising in contract, tort (including negligence), indemnity, by statute, as matters of strict or absolute liability, or from any other cause, will be limited to an amount equal to the aggregate of:

(a) the Contract Price; plus

(b) any insurance proceeds received, recoverable or claimable (or which would have been received, recoverable or claimable but for the default or other failure, act or omission on the part of the Supplier, the Supplier's Affiliates or any Subcontractors, or those for whom such Persons may in law be responsible) under any insurance policy obtained and maintained or required to be obtained and maintained under the Contract, up to the minimum required amount of the applicable policy under the Contract.

18.2 Consequential Damages

Neither party is liable to the other party for that other party's own:

(a) special, contingent, exemplary, punitive, indirect, incidental or consequential loss or damage;

(b) loss of anticipated revenue, overhead or profit;

(c) loss of production, business or contracts;

(d) loss by reason of shutdowns, non-operation or increased costs of construction, manufacturing or operation; or

(e) loss of business reputation or opportunities,

of any nature arising at any time or from any cause whatsoever relating to the Contract, and whether or not such losses or damages were foreseeable even if a party was advised of the possibility of them (collectively, "**Consequential Damages**").

For certainty, nothing in this GC.18.2 will apply to, or be interpreted so as to, preclude, or otherwise limit:

(f) recovery of liquidated damages specified as payable to BC Hydro pursuant to the Contract Documents, if any, and, any right of recovery for the Supplier's delay in the performance of the Services contrary to the provisions of the Contract, or any breach of the Contract by the Supplier, including BC Hydro's increased costs of construction, the costs of other suppliers, any administrative costs, the cost of BC Hydro's own forces and resources and the cost of Hydro's Representative; or

(g) recovery of any of the types of loss or damage described in GC.18.2(a) through GC.18.2(e), if such losses or damages would be receivable, recoverable or claimable (or which would have been receivable, recoverable or claimable but for the default or other failure, act or omission on the part of the Supplier, the Supplier's Affiliates or any Subcontractor, or those for whom such Persons may in law be responsible) under any insurance policy obtained and maintained or required to be obtained and maintained under the Contract, up to the minimum required amount of the applicable policy under the Contract.

18.3 Exceptions to Limitation of Liability

Notwithstanding any other provision in the Contract, the limits on the Supplier's liability under GC.18.1 and all other limitations of liability in favour of the Supplier specified in the Contract Documents will not apply to or limit the Supplier's responsibility and liability for, and the Supplier will be fully liable for:

(a) Claims and Claim Costs relating to or arising out of the gross negligence, recklessness or willful, fraudulent, criminal or intentional misconduct on the part of the Supplier, the Supplier's Affiliates or any Subcontractor, or those for whom such Persons may in law be responsible;

(b) third party Claims and Claim Costs relating to or arising out of personal injury, including death, property damage, or any actual or alleged unauthorized disclosure, use or infringement of intellectual property rights, howsoever caused (including by negligence) by the Supplier, the Supplier's Affiliates or any Subcontractor, or those for whom such Persons may in law be responsible;

(c) Claims and Claim Costs relating to or arising out of the breach of any confidentiality obligations under the Contract by the Supplier, the Supplier's Affiliates or any Subcontractor, or those for whom such Persons may in law be responsible;

(d) Claims and Claim Costs relating to or arising out of any breach of any Laws by the Supplier, the Supplier's Affiliates or any Subcontractor, or those for whom such Persons may in law be responsible; and

(e) liquidated damages specified as payable to BC Hydro pursuant to the Contract Documents.

GC.19 WARRANTY

19.1 Warranty

The Supplier warrants that all Services, including the supply of the Equipment, will be performed in accordance with the Contract Documents, free from defects in material, workmanship and any design or engineering furnished by or on behalf of the Supplier.

19.2 Quality of Equipment

The Supplier warrants that the Equipment furnished by or on behalf of the Supplier for the Services will, except as expressly set out otherwise in the Contract Documents, be:

(a) new and of recent manufacture;

(b) first quality;

(c) where such Equipment is not specified in the Contract Documents, fit for its intended purpose as reasonably inferred from the Contract Documents;

(d) of a quality at least equivalent to the quality of the adjacent or connecting portions of the Services;

(e) free from design defects, faults and faulty operation, including latent defects, provided that:

(i) if the Supplier obtains an equivalent warranty, including with respect to the Warranty Period described in GC.19.3, from the applicable third party manufacturer of the Equipment; and

(ii) the Supplier complies with GC.19.5 to assign the manufacturer's warranty to BC Hydro,

then the Supplier will be deemed to have satisfied this GC.19.2(e);

(f) compliant with the Contract Documents, including the specifications set out in Appendix G – Specifications; and

(g) compliant with all Laws and Permits.

19.3 Length of Warranty

The warranty set out in GC.19.1 and GC.19.2 will expire 12 months after the earlier of the following (the "**Warranty Period**"):

(a) BC Hydro using the Equipment; or

(b) 180 days after BC Hydro takes possession and control of the Equipment,

except with respect to any matters for which a warranty claim has been made during such period. If any warranty claim is made pursuant to GC.19 and any part of the Services or the Equipment is re-performed, repaired or replaced, a new Warranty Period will commence for

such re-performed, repaired or replaced Services or Equipment from the date such re-performed, repaired or replaced Supply and Delivery Service or Equipment is completed, unless such warranty work required only minor adjustment to and not replacement of a piece of Equipment, other equipment or a component.

19.4 Performance Guarantees

The Supplier will achieve all performance requirements as required under the Contract, including as set out in Appendix G – Specifications.

19.5 Assignment

Without limiting the generalities of GC.19.1, GC.19.2 or GC.19.3 the Supplier will assign to BC Hydro the guarantees and warranties (such that they may be enforceable directly by BC Hydro) provided by Subcontractors and other Persons performing services for or on behalf of the Supplier with respect to the Services, including the supply of the Equipment.

19.6 Defects

If defects, including latent defects, are discovered in the Services or the Equipment, including in any materials incorporated into the Services or Equipment, then the Supplier will correct the defect or replace the Equipment and materials promptly upon written notification from Hydro's Representative. The Supplier will be responsible for all costs associated with such corrections and replacements, including all costs incurred by BC Hydro in relation to the corrections and replacements (such as the costs to retain other Suppliers, costs of materials and equipment, administrative and supervisory costs and the cost of BC Hydro's own forces), and the Supplier will indemnify and save harmless the Indemnified Parties from any resulting damages. Other work removed or damaged due to such defects, or the corrections or replacements or making good such defects, will also be made good by the Supplier without additional payment by or cost to BC Hydro.

19.7 Failure to Remedy Defects

If the Supplier fails to remedy any defect or damage within a reasonable time, then a date may be fixed by Hydro's Representative on or by which the defect or damage is to be remedied. The Supplier will be given reasonable written notice of this date. If the Supplier fails to remedy the defect or damage by such date and the remedial work was to be executed at the cost of the Supplier under GC.19, then BC Hydro may, at its option:

(a) carry out the work using BC Hydro's own forces or other suppliers, in a reasonable manner and at the Supplier's sole cost and risk. The Supplier will pay to BC Hydro, within 30 days after receipt of an invoice, the costs reasonably incurred by BC Hydro in remedying the defect or damage;

(b) require Hydro's Representative to determine a reasonable reduction in the Contract Price; or

(c) if the defect or damage deprives BC Hydro of substantially the whole benefit of the Services or the Equipment or both or any major part of the Services or the Equipment or both, terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any of its other rights and remedies

under the Contract or otherwise, BC Hydro will then be entitled to recover all sums paid for the Services and the Equipment or for such part(s) (as the case may be), plus financing costs and the cost of dismantling such Services and Equipment or part(s), clearing the Site and returning the Equipment to the Supplier.

19.8 Removal of Defective Services

If the defect or damage cannot be remedied expeditiously on the Site and Hydro's Representative gives its written consent, then the Supplier may remove from the Site for the purposes of repair such items as are defective or damaged. This consent may require the Supplier to increase the amount of the performance bond, if any, by the full replacement cost of these items, or to provide other appropriate security.

19.9 BC Hydro Correction in Emergency

In the event of an emergency, BC Hydro may correct any defect or damage and the Supplier will promptly reimburse BC Hydro for all costs reasonably incurred by BC Hydro to correct the defect or damage.

GC.20 COMPLIANCE WITH LAWS AND BC HYDRO'S POLICIES AND PROCEDURES

20.1 Compliance with Laws

The Supplier, its employees and agents, and the Subcontractors, and their employees and agents, will be fully knowledgeable of and comply with all Laws.

20.2 Compliance with BC Hydro's Policies and Procedures

The Supplier will, and will cause its employees, agents and Subcontractors to, comply with the attached Appendix C – BC Hydro's Policies and Procedures, including all documents and other material referred to in Appendix C – BC Hydro's Policies and Procedures, in performing the Services, including in supplying the Equipment, or any part of the Services.

GC.21 PRIVACY

21.1 Compliance with FOIPPA

BC Hydro is subject to FOIPPA and, accordingly, in order for BC Hydro to comply with the requirements of FOIPPA, the Supplier will, prior to or at the same time as providing BC Hydro or Hydro's Representative with copies of, or access to copies of, any records containing Personal Information of the Supplier's or any Subcontractor's employees, obtain the written consent of each affected individual to the indirect collection of his or her Personal Information by BC Hydro. Upon request, at any time, from Hydro's Representative, the Supplier will provide, within five days of such request, evidence satisfactory to Hydro's Representative, acting reasonably, that such consent has been obtained.

21.2 Default

The Supplier's failure to comply with its obligations under GC.21 will be deemed to be a default under the Contract to which the provisions of GC.9.1 will apply.

GC.22 TAXES AND DUTIES

22.1 Tax Included in Contract Price

The Contract Price (and any part of the Contract Price) paid or payable by BC Hydro to the Supplier includes all applicable taxes, duties, levies and charges (excluding only GST, and PST if applicable) payable in respect of the Contract Price (or any part of the Contract Price) payable by any of the Supplier, Subcontractors, or their employees or other Persons engaged by or through them by any and all Governmental Authorities in connection with the Services and includes all customs duties with respect to all imported materials.

22.2 GST and PST

GST, and PST where applicable, will be identified as a separate line item on all invoices, and will be payable by BC Hydro to the Supplier as a separate item in addition to the Contract Price.

22.3 Input Tax Credits

Each party will provide to the other party at all times when any GST is required to be paid, such documents and particulars relating to the supply as may be required by either BC Hydro or the Supplier, as the case may be, to substantiate a claim for any input tax credits as may be permitted pursuant to the *Excise Tax Act* (Canada) in respect of GST.

22.4 PST Exemption

Where applicable, BC Hydro will provide the Supplier with the required certificate to support a PST exemption.

22.5 Payment of Taxes

Except as expressly set out otherwise in the Contract Documents, the Supplier is solely responsible for and will pay all taxes, duties, levies and charges (excluding only GST) payable in respect of the Contract Price (or any part of the Contract Price) assessed on any of the Supplier, Subcontractors, or their employees or other Persons engaged by or through them by any Governmental Authorities in connection with the Services ("**Supplier Taxes**"). The Supplier will be solely responsible for and pay all customs duties with respect to all imported Equipment regardless of whether such Equipment is held in the name of the Supplier, a Subcontractor or BC Hydro at the time of import ("**Supplier Duties**").

22.6 GST Flow-Through

Where the Supplier is a non-resident of Canada, and is not registered for GST and wishes to recover GST the Supplier has paid as the importer of record on the importation of goods supplied under this Contract, the Supplier will provide to BC Hydro such evidence satisfactory to the Minister of National Revenue of Canada as may be necessary to establish that the GST has been paid on importation of goods supplied under this Contract.

22.7 Tax Indemnity

The Supplier will indemnify and hold harmless the Indemnified Parties, or any one of them, from and against any liability and costs incurred by them in respect of any Supplier Taxes or Supplier

Duties, or any other related charges, including any related interest, fines, or penalties and any related reporting obligations and costs incurred as a consequence of such. The Supplier will be registered with all Governmental Authorities in accordance with Law and will comply with all of its obligations to collect and remit any such Supplier Taxes and Supplier Duties. Notwithstanding any other provision in the Contract, BC Hydro may, in its sole discretion, withhold from any monies owed to the Supplier, whether such monies are owed under and pursuant to the Contract or otherwise, such amounts as are payable by the Supplier in respect of Supplier Taxes or Supplier Duties for which BC Hydro becomes or may become liable.

GC.23 SUPPLIER'S REPRESENTATIONS AND WARRANTIES

23.1 Supplier's Corporate Representations and Warranties

The Supplier hereby covenants with, and represents and warrants to BC Hydro that, as of the Effective Date, the following representations and warranties are true:

(a) that unless otherwise disclosed to BC Hydro in writing before the Effective Date and agreed by BC Hydro in writing, the Supplier's performance of the Services will not create any conflict of interest in relation to any services provided by the Supplier to any other party prior to or subsequent to Total Completion;

(b) it is an entity duly created and organized, validly subsisting and in good standing under the Laws of the jurisdiction of its creation and is validly subsisting and in good standing under the Laws of the jurisdiction in which the Services will be performed, and, if different, where the Delivery Point(s) is located, and has all requisite power and authority to execute, deliver and perform its obligations under the Contract; and

(c) the Contract has been duly authorized, executed, and delivered by the Supplier and constitutes a legal, valid, and binding obligation of the Supplier, enforceable against the Supplier in accordance with its terms.

23.2 Supplier's Performance Representations and Warranties

The Supplier acknowledges that BC Hydro is relying on the Supplier's skill, knowledge and expertise in performing the Services in accordance with the Contract Documents. The Supplier hereby represents and warrants, with respect to the Services performed by the Supplier and the Subcontractors, that:

(a) the Supplier and the Subcontractors have the necessary qualified personnel, with the skills and expertise, to perform and to complete the Services and are experienced, ready and willing to perform the Services in accordance with the Contract Documents; and

(b) the Supplier has, or will obtain, all required permits, licences and authorizations necessary to carry on its business and to be obtained by it to perform the Services.

GC.24 INTELLECTUAL PROPERTY

24.1 Grant of Licence

The Supplier hereby grants to BC Hydro an irrevocable, perpetual, nonexclusive, fee-free, royalty-free, assignable license to use, practice, produce, reproduce, or publish (including in a

future procurement process), and to permit others on behalf of BC Hydro to use, practice, produce, reproduce, or publish (including in a future procurement process), any intellectual property rights owned by, controlled by, licensed to or used by the Supplier to the extent such intellectual property rights are incorporated into the Submittals, the Services or the Equipment, in connection with:

(a) the operation, maintenance, repair, refurbishment or alteration of the Services or the Equipment or any part of the Services or the Equipment;

(b) in the circumstances where the Services are incomplete due to the default of the Supplier, the completion of the Services, including the completion of the Equipment; and

(c) any operation, maintenance, repair, refurbishment or alteration of work, equipment, products or materials that are adjacent to or connected to the Services or the Equipment.

24.2 Third Party Intellectual Property

The Supplier will make each third party with whom it deals and who may be affected by GC.24.1 aware of GC.24.1 and will cause each such third party to comply with such provision so as to enable the Supplier to fulfill its obligations under such provision, prior to or upon entering into any contract or agreement with such third party.

24.3 Royalty and Patent Fees

The Supplier will be solely responsible for and will pay all royalties, patent fees, license fees and other charges payable on the items or things furnished by or on behalf of the Supplier in connection with the Services.

24.4 Moral Rights

The Supplier waives in favour of BC Hydro all moral rights, and will cause all of the Supplier's personnel, Subcontractors and their personnel working on the supply of the Equipment or the performance of the Services or both to waive in favour of BC Hydro all such rights in and to any intellectual property incorporated into the Equipment or the Services. The Supplier will have each of its personnel or any third persons engaged in the supply of the Equipment or the performance of the Services do all such other things and execute all such documents as reasonably requested by Hydro's Representative in writing in order to confirm or give effect to any of the matters described in this GC.24.4.

GC.25 MISCELLANEOUS

25.1 International Sale of Goods

The parties expressly agree that the United Nations Convention on Contracts for the International Sale of Goods does not and will not apply to the Contract.

25.2 Duty to Mitigate

In all cases where the Supplier is entitled to receive from BC Hydro any additional compensation, damages, or extensions of time, the Supplier will use both all commercially

reasonable efforts and all due diligence to mitigate and reduce the amount required under the Contract to be paid by BC Hydro to the Supplier or the amount of the extension of the time for the performance of the Services. This obligation will be taken into account in the determination of the Supplier's entitlement to an extension of time for the performance of the Services and reimbursement of costs or both.

25.3 Change of Law

If any Law that is directly applicable to the design or the manner of the performance of the Services is amended after the Effective Date and before Total Completion, and such amendment unavoidably results in a material increase or decrease in the costs incurred by the Supplier to perform the Services, then such amendment will entitle the Supplier to claim a Change pursuant to the provisions of GC.7.4, except that the Supplier's notice obligation under GC.7.4(a)(i) will be to give written notice of such claim to Hydro's Representative promptly upon the Supplier becoming aware of such amendment, or, in any event, promptly after the date when the Supplier should reasonably have become aware of such amendment.

25.4 Severability

Each provision of the Contract is severable. If any provision of the Contract is to any extent invalid or unenforceable, the remainder of the Contract will not be affected and each remaining provision of the Contract will be separately valid and will be enforceable.

25.5 Joint and Several Liability

Where the Supplier is a joint venture, partnership or consortium:

(a) each member of such entity agrees to be jointly and severally liable for the obligations of the Supplier; and

(b) the Supplier will not change its composition or legal status without the prior written consent of BC Hydro.

25.6 Independent Supplier

The relationship between BC Hydro and the Supplier under the Contract is that of the Supplier being an independent Supplier, notwithstanding any other provision in the Contract or anything arising out of the actions of the parties. BC Hydro and the Supplier expressly deny that it is their intention to create any partnership, joint venture, agency or other relationship. Unless otherwise agreed in writing, the Supplier is not the agent of BC Hydro in any capacity whatsoever under the Contract, and has no authority to act as an agent of BC Hydro.

25.7 Third Persons

Except as expressly set out otherwise in the Contract Documents, nothing in the Contract, expressed or implied, is intended or will be construed to confer upon or to give any Person which is not a party to the Contract any rights or remedies under or by reason of the Contract.

25.8 Public Communications

The Supplier acknowledges that BC Hydro will not provide any endorsement of the Supplier or the Equipment supplied or Services performed pursuant to the Contract. The Supplier will not erect any sign or advertising, use any BC Hydro trademark, logo or device in any sign or advertisement or make any public announcement or disclosure, whether for publication in the press, radio, television, or any other medium, regarding the existence of the Contract, the Equipment or the Services without the prior written consent of BC Hydro, which consent may be arbitrarily withheld.

25.9 Attornment

Subject to GC.12, for the purposes of any legal actions or proceedings brought by a party against the other party, the parties hereby irrevocably accept and submit to the exclusive jurisdiction of the courts of the Province of British Columbia and acknowledge such courts' competence and the convenience and propriety of the venue and agree to be bound by any judgment of such courts and not to seek, and hereby waive, review of its merits by the courts of any other jurisdiction.

25.10 Rights and Remedies Cumulative

All rights and remedies under the Contract (other than those which are expressly specified in the Contract Documents as exclusive rights and remedies) are cumulative and are in addition to and not in substitution for any other rights or remedies available under the Contract or Law or at equity.

25.11 Survival

All representations and warranties of the Supplier to BC Hydro and all provisions of:

(a) Section 11 of the Agreement;

(b) GC.14;

(c) GC.15;

(d) GC.17;

(e) each other provision of the Contract providing for indemnification of a party by the other party;

(f) GC.19;

(g) GC.24;

(h) GC.25, with the exception of GC.25.3, which will not survive the termination, suspension, cancellation or expiration of the Contract; and

(i) each other provision of the Contract which either expressly in accordance with its terms or by its nature survives the termination, suspension, cancellation, completion or expiration of the Contract,

including each other provision necessary for the interpretation or enforcement of such provisions, will continue as valid and enforceable obligations of the parties notwithstanding any termination, suspension, cancellation, completion or expiration of the Contract.

APPENDIX B – SUPPLEMENTARY GENERAL CONDITIONS

SGC.1 WARRANTY

Length of Warranty

GC.19.3(b) is deleted in its entirety and replaced with the following:

"(b) with respect to any materials furnished by or on behalf of the Supplier, 36 months after the date of Total Completion or earlier termination of the Contract, or the end of any extended warranty period,"

SGC.2 LIQUIDATED DAMAGES

The following is added to GC.8 Delays and Acceleration:

"8.9 Liquidated Damages

If the Supplier fails to achieve any milestone on or before the date required for completion of such milestone as shown on SP1.3 Project Schedule updated in accordance with the Contract Documents or as otherwise required by the Contract Documents, then BC Hydro may, without prejudice to any of its other rights or remedies, deduct from any payment then or thereafter due to the Contractor an amount of $15,000.00 for each day up to a maximum of 10% of the contract value that achievement of the applicable milestone is delayed past the date such milestone was to be achieved. The parties acknowledge that such amount is a genuine pre-estimate of BC Hydro's increased costs resulting from the delay."

SGC.3 PERFORMANCE SECURITY

3.1 Requirements

Within 14 days after the award of the Contract, or by such later date as Hydro' s Representative may agree to in writing, and in addition to, and not in substitution for, the Performance Security holdback, the Supplier shall provide to BC Hydro a performance bond in the form of:

(a) a letter of credit in the amount of 15% of the total amount of the Contract Price (the "Letter of Credit"); and

(b) a third party guarantee executed by an entity acceptable to BC Hydro with respect to all obligations and liabilities of Supplier under the Contract including Changes, if any (the "Third Party Guarantee").

3.2 Form of Letter of Credit and Third Party Guarantee

The Letter of Credit shall be an irrevocable standby Letter of Credit, substantially in the form shown in Exhibit B-1 and must be available for presentation in Vancouver (B.C.) Canada. The Letter of Credit shall be issued or confirmed by a domestic Canadian financial institution authorized to transact business of such nature and having a

minimum credit rating of not less than Standard & Poor's A-, Moody's A3 or DBRS A (low). If the issuing financial institution is not a domestic Canadian financial institution, the Sovereign (Country) debt rating shall not be less than Standard & Poor's AA, Moody's Aa2 or DBRS AA and the financial institution must be acceptable to BC Hydro. For the purpose of this section, the lowest credit rating issued by the above referenced credit rating agencies for a specific financial institution shall be considered as that financial institution's credit rating. The Third Party Guarantee shall be in form and content acceptable to BC Hydro, substantially as set forth in Exhibit B-2.

3.3 Term

Unless otherwise permitted in writing by BC Hydro, the Letter of Credit and the Third Party Guarantee shall be maintained (including renewed or replaced as necessary) by Supplier, and shall remain in full force and effect for the benefit of BC Hydro, until 12 months after the end of the Warranty Period as the same may be extended in accordance with SGC.3. BC Hydro shall return to Supplier any unused performance security held under this SGC.3 once the period of time stipulated in the immediately prior sentence has elapsed, or at such earlier time as BC Hydro, in its sole discretion, may consider appropriate.

3.4 Hydro's Right

Upon the occurrence of any of the events specified in GC.9.2, or if Supplier breaches any term of, or fails to perform any obligation under, the Contract (including fails to pay any amount owing to BC Hydro under the Contract), BC Hydro shall have the immediate and absolute right to:

(a) draw upon the Letter of Credit, in accordance with its terms, in an amount as reasonably determined by Hydro's Representative to be the amount that is required to compensate BC Hydro for Supplier's breach; and

(b) enforce its rights under the Third Party Guarantee.

BC Hydro shall be entitled to pursue its remedies under (a) and (b) of this clause simultaneously, as long as there is no double recovery, and shall not be required to exhaust its recourse under either (a) or (b), as applicable, before pursuing any other remedy available to it under the Contract or at law.

If, in accordance with the terms of the Letter of Credit the issuing bank gives notice of its determination not to extend the Letter of Credit and/or Supplier fails to provide BC Hydro with acceptable replacement security at least 30 days prior to expiration date of the Letter of Credit, BC Hydro shall have the immediate and absolute right to draw upon the Letter of Credit for the full amount thereof, in which case BC Hydro will hold the proceeds thereof as a cash deposit (without interest) to be drawn on and applied in the same manner as the Letter of Credit. Any unused amount of such cash deposit shall be returned to Supplier at the time prescribed in SGC.3 for the return of any unused performance security.

3.5 No Limitation on BC Hydro's Remedies

The performance security given by Supplier to BC Hydro pursuant to this SGC.3 shall not in any way limit BC Hydro's other remedies under this Contract or under applicable laws.

SGC.4 PACKAGING

Any reference to "Packaging" set out in SP4 Identification, Packaging and Shipping shall take precedence over the meaning set out GC.4.4 Packaging.

SGC.5 QUANTITY VARIATION AND MINOR DESIGN CHANGES

For any quantity variation or design changes that is within plus or minus 20% of the total contract price, the unit price or the calculated unit price per kg (column e divided by column d in the attached Appendix E – Schedule of Quantities and Prices) shall apply.

If, for any reason, the quantity variation or design changes varies by more than plus or minus 20% from the total contract price as listed in the attached Appendix E – Schedule of Quantities and Prices, or as otherwise agreed to pursuant to the Contract Documents, then either BC Hydro or the Contractor may, by written notice to the other party, request the other party to agree to a revised unit price, to take account of the variation in quantity and prevent either party from obtaining a windfall or suffering a loss as a result of the quantity variation. A party will make a request for a revised unit price as soon as reasonably practicable after it becomes aware of the quantity variation and/or design changes. Upon a request under this SGC.5, the Supplier's Representative will deliver to Hydro's Representative all documentation reasonably required by Hydro's Representative to evaluate and substantiate the calculation of the applicable unit price(s).

If the parties agree to a revised unit price, then the revised unit price will be recorded in a Change Order, signed by the parties and issued pursuant to GC.7.1.

SGC.6 GC.7.4(c)(i) is deleted in its entirety and is replaced with:

(i) that occurs more than fourteen days prior to the notice delivered by the Supplier to Hydro's Representative as provided by GC.7.4(a)(i); or

SGC.7 GC.8.6(d)(i) is deleted in its entirety and is replaced with:

(i) that occurs more than fourteen days prior to the notice delivered by the Supplier to Hydro's Representative as provided by GC.8.6(a); or

EXHIBIT B-1
FORM OF LETTER OF CREDIT – FOR PERFORMANCE SECURITY

[*Issuing Bank Name & Address*]

Date of Issue: [*Date*]

Irrevocable Standby Letter of Credit

No. [*Number*]

Applicant:

[*Customer Name and Address*]

Beneficiary:

British Columbia Hydro and Power Authority

[*Address*]

Amount:

[*Currency and Amount both in letters and numbers*]

At the request of and for the account of the Applicant, we, [*Bank Name*], hereby establish in favour of the Beneficiary our irrevocable standby Letter Of Credit No. [*Number*] (hereinafter called the "**Letter of Credit**") for an amount not exceeding [*Currency and Amount both in letters and numbers*].

We, [*Bank Name and Address*], hereby unconditionally and irrevocably undertake and bind ourselves, and our successors and assigns, to pay British Columbia Hydro and Power Authority ("**you**") immediately, the sum, which you claim upon receipt of the following documents:

(1) your written demand specifying the amount claimed, the number of this Letter of Credit, and the date of issue of this Letter of Credit; and

(2) this original Letter of Credit, including any amendments, must be presented with your demand for payment for endorsement purposes.

This Letter of Credit may be presented for payment at the above issuing address or at [*alternate Vancouver (B.C.) branch location if letter of credit is not issued or confirmed in Vancouver*].

It is understood that we are obligated under this Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment, on or before the expiry date or any future expiry date, without enquiring whether you have a right as between yourself and the Applicant to make such demand and without recognizing any claim of the Applicant.

Partial drawings and multiple presentations are allowed. The amount of this Letter of Credit shall be automatically reduced by the amount of any drawing paid hereunder.

This Letter of Credit takes effect from the Date of Issue set forth above, and shall remain valid until [*Date*]. However, it is a condition of this Letter of Credit that it will be automatically extended without notice for a further one year period from the present or any future expiry date unless at least ninety (90) days prior to such expiry date we notify you in writing by courier or registered mail at your address above that we elect not to consider this Letter of Credit to be extended for any additional period. If we give you notice of our election not to extend for an

additional period, you shall be entitled to immediately demand payment of the full amount of this Letter of Credit.

This Letter of Credit is subject to the International Standby Practices 1998 ("**ISP98**"). All matters not covered by ISP98 will be governed by the laws applicable in the Province of British Columbia. The parties hereby irrevocably attorn to the exclusive jurisdiction of the courts of British Columbia. The number of this Letter of Credit must be quoted on all documents required hereby.

_____	_____
Authorized Signing Officer	Authorized Signing Officer
[*Bank Name*]	[*Bank Name*]

Letter of Credit Requirements
(wording contained in this box does not form part of the issued LoC)

(a) issued or confirmed by a branch of a domestic Canadian financial institution having a minimum credit rating not less than Standard & Poor's A-, Moody's A3 or Dominion Bond Rating Service A (low). If the issuing financial institution is not a domestic Canadian financial institution, the sovereign country's debt rating should not be less than Standard & Poor's AA, Moody's Aa2 or DBRS AA and the financial institution must be acceptable to BC Hydro. BC Hydro, at its discretion, may accept a sovereign debt rating of Standard & Poor's AA-, Moody's Aa3 or DBRS AA(low) if the issuing bank has a rating of not less than Standard & Poor's A, Moody's A2 or DBRS A. If such credit rating agencies publish differing credit ratings for the same financial institution, the lowest credit rating of any of the credit rating agencies shall apply for purposes of this section. The letter of credit issuer or the confirming bank must meet these minimum credit ratings at all time during the validity period of the letter of credit;

(b) available for presentation in Vancouver (B.C.) Canada; and

(c) for a term of not less than one year and providing that it is renewed automatically, unless the issuing or confirming financial institution advises otherwise as specified in the letter of credit.

EXHIBIT B-2
FORM OF GUARANTEE

THIS GUARANTEE is made as of the _____ day of _____, 20__.

BETWEEN:

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY, having its head office at 333 Dunsmuir Street, Vancouver, B.C., V6B 5R3, Canada

(hereinafter referred to as the "**Beneficiary**")

AND:

(hereinafter referred to as the "**Guarantor**")

WHEREAS:

(A) The Beneficiary and [ ] ("**Contractor**") entered into a contract dated _____, 20__ for _____, BC Hydro Reference No. _____ (the "**Contract**").

(B) At the request of the Beneficiary, and as a condition of the Contract, the Guarantor has agreed to guarantee the punctual and complete performance of any and all of the present and future obligations and liabilities of Contractor under or arising out of the Contract, including, without limitation, the Contractor's obligations to pay Liquidated Damages (as defined in the Contract) as specified the Contract (the "**Guaranteed Obligations**").

THEREFORE IN CONSIDERATION OF THE PAYMENT of ten ($10.00) dollars by the Beneficiary to the Guarantor and other good and valuable consideration (the receipt and sufficiency of which is hereby acknowledged and agreed), including the Beneficiary entering into the Contract with Contractor, the parties agree as follows:

(1) The Guarantor absolutely, irrevocably and unconditionally guarantees to the Beneficiary the punctual and complete performance and observance of all of the Guaranteed Obligations whenever, however or wherever incurred. If at any time Contractor defaults in the performance of any of the Guaranteed Obligations in accordance with the Contract, the Guarantor shall, immediately upon the Beneficiary's written demand, remedy the default, including perform (or procure the performance of) Contractor's Guaranteed Obligations and pay any and all sums, including, without limitation, Liquidated Damages, that may be payable under the Contract in consequence of the non-performance by Contractor of such Guaranteed Obligations.

(2) Subject to clause (6), the Guarantor agrees to pay the Beneficiary, forthwith upon demand, all out-of-pocket costs and expenses, including, without limitation, legal fees on a solicitor and client basis, incurred by or on behalf of the Beneficiary to realize the benefit of any of its rights:

(a) against Contractor; and

(b) against the Guarantor,

in respect of the Guaranteed Obligations.

(3) Any obligation of the Guarantor hereunder that is not paid when due will bear interest at a rate that is equal to the annual rate of interest declared by the Bank of Montreal from time to time as the rate of interest charged to its most creditworthy commercial borrowers for loans in Canadian dollars payable on demand and commonly referred to as its “prime rate”, plus 2%, from the date it becomes due to the date of payment, due and payable on demand.

(4) This Guarantee is a continuing guarantee and shall apply to all of the Guaranteed Obligations and remain in place until the earlier of 1) the date which is 24 months after the date of completion as shown in the certificate of Total Completion (as defined in the Contract) issued under the Contract or 2) fulfilment or expiration of all such Guaranteed Obligations in accordance with the Contract, or if the Contract is terminated, the date which is 24 months after the Contract is terminated.

(5) The Beneficiary shall not be bound to seek or exhaust its recourse against Contractor or any other persons or to realize on any security (including, without limitation, any letters of credit it may hold in respect of the Guaranteed Obligations) before being entitled to exercise its rights under this Guarantee. However, the Beneficiary shall not be entitled to enforce its rights and claims under this Guarantee with respect to a Guaranteed Obligation to the extent such Guaranteed Obligation has already been satisfied through other security held by the Beneficiary in respect of the Guaranteed Obligations.

(6) Subject to clause (3) and (12), nothing herein shall be construed as imposing greater obligations and liabilities on the Guarantor than are imposed on Contractor under the Contract. The Guarantor shall be entitled to all defences, limitations and exclusions available to Contractor under the Contract.

(7) This Guarantee shall extend to any variation of or amendment to the Contract and to any agreement supplemental thereto agreed between the Beneficiary and Contractor.

(8) The Beneficiary may, at its election, exercise or decline to exercise any right or remedy it may have against Contractor or any other person liable on or in respect of the Guaranteed Obligations, or any security held from Contractor or any other person in respect of the Guaranteed Obligations, without affecting or impairing the liability of the Guarantor, and the Guarantor hereby waives any defence arising out of the absence, impairment or loss of any such security or right of reimbursement, contribution or subrogation.

(9) The Beneficiary will have the right, in its discretion, to proceed directly against the Guarantor for any and all remedies provided by law, equity or in the Contract whether by legal proceedings or otherwise, to have the Guarantor fulfil the Guaranteed Obligations.

(10) Until the Guaranteed Obligations have been fully and completely performed, and subject to fulfilment of the requirements of this Guarantee, the Guarantor will not be released or discharged from its obligations hereunder by any matter or thing whatsoever that would

otherwise release or discharge a guarantor. Without limiting the generality of the foregoing, the Guarantor expressly agrees that none of the following circumstances or actions, whether taken by or occurring in respect of Contractor, the Beneficiary, the Guarantor or any other person or entity, will in any way release, affect or impair the obligations and liabilities of the Guarantor hereunder:

(a) voluntary or involuntary liquidation, dissolution, consolidation or merger (or the sale or other disposition of all or part of a party or its assets);

(b) bankruptcy, receivership, insolvency, assignment for the benefit of creditors, reorganization, arrangement, composition or readjustment of debt, or other similar proceeding affecting a party or any of its assets;

(c) the invalidity or unenforceability of the Contract or any security, bond, third party guarantees, or other assurances intended to be granted or provided by Contractor or any other party to the Beneficiary or any other party under the Contract;

(d) the failure of the Beneficiary or any other party to take, protect or preserve any rights, security or similar assurance in relation to the Contract, from Contractor or any other party, or the loss, diminution or unenforceability or impossibility to realize or abstention from realization of any such right, security or similar assurance, whether or not caused or resulting from any act or omission of the Beneficiary or any person acting for the Beneficiary;

(e) any other occurrence or circumstance whatsoever, whether similar or dissimilar to the foregoing, any other circumstance that might otherwise constitute any legal or equitable defence or discharge of the obligations and/or liabilities of Contractor or the Guarantor or that might otherwise limit recourse against the Guarantor; and

(f) if, with or without the Guarantor's knowledge or consent, any one or more of the following occur:

(1) any modifications of the Contract, made by agreement of Contractor and the Beneficiary;

(2) any waivers by the Beneficiary or Contractor of any terms, provisions, conditions or obligations under the Contract;

(3) any assignment or the making of any assignment of the Contract as may be permitted under the Contract;

(4) any failure by the Beneficiary to enforce any provision of the Contract against Contractor; or

(5) any other granting of extensions or time, renewals, indulgences, waivers, releases or discharges, or the making of any compromises or transactions or arrangements, regarding the Contract.

(11) Until the Guaranteed Obligations have been fully and completely performed, the Guarantor shall not be subrogated in any manner to any right of the Beneficiary.

(12) If the Guarantor or any other person is required by law to make any deduction or withholding on account of any tax or other amount from any sum paid or payable by the Guarantor under this Guarantee, the sum payable by the Guarantor in respect of which the relevant deduction, withholding or payment is required shall (except, in the case of any such payment, to the extent that its amount is not ascertainable when that sum is paid) be increased to the extent necessary to ensure that, after the making of that deduction, withholding or payment, the Beneficiary receives on the due date and retains (free from any liability in respect of any such deduction, withholding or payment) a net sum equal to what it would have received and so retained had no such deduction, withholding or payment been required or made.

(13) Neither the Guarantor's obligations under this guarantee nor any right or remedy for the enforcement thereof will be impaired, stayed, modified, changed or released in any manner whatsoever by any order, stay, modification, release or limitation in regard to Contractor or the Guarantor resulting from the operation or effect of any provision of the *Bankruptcy and Insolvency Act* (Canada), the *Companies' Creditors Arrangement Act* (Canada), the *Winding-Up Act and Restructuring Act* (Canada) or other statute, code or laws of any jurisdiction relating to debtor relief or relating to the release of the obligations of the Guarantor hereunder, or from the decision of any court or authority interpreting any of the same, and the Guarantor will be obligated under this guarantee as if no such order, stay, modification, release or limitation had occurred.

(14) This Guarantee constitutes the entire agreement of the Guarantor with the Beneficiary relating to the subject matter hereof and supersedes all prior contracts or agreements, whether oral or written. There are no representations, agreements, arrangements or undertakings, oral or written, between the Guarantor and the Beneficiary relating to the subject matter of this Guarantee which are not fully expressed herein.

(15) No amendment to this Guarantee will be valid or binding unless set forth in writing and duly executed by each of the Beneficiary and the Guarantor. No waiver of any breach by the Guarantor of any provision of this Guarantee will be effective or binding unless made in writing and signed by the Beneficiary and, unless otherwise provided, will be limited to the specific breach waived.

(16) This Guarantee is in addition to and not in substitution for any other undertakings, securities and guarantees held or which may be held by or for the benefit of the Beneficiary, including without limitation any performance bonds, letters of credit, financial holdbacks under the Contract, and guarantees from any other parties.

(17) The Guarantor shall promptly and with all due diligence perform its obligations under this Guarantee.

(18) All notices or other communications in connection with this Guarantee shall be served:

(a) Upon the Beneficiary, at 333 Dunsmuir Street, Vancouver, British Columbia, V6B 5R3. Attention: ; and

(b) Upon the Guarantor, at [_____] Attention: [____].

Notice given by personal delivery or mail shall be effective upon actual receipt. Notice given by facsimile transmission shall be effective upon actual receipt if received during the recipient's normal business hours, or at the beginning of the recipient's next business day after receipt if not received during the recipient's normal business hours. All Notices by facsimile transmission shall be confirmed promptly after transmission in writing by certified or registered mail or personal delivery.

(19) The Beneficiary and the Guarantor may change their respective nominated addresses for service of communications to another address but only by prior written notice to each other. All such communications must be in writing.

(20) This Guarantee shall enure to the benefit of and be binding upon the parties and their respective heirs, legal representatives, successors and permitted assigns.

(21) Whenever possible, each provision of this Guarantee shall be interpreted in such manner as to be effective, enforceable and valid under British Columbia law, and Canadian law to the extent applicable, but if any provision of this Guarantee shall be found to be illegal, ineffective, invalid or unenforceable under such law, it shall be deemed severed from this Guarantee to the extent of such illegality, ineffectiveness, invalidity or unenforceability without effect on any of the remaining provisions of this Guarantee.

(22) This Guarantee shall be governed by and construed in accordance with the laws of the Province of British Columbia and the laws of Canada applicable in British Columbia.

(23) Any dispute arising from, connected with, or relating to this Guarantee will be resolved by the courts of British Columbia sitting in the City of Vancouver, and the Guarantor hereby irrevocably submits and attorns to the original and exclusive jurisdiction of the courts of British Columbia sitting in the City of Vancouver for those purposes.

(24) The Guarantor represents and warrants that:

(a) it is duly organized and validly existing under the laws of its jurisdiction of organization;

(b) it has the power, authority and legal right to execute and deliver, and to perform its obligations under, this Guarantee, and has taken all necessary action to authorize its execution, delivery and performance of this Guarantee, and this Guarantee has been duly executed by it;

(c) this Guarantee constitutes a legal, valid and binding obligation of the Guarantor;

(d) the execution, delivery and performance of this Guarantee will not violate or result in default under any applicable law, rule or regulation or any judgement, order, decree, agreement, instrument or undertaking applicable to the Guarantor;

(e) it is related to Contractor and directly or indirectly derives a benefit from the Beneficiary entering into the Contract with Contractor;[1]

(f) it has the financial equity and the ability and capacity as described in (a) and (b) above to carry out its obligations under this Guarantee.

(25) The Beneficiary may at any time during the term of this Guarantee request, by written notice, reasonable financial assurances of the Guarantor's continued ability to carry out its obligations under this Guarantee and the Guarantor shall provide such reasonable assurances to the Beneficiary in writing within ten (10) Days of the Beneficiary's notice.

IN WITNESS WHEREOF the Guarantor has executed this Guarantee as of the day and year first above written.

[GUARANTOR]

By: _____
(Signature)

_____
(Print Name)

Title: _____

Date: _____

[1] If the Guarantor is not an affiliate of the Contractor, clause (e) will be deleted from the Guarantee before it is delivered.

APPENDIX C – BC HYDRO'S POLICIES AND PROCEDURES

The following are BC Hydro's Policies and Procedures which may be amended at any time and from time to time.

The Supplier is responsible to obtain and to comply with the most current form of such policies and procedures.

1. Code of Conduct guidelines applicable to BC Hydro contracts
   https://www.bchydro.com/content/dam/hydro/medialib/internet/documents/policies/pdf/policies_guidelines_applicable_to_bc_hydro_contracts.pdf

APPENDIX D – SCOPE OF SERVICES

The scope of Services generally includes the supply of lattice type steel structures for the Site C 500 kV transmission lines 5L005, 5L006, with provisional supply of 5L015, 5L016 and 5L017.

Please refer to Appendix G – Specifications for the detailed scope of Services, specifications and requirements.

APPENDIX E – SCHEDULE OF QUANTITIES AND PRICES

1. All prices unless expressly stated otherwise:

   (a) will be deemed to be in Canadian dollars (and if any price is expressed in any other currency, then for the purposes of evaluation BC Hydro will convert such price to the Canadian dollar equivalent, calculated as of the Closing Time); and

   (b) will be deemed to include all applicable duties and all costs of performing the Services and all applicable taxes, except only GST and PST where applicable.

2. The abbreviations in the Schedule of Quantities and Prices are defined as follows:

   m metre
   MT metric tonne
   kg kilogram

3. Terms of Payment are provided in GC.6 of Appendix A – General Conditions (Supply) and Appendix E – Schedule of Quantities and Prices, to the Contract Documents.

4. The following Schedule of Quantities and Prices includes both Base Proposal and Alternative Proposal. The Contract Price is based on the Base Proposal. However, in the event that BC Hydro accepts Sa-Ra's alternative proposal of using its own manufactured fasteners, Contract Price will be amended based on the Alternative Proposal.

Payment Item	Description	Quantity (each) 5L005 (a)	5L006 (b)	Total (c) = (a) + (b)	Estimated Weight (kg) (d)	BASE PROPOSAL Price per Unit (e)	BASE PROPOSAL Amount (f) = (c) x (e)	ALTERNATIVE PROPOSAL Price per Unit (g)	ALTERNATIVE PROPOSAL Amount (h) = (c) x (g)
SUPPLY OF TOWERS									
1	**Lattice Structures Type 2AGM** – complete with fasteners (procured from BC Hydro pre-qualified manufacturer as per SP3.6, including additional 5% quantity per SP1.1) and accessories Dwg Nos 5L40-T08-00008 to 00016, 00023 and 00024; 5LGS-T08-00555 to 00558, 00561, 00563, 00566 to 00570; G-T08-00271								
	(a) Design (connection design, detailing, drafting)			1	N/A				
	(b) Common Body	9	9	18	7137				
*	(c) +3.0 m Body Extension	2	1	3	779				
	(d) +6.0 m Body Extension	5	3	8	1,764				
	(e) +9.0 m Body Extension	4	4	8	1,193				
	(f) 0 m Leg Extension	28	23	51	172				
	(g) +1.2 m Leg Extension	8	6	14	182				
	(h) +2.4 m Leg Extension	8	5	13	200				
	(i) +3.6 m Leg Extension	8	2	10	219				

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Price per Unit	Amount	Price per Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
2	**Lattice Structures Type 8KGT** – complete with fasteners (procured from BC Hydro pre-qualified manufacturer as per SP3.6, including additional 5% quantity per SP1.1) and accessories Dwg Nos 5L013-T08-00192 to 00196; 5LGS-T08-02780 to 02798; G-T08-00271								
	(a) Design (connection design, detailing, drafting)			1	N/A				
	(b) Common Body	6	5	11	36,054				
	(c) +3.0 m Body Extension	1	0	1	5,444				
	(d) +6.0 m Body Extension	5	3	8	10,698				
	(e) 0 m Leg Extension	12	12	24	1,449				
	(f) +1.2 m Leg Extension	11	4	15	759				
	(g) +2.4 m Leg Extension	10	1	11	2,118				
	(h) +3.6 m Leg Extension	9	2	11	2,413				
	(i) +4.8 m Leg Extension	4	1	5	2,634				

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Price per Unit	Amount	Price per Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
3	**Lattice Structures Type 54GA** – complete with base shoes, curved base and pin, fasteners (procured from BC Hydro pre-qualified manufacturer as per SP3.6, including additional 5% quantity per SP1.1) and accessories Dwg Nos 5L005-T08-00007 to 00010; G-T08-00271					[redacted]			
	(a) Design (connection design, detailing, drafting)			1	N/A				
	(b) Basic Tower	160	166	326	8,400				
	(c) +1.5 m Mast Extension	58	30	88	250				
	(d) +3.0 m Mast Extension	39	31	70	433				
	(e) +4.5 m Mast Extension	36	43	79	610				
	(f) +6.0 m Mast Extension	121	112	233	801				

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Price per Unit	Amount	Price per Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
4	**Lattice Structures Type 54A** –complete with fasteners (procured from BC Hydro pre-qualified manufacturer as per SP3.6, including additional 5% quantity per SP1.1) and accessories Dwg Nos 5L005-T08-00011 to 00014; G-T08-00271								
	(a) Design (connection design, detailing, drafting)			1	N/A				
	(b) Common Body	15	11	26	9,675				
	(c) +3.0 m Body Extension	1	3	4	1,471				
	(d) +6.0 m Body Extension	7	3	10	2,263				
	(e) +9.0 m Body Extension	6	1	7	3,142				
	(f) +12.0 m Body Extension	4	4	8	4,389				
	(g) -3.0 m Leg Extension	0	0	0	140				
	(h) -1.5 m Leg Extension	6	1	7	260				
	(i) 0 m Leg Extension	51	42	93	342				
	(j) +1.5 m Leg Extension	21	1	22	480				
	(k) +3.0 m Leg Extension	8	0	8	579				
	(l) +4.5 m Leg Extension	2	0	2	709				
	(m) +6.0 m Leg Extension	0	0	0	838				

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Price per Unit	Amount	Price per Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
5	**Lattice Structures Type 54C** – complete with fasteners (procured from BC Hydro pre-qualified manufacturer as per SP3.6, including additional 5% quantity per SP1.1) and accessories Dwg Nos 5L005-T08-00015 to 00018; G-T08-00271								
	(a) Design (connection design, detailing, drafting)			1	N/A				
	(b) Common Body	7	5	12	11,992				
	(c) +3.0 m Body Extension	0	0	0	1,560				
	(d) +6.0 m Body Extension	1	2	3	2,761				
	(e) +9.0 m Body Extension	2	0	2	3,910				
	(f) +12.0 m Body Extension	3	0	3	5,063				
	(g) +15.0 m Body Extension	4	2	6	6,420				
	(h) +18.0 m Body Extension	1	0	1	7,402				
	(i) -3.0 m Leg Extension	0	0	0	181				
	(j) -1.5 m Leg Extension	6	0	6	322				
	(k) 0 m Leg Extension	30	15	45	411				
	(l) +1.5 m Leg Extension	16	5	21	564				
	(m) +3.0 m Leg Extension	8	0	8	673				
	(n) +4.5 m Leg Extension	0	0	0	826				
	(o) +6.0 m Leg Extension	0	0	0	1,051				

Payment Item	Description	Quantity (each) 5L005 (a)	5L006 (b)	Total (c) = (a) + (b)	Estimated Weight (kg) (d)	BASE PROPOSAL Price per Unit (e)	BASE PROPOSAL Amount (f) = (c) x (e)	ALTERNATIVE PROPOSAL Price per Unit (g)	ALTERNATIVE PROPOSAL Amount (h) = (c) x (g)
6	**Lattice Structures Type 54J** – complete with fasteners (procured from BC Hydro pre-qualified manufacturer as per SP3.6, including additional 5% quantity per SP1.1) and accessories Dwg Nos 5L005-T08-00019 to 00022; G-T08-00271								
	(a) Design (connection design, detailing, drafting)			1	N/A				
	(b) Common Body	10	9	19	22,456				
	(c) +3.0 m Body Extension	2	1	3	3,331				
	(d) +6.0 m Body Extension	4	2	6	5,997				
	(e) +9.0 m Body Extension	4	3	7	7,919				
	(f) +12.0 m Body Extension	0	0	0	11,638				
	(g) -3.0 m Leg Extension	0	0	0	464				
	(h) -1.5 m Leg Extension	6	0	6	686				
	(i) 0 m Leg Extension	39	36	75	951				
	(j) +1.5 m Leg Extension	15	0	15	1,190				
	(k) +3.0 m Leg Extension	4	0	4	1,315				
	(l) +4.5 m Leg Extension	0	0	0	1,671				
	(m) +6.0 m Leg Extension	0	0	0	1,995				

Payment Item	Description	Quantity (each) 5L005 (a)	Quantity (each) 5L006 (b)	Quantity (each) Total (c) = (a) + (b)	Estimated Weight (kg) (d)	BASE PROPOSAL Unit (e)	BASE PROPOSAL Amount (f) = (c) x (e)	ALTERNATIVE PROPOSAL Unit (g)	ALTERNATIVE PROPOSAL Amount (h) = (c) x (g)
LOAD TESTING									
7	Tower type 2AGM **(OPTIONAL)**								
	(a) Nominal test			0					
	(b) Destruction test			0					
8	Tower type 8KGT **(OPTIONAL)**								
	(a) Nominal test			0					
	(b) Destruction test			0					
9	Tower type 54GA Based on basic tower +12.0 m mast extension (50.2 m total height)								
	(a) Nominal test			1					
	(b) Destruction test			1					
10	Tower type 54A Based on basic tower + 12.0 m BE + 0.0 m LE (50.2 m total height)								
	(a) Nominal test			1					
	(b) Destruction test			1					
11	Tower type 54C Based on basic tower + 18.0 m BE + 0.0 m LE (56.1 m total height)								
	(a) Nominal test			1					
	(b) Destruction test			1					

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Unit	Amount	Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
12	Tower type 54J **(OPTIONAL)** Based on basic tower +12.0 m BE + 0.0 m LE (47.8 m total height)								
	(a) Nominal test			0					
	(b) Destruction test			0					
13	Additional Load Cases / Tower (OPTIONAL)			0					
14	Strain Gauges / Member			0					
	SUBTOTAL (Payment Items 1 to 14)								

Payment Item	Description			Quantity	Estimated Weight (kg)	Unit Price	Amount	Unit Price	Amount
				(a)	(b)	(c)	(d) = (a) x (b) x (c)	(e)	(f) = (a) x (b) x (e)
PROVISIONAL SUMS									
15	**Lattice Structures similar to Type 8KGT** – tower supply only, including additional 5% quantity per SP1.1 and accessories			8	35,000				
16	**Lattice Structures similar to Type 3JGX** – tower supply only, including additional 5% quantity per SP1.1 and accessories			3	80,000				

Payment Item	Description			Quantity (a)	Estimated Weight (kg) (b)	Unit Price (c)	Amount (d) = (a) x (b) x (c)	Unit Price (e)	Amount (f) = (a) x (b) x (e)
17	**Prototype assembly testing in Romania**					[redacted]			
	(a) Lattice Structures Type 54GA			1	*1,379.31	[redacted]			
	(b) Lattice Structures Type 54A			1	*9,655.17	[redacted]			
	(c) Lattice Structures Type 54C			1	*22,758.62	[redacted]			
	(d) Lattice Structures Type 3JGX			1	80,000	[redacted]			
	(e) Lattice Structures Type 54J			1	*60,000	[redacted]			
	(f) 2L099 crossing tower			1	35,000	[redacted]			
18	**Design review in Canada**					[redacted]			
	(a) Fixed cost per trip (admin cost, round trip airfare, including all off-site costs)			4		[redacted]			
	(b) Weekly rate (all designer on site costs including accommodation, transport, food, per diem)			4		[redacted]			
19	**Spare components** (refer to Table 1 below for schedule of quantities and prices)					[redacted]			
						SUBTOTAL (Provisional Sums - Payment Items 15 to 19)	[redacted]		[redacted]
						CONTRACT PRICE (aggregate of the above, including price of bonding)	[redacted]		[redacted]
						GST	[redacted]		[redacted]
						PST (if applicable)	[redacted]		[redacted]
						Aggregate Total	[redacted]		[redacted]

* Estimated weight for legs and extension only.

Table 1: Schedule of Quantities and Prices for Payment Item 18 – Provisional Sum for Spare Components

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Unit	Amount	Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
1(b)	Common Body			1		[redacted]			
2(b)	Common Body			1					
2(d)	+6.0 m Body Extension			1					
3(b)	Basic Tower			5					
3(d)	+3.0 m Mast Extension			2					
3(e)	+4.5 m Mast Extension			2					
3(f)	+6.0 m Mast Extension			9					
5(b)	Common Body			3					
6(b)	Common Body			1					
					TOTAL (Payment Item 18)		[redacted]		[redacted]

OPTIONAL WORK FOR 2L099 River Crossing Dead End Towers

Payment Item	Description	Quantity (each)			Estimated Weight (kg)	BASE PROPOSAL		ALTERNATIVE PROPOSAL	
		5L005	5L006	Total		Price per Unit	Amount	Price per Unit	Amount
		(a)	(b)	(c) = (a) + (b)	(d)	(e)	(f) = (c) x (e)	(g)	(h) = (c) x (g)
SUPPLY OF TOWERS									
18	**2L099 River Crossing Dead End Towers**			2	35,000	[redacted]			

Unit prices for additional Services as required by BC Hydro:

Payment Item	Description	Unit	Unit Price (BC Hydro pre-approved fasteners)	Unit Price (Sa-Ra fasteners)
1	**Fasteners** – complete with bolts, nuts and spring washers (procured from BC Hydro pre-qualified manufacturer as per SP3.6)		[redacted]	
	(a) 5/8" dia x 1-1/2" lg	MT		
	(b) 5/8" dia x 1-3/4" lg	MT		
	(c) 5/8" dia x 2" lg	MT		
	(d) 5/8" dia x 2-1/4" lg	MT		
	(e) 5/8" dia x 2-1/2" lg	MT		
	(f) 5/8" dia x 2-3/4" lg	MT		
	(g) 5/8" dia x 3" lg	MT		
	(h) 5/8" dia x 3-1/4" lg	MT		
	(i) 5/8" dia x 3-1/2" lg	MT		
	(j) 5/8" dia x 3-3/4" lg	MT		
	(k) 5/8" dia x 4" lg	MT		
	(l) 5/8" dia x 4-1/4" lg	MT		
	(m) 5/8" dia x 4-1/2" lg	MT		
	(n) 3/4" dia x 1-1/2" lg	MT		
	(o) 3/4" dia x 1-3/4" lg	MT		
	(p) 3/4" dia x 2" lg	MT		
	(q) 3/4" dia x 2-1/4" lg	MT		
	(r) 3/4" dia x 2-1/2" lg	MT		
	(s) 3/4" dia x 2-3/4" lg	MT		
	(t) 3/4" dia x 3" lg	MT		

Payment Item	Description	Unit	Unit Price (BC Hydro pre-approved fasteners)	Unit Price (Sa-Ra fasteners)
	(u) 3/4" dia x 3-1/4" lg	MT	[redacted]	
	(v) 3/4" dia x 3-1/2" lg	MT		
	(w) 3/4" dia x 3-3/4" lg	MT		
	(x) 3/4" dia x 4" lg	MT		
	(y) 3/4" dia x 4-1/4" lg	MT		
	(z) 3/4" dia x 4-1/2" lg	MT		
2	**Step Bolts** – complete with two nuts and spring washers (procured from BC Hydro pre-qualified manufacturer as per SP3.6)			
	(a) 5/8" dia x 7" lg	MT		
	(b) 5/8" dia x 8" lg	MT		
	(c) 3/4" dia x 8" lg	MT		
	(d) 3/4" dia x 8-1/2" lg	MT		
	(e) 3/4" dia x 9-1/2" lg	MT		
3	**Plates**	MT		
4	**Angles**			
	(a) up to L4"	MT		
	(b) up to L8"	MT		
5	**Stub Angles** (for Grillage Foundations)			
	(a) Lattice Structures Type 54A (Estimated Quantity = 36)	MT		
	(b) Lattice Structures Type 54C (Estimated Quantity = 36)	MT		
	(c) Lattice Structures Type 54J (Estimated Quantity = 28)	MT		

Payment Item	Description	Unit	Unit Price (BC Hydro pre-approved fasteners)	Unit Price (Sa-Ra fasteners)
6	**Stub Base Shoe** (for Pile Foundations)			
	(a) Lattice Structures Type 54A (Estimated Quantity = 64)	MT		
	(b) Lattice Structures Type 54C (Estimated Quantity = 8)	MT		
	(c) Lattice Structures Type 54J (Estimated Quantity = 44)	MT		
7	**Additional Prototype Trial Assembly**			
	(a) Lattice Structures Type 2AGM	each		
	(b) Lattice Structures Type 8KGT	each		
	(c) Lattice Structures Type 54GA	each		
	(d) Lattice Structures Type 54A	each		
	(e) Lattice Structures Type 54C	each		
	(f) Lattice Structures Type 54J	each		
8	**Personnel Rates**			
	(a) Lead Designer or Engineer	hour		
	(b) Detailer	hour		
	(c) Drafter	hour		
	(d) Others (please specify)	hour		

EXHIBIT E-1
PAYMENT SCHEDULE

Payment requests for items indicated "Lump Sum" to be made following completion of the applicable Payment Event.

Payment requests for items indicated "Progress" to be made monthly, based on percentage of completion of the applicable Payment Event.

Each Payment Event is subject to a 5% Performance Security Holdback as stipulated in GC.6.6.

PAYMENT SCHEDULE FOR LATTICE STRUCTURES

No.	Payment Event	Payment	% of Payment Item
Lattice Structures Type 2AGM			
1.	Upon acceptance of 65% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	30% of Payment Item 1(a)
2.	Upon acceptance of 95% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	70% of Payment Item 1(a)
3.	Procurement and delivery of steel to proponents works and upon receipt of all supporting documentation (material certification and unpriced purchase orders for the same) (Package 4)	Progress	40% of Payment Items 1(b) – 1(i)
4.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 4)	Progress	50% of Payment Items 1(b) – 1(i)
5.	Upon receipt and acceptance of "Issued for Record" Drawings	Lump Sum	10% of Payment Items 1(b) – 1(i)
Lattice Structures Type 8KGT			
6.	Upon acceptance of 65% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	30% of Payment Item 2(a)
7.	Upon acceptance of 95% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	70% of Payment Item 2(a)
8.	Procurement and delivery of steel to proponents works and upon receipt of all supporting documentation (material certification and unpriced purchase orders for the same) (Package 4)	Progress	40% of Payment Items 2(b) – 2(i)
9.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 4)	Progress	50% of Payment Items 2(b) – 2(i)

No.	Payment Event	Payment	% of Payment Item
10.	Upon receipt and acceptance of "Issued for Record" Drawings	Lump Sum	10% of Payment Items 2(b) – 2(i)
Lattice Structures Type 54GA			
11.	Upon acceptance of 65% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	30% of Payment Item 3(a)
12.	Upon acceptance of 95% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	70% of Payment Item 3(a)
13.	Procurement and delivery of steel to proponents works and upon receipt of all supporting documentation (material certification and unpriced purchase orders for the same) (Package 1)	Progress	40% of Payment Items 3(b) – 3(e)
14.	Procurement and delivery of steel to proponents works and upon receipt of all supporting documentation (material certification and unpriced purchase orders for the same) (Package 2)	Progress	40% of Payment Items 3(b) – 3(e)
15.	Procurement and delivery of steel to proponents works and upon receipt of all supporting documentation (material certification and unpriced purchase orders for the same) (Package 5)	Progress	40% of Payment Items 3(b) – 3(e)
16.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 1)	Progress	50% of Payment Items 3(b) – 3(e)
17.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 2)	Progress	50% of Payment Items 3(b) – 3(e)
18.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 5)	Progress	50% of Payment Items 3(b) – 3(e)
19.	Upon receipt and acceptance of "Issued for Record" Drawings	Lump Sum	10% of Payment Items 3(b) – 3(e)
Lattice Structures Type 54A			
20.	Upon acceptance of 65% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	30% of Payment Item 4(a)
21.	Upon acceptance of 95% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	70% of Payment Item 4(a)
22.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 3)	Progress	50% of Payment Items 4(b) – 4(m)

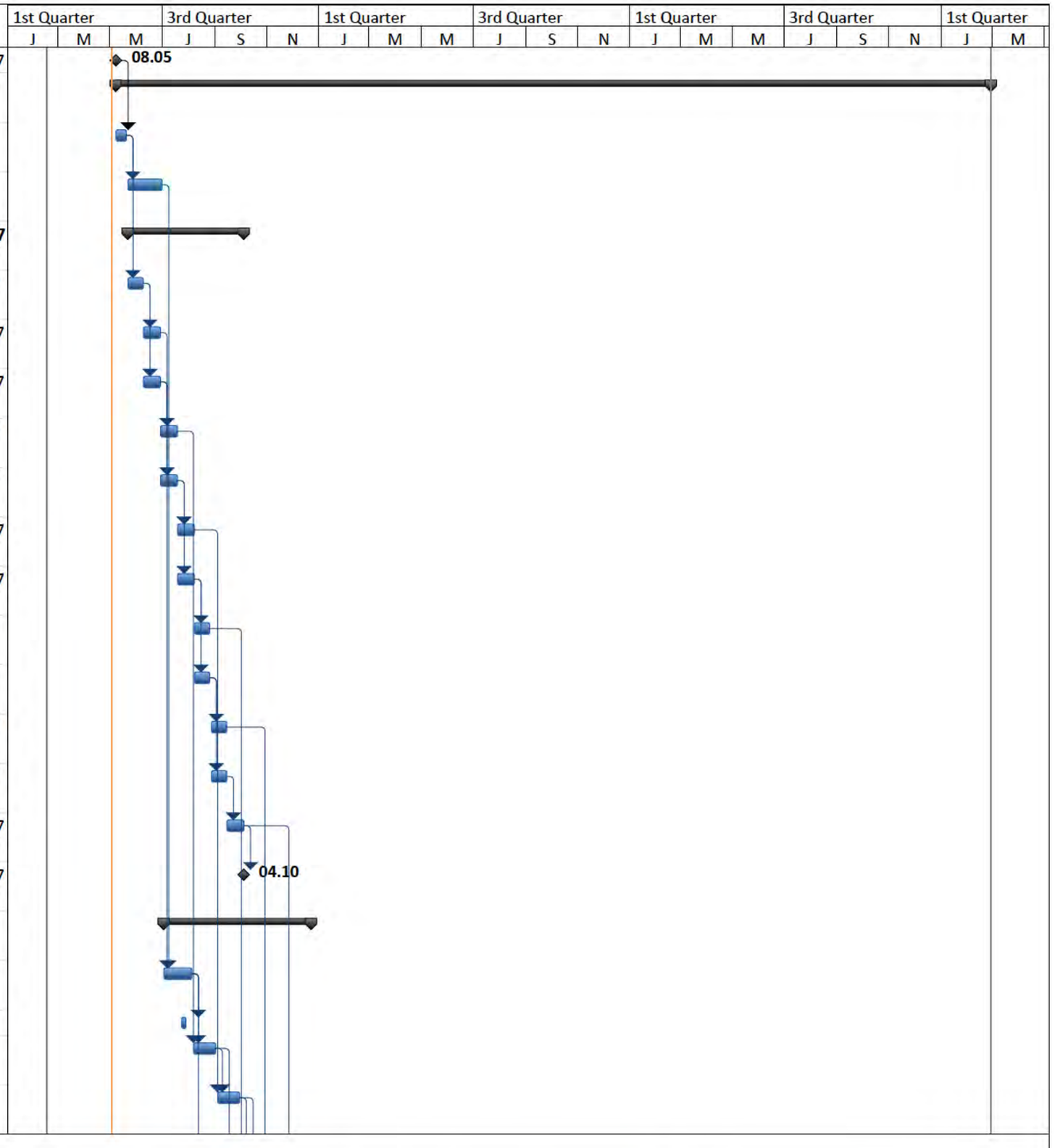
No.	Payment Event	Payment	% of Payment Item
23.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 6)	Progress	50% of Payment Items 4(b) – 4(m)
24.	Upon receipt and acceptance of "Issued for Record" Drawings	Lump Sum	10% of Payment Items 4(b) – 4(m)
Lattice Structures Type 54C			
25.	Upon acceptance of 65% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	30% of Payment Item 5(a)
26.	Upon acceptance of 95% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	70% of Payment Item 5(a)
27.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 3)	Progress	50% of Payment Items 5(b) – 5(o)
28.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 6)	Progress	50% of Payment Items 5(b) – 5(o)
29.	Upon receipt and acceptance of "Issued for Record" Drawings	Lump sum	10% of Payment Items 5(b) – 5(o)
Lattice Structures Type 54J			
30.	Upon acceptance of 65% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	30% of Payment Item 6(a)
31.	Upon acceptance of 95% Design by Hydro's Representative (connection design, detailing, drafting)	Lump Sum	70% of Payment Item 6(a)
32.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 3)	Progress	50% of Payment Items 6(b) – 6(m)
33.	Supply and delivery of towers to marshalling yard and acceptance by Hydro's Representative (Package 6)	Progress	50% of Payment Items 6(b) – 6(m)
34.	Upon receipt and acceptance of "Issued for Record" Drawings	Lump Sum	10% of Payment Items 6(b) – 6(m)

Proponents may propose their own payment milestones but need to indicate the advantage to BC Hydro.

APPENDIX F – SUPPLY SCHEDULE

Per attached Supply Schedule Rev. 4

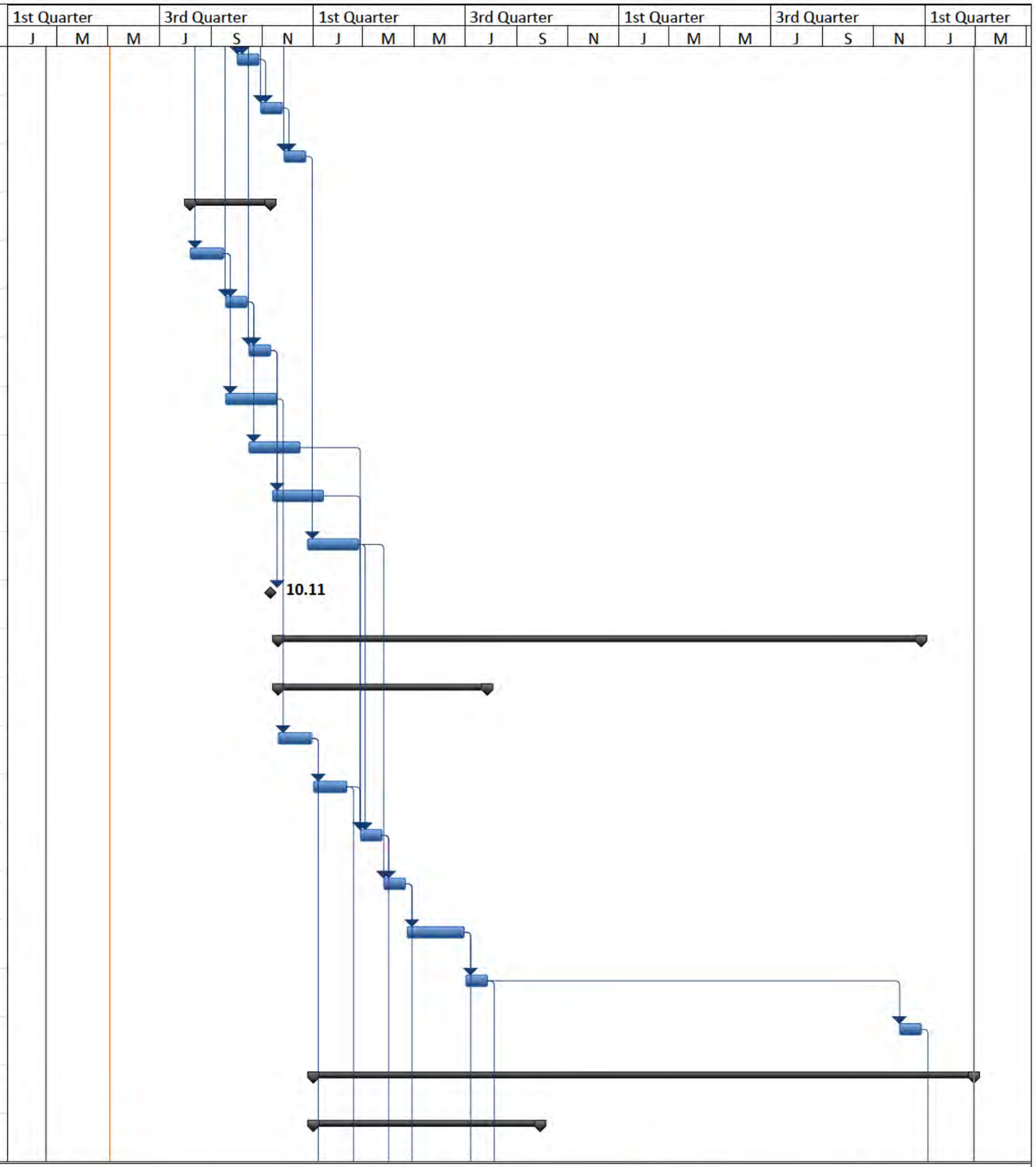
ID	Task Mode	Task Name	Duration	Start	Finish
1		**Project Start Date**	0 days	Mon 08.05.17	Mon 08.05.17
2		**Site C Supply of Steel Lattice Towers Project**	**735 days**	**Mon 08.05.17**	**Fri 28.02.20**
3		Initial Engineering for Raw Material Procurement	10 days	Mon 08.05.17	Fri 19.05.17
4		Raw Material Procurement For Prototype	30 days	Mon 22.05.17	Fri 30.06.17
5		**Connection Design & Detailing**	**98 days**	**Mon 22.05.17**	**Wed 04.10.17**
6		54GA	14 days	Mon 22.05.17	Thu 08.06.17
7		BC Hydro Review / Approval for Prototype	14 days	Fri 09.06.17	Wed 28.06.17
8		54A	14 days	Fri 09.06.17	Wed 28.06.17
9		BC Hydro Review / Approval for Prototype	14 days	Thu 29.06.17	Tue 18.07.17
10		54C	14 days	Thu 29.06.17	Tue 18.07.17
11		BC Hydro Review / Approval for Prototype	14 days	Wed 19.07.17	Mon 07.08.17
12		54J	14 days	Wed 19.07.17	Mon 07.08.17
13		BC Hydro Review / Approval for Prototype	14 days	Tue 08.08.17	Fri 25.08.17
14		8KGT	14 days	Tue 08.08.17	Fri 25.08.17
15		BC Hydro Review / Approval for Prototype	14 days	Mon 28.08.17	Thu 14.09.17
16		2AGM	14 days	Mon 28.08.17	Thu 14.09.17
17		BC Hydro Review / Approval for Prototype	14 days	Fri 15.09.17	Wed 04.10.17
18		Preliminary (65% Design) drawings, signed	0 days	Wed 04.10.17	Wed 04.10.17
19		**Prototype Production, Assembly and Testing**	**125 days**	**Mon 03.07.17**	**Fri 22.12.17**
20		54GA	25 days	Mon 03.07.17	Fri 04.08.17
21		*Shipment Time to Testing Station*	*5 days*	*Mon 24.07.17*	*Fri 28.07.17*
22		54A	20 days	Mon 07.08.17	Fri 01.09.17
23		54C	20 days	Mon 04.09.17	Fri 29.09.17



Project: Site C Supply of Lattice To
Date: Wed 03.05.17

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Progress	
Milestone	External Milestone	Manual Task	Start-only		
Summary	Inactive Task	Duration-only	Finish-only		

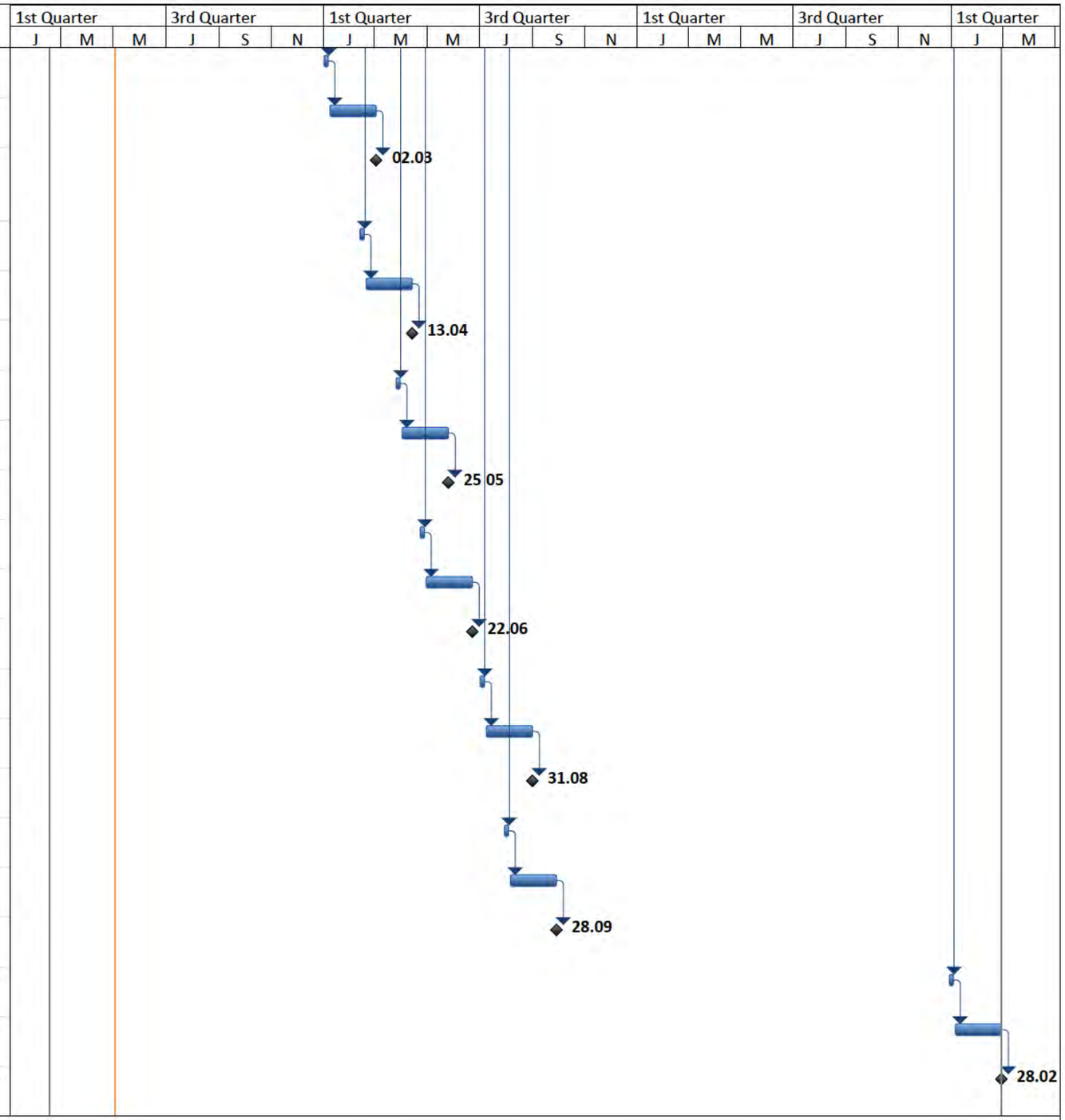
ID	Task Mode	Task Name	Duration	Start	Finish
24		54J	20 days	Mon 02.10.17	Fri 27.10.17
25		8KGT	20 days	Mon 30.10.17	Fri 24.11.17
26		2AGM	20 days	Mon 27.11.17	Fri 22.12.17
27		**Shipment to Testing Station and Full Scale Load Test**	**70 days**	**Mon 07.08.17**	**Fri 10.11.17**
28		54GA	30 days	Mon 07.08.17	Fri 15.09.17
29		54A	20 days	Mon 18.09.17	Fri 13.10.17
30		54C	20 days	Mon 16.10.17	Fri 10.11.17
31		Raw Material Procurement (54GA)	45 days	Mon 18.09.17	Fri 17.11.17
32		Raw Material Procurement (54A)	45 days	Mon 16.10.17	Fri 15.12.17
33		Raw Material Procurement (54C)	45 days	Mon 13.11.17	Fri 12.01.18
34		Raw Material Procurement (Remaining Towers)	45 days	Mon 25.12.17	Fri 23.02.18
35		Final Drawings Signed & Sealed	0 days	Fri 10.11.17	Fri 10.11.17
36		**Production Runs**	**550 days**	**Mon 20.11.17**	**Fri 27.12.19**
37		**5L005/5L006**	**180 days**	**Mon 20.11.17**	**Fri 27.07.18**
38		Package 1 54GA (25%)	30 days	Mon 20.11.17	Fri 29.12.17
39		Package 2 54GA (25%)	30 days	Mon 01.01.18	Fri 09.02.18
40		Package 3 54A, 54C, 54J (50%)	20 days	Mon 26.02.18	Fri 23.03.18
41		Package 4 8KGT, 2AGM (100%)	20 days	Mon 26.03.18	Fri 20.04.18
42		Package 5 54GA (50%)	50 days	Mon 23.04.18	Fri 29.06.18
43		Package 6 54A, 54C, 54J (50%)	20 days	Mon 02.07.18	Fri 27.07.18
44		5L015/16/17	20 days	Mon 02.12.19	Fri 27.12.19
45		**Shipments (Transit Time)**	**565 days**	**Mon 01.01.18**	**Fri 28.02.20**
46		**5L005/5L006**	**195 days**	**Mon 01.01.18**	**Fri 28.09.18**



Project: Site C Supply of Lattice To
Date: Wed 03.05.17

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Progress	
Milestone	External Milestone	Manual Task	Start-only		
Summary	Inactive Task	Duration-only	Finish-only		

ID	Task Mode	Task Name	Duration	Start	Finish
47		FAT Package 1 54GA (25%)	5 days	Mon 01.01.18	Fri 05.01.18
48		Package 1 54GA (25%)	40 days	Mon 08.01.18	Fri 02.03.18
49		First Delivery Milestone - (Not Before Marshalling yard Available to Receive Deliveries)	0 days	Fri 02.03.18	Fri 02.03.18
50		FAT Package 2 54GA (25%)	5 days	Mon 12.02.18	Fri 16.02.18
51		Package 2 54GA (25%)	40 days	Mon 19.02.18	Fri 13.04.18
52		Package 2 54GA (25%) Delivery Milestone	0 days	Fri 13.04.18	Fri 13.04.18
53		FAT Package 3 54A, 54C, 54J (50%)	5 days	Mon 26.03.18	Fri 30.03.18
54		Package 3 54A, 54C, 54J (50%)	40 days	Mon 02.04.18	Fri 25.05.18
55		Package 3 54A, 54C, 54J (50%) Delivery Milestone	0 days	Fri 25.05.18	Fri 25.05.18
56		FAT Package 4 8KGT, 2AGM (100%)	5 days	Mon 23.04.18	Fri 27.04.18
57		Package 4 8KGT, 2AGM (100%)	40 days	Mon 30.04.18	Fri 22.06.18
58		Package 4 8KGT, 2AGM (100%) Delivery Milestone	0 days	Fri 22.06.18	Fri 22.06.18
59		FAT Package 5 54GA (50%)	5 days	Mon 02.07.18	Fri 06.07.18
60		Package 5 54GA (50%)	40 days	Mon 09.07.18	Fri 31.08.18
61		Package 5 54GA (50%) Delivery Milestone	0 days	Fri 31.08.18	Fri 31.08.18
62		FAT Package 6 54A, 54C, 54J (50%)	5 days	Mon 30.07.18	Fri 03.08.18
63		Package 6 54A, 54C, 54J (50%)	40 days	Mon 06.08.18	Fri 28.09.18
64		Package 6 54A, 54C, 54J (50%) Delivery Milestone	0 days	Fri 28.09.18	Fri 28.09.18
65		FAT 5L015/16/17	5 days	Mon 30.12.19	Fri 03.01.20
66		5L015/16/17	40 days	Mon 06.01.20	Fri 28.02.20
67		5L015/16/17 Delivery Milestone	0 days	Fri 28.02.20	Fri 28.02.20



Project: Site C Supply of Lattice To
Date: Wed 03.05.17

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Progress	
Milestone	External Milestone	Manual Task	Start-only		
Summary	Inactive Task	Duration-only	Finish-only		

APPENDIX G – SPECIFICATIONS

INDEX

SP1 GENERAL

SP1.1 PROJECT DESCRIPTION

The Site C Clean Energy Project ("**Site C**") will be a third dam on the Peace River that will optimize BC Hydro's two existing heritage assets upstream and develop the hydroelectric potential of the Peace River. Once built, the project will provide 1100 MW of capacity and 5100 GWh of energy per year – enough to power the equivalent of about 450,000 homes per year in B.C.

Transmission lines 5L005 and 5L006 are two new 75 kilometer, single circuit, 500 kV transmission lines that will connect the new Site C substation to the BC Hydro integrated electrical system at Peace Canyon Generating Station (PCN). Construction of the transmission lines is expected to start in 2017.

The project also includes three one kilometer long transmission lines, designated 5L015, 5L016 and 5L017, that will connect the Site C generating station to the Site C substation.

SP1.2 SCOPE

The scope of Services is the supply, which includes the connection design, detailing, fabrication, full trial assembly, full-scale load testing, packaging, shipping and delivery to the Delivery Point, of galvanized steel lattice towers for the Site C transmission lines 5L005 and 5L006 with provisional supply of towers for 5L015, 5L016 and 5L017. Also included is optional pricing for supply of two river crossing dead end towers for Terrace to Kitimat Transmission Line 2L099.

The supply of towers will include fasteners (including bolts, nuts, spring washers and step bolts) to be procured from one of the BC Hydro pre-approved suppliers listed in SP3.6. Fasteners will be supplied with an additional 5% over the quantity of fasteners shown as required in the bill of materials drawings. The supply of the towers will include galvanized ring fills.

The supply of towers will include the base assembly consisting of upper base, lower base and threaded stud of the guyed tower type 54GA. BC Hydro provides tower specification drawings, loading application table drawings, design outline drawings, and typical details drawings for tower types 54GA, 54A, 54C and 54J as listed in the drawings. BC Hydro also provides, for information only, structural detail drawings for tower types 52A, 53A and 53C based on which the 54GA, 54A and 54C towers have been designed. For tower type 54J, BC Hydro provides original structural detail drawings for tower type 53J as listed in the drawings.

BC Hydro provides tower specification drawings, and original structural detail drawings for tower types 2AGM and 8KGT as listed in the drawings.

The Contract includes but is not limited to the following:

1.2.1 Tower Types 2AGM and 8KGT

1. Provide structural detail drawings for each of the tower types 2AGM and 8KGT, including complete bill of materials, erection and fabrication (shop) detail drawings, for review and acceptance by BC Hydro. Creation of drawings will be based on details provided in existing structural detail drawings, unless otherwise approved by BC Hydro. Drawing package will include fabrication (shop) detail for each of the tower members. All drawings will be prepared using the latest version of AutoCAD or Microstation CAD software.

2. Fabricate and trial assemble each of the tower types 2AGM and 8KGT to demonstrate and confirm that the towers and all of its components will fit as detailed.

3. Package and deliver towers 2AGM and 8KGT as per quantities specified in the Schedule of Quantities and Prices.

1.2.2 Tower Types 54GA, 54A, 54C and 54J

1. Provide structural detail drawings for each of the tower types 54GA, 54A, 54C and 54J, including complete bill of materials, erection and fabrication (shop) detail drawings, for review and acceptance by BC Hydro. Creation of drawings will be based on details provided in specification drawings, loading application table drawings, design outline drawings, and typical detail drawings, unless otherwise approved by BC Hydro. Drawing package will include fabrication (shop) detail for each of the tower members. All drawings will be prepared using the latest version of AutoCAD software or Microstation CAD.

2. Fabricate and full-scale load test each of the tower types 54GA, 54A and 54C to demonstrate and confirm that the towers and all of its components will perform as designed and detailed.

3. Fabricate and trial assemble each of the tower types 54GA, 54A, 54C and 54J to demonstrate and confirm that the towers and all of its components will fit as detailed. All increments of body extensions and leg extensions, for self-supporting towers, will be trial assembled and mated to a minimum of one section above and below to confirm fit.

4. Package and deliver towers 54GA, 54A, 54C and 54J as per quantities specified in the Schedule of Quantities and Prices.

SP1.3 PROJECT SCHEDULE

The Supplier will incorporate the following key delivery milestones into the Supply Schedule and submit for review and acceptance by Hydro's Representative in accordance with GC.5.6 and Appendix F – Supply Schedule.

Milestone Dates

The following milestone dates are provided, subject to Contract award by April 19, 2017.

Item	Activity	Contract Milestone Date
1	Preliminary foundation interface structural detail drawings, tower types 54GA, 54A and 54C	30 days after award
2	Preliminary (65% Design) drawings, signed and sealed as “Issued for Tender” (to be used as reference drawings in Transmission Line Construction Contract RFP)	June 30, 2017
3	Final drawings, signed and sealed as “Issued for Construction”	30 days prior to shipment
4	Marshalling Yard available to receive deliveries	December 1, 2017
5	Delivery of complete 5L005/5L006 Tower structures including guyed tower base assemblies, fasteners and accessories	
	Package 1 – Type 54GA (25%)	March 2, 2018
	Package 2 – Type 54GA (25%)	April 13, 2018
	Package 3 – Types 54A, 54C, 54J, (50%)	May 25, 2018
	Package 4 – Types 8KGT, 2AGM	June 22, 2018
	Package 5 – Type 54GA (50%)	August 31, 2018
	Package 6 – Types 54A, 54C, 54J, (50%)	September 28, 2018
6	Delivery of 2L099 structures including base assemblies (if applicable), fasteners and accessories (OPTIONAL)	August 2018
7	Delivery of 5L015/16/17 structures including base assemblies (if applicable), fasteners and accessories	February 28, 2020
8	“Issued for Record” drawings	Within 12 months after shipment

SP1.4 WORK NOT INCLUDED

The supply of the following is excluded from the Work:

1. Grillage and pile foundations.
2. Guys, guy anchors and associated hardware except as required for tower testing.
3. Structure number signs.
4. Fall arrest hardware.

SP1.5 DELIVERY POINT

The steel tower parts (disassembled) will be shipped DDP (Delivered Duties Paid per Incoterms 2010) to the transmission line contractor's marshalling yard in the vicinity of Fort St. John, B.C. The Supplier will be advised of the specific address prior to shipping.

Tower parts for 5L015, 016, 017 will be received at a different location, in the vicinity of Fort St. John.

Tower parts for 2L099 (OPTIONAL) will be received at a different location, in the vicinity of Terrace, B.C.

SP1.6 SUPPLIER SUBMITTALS

1.6.1 Drawings, Design Reports, Explanatory Material and Submissions

The Supplier will submit one soft copy of all drawings, design calculations and explanatory material to Hydro's Representative for review and acceptance as specified below.

1. Within 14 days after issuance of contract order for the supply Work, the Supplier will submit detailed design plan and drawing list.

2. Within 14 days after acceptance of design plan, and no less than 30 days before commencement of manufacture, trial assembly or execution of Work, as applicable, the Supplier will submit structural detail drawings, fabrication and erection drawings, and explanatory material (e.g. design report including calculations).

3. Within 14 days after receipt of the detailed fabrication and erection drawings in item 2 above, Hydro's Representative will indicate any exceptions he may wish to make or will give provisional acceptance. Hydro's Representative reserves the right to require the Supplier to make any changes to the Supplier's drawings which were not apparent, or omitted, in the submissions made previously, without incurring additional cost to BC Hydro. Final acceptance by Hydro's Representative of the Supplier's detailed fabrication and erection drawings will be given only upon satisfactory completion of such tests that are required or as directed by Hydro's Representative.

4. Within 14 days after final acceptance outlined in item 3 above is received, the Supplier will supply Hydro's Representative one signed and sealed readable pdf and an electronic CAD file (AutoCAD or Microstation, current version) of the same of each drawing of the submission.

5. At least 30 days prior to the commencement of manufacture, the Supplier will submit to Hydro's Representative, for acceptance, an "Inspection and Test Plan" (ITP) which conforms to the requirements of ISO 9001, including the inspection and testing requirements of this specification. "Customer Inspection and Test Hold Points" will be established jointly between the Supplier and

Hydro's Representative. The Supplier will also provide ITP for manufacture of fasteners.

6. At least 60 days prior to the commencement of full-scale load testing, the Supplier will submit to Hydro's Representative, for acceptance, a Tower Testing Schedule which conforms to the requirements of this specification.

7. At least 30 days prior to the commencement of full-scale load testing, the Supplier will submit to Hydro's Representative, for acceptance, a Tower Testing Plan which conforms to the requirements of this specification.

8. Upon completion of each structure full-scale load test, the Supplier will submit to Hydro's Representative a Tower Test Report (refer to SP2.7.13).

9. Within 14 days after full-scale load test, the Supplier will provide to Hydro's Representative one final signed and sealed readable pdf and an electronic CAD file (AutoCAD or Microstation, current version) of the same of each drawing of the submission which incorporate any design changes following trial assembly tests and full-scale load tests, prior to mass production.

1.6.2 Summary of Submittals by Supplier

A list of required submissions referenced throughout the Contract is provided herein to summarize the requirements for quick reference. In the event of discrepancy between this summary and the requirements of any other part of the specifications, the requirements stated in the relevant part of the specifications will take precedence over the summary. Hydro's Representative may also require additional information including drawings, specifications, records, and manuals as deemed necessary:

Section	Submittal Description	Required By
GC.5.5	Supplier's Quality Plan	Within 10 days after award of Contract
GC.5.6/ Appendix F	Supply Schedule	Within 14 days after award of Contract
GC.16	Supplier insurance coverage	Within 14 days following request by Hydro's Representative
SGC.3	Performance Security	Within 14 days after award of Contract
SP1.6.1(1)/ SP2.4.1	Production Schedule, Design Plan, Drawing List, Quality Plans (towers and fasteners)	14 days after award of Contract (5% design)
SP1.6.1(2)/ SP2.4.1	Initial submission of structural detail drawings, assembly/erection drawings, design report, inspection and test plans (towers and fasteners)	14 days after acceptance of design plan (35% design)

Section	Submittal Description	Required By
SP1.3/ SP1.6.1(4)/ SP2.4.1	Preliminary Design “Issued for Tender” signed and sealed pdf and electronic CAD files of structural detail drawings, fabrication drawings, and assembly/erection drawings	14 days after BCH acceptance of structural detail, fabrication and erection drawings (65% design) Milestone: June 30, 2017
SP1.6.1(5)	Supplier’s Inspection and Test Plan (ITP) for the manufacture of towers and fasteners	30 days prior to commencement of manufacture
SP1.6.1(6)	Tower Testing Schedule	60 days prior to commencement of full-scale load testing
SP1.6.1(7)	Final Tower Testing Plan, Full-Scale Load Testing Inspection and Test Plan (ITP)	30 days prior to commencement of full-scale load testing
SP1.6.1(8)/ SP2.7.13	Provisional Tower Test Report	Immediately following completion of full-scale load testing
SP1.6.1(8)/ SP2.7.13	Final Tower Test Report	Within 14 days after completion of full-scale load testing
SP1.6.1(9)/ SP2.4.1	Final Design signed and sealed pdf and electronic CAD files of structural detail drawings, fabrication drawings, and assembly/erection drawings	Within 14 days after completion of full-scale load testing, prior to mass production (95% design)
SP1.6.4	Production Schedule	Within 14 days after issuance of contract order.
SP2.4.1	Full-Scale Load Testing ITP, Trial Assembly ITP, Supplier’s ITP, Fastener Manufacturer’s ITP, including quality control checklists and recording templates	35% design
SP2.4.1	Design report, updated drawing list, final quality plans, detailed 3D tower models, initial submission of structural detail drawings, assembly/erection drawings, foundation interface detail drawings, tower setting dimensions	35% design
SP2.4.1	Updated 3D tower models, updated/final ITPs, complete preliminary design drawing package for each tower type, updated design report, tower test plan for each tower type	65% design

Section	Submittal Description	Required By
SP2.4.1/ SP2.7.13	Trial assembly test reports, full-scale load testing reports, final CAD/pdf of structural detail drawings, final CAD/pdf of assembly/erection drawings, final CAD/pdf of tower fabrication drawings, design report and supporting material testing documents, final quality plans, final ITPs	95% design
SP3.8	Test Certification	14 days after material sampling, testing, and inspection
SP4.2.1(b)	Bundling and Packaging Plan	60 days after award of Contract
SP4.2.1(f)	Transportation Plan (inland)	3 months prior to shipping
SP1.3	Final Design “Issued for Construction” signed and sealed pdf and electronic CAD files of drawings	30 days prior to shipment
SP4.2.3(a)	Shipping Notice	24 hours before each shipment
SP4.2.3(b)	Shipping Reports (packing list, Bills of Lading, carrier name, etc.)	24 hours after each shipment
Appendix H	Final QA Report	21 days after completion of delivery
SP1.3	“Issued for Record” drawings	Within 12 months after completion of delivery

1.6.3 Electronic Data Site

The electronic data site referred to in GC.5.15 will be the BC Hydro Supply Chain Workspace (SCW) extranet site which will be used by the Supplier and BC Hydro for the official submission and transmittal of drawings, Requests for Information and other formal communication required for the performance of the Services. The Supplier will be given instructions on the use of this site after the contract signing.

1.6.4 Production Schedule (as part of the Supply Schedule)

The Supplier will include in the Supply Schedule a detailed Production Schedule . The Production Schedule will show the time required for engineering/detailing, drafting, material procurement, manufacturing, shop and assembly testing, full-scale load testing, shipping and delivery, all in sufficient detail to identify each component of the Work and progress thereon.

This schedule will align with the tower delivery schedule milestones defined in SP1.2 above.

After acceptance, the Supplier will submit to Hydro’s Representative at monthly intervals, a marked up Supply Schedule to show the actual progress of Work

compared to the original base line. The Supplier will explain cause and effect of any delays and the remedial action taken, or proposed, to maintain the Supply Schedule.

SP1.7 ABBREVIATIONS

The following abbreviations are used in this specification:

APEGBC	Association of Professional Engineers and Geoscientists of British Columbia
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
CSA	Canadian Standards Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
NACE	National Association of Corrosion Engineers

SP1.8 DRAWING AND DRAFTING STANDARDS

The Supplier will prepare final design calculations and submit to Hydro's Representative for information. The design calculations will include all necessary analysis input, output and other miscellaneous calculations to demonstrate the accuracy of the design, including connection design and replacement members if used. This information will be contained within design report.

The Supplier will prepare and supply drawings suitable for fabrication, assembly and erection that conform to the requirements given below:

- Drawings will be in accordance with BC Hydro Engineering Standards ES 10-A0020 and ES 10-A0100, latest revisions.

- The Supplier will prepare drawings in accordance with the requirements of CSA CAN3-B78.1M – "Technical Drawings – General Principles". Specifically, drawing sizes P4 (215 x 280 mm), P3 (280 x 430 mm) and P1 (560 x 860 mm) as listed in Table 1 of the standard. Sizes larger than P1 will not be permitted. (Note, the P series drawings, sizes P1, P3 and P4 were formerly designated D, B and A respectively.)

- All drawings submitted to Hydro's Representative will include notations in the English language and metric dimensions. Imperial dimensions may be shown in brackets beside the metric dimensions. All lettering and figures will be clear and legible, using Segoe UI Semibold font only.

- When referring from one drawing to another, the information will be given on the drawing referred to and not, in turn, referred to another drawing.

- All necessary manufacturing instructions will be clearly indicated.

- All drawings will indicate the scale and primary units of measure.

- Drawings will include a bill of material and total mass. One drawing will be provided as a summary of the total bill of material and mass for the tower type. The size, length and quantity of fasteners for each connection will be indicated, and a table summarizing bolt quantities for each component will be included on the drawing.

- BC Hydro will provide a drawing border template and bill of material template. BC Hydro will supply a list of drawing numbers to be used by the Supplier.

- Drawings submitted for review and acceptance will be provided in pdf format.

- The final drawings will be sent to Hydro's Representative via electronic data site per SP1.6.3, in a file format compatible with BC Hydro's system (Microstation or AutoCAD .dxf). One full size set of final signed and sealed drawing prints will be provided.

Upon completion of the design, for each tower type, the Supplier will provide general standard (5LGS) series of drawings prepared from the 5L005/006 and 5L015/016/017 series of drawings. BC Hydro will provide sample drawing border and title block for the 5LGS series of drawings.

SP2 LATTICE TOWER SUPPLY REQUIREMENTS

SP2.1 PURPOSE OF SECTION

This section sets forth minimum requirements for detailing and manufacture of the single circuit 500 kV lattice towers, including codes and standards to be used and other technical requirements.

The minimum requirements in these technical specifications are not intended to be all-inclusive of the supply requirements, including those necessary to meet other conditions set forth in the Agreement and these specifications.

SP2.2 GENERAL SUPPLY REQUIREMENTS

The Supplier will procure specified structural steel and other materials appropriate for the fabrication, perform connection design and detailing activities, prepare structural detail and fabrication (shop) drawings required for fabrication, and prepare erection drawings required for assembly and installation of the lattice towers. Unless otherwise noted in these specifications, the final deliverables for supply Agreement will:

1. Not deviate from the original design of the type 2AGM and 8KGT lattice towers as shown on the existing BC Hydro drawings provided herein.

2. Utilize, without change, the design information on the type 54GA, 54A, 54C and 54J lattice tower BC Hydro PLS-Tower .BAK files, specification drawings, loading application table drawings, design outline drawings, and typical detail drawings provided herein, including: foundation design details, tower body slope angles, tower outline dimensions, clearance dimensions, structural steel member sizes, bolt hole diameter, number of bolts, conductor attachment system, tower heights including basic tower body, body and leg extensions, unless prior approval provided by BC Hydro.

3. Utilize structural steel conforming to CSA-G40.20-13/G40.21-13 grade 350WT minimum Category 5 (20 J at -20°C).

4. Substitute steel section sizes only where required and with prior approval from BC Hydro. When approved, member substitutions for imperial structural steel sections used in the existing tower designs will be with imperial and/or equivalent metric sizes conforming to CSA-G40.20-13/G40.21-13 grade 350WT minimum Category 5 (20 J at -20°C) having equivalent or higher geometrical properties (e.g. cross sectional area, moment of inertia, second moment, radii of gyration, etc.). The substituted sections will be detailed such that their attachment points to other members and groups of members remain exactly the same as the original (replaced) members including number and position of bolt holes, and gauge lines as per BC Hydro supplied structural detail drawings (for type 2AGM, 8KGT and 54J). Where a member (or angle) is substituted with a new one, orientation of the new member relative to other members will remain unchanged.

5. Utilize edge and end distances on each structural steel member in accordance with the requirements of ASCE 10-15.

6. Detail each tower type with bolt hole diameter and arrangement as shown on each of the BC Hydro provided typical detail/structural detail drawings.

7. Provide for each tower type, detailed structural drawings including, at a minimum, volume and level of structural detail information as shown on the existing BC Hydro structural detail drawings. As a minimum, each structural detail drawing will show, for each individual structural member: member size, gauge lines, centre-to-centre distances (dimensions) between all of the bolt holes on the member, centre-to-centre distance between the edge holes, total length of the member. Sample BC Hydro structural detail drawing numbers 5LGS-T08-00291, 00292 and 00574 are provided in the drawings section.

8. Provide bills of material such that field assembly and erection (by crane or helicopter) of each tower could be planned and carried out in the most efficient manner, e.g. calculate the weight of each subcomponent or subsection, (e.g. crossarm, basic tower, body extension, leg extension, grillage foundation, etc.). The bill of material will show each individual member including: mark number, quantity, length, unit weight, total weight of the total quantity of each mark number required. A sample BC Hydro bill of material drawing number 5LGS-T08-02381 is provided in the drawing section of this RFP.

9. Provide tower assembly/erection drawings presented in the same manner as the existing BC Hydro drawings. Sample BC Hydro assembly/erection drawing numbers 5LGS-T08-03038, 03040, 03042, 03044 are provided in the drawings section. As a minimum, information included on the assembly/erection drawings will equal or exceed the level of information on the existing BC Hydro assembly/erection drawings. Assembly/erection drawings will include bolt information (type, diameter, length, number) and bill of material for each subcomponent/assembly to facilitate installation.

10. Include complete testing of coupon samples of each of the structural steel material (structural steel angles, plates etc.) from each heat lot to confirm mechanical properties of the steel material declared in the mill certificates accompanying the heat lots. Tests will be conducted in certified laboratories by qualified and certified personnel to perform such tests. At a minimum, test will determine yield and tensile strengths, chemical composition (heat analysis), Charpy V-notch test as per CSA-G40.20-13/G40.21-13 for grade 350WT Category 5 (20J at -20°C) steel material.

11. Include complete full prototype tower trial assembly testing of each tower type to confirm that all of the tower members and components will fit as per assembly/erection detail drawings during transmission line construction activities. Partial assembly of the towers is not acceptable as a proof that the tower design will fit. Prototype tower trial assembly will consist of all of the four faces of the tower body including body extensions and leg extensions, crossarms, and, if applicable, base assemblies for foundation interface. At a minimum, first trial assembly will consist of a complete basic tower with zero (±0) leg extension and all of the crossarms and groundwire horns, as

applicable. Thereafter, second mandatory trial assembly consisting of tower pedestal in combination with each of the body extensions and leg extensions will be conducted. When tower components or members which require bending (for example, bent base plate for the 54GA tower, bent plates at the waist of the 54A, 54C and 54J towers) have been utilized in the design/detailing, the Supplier will complete multiple trial assembly tests of subsection(s) of the tower where the bent component and/or members have been utilized. Multiple trial assembly tests are intended to demonstrate that the bent components will fit consistently. The Supplier must demonstrate, through ITP and sufficient number of trial assembly tests, that the design detailing of the manufactured bent components will fit as intended.

12. Include design reports, complete with calculations and test reports, as well as 3D tower models, to confirm that the tower is capable of withstanding the specified design factored loads including the applicable strength factor (SF) for BC Hydro review and acceptance. Design reports shall include, but are not limited to, all necessary analysis input/output and other miscellaneous calculations to demonstrate the accuracy of the design, including connection design and alternate members if used, and all relevant assumptions.

13. Utilize reliability based design (RBD) principle for connection design (i.e. use SF according to load application table drawing for tangent, angle and deadend towers, respectively, and for the construction and maintenance load case, utilize SF of 0.5 for all tower types). Due diligence shall be exercised while finalizing installation friendly feasible connection design towards fulfilling successful full-scale tower tests and trial assembly tests.

14. Utilize design factored loads for full-scale load testing (i.e. apply the inverse of SF to factor the design loads).

SP2.3 DESIGN STANDARDS

2.3.1 General

The design, materials, testing, assembly, erection, fabrication, manufacturing, packaging, storing, bundling, shipping, galvanizing and workmanship must conform to the applicable standards, codes and regulations, or revisions thereto, which are in force as of the date of the Agreement. The design, materials, testing, assembly, erection, fabrication, manufacturing, packaging, storing, bundling, shipping, galvanizing and workmanship must also conform to any BC Hydro standards or guidelines identified in these specifications. Appendices, commentaries, design examples and explanatory notes to design standards, codes and regulations referenced in these specifications will be considered mandatory parts of the standards, codes and regulations or revisions thereto.

Where similar or common design requirements fall under more than one of the applicable standards, codes, regulations and guidelines, the design must comply with the more stringent requirement.

The Supplier will satisfy itself that the design is in accordance with the applicable standards, codes, regulations and guidelines.

2.3.2 Standards, Codes, Regulations and Guidelines

The Supplier's design must meet the following latest versions of standards, codes, regulations and guidelines including Appendices, Annexes, Commentaries, and design examples:

CSA C22.3 No. 1-15	Overhead Systems
CSA C22.3 No. 60826-10	Design Criteria for Overhead Transmission Lines
CSA C83-96 (R2011)	Communication and Powerline Hardware
CSA G40.20-13/G40.21-13	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels
CSA-W59-13	Welded Steel Construction (Metal Arc Welding)
CSA W178.2	Certification of Welding Inspectors
CAN/CGSB 48.9712	Non-Destructive Testing: Qualification and Certification of Personnel
CSA G164	Hot Dip Galvanizing of Irregularly Shaped Articles
CSA W47.1-09	Certification of Companies for Fusion Welding of Steel
CSA W48-14	Filler Metals and Allied Materials for Metal Arc Welding
CSA-S16-14	Design of Steel Structure
CSA ISO-9000	Quality Management Systems – Fundamentals and Vocabulary
CSA ISO-9001	Quality Management Systems – Requirements
CSA ISO-19011	Guidelines for Auditing Management Systems
IEEE 951 (R2009)	Guide to Assembly and Erection of Metal Transmission Structures
IEC 60652	Loading Tests on Overhead Line Structures
IEC 61284	Overhead Lines – Requirements and Tests for Fittings
ASCE 10-15	Design of Lattice Steel Transmission Structures

ASTM A394-08 (R2015)	Standard Specification for Steel Transmission Structure Bolts
ANSI/ASME B18.21.1	Standard Specification for Helical Spring Lock Washers
ASTM F436	Standard Specification for Hardened Steel Washers
ASTM A563-15	Standard Specification for Carbons and Alloy Steel Nuts
ASTM A673/A673M-07 (R2012)	Standard Specification for Sampling Procedure for Impact Testing of Structural Steel
ASTM E8/E8M-15	Standard Test Methods for Tension Testing of Metallic Materials
ASTM E164-13	Standard Practice for Contact Ultrasonic Testing of Weldments
ASTM E709-15	Standard Guide for Magnetic Particle Testing
ASTM E165/E165M-12	Standard Practice for Liquid Penetrant Examination for General Industry
ASTM E94-04 (R2010)	Standard Guide for Radiographic Examination
NACE No. 3/SSPC-SP 6 (R2006)	Joint Surface Preparation Standard: Commercial Blast Cleaning
CSA CAN3-B78.1-M83 (R2002)	Technical Drawings – General Principles

SP2.4 ENGINEERING STANDARDS

2.4.1 Design Documentation

The Supplier will prepare all design documentation including design report, structural detail drawings, fabrication (shop) detail drawings, assembly and erection details, bills of material, material specifications, material mill certification, material test results and other documentation necessary to allow BC Hydro to review, evaluate and accept the design. Unless otherwise noted, 500 kV lattice tower detail, erection, assembly and fabrication drawings will be prepared, at a minimum, on P3 standard drawing size. Each drawing will be prepared using BC Hydro's standard drafting layout principles, i.e. standard title block, structural dimensions, drawing arrangement. Each design document package must be presented in a manner that would allow BC Hydro to operate and maintain the 500 kV lattice towers. All engineering drawings must be presented using BC Hydro-specified drawing border. The design report and tower test report will be assigned a drawing number and/or report number and cross referenced as required on all design documents including detail drawings. Where applicable, BC Hydro-supplied exhibits (e.g. existing tower

detail and assembly drawings) in these specifications will be referenced on design documents with their appropriate drawing and/or reference numbers.

If the Supplier chooses to divide the Work into subcomponents for design, detailing, testing and manufacturing, the requirements and submittals identified in these specifications will apply to each Work subcomponent. If the Supplier chooses to divide the Work in a given subcomponent into separate packages, the requirements and submittals identified in these specifications will apply to each Work in a given subcomponent package.

Design documentation will include connection design calculations and other design information necessary to illustrate the Supplier's current level of design completion. drawings and design documentation for each tower type will be provided to BC Hydro at design milestones, which at a minimum will include the following:

1. 5% design – production schedule, design plan, drawing list, quality plans (towers and fasteners).

2. 35% design – initial submission of structural detail drawings and assembly/erection drawings, preliminary design report, inspection and test plans (towers and fasteners), inspection and test plans (full-scale testing).

3. 65% design – complete set of preliminary design structural detail drawings, fabrication (shop) detail drawings, erection/assembly detail drawings, complete design report, final test plans for full-scale tower testing.

4. 95% design – final structural detail drawings, final erection/assembly detail drawings and bills of material, final fabrication (shop) detail drawings, final design report, final test reports (trial assembly and full-scale testing).

The 5% design will provide all necessary information to detail plans for design, production and quality management. The 5% design submission will provide, but is not limited to, the following:

1. Detailed project schedule showing key milestone dates.
2. Design plan.
3. Drawing list, including schedule of structural detail drawings, assembly/erection drawings, and fabrication (shop) drawings for each of the steel lattice towers (including but not limited to drawing numbers and drawing titles).
4. Quality plan for fabrication of towers and quality plan for manufacture of fasteners.

The 35% design will address all BC Hydro comments on the 5% design and, in addition, provide sufficient information to illustrate the Supplier's approach to connection design and detailing for each of the tower types. The connection design and detailing will avoid and minimize eccentricities in the connections between tower members and components. Preliminary structural detail drawings will be presented in combination with a complete 3D tower model to confirm that the detailing meets the requirements of the specifications. The 35% design submission will provide, but not limited to, the following:

1. Design report.
2. Updated drawing list.
3. Final quality plans (towers and fasteners).
4. Detailed 3D tower model (X-Steel) of each tower (also in SDNF format).
5. Structural detail drawings for each of the tower types.
6. Tower setting dimensions.
7. Foundation interface detail drawings, including base assembly, for guyed tower mast foundation.
8. Assembly/Erection drawings for each of the tower types.
9. Inspection and Test Plan (ITP) for the full-scale load testing, including quality control checklists and recording templates.
10. ITP for the trial assembly and production, including quality control checklists and recording templates.
11. ITP for the manufacture of fasteners.

The 65% design will address all BC Hydro comments resulting from the 35% design and will represent the draft of all material procurement, structural detail drawings, fabrication (shop) detail drawings and assembly/erection detail drawings, bill of material, and any other documentation necessary to convey the work plan, including:

1. All hardware necessary for insulator assembly attachment at respective attachment points on the crossarms and/or OHGW as required by these specifications.
2. Updated 3D tower models for each tower type.
3. Updated and/or final ITP including test schedule (list of tests, test program, timetable, sequence and method of recording/documenting test results) to proof qualification/certification and/or accreditation of personnel and laboratories to be used to perform all of the material testing as required by these specifications.
4. For each tower type, complete preliminary design drawing package including structural detail drawings, tower setting dimensions, assembly/erection detail drawings, bill of material, and fabrication (shop) detail drawings. Drawing package for each tower type will be prepared and submitted in CAD (.dgn files or compatible .dxf) and pdf digital copies.
   Drawings shall be signed and sealed “Issued for Tender” according to required SP1.3 schedule milestone date (suitable for inclusion in Transmission Line Construction Contract Request for Proposal package).
5. Updated design report.
6. Tower Test Plan for each tower type, if applicable, as required by these specifications.
7. Final quality plan for towers and quality plan for fasteners.
8. Final ITP for towers.
9. Final ITP for fasteners.

The 95% design will address all BC Hydro comments resulting from the review of the 65% design package and will fully specify and illustrate the following:

1. Trial assembly test report for each tower type as required by these specifications including records of misfits and modifications thereof, video and photo records of trial assembly/erection and other trial assembly test evidence and documentation as required by these specifications.

2. Full-scale load testing report for each tower type as required by these specifications including final structure test plan, final test load sequence, deflection measurements, records of detail drawing modifications, video and photo records of testing and other load test evidence and documentation as required by these specifications.
3. Final CAD, pdf, and hard copies of structural detail drawings for each tower type incorporating all modifications resulting from tower trial assembly test and full-scale load test.
4. Final CAD, pdf, and hard copies of assembly/erection detail drawings for each tower type incorporating all modifications resulting from tower trial assembly test and full-scale load test.
5. Final CAD, pdf, and hard copies of tower fabrication (shop) detail drawings incorporating all modifications resulting from tower trial assembly test and full-scale load test.
6. Final digital, pdf and hard copies of design documents including, as a minimum, design report, mill certificates, certified material test reports as required by these specifications.
7. Final 3D tower models for each tower type.
8. Final quality plans (towers and fasteners).
9. Final ITP for assembly and production of towers.
10. Final ITP for the manufacture of fasteners.

Progressions of design at the milestone dates will be submitted which, in general, will reflect the level of completion for the submission.

Refer to GC.5.14 regarding review process of submittals.

2.4.2 Computer-Aided Design Tools

The connection design and detailing must be accomplished using 3D tower modelling software. The connection design for each of the towers must consider all of the specified load cases and load combinations with the appropriate strength factor for each load case. All drawings (e.g. structural detail drawings, assembly/erection detail drawings, fabrication (shop) detail drawings) will be prepared in .dgn file format using the latest edition of Microstation software (or .dwg file format using the latest edition of AutoCAD software).

The Supplier will provide BC Hydro with electronic copies of connection design calculations and 3D tower models, in addition to any revised PLS-Tower models, as well as electronic copies of CAD (.dgn files, .dwg files, or compatible .dxf), pdf and hard copies of drawing package for each tower type, at each design milestone submission and for the final tower design/drawing package.

2.4.3 Drawing and Drafting Standards

The Supplier’s drawing package(s) for each tower type will be suitable for fabrication, assembly and erection. The drawings must be prepared with appropriate version control information, notations, drawing numbers, title blocks, and other drafting standards set out in these specifications. All drawings will be prepared in .dgn files using the latest edition of Microstation CAD software (or AutoCAD .dwg).

Structural detail drawings will:

1. Show such detail as is necessary for the fabrication of components and/or subcomponents. Members will be shown assembled in place. The level and amount of information presented on structural detail drawings will be equal or exceed the information presented on the original BC Hydro structural detail drawings provided herein and based on which the towers have been designed and detailed, where applicable.

2. Show for each individual member: member size, gauge line(s) from the edge of the individual member, centre-to-center distance(s) from one bolt hole to another, centre-to-centre distance from the end bolt holes, total length of the individual member.

3. Show expanded detail of each individual connection and/or connection point(s).

4. Show edge and end distances of each individual member in accordance with the latest edition of ASCE 10, notwithstanding the edge and end distances on the existing BC Hydro structural detail drawings, where applicable.

5. Show bolt length and quantity required to make connection of the combination of individual members at each bolt connection point using ASTM A394 type T1 tower bolts. Bolt quantity and length will be shown in the same manner as shown on the original BC Hydro drawings provided herein. Supplier will provide copy of bolt grip table used for detailing as means to verify the bolt lengths shown.

6. Identify individual pieces and members by mark number. Individual members in each component will be numbered consecutively. “Left” and “Right” marking system is not to be used.

7. Use two or more drawings, numbered consecutively, when a component or subcomponent is too large to be detailed on one drawing.

8. Show the details of similar members on the same drawing completely for each member. References such as “parts not shown same as”, or “opposite hand to” will not be used.

9. When referring from one drawing to another, provide all information on the drawing to which reference is made (and not, in turn, refer to another drawing).

10. Avoid slight variations in details. When a piece cannot be symmetrical, the bolts will be spaced so it cannot be reversed by mistake. When two pieces must be slightly different, they will be detailed such that an interchange is impossible.

11. Present each tower subsection (e.g. crossarm, pedestal, body extension, ±0 leg extension, etc.) on a separate drawing with a separate drawing title and drawing number assigned to the drawing. Where it is not possible to present the complete longitudinal/transverse views together with various section views and connection details on one single drawing, additional extension sheet(s) will

be added to the drawing such that all of the drawings have the same drawing number but different sheet number (e.g. for a drawing number with three sheet extensions, drawing will bear the same drawing title but following drawing numbers 5L005-T08-00999-001, 5L005-T08-00999-002, 5L005-T08-00999-003).

12. Define all auxiliary views with section or view arrows to avoid misinterpretation.

13. Detail on the drawings the actual size of clip, back-cuts, etc. and locate edge distances.

14. Provide enlarged details of connections where necessary for clarity.

15. Clearly indicate all necessary manufacturing instructions.

16. Provide bills of material for each component, in accordance with these specifications and the sample BC Hydro drawings, on separate sheets (drawings) showing: piece quantity, description, length, unit weight, weight of all pieces and members, reference drawing number. Quantity of bolts and ring fills will also be included on the bill of material.

Tower assembly/erection detail drawings will:

1. Give sufficient information to enable field assembly and erection to be performed without reference to the structural detail drawings.

2. Show the orientation and location of all parts of a component or subcomponent.

3. Identify each individual piece and member by mark number.

4. Indicate the size (diameter and length) and quantity of bolts for each connection and include a table summarizing bolt quantities for each component on the drawing.

5. Provide enlarged details of connections where necessary for clarity.

6. Include, on all drawings, notations in the English language, metric dimensions and weights in kilograms. All lettering and figures will be clear and legible.

7. Provide a record title block on each drawing in accordance with the sample included in these specifications.

2.4.4 Ownership of Drawings

Supplier’s drawings will be the property of BC Hydro who will have the right to use them for any purpose.

SP2.5 DESIGN TECHNICAL REQUIREMENTS

2.5.1 General Requirements

The design objective will be to produce lattice towers which combine economy of material with ease of erection.

The towers structures will be of latticed galvanized steel angle construction. Leg splices will be immediately above but clear of the truss framework at the panel points. In general, the bracing angles will be positioned with the heel of the angle uppermost.

All design documents including final design report, trial assembly test report, full-scale load test report, structural detail drawing packages, final structural detail drawings, final assembly/erection drawings will be signed and sealed by a professional engineer registered to practice in British Columbia (with APEGBC).

2.5.2 Conductor Attachments

Insulator support brackets, required to provide clearance to underside of the crossarm on suspension towers, will be free to swing in the longitudinal direction only.

Deadend insulator assemblies will be attached at a single point on the crossarm in such a manner as to permit rotation in the vertical axis and in the horizontal axis over the full range of the line angles specified. This will be accomplished by using the existing BC Hydro trunnion block only, shown on drawing G-T08-00384 (R1), item J.

To allow stringing tackle to be attached to the crossarm, a series of holes will be provided below each insulator attachment point on deadend towers. The location of the holes and loadings will be as shown on the deadend tower drawings provided in these specifications.

The detailing of suspension towers will make provision for stringing tackles and at least one 1-1/8 inch diameter hole for live-line maintenance of the transmission line.

Preliminary hardware assembly drawings are listed below and will be made available when complete. Critical dimensions for hardware assembly attachments are shown on the drawings for each tower type.

Drawing No.	Tower	Description
5L005-T08-00027	54J	Double 220 kN Insulator String Deadend Hardware Assembly for SP-926.7, 4 Conductor Bundle
5L005-T08-00028	54J	Quad 220 kN Insulator String Deadend Hardware Assembly for SP-926.7, 4 Conductor Bundle

Drawing No.	Tower	Description
5L005-T08-00025	54GA, 54A, 54C	Single 160 kN Insulator Vee String Suspension Hardware Assembly for SP-926.7, 4 Conductor Bundle Used on Tower Types 54A and 54C
5L005-T08-00024	54C	Double 160 kN Insulator Vee String Suspension Hardware Assembly for SP-926.7, 4 Conductor Bundle Used on Tower Type 54C
5L005-T08-00029	54J	Single 160 kN Insulator String Jumper Suspension Hardware Assembly for SP-2303.5, 2-Conductor Bundle
5LGS-T08-04003	8KGT	Double 220 kN Insulator String Deadend Hardware Assembly for 4 Conductor Bundle Used on Tower Type 8KGM
5LGS-T08-04057	8KGT	Single 160 kN Insulator String Jumper Suspension Hardware Assembly for SP-2303.5, 2-Conductor Bundle
5LGS-T08-04124	8KGT	Single 160 kN Insulator String Slack Span Deadend Hardware Assembly for SP-2303.5, 2-Conductor Bundle
5LGS-T08-04059	2AGM	Single 160 kN or 220 kN Insulator String Suspension Hardware Assembly for 4 Conductor Bundle Used on Tower Type 2AGM
G-T08-B579	2AGM, 8KGT	Groundwire Deadend Hardware Assembly
G-T08-B576	54GA	Guy Assembly for 1” Diameter Guy Wire with Formed Wire Terminations

2.5.3 Climbing Facilities

Each tower design will incorporate step bolts extending from the ground line up to the level of the top most conductor(s) attachment elevation. Step bolts will have a clear 120 mm projection of bolt shank and their maximum vertical spacing will not exceed 380 mm. The bolt will conform to the ASTM A394 standard type T1 and shall meet the requirements of BC Hydro Transmission Engineering Technical Specification 243-1000 (R1), “Transmission Steel Tower Bolts” provided in Exhibit G-1. Refer to drawing G-T08-00271 and 5L005-T08-00023 for step bolt locations on type 54 series lattice towers.

2.5.4 Erection Stresses

Towers will be detailed with lifting holes and/or designated lifting plates positioned such that each subsection, subcomponent, or the tower can be lifted as a unit.

Guyed 54GA tower shall be detailed such that it is able to withstand erection loads imposed by the procedures which generally involve pivoting the assembled tower from the horizontal position to the erection position with lifting tackles applied.

Trial lifts shall be performed to demonstrate that the above noted requirements have been met.

2.5.5 Tower Design

For tower types 2AGM and 8KGT, tower design will not change from the tower design as shown on BC Hydro drawings, unless prior approval received from BC Hydro. All details, including setting dimensions and the slope angle of the tapered section of the tower body, will be kept unchanged from the tower details shown on existing BC Hydro drawings, unless prior approval received from BC Hydro.

For tower types 54GA, 54A, 54C and 54J, the tower general configuration, clearances, centerline dimensions, bracing patterns, bolt size for each tower type, steel grades, guy wire size, grade and slope as well as member sizes will be kept unchanged. Member substitution is allowed only after showing that the substituted member is sufficient to carry the design loads. To insure that, BC Hydro will be providing the Supplier with a PLS-Tower .BAK file for each tower type, in the latest revision, and it will be the Supplier responsibility to incorporate all suggested changes in these models and submit to BC Hydro together with all supporting calculations and modified outline drawings.

The basic tower will accommodate body and leg extensions as shown on the design drawings. These extensions will be compatible with and connect directly to the bottom of the basic tower.

Individual leg extensions will be interchangeable in any combination from the shortest to the longest and will be compatible with, and connect directly to, any leg position of the basic tower or body extension.

All leg extensions will be designed and detailed to accommodate the different types of foundations.

2.5.6 Member Orientation

On all angle members, in general, the flat side of the angle shall be up. On members that could be approached by a swinging conductor, the flat side of the angle shall face the conductor.

There shall be no pockets or depressions, which will retain water.

2.5.7 Length of Members

The maximum permissible length (L) for angle sections shall be:

1.75 inch angle:	L < 6 m
2 inch angle:	L < 7 m
2.5 inch angle:	L < 8 m
3 inch angle:	L < 9 m
3.5 inch angle:	L < 10 m
All sizes > 4 inch angle:	L < 11.5 m

2.5.8 Connections and Tower Bolts

In general, all connections will be bolted. Welded connections will only be permitted at the footing base. The bolts on any tower will be of the same nominal diameter as shown on design drawings. Connections will be so detailed that bolts can be tightened in the field using a socket or box type wrench.

All connection details will be in accordance with the typical detail drawings provided herein. Any deviations from typical details will require prior approval by BC Hydro, and are subject to final review and acceptance by BC Hydro.

The design of connections will be based on the use of ASTM A394 type T1 tower bolts with imperial sizes only (no metric substitution is allowed). Supplier will provide bolt grip table used for detailing to BC Hydro as a means to verify the bolt lengths shown on structural detail and assembly/erection detail drawings.

2.5.9 Holes for Tower Number Signs

Holes for tower number signs will be provided on all structures as shown on drawing G-T08-00483.

2.5.10 Erection Holes

At single hole connections, an additional hole of identical diameter will be provided for erection purposes, particularly at one end of all horizontal diaphragms and at the lower end of diagonal members. Such holes will be provided in all cases without increasing the size of the members.

2.5.11 Foundation Interface

The Supplier will detail connections to two types of foundations, for each of self-supporting tower types 54A, 54C and 54J, as follows:

1. Grillage foundation (detailed design drawings will be provided once available). A stub angle detail will be used with each grillage foundation, as shown on the typical details drawings for each structure type.

2. Pile/caisson foundation (detailed design drawings will be provided once available). A stub angle base assembly detail will be used with each pile/caisson foundation, as shown on the typical details drawings for each structure type.

The Supplier will detail connections to one standard foundation for guyed tower type 54GA. A base assembly (with upper base, lower base and threaded stud) will be used with each foundation, as shown on the typical details drawings for structure type 54GA.

Foundation connections will be detailed to withstand the maximum compression forces and horizontal shears originating from the specified ultimate design loads with the appropriate strength factor applied.

The identical detail will be used for connecting each of the standard foundations to the legs/masts of each tower type. This will permit the use of any standard type of foundation as dictated by site conditions. The connection of foundations to legs/masts will be above ground level.

For detailing purposes, minimum thickness of foundation pieces and components will be 6.35 mm (1/4 inch).

Both single setting dimensions and setting templates will be provided by the Supplier.

SP2.6 TOWER TESTING STANDARDS

Full-scale load tower testing will be carried out according to IEC 60652 and ASCE 10, unless otherwise noted in these specifications. If a conflict between these standards and specifications exists, then these specifications shall take precedence.

SP2.7 TOWER TESTING TECHNICAL REQUIREMENTS

2.7.1 General

The Supplier will test one prototype of each of the tower types 54GA, 54A and 54C to check the connection detailing and to prove that the design is capable of withstanding the specified loads.

The tests will be carried out in the presence of BC Hydro's Professional of Record (POR) and at a location where replacement steel and fabrication facilities are readily available.

2.7.2 Tower Testing Station

Supplier shall provide to BC Hydro a firm arrangement for the full-scale testing of the prototype tower(s) subject to the Acceptance of BC Hydro POR. This will include the following information:

Location of the tower testing station with the necessary arrangement to carry out the testing.

Detailed description of the facilities and equipment available along with their respective capacities at the tower testing station to perform the full-scale tower(s) tests, and

A firm commitment from the tower testing station as to the dates and duration reserved to perform the full-scale tower(s) tests.

2.7.3 Material Procurement for Prototype Towers

Material used for prototype test towers shall be from the material to be used for regular production run towers.

2.7.4 Modification of Failed Prototype Towers

In the event of a premature failure, BC Hydro POR will consult with representatives from Supplier and testing facility, to determine the cause of the failure and the proposed solution. Subsequently, Supplier shall modify its detailed drawings, supply new tower members as required and have the tower re-tested for the load combination under which the failure occurred.

In event of premature failure, the Contractor shall make every effort to re-test a new prototype tower at earliest date without schedule delay. In case of localized member or connection failure, the Contractor shall modify the tower member(s) and/or connection detail(s) within a reasonable time in order to proceed to complete the test at earliest date without schedule delay.

2.7.5 Deflection Measurement

Deflections shall be recorded in the transverse and longitudinal directions. Deflection measurements shall be taken under the no load condition both before and after testing.

2.7.6 Guy Wire Tension Measurement

Guy wire tensions shall be recorded for each guy wire at each load step.

2.7.7 Steel Test Samples

In the course of prototype tower fabrication, test coupons shall be cut from structural sections used for certain tower members, as designated by BC Hydro POR. The mechanical and chemical tests shall be performed, prior to the tower test by Supplier in order to establish the yield strength and elongation of those members.

After the completion of successful tower test, samples of coupons shall be cut from the test tower members identified by BC Hydro POR for subsequent mechanical and chemical test.

2.7.8 Tested Tower Disposal

After completing the load tests, Supplier shall dispose of the tested tower(s) at its own expense, unless instructed otherwise in writing by BC Hydro POR.

Any tested tower or parts thereof shall not be used subsequently in the supply of the materials by Supplier.

2.7.9 General Test Criteria

1. The test station will be equipped and capable of testing guyed and self-supporting towers.

2. All test station equipment will be certified and calibrated by competent authorities acceptable to BC Hydro. All certifications will be valid for at least 6 months after the test dates.

3. The test station will demonstrate ability to measure and record local weather conditions current during the full-scale testing (including but not limited to wind speed and wind direction, air temperature), ability to take high quality digital audio/video recordings of the tests from at least three (3) different view planes, ability to measure and record transverse and longitudinal structure deflections at least at four (4) specified elevations on the structure.

4. At a minimum, transverse and longitudinal deflection measurements will be taken (in real time) and recorded at the top of the tower bridge, at the bottom of the crossarms, at the tower waist level and at another level as may be specified by the BC Hydro POR. Residual deflections will also be measured and recorded. Displacement measurements will include strain measurements if required.

5. The test will be conducted during daylight hours only, that is, when it is possible to measure and record structure deflections, monitor and inspect deformations and structural response of each member of the prototype structure and when each member of the prototype structure is visible from the control and/or test monitoring room.

6. Test proceedings will be conducted in English language.

7. The tests shall be classified as “nominal load tests” (under this category the critical loading conditions will be identified for mechanical load test up to 100% limit) and followed by “Destruction Test” (one critical load condition shall be identified). The “Destruction Test” (for one critical load) shall be carried out up to the 120% limit.

8. The anticipated number of load cases will be at least eight (8) including the destruction load case. BC Hydro may elect to revise this number up to a maximum of ten (10) load cases including the destruction load case.

9. The Supplier will proceed with full-scale load testing of each prototype tower only after BC Hydro has reviewed and accepted a detailed test plan.

10. Complete and thorough tower visual inspection will be carried out between each load case.

11. There will be a hold period of at least 1 minute at 50%, 75%, 90%, 95% test load levels and at least 5 minutes at 100% test load level. Thereafter, for the destruction load case, there will be at least 1 minute hold period at 105%, 110%, 115% and 120% load levels and/or until destruction, whichever happens first. Loads will be ultimate, that is, design load divided by the strength factor appropriate for the load case.

12. The guy wire loads will be measured and recorded at each of the test load levels described in item 11.

13. For each load level, actual test loads applied to the prototype structure is considered to have been achieved if the deviation is within plus or minus 2% for test load levels up to and including 95%. For the 100%, actual test load applied to the prototype structure will be equal to or greater than 100%.

2.7.10 Prototype Tower

1. Each prototype tower for the full-scale load test, will conform to the requirements of these specifications. The prototype tower will be galvanized.

2. The fasteners (i.e. bolts, nuts and washers) used in the assembly of the prototype towers, will be supplied by the Supplier and will be the same as the actual bolts, nuts, and washers to be supplied with the towers under this Contract.

3. The prototype towers including steel materials used for their fabrication will be representative of the design. The steel materials used for the prototype tower will be from the same materials to be utilized for the mass production of the towers.

4. The actual yield strength of the steel material will not exceed the nominal yield strength by more than 19%. Where this is not achieved, particularly for the members with L/R ≤ 120, the actual tower design capacity will be subject to BC Hydro POR's review and acceptance.

5. The prototype towers will be assembled in the presence of BC Hydro's POR. Photographs of each assembled component will be recorded and submitted to BC Hydro upon completion of the full-scale assembly testing. Any modification of the tower details resulting from the assembly of the prototype towers will be reflected in the final structural detailed drawings, final erection detail drawings and final fabrication (shop) drawings.

6. Prior to erection on the test bed, the prototype tower will be inspected in the presence of BC Hydro POR to confirm conformance with the specifications particularly final structural detail drawings approved by the BC Hydro's POR. The inspection will include section properties, length and dimensions of each member of the prototype tower, bolted connections including bolt type, diameter, quantities, and length at each connection. The inspection will be conducted by an independent third party inspectors acceptable to BC Hydro POR. The inspector(s) will submit an inspection report for each prototype tower.

2.7.11 Test Plan

The Supplier will submit a test plan for each tower type to be full-scale load tested. The test plan will include, but is not limited to the following:

1. Rigging plan.

2. Test criteria/procedure; including:

   - load sequence;
   - actual test loads including test load calculations;
   - load application (50%, 75%, 90%, 95%, 100%);
   - footing arrangement/simulation;
   - guy wire and anchorage;
   - load attachment and control method;
   - load measuring and recording method;
   - load cell calibration;
   - deflection measurements including strain measurements, if required;
   - test load hold time;
   - test result acceptance criteria.

2.7.12 Test Load Sequence

The test load sequence (except for the destruction load case) will be developed jointly by BC Hydro and Supplier, and final acceptance required by BC Hydro prior to commencement of full-scale load testing.

The destruction load case will be selected solely by BC Hydro. The loads will be incremented in steps of 5% above the 100% load (i.e. 105%, 110%, etc.) and held down for 1 minute until destruction or 120% of the load has been reached.

2.7.13 Test Report

The full-scale load tower test report will include for each load step:

1. Load cells readings.
2. Guy wire tension readings.
3. Displacements readings.
4. Strains gauges readings, if applicable.
5. Description of all issues and events such as localized failure, readings irregularities, etc.
6. Photographs.
7. Videos.

The test report will be prepared with records of all modifications resulting from the load testing including but not limited to coupon test results, recommended design changes, revisions required to the detail drawings, copy of marked up structural detail drawings of the prototype tower showing all of the required changes and modifications resulting from the load testing, photographs and video records of each test load case.

A provisional test report will be provided to BC Hydro immediately following each tower test, as witnessed by attending representatives. The final test report will be submitted to BC Hydro within 14 days upon completion of each tower test. Videos and photographs will be provided on a DVD attached to the test report. An electronic version of the test report, along with videos and photos, will also be submitted via the electronic data site per SP1.6.3.

SP3 MATERIAL AND MANUFACTURE

SP3.1 QUALITY

All material used will be new and conform to specified standard(s). The Supplier will be required to verify by means of mill tests and other reports by qualified and certified authorities that these requirements have been satisfied.

SP3.2 STEEL GRADE

Steel will conform to the requirements of CSA G40.20-13/G40.21-13 grade 350WT minimum Category 5 and will have a minimum average absorbed energy of 20 J at -20°C. The Supplier will incorporate in his ITP a test process, acceptable to BC Hydro, to ensure that these requirements are met.

SP3.3 FABRICATION

Fabrication will be in accordance with the best recognized practice for tower manufacturing. Dimensions must be held to sufficient accuracy to preclude difficulties in erection. Fabrication procedures which would reduce or impair the physical properties of the material or the capacity of the members will not be used.

Members will be bent to a radius sufficiently large so as not to produce cracking of the material. Unless approved by BC Hydro, the inside radius will not be less than the radius specified for bend tests in the applicable CSA standards for the steel used. All cold bent members will be stress-relieved prior to galvanizing.

Unless otherwise noted, holes in material to be assembled with galvanized tower bolts will have the following diameters:

- 11/16 inch (17.5 mm) for 5/8 inch diameter bolts.
- 13/16 inch (21 mm) for 3/4 inch diameter bolts.

All holes in material 13 mm or more in thickness will be either drilled or subpunched 3 mm undersize and reamed. The use of welding to correct a limited number of minor fabrication errors or material defect is not permitted.

SP3.4 WELDING

1. **Welding Shop** – The welding shop will be qualified under the requirements of CSA W47.1 “Certification of Companies for Fusion Welding of Steel Structures”.

2. **Welding Techniques** – The Supplier will be responsible for determining and for developing proper techniques to be used in his welding operations, including preheating and any special welding techniques that may be necessary to ensure that the mechanical properties of the deposited weld metal and the heat-affected zone are at least equal to those of the parent material.

   All weldments will be thermally stress relieved before galvanizing.

Prior to commencing fabrication, the Supplier will submit to BC Hydro for acceptance the weld procedure specifications and procedures qualification records for all welding as specified in Appendix B, CSA W47.1.

3. **Operators** – Only skilled operators who have had experience in welding the steels of a strength and thickness associated with these structures and are qualified under the requirements of CSA W59 and W47.1 will be used on this work. The Supplier will, if required, furnish proof to BC Hydro that welding operators have successfully passed qualification tests. If, in the opinion of BC Hydro, the work of any operator appears questionable, such an operator will be required to pass another qualification test and the cost of such test will be borne by the Supplier. If the work of any operator is shown to be repeatedly unsatisfactory by inspection, he will be replaced.

4. **Welding Consumables** – All welding consumables will be of the low hydrogen variety and will conform to the applicable section of CSA W48.

5. **Welding Design, Fabrication and Inspection**

   - All welding will conform to the requirements of CSA W59 “Welded Steel Construction”, except as noted below.

   - Full penetration is required on all groove welds except for longitudinal welds where 80% penetration is acceptable with BC Hydro Engineering approval. All tack welds and temporary welds will be incorporated into the final weld in accordance with the requirements of CSA W59.

   - All welding will be 100% visual inspected in accordance with BC Hydro Engineering Standard ES 10-R0035 R0 in Exhibit G-2. All inspection will be performed by an independent company certified to CSA W178.1. All visual inspection to be performed by inspectors certified to CSA W178.2 Level 2 or 3 for the relevant class of inspection. All NDE to be performed by CGSB Level 2 or 3 certified operators.

SP3.5 GALVANIZING

All steel material will be galvanized by the hot-dip galvanizing process in accordance with the requirements of CSA G164, except that all rolled angle sections shall be considered as “5 mm thick and heavier” per Table 1 – Mass of Zinc Coating for Various Classes of Materials (CSA G164, 1981, Page 14).

To prevent corrosion and/or damage, of galvanized surfaces during delivery or subsequent storage, the Supplier will provide adequate protection as accepted by Hydro’s Representative. Metallic spacers will not be accepted. Passivation is required prior to oceanic transportation shipments by Supplier.

Defective or damaged galvanized coatings will be repaired by stripping and re-galvanizing. Any member on which the galvanized coating is defective or becomes damaged after having been dipped twice will be rejected.

The recommendations for safeguarding against embrittlement as delineated in Appendix A of CSA G164 standard will be considered mandatory part of these specifications.

Tower fasteners (i.e. bolts, nuts and washers) will be galvanized, as well as test sampled, inspected and accepted, to the requirements of BC Hydro Transmission Engineering Technical Specification 243-1000 (R1), “Transmission Steel Tower Bolts” provided in Exhibit G-1.

The Supplier will perform galvanizing tests on representative samples of the materials used for this design/supply contract to confirm conformance with these specifications:

1. **Spelter Analysis** – To be performed at the commencement of the galvanizing operation and at monthly intervals thereafter.

2. **Thickness and Uniformity of Coating** – Test results will be evaluated for acceptance using the sampling inspection variable procedure as per CSA C83 or other equivalent procedure acceptable to BC Hydro.

3. **Adhesion of Coating** – Test results will be evaluated for acceptance using the Minimum Inspection by Attributes procedure per CSA C83 standard or other equivalent procedure acceptable to BC Hydro.

SP3.6 TOWER BOLTS, NUTS AND WASHERS

Tower fasteners (i.e. bolts, nuts and washers) will meet the requirements of BC Hydro Transmission Engineering Technical Specification 243-1000 (R1), “Transmission Steel Tower Bolts” provided in Exhibit G-1.

The Supplier will use tower fasteners meeting the requirements of specification 243-1000 (R1) and procured from one of the following BC Hydro pre-approved manufacturers, unless otherwise approved by BC Hydro:

(a)	**INFASCO**	**INFASCO** **Corporate Office** 700, rue Ouellette Marieville, Québec J3M 1P6 **Phone**: 450 658-8741 **Fax**: 450 447-0114 **Email**: web-information@infasco.com **INFASCO NUT** 3990 Nashua Drive Mississauga, Ontario L4V 1P8 **Phone**: 905 677-8920 **Fax**: 905 677-6295 **Email**: sales@infasconut.com **Warehouses US** **Atlanta** 5800 Plummer Road, Suite 175 Atlanta, GA 30336 **Phone**: 404 346-1515 **Phone**: 866 232-0598 **Fax**: 404 346-1422 **Website**: http://www.infasco.com/en/index.asp
(b)	**NUCOR FASTENER**	**NUCOR FASTENER** Mailing Address: PO Box 6100 St. JOE, IN 46785 Street Address: 6730 CR 60 St. Joe, IN 46785 **Phone**: 260 337-1600 **Toll Free**: 800 955-6826 **Fax**: 260 337-1726 **Website**: http://www.nucor-fastener.com/
(c)	**PACIFIC BOLT MANUFACTURING LTD.**	**Pacific Bolt Manufacturing Ltd.** 435 Canfor Avenue New Westminster, B.C. V3L 5H5 **Phone**: 604 524-2658 **Fax**: 604 524-2699 **Email**: sales@pacbolt.com **Website**: http://www.pacbolt.com/
(d)	**BBC FASTENERS INC.**	**BBC Fasteners Inc.** 4210 West Shirley Lane Alsip, IL 60803 **Toll Free**: 1-800-323-1347 **Local**: 708 597-9100 **Fax**: 708 597-0423 **Email**: sales@bbcfasteners.com **Website**: http://www.bbcfasteners.com/

Transmission tower bolts, including step bolts, will be in accordance with ASTM A394T1, head marked T-1. Each tower bolt will be supplied complete with regular series hex nut per ASTM A 563, Grade DH, galvanized, and helical spring lock washer per ASME B18.21.1, heavy series, carbon steel, galvanized.

Each step bolt will be supplied complete with two regular series hex nuts per ASTM A563, Grade DH, galvanized and helical spring lock washer per ASME B18.21.1, heavy series, carbon steel, galvanized.

Bolts will be supplied assembled as a unit with nut engaged on the bolt to shank end. All material will be hot dip galvanized per CSA G164-M or ASTM F2329.

Transmission tower bolts will meet the Charpy V-notch minimum absorbed energy value of 20 J at -20C. Each lot will be sampled and tested in accordance with ASTM A370.

Tower bolts will be supplied in imperial units.

Fasteners will be supplied with 5% quantity in excess of the net quantity for each assembly component shown in bill of materials drawings.

SP3.7 TOWER FABRICATION

Prior to commencing tower fabrication, the Supplier will obtain BC Hydro's acceptance of the final lattice tower design/detailing, complete design drawing package, tower prototype trial assembly test report, and full-scale load test report (if applicable). All of the modifications resulting from the prototype trial assembly test report and full-scale load test report must have been incorporated into the design/detailing and final tower drawings and submitted to BC Hydro for acceptance prior to commencement of fabrication.

Tower fabrication tolerances will be in accordance with CSA S16, ASCE-10 and as specified in these specifications.

The Supplier will perform fabrication tests to confirm conformity with the fabrication tolerances including:

1. **Bends** – All parts will be inspected by the using liquid penetrant examination method before galvanizing.

   All linear type discontinuities are unacceptable.

   Bends on angle members that cause a stretching of the leg in the plane of the bend will be governed by the following dimensional tolerances, measured on completion of bending:

   A maximum of 10% in leg length in combination with a maximum reduction of 10% in leg thickness measured at the original midpoint of the stretched leg.

2. **Welds** – All full penetration welds be subjected to 100% ultrasonic or radiographic testing.

Not less than 15% of all fillet welds shall be inspected by the fluorescent magnetic particle method or by the dye penetrant method. Should unacceptable defects be found, BC Hydro will specify an inspection of a further quantity of fillet welds in order to ensure acceptable quality of all the remaining fillet welds.

3.7.1 Assembly Tests

Prior to commencement of mass production, the Supplier will, in the presence of BC Hydro carry out trial assembly tests to prove the accuracy of design, detailing and fabrication of each of the components ordered including, without limiting the generality of the foregoing, tower bodies, body extensions, leg extensions and foundation components. The Supplier shall give a minimum of 30 days notice to BC Hydro for assembly test dates prior to each trial assembly test. Tests will include the interconnection of fully braced adjacent components.

Upon completion of assembly testing of the tower, selected sample coupons from the prototype tower will be tested to confirm mechanical properties of the material used to manufacture the prototype tower. The mechanical test will establish, at a minimum, yield strength, tensile strength, notch toughness (Charpy V-notch test). Bolt samples will be tested to confirm conformity to the design assumptions.

Bolts, nuts and washers used in the assembly tests will be supplied by the Supplier, and will be in accordance with the detail drawings for each of the tower types.

A trial assembly test report will be prepared with records of all modifications resulting from the assembly testing including but not limited to coupon test results, copies of mill certificates of the materials used to manufacture the prototype tower, recommended design changes, revisions required to the detail drawings, copy of marked up structural detail drawings of the prototype tower showing all of the required changes and modifications resulting from the assembly testing, photographs and video records of each test assembled component. The report will be submitted to BC Hydro upon completion of each trial assembly test.

3.7.2 Non-Destructive Testing

Procedures for non-destructive testing will be as follows:

1. Ultrasonic Testing (UT) as per ASTM E164.
2. Magnetic Particle Testing (MT) as per ASTM E709.
3. Liquid Penetrant Examination as per ASTM E165.
4. Radiographic Examination as per ASTM E94.

SP3.8 TEST CERTIFICATION

The Supplier will furnish to BC Hydro certified test reports including results showing that the material used has been sampled, tested and inspected in accordance with the provisions of these specifications. Each certificate will be cross-referenced to the component(s) to which it pertains.

SP4 IDENTIFICATION, PACKAGING AND SHIPPING

SP4.1 PURPOSE OF SECTION

The purpose of this section is to describe the requirements for packaging and shipping of the finished product from the Supplier's facility to the Delivery Point. Packaging and Shipping is critical to the successful implementation of the project as it addresses a number of critical issues and risks, including:

1. Damage of components during shipping due to improper packaging.

2. Delay of shipments due to poorly planned shipping, which can include delays in port, at border crossings or due to unforeseen obstacles inland.

3. Loss of parts at site due to improper bundling and/or inadequate labelling and marking.

4. Increased construction costs and schedule delays due to inadequate labelling and bundling of parts and inadequate marking of individual components.

The Supplier must follow the requirements of SP4 to avoid the issues and risks identified above.

SP4.2 PRODUCT IDENTIFICATION AND MARKING

Prior to galvanizing, each member will be plainly and permanently marked (stamped) to show the mark number designated on the final structural detail and/or final assembly/erection detail drawings. Each marking will have a prefix letter identifying the tower manufacturer.

The mark numbers of fully interchangeable substitute members will be identical to the mark numbers of members they replace.

The mark numbers of substitute members which are not fully interchangeable with the members they replace will be suffixed by the letter "W".

All tower members shall be stamped with distinguishing numbers and/or letters corresponding to those accepted drawings or material lists. These erection marks shall be impressed before galvanizing and shall be clearly readable afterwards.

Erection marks for towers to be tested shall be prefixed with letter "T"' followed by relevant mark numbers.

The mark numbers will be placed near the end of the member and in such a position that they will be readily visible after the structure is assembled for future maintenance purposes. Identical members will have the same mark number places in the same position.

Both ends of each member will be painted with one or two colors which will be as follows:

1. Tower type 54GA Blue
2. Tower type 54A Green
3. Tower type 54C Yellow
4. Tower type 54J Red
5. Tower type 2AGM White
6. Tower type 8KGT Black

Each individual member will also have its mark number stenciled with 30 mm minimum height characters in black waterproof paint or ink after galvanizing.

4.2.1 Packaging and Shipping

(a) **General**

All items will be packaged and loaded for shipment in such a manner as to protect them from damage and corrosion in transit, handling and outdoor storage. The threads of nuts will be treated with a long-lasting lubricant to maintain a finger-free bolt nut fit after long storage.

The Supplier will be responsible for and make good any and all damage and shortages incurred in loading and transit.

(b) **Packaging and Bundling Details**

All assemblies, comprised of components shown on final assembly/erection drawings, will be shipped unassembled.

Supplier shall submit a proposed bundling detail to Hydro's Representative for acceptance not less than 60 days prior to bundling the material for shipment.

Steel members shall be bundled by towers. However in order to optimize container capacity, spare capacity, if any, can be utilized for leg/body extensions. Where possible, all members of the individual components (i.e. arms, extension, body section, etc.) shall be contained in a separate bundle, except that the mass of a bundle shall not exceed 1500 kg.

Where more than one bundle for each individual component is necessary because of this mass limitation, all members in each bundle shall be associated with the same physical part of the tower component or tower segment.

When angle iron is layered against adjacent angles, they shall be separated with plastic spacers or nylon rope to prevent coating damage during storage and transport and to permit airflow which will inhibit the formation of white rust.

Odd shaped plates, ring fills (wired together) and other items that do not lend themselves to bundling shall be packaged in wooden boxes. The gross mass of any box shall not exceed 200 kg. These items shall be packaged on a per tower basis.

The member content of the bundles will be as specified in the final assembly/erection drawings signed and sealed by the POR and approved by BC Hydro.

The Supplier will provide to BC Hydro, not less than 30 days prior to shipment, sketches showing the physical arrangement of the members within the bundles for all ordered components.

Bundles will be securely fastened with tension-tied steel bands of sufficient strength, or by other means approved by the POR, to adequately maintain and protect the members in the bundle during transportation, loading and offloading, and yard and field handling.

The 5% quantity of ring fills to be supplied in excess of the net quantity for each assembly component will be packaged separately in bulk and sorted by size and thickness.

All boxes and containers will be provided with drainage holes in the base.

Burlap or other absorbent materials will not be used for packing of any material shipped.

Where the material is shipped by pallet, the pallets will contain like material only and will be of the 4-way type to facilitate handling. All material will be firmly secured to the pallets.

(c) **Marking of Bundles, Boxes and Pallets**

All bundles, boxes and pallets will be identified with an aluminum tag securely fastened to each end. The tags will have indented or embossed lettering to show:

1. Shipping address.
2. Supplier’s name.
3. Contract number and purchase order number.
4. Tower type and component.
5. Piece mark number and quantity when applicable.
6. Bundling list sheet number.
7. Package identification number.
8. Gross and net mass.

The package identification number, item 7 above, will be in a series commencing with the number 1 and will be assigned consecutively as the material is shipped. The series will continue for the duration of the Contract.

All bundles, boxes and pallets will also be plainly marked by stencil at each end with 25 mm high characters in black waterproof non-fading paint to show the package identification number.

Assembly component bundles will also be stenciled on the top at each end of the bundle to show the component number, Supplier’s identification letter,

tower type and component. When an assembly component is packaged in more than one bundle, box or pallet, then the bundles, boxes and pallets will be identified “1 of 4”, “2 of 4”, etc.

(d) **Packaging and Bundling Plan**

The Supplier will prepare a packaging and bundling plan for acceptance by Hydro’s Representative 60 days following award of the contract. The packaging and bundling plan shall describe how the Supplier intends to package and bundle all of the finished materials.

This will include the number, size, weight and type of shipping containers, size and weight of all bundles, and packaging used to prevent damage during transit and storage.

(e) **Shipping and Shipping Sequence**

Material shipped by rail cars or trucks will be so arranged as to permit convenient access and rapid off-loading by forklift or crane while the integrity of the materials are being maintained, i.e. no damage as a result of offloading the materials. Adequate dunnage, not less than 100 mm x 100 mm timber, will be provided to allow slings to be placed readily between successive layers of the load and the sides and bottom of the vehicle.

Material shipped in containers will be provided with both horizontal and vertical dunnage, as necessary, to avoid interface between bundles and to permit ease of unloading by forklift.

The Supplier will be responsible for tracing and expediting all shipments and for obtaining all required clearances.

The Supplier shall provide BC Hydro with minimum 5 days to enable adequate time to inspect and unload shipping containers.

(f) **Transportation Plan**

The Supplier will prepare and submit a Transportation Plan to Hydro’s Representative for acceptance 120 days prior to shipment. The Transportation Plan will be provided in pdf format and will include the following:

1. Name of the transportation company or companies involved in the complete move from North American port to the Delivery Point.

2. Route selection including loading and offloading locations for applicable sea, land and rail routes.

3. Route survey report including assessments of bridges, tunnels, height and width clearances, turning radius, road gradient, road closure and other anticipated delivery challenges.

4. Permitting requirements including evidence of acquiring all necessary permits and approvals.

5. Identified risks and/or problems and the contingency measures that will be put in place to address them. The contingency plan will include a clear description of the types of failure and scenarios and its trigger points.

4.2.2 Packing Lists

Packing list will be included with each shipment. In addition, six copies of packing lists will be submitted with the shipping reports. Packing lists will show the following information:

1. Contents of shipping.

2. The calculated net mass and actual gross mass of each package unit, in kilograms.

3. The overall dimensions of each individual package, in millimetres.

4. The identification number of each package in the shipment.

4.2.3 Shipping Advice

(a) **Shipping Notice**

A Notice of Shipment will be emailed to the Hydro's Representative within 24 hours before each shipment is made with the following information:

1. Contract number and purchase order number.
2. Items and quantities shipped.
3. Carrier.
4. Bill of lading numbers.
5. Anticipated date of arrival.

(b) **Shipping Reports**

A complete shipping report will be emailed to the Hydro's Representative within 24 hours after each shipment is made. The shipping reports will include:

1. Packing list.
2. Bills of lading.
3. Carrier.
4. Shipping dated.
5. Estimated time of arrival at the Delivery Point.
6. Details of any special requirements regarding the methods of handling and storing the items shipped.

The Supplier will give BC Hydro not less than 2 working days notice of the actual arrival times of all shipments at the Delivery Point.

EXHIBIT G-1
TRANSMISSION ENGINEERING TECHNICAL SPECIFICATION 243-1000

EXHIBIT G-2
ENGINEERING STANDARD ES 10-R0035

APPENDIX H – QUALITY REQUIREMENTS

1. GENERAL

The Supplier is responsible for the quality of the Services as required by the Contract Documents. The Supplier will implement a Quality Plan to ensure that the Services meets all requirements and the intent of the Contract and provide adequate documentation proving due diligence. The Quality Plan will be subject to audit by Hydro's Representative. Deficiencies found during the audit will be addressed in a timely manner to the conformance of the Contract.

The Supplier will facilitate access to all manufacturing/fabrication facilities for Hydro's Representative to conduct inspections and audits as required. The Supplier will provide safe access to and, when requested, and copies of all relevant quality records including the following:

- issued for fabrication drawings and specifications;
- material qualification records and certificates;
- delivery and installation procedures;
- certifications and qualifications, including of third party testing inspectors;
- process control charts;
- quality records;
- inspection and test results;
- procedures for special processes, if any;
- all other quality records compiled during the performance of Services.

2. DEFINITIONS

Quality Assurance (QA) is part of quality management focused on providing confidence that quality requirements will be fulfilled.

Quality Control (QC) is part of quality management focused on fulfilling quality requirements.

Quality Management (QM) is the coordinated activities to direct and control an organization with regard to quality. Direction and control with regard to quality generally includes establishment of the quality policy and quality objectives, quality planning, quality control, quality assurance and quality improvement.

Audit is a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled. It may cover quality, environment, health and safety or other activities.

Inspection is conformity evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging.

Procedures for Special Processes (e.g. welding) are documents describing a process where the conformity of the resulting product cannot be readily or economically verified.

Quality Manual is a document specifying the quality management system of an organization.

QA Plan is a QA document specifically designed for the Contract, supplementary to the QA Manual, and includes ITPs, responsibility matrix, QA milestones and outline of QA documents to be submitted per the Contract.

Review Point (R) – Means that the Supplier's documentation and records will be available for verification at any time by Hydro's Representative

Witness Point (W) – A critical step in construction, installation or testing where it is desirable that Hydro's Representative inspects the material, equipment, activity, operation or workmanship in order to ascertain the Supplier's compliance with the specified requirements. The operation or process may proceed with or without the presence of Hydro's Representative as long as Hydro's Representative was formally informed by the Supplier prior to start of the operation or process.

Hold Point (H) – A critical step in construction, installation or testing where it is essential that Hydro's Representative inspects the items in order to ascertain that the material, equipment, activity, operation or workmanship of the Supplier complies with the specified requirements. The process may not proceed without the presence of the notified party. A Hold Point cannot be waived unless this has specially been confirmed in writing and accepted by Hydro's Representative.

Document (D) – Means that the party conducting the activity or operation is responsible for ensuring the documentation meets the specifications and quality criterion.
Inspection and Testing – Means the inspection and testing performed by the Supplier's QA Representative or by any third party or independent certified laboratory or agency engaged by the Supplier.

Any third party or independent testing laboratory engaged by the Supplier will be certified to CSA, ASTM, and other specified test methods for the sampling and testing of materials.

3. SUPPLIER'S QUALITY REPRESENTATIVE

The Supplier shall appoint and identify a Supplier's Quality Representative to ensure that qualified resources are assigned to carry out inspections, perform and witness tests, in accordance with the accepted Inspection Test Plans (ITPs), to verify the conformity of each part of the Services in accordance with this Contract.

The performance of the Supplier's Quality Representative duties shall further include as a minimum:

- Monitor and ensure the proper implementation of the accepted Supplier's Quality Plan to complete the Services for BC Hydro.
- Observe and review all test and inspection activities, schedules, and reporting.
- Review all quality records/documentation, non-conformance reports, changes, and other documentation as required by Contract before submission to BC Hydro.
- Interface with other BC Hydro personnel regarding quality issues.
- Independently report any observed variances or non-conformance issues directly to BC Hydro and ensure the implementation of accepted corrective/preventive action.

- Review and confirm that all inspections, tests, non-conformities, changes, and other quality issues are documented in accordance with the Contract Documents, the accepted Supplier's Quality Plan, and the Supplier's Quality Manual.
- Maintain updated quality documents and records for review.

4. SUPPLIER QUALITY PLAN

Within 14 days of Contract award the Supplier will submit for acceptance by the Hydro's Representative a Contract specific Quality Plan that identifies all of the quality attributes of the work. The Quality Plan will be updated to reflect ongoing changes and be submitted for acceptance by the Hydro's Representative.

Other required information includes:

- Identified Inspection and Test Plans for activities occurring at the Shop.
- Identified Inspection and Test Plans for activities occurring at all locations other than at the Shop.
- Qualification documents of the Supplier's Quality Representative(s).
- Special procedures.
- Detailed testing schedules for the Work.
- Responsibility chart for quality activities.
- ISO Certification or a description of the Supplier's quality management processes (Quality Manual).
- List and details of the Sub-suppliers.
- List and details of Material Suppliers.
- Qualifications for third party Inspectors (e.g. NDE inspectors) and trade
- specialists
- List of trade specialists engaged in performing procedures for special processes.
- Document/drawing control procedure.
- Remediation and non-conformance tracking procedure.
- Document/drawing control plan.
- Sample of recording document templates, including but not limited to forms, checklists proposed to be used by the Supplier in the execution of its Services.
- Contract specific templates to be submitted together with ITP Document control procedure.
- Identified Inspection and Test Plans for activities occurring at all locations other than at the Shop.

The following key elements of the QA Plan need special attention:

Inspection and Test Plans

Inspection and Test Plans (ITP) will be submitted to BC Hydro for review and acceptance. The inspection and test plans will cover the complete scope of Services including (as applicable) design, procurement, manufacturing, assembly, factory testing, worker qualifications, Shop fabrication activities related to fabrication, delivery, storage, fabrication and testing, and final test and commissioning. Plans will identify whether they are for Services performed at the Shop or in a location other than the Shop.

The submitted ITP will include, or include clear reference, to the following information:

- Service scope.
- Parameters to be controlled/checked (test conditions).
- Control methods/equipment used for testing/inspection.
- Acceptance criteria.
- Control frequency (sampling rate).
- Quality Control Responsibility Identification (QC by).
- Name of Subcontractor(s).
- Reference Documents.
- Quality Records.
- Inspection Review, Witness, and Hold Points for all possible witnesses (e.g. Supplier, Subcontractor, third party Inspectors, BC Hydro).

Recording document templates, test forms, tables and checklists proposed to be used by the Supplier in the execution of his Work will be submitted together with the QA Plan. The Supplier is responsible to ensure that the required data and information are recorded in a timely and thorough fashion as the Work progresses.

1. **Qualification Documents** of Supplier's Quality Representative(s), third party inspectors and trade specialists will be submitted together with the Quality Plan unless otherwise specified.

2. **Supplier's audit plan** detailing the scope of the inspection and audit, schedules of activities performed by their Sub-suppliers, including material suppliers, etc.

Calibration Certificates

Calibration certificates for critical tools, test equipment or devices.

Special Fabrication and/or Test Procedures

The Supplier will submit any procedures for special processes for manufacturing, fabrication, and testing for BC Hydro's acceptance at least 28 days prior to such Services being undertaken unless otherwise specified. In addition, the Supplier will supply at no cost any samples requested by Hydro's Representative for procedure analysis and test.

Notice of Tests

- Timely notice will be given to BC Hydro prior to each established ITP Review, Witness, and Hold points as identified below.
- For Services occurring at the Shop, notice for inspections and/or tests requiring Witness/Hold will be given to Hydro's Representative at least 14 days for Services to be done in Canada or minimum of 28 days for Services done outside of Canada.
- If timely notice has not been given to BC Hydro, BC Hydro may request the test to be repeated at the expense of the Supplier.

5. NON-CONFORMANCE REPORT (NCR)

All non-conformances to the requirements of this Contract and the Supplier's quality system will be documented by the Supplier via Non-Conformance Reports (NCRs) as they occur.

The Supplier will investigate and document the root cause of the non-conformance, provide the proposed correction and corrective and preventive actions plans in the NCR and obtain acceptance from the Hydro's Rep of the proposed corrective action plan.

BC Hydro will require critical (e.g. variation in – material, process, product, documentation, etc.) NCRs to be submitted for acceptance of the proposed correction.

The Supplier will make all possible arrangements to immediately rectify and correct the non-conformance such that the Services are in conformance with the Contract requirements and the NCR may then be closed. The Supplier will provide quality records and photo documentation together with the NCR to confirm the before and after status of the non-conformance.

- Identify where the defect identified does not meet the specification requirements.
- Adequate details of the non-conformance and root cause for review. Identify potential remedial action by the Supplier.
- Review and acceptance of the Supplier's proposed remedial action by Hydro's Representative. Where design issues are involved the Professional of Record (PoR) must accept the proposed remedial action.
- Execution of the accepted remedial action complete with appropriate quality records and photo documentation by the Supplier. Hydro's Representative (and the PoR where applicable) and the Supplier Quality Representative will provide confirmation and verification that the Work is in conformance with the Contract requirements by closing the NCR.
- Hydro's Representative's acceptance of completed correction.
- Closed NCRs will form part of the Completion QA Report.

6. INSPECTION AND AUDIT BY HYDRO'S REPRESENTATIVE

Any quality inspection and audit activities carried out by BC Hydro separately or in conjunction with the Supplier will in no way relieve the Supplier of full responsibility for the quality, character, or performance of the completed Work.

1. Materials and components to be procured and supplied by the Supplier will be subject to review and acceptance by Hydro's Representative. A complete technical specification will be furnished to Hydro's Representative.

2. Shop inspections and audits may be performed by Hydro's Representative at any time during the execution of the Work. Hydro's Representative will give the Supplier notice of the inspection or audit. Hydro's Representative will have access to the Work at all times. If a part of the Work is in preparation at locations other than the Shop, access will be given to such Work whenever it is in progress and the Supplier will arrange safe access for such inspection and audit.

3. Hydro's Representative may employ independent inspection and testing agencies. This agent of BC Hydro will be afforded the same facilitation provided to Hydro's Representative.

4. The Supplier will provide the corrective measures, correct the defects and irregularities as advised by Hydro's Representative at no additional cost to BC Hydro. The Supplier will pay all costs for re-testing and re-inspection.

5. Hydro's Representative may order any part of the Work to be examined if the Work is suspected to be not in accordance or conformance with the Contract. If upon examination such Work is found not in accordance or conformance with the Contract, the Supplier will correct such Work to comply with the Contract requirements and pay the cost of inspection and correction.

6. Hydro's Representative may elect to furnish to the Supplier a copy of the test results undertaken by BC Hydro's third party inspection agency, should the Supplier request them.

7. SUPPLIER'S QUALITY RECORDS

The Supplier will submit on a monthly basis completed Quality Records during the execution of the Work in accordance with the accepted ITP. Quality Records will be factual records containing numerical data of the work and a record of quality control activity results.

1. Quality Records as per accepted Inspection and Test Plan.

2. The Supplier's Quality Representative will review, and sign all Quality Records.

3. Certified Test Reports will specify the following test condition details:

   - Type of test and objective of testing.
   - Specified requirements and standards.
   - Test standard reference.
   - Organization executing the test.
   - Dates of sampling, testing and reporting.
   - Test equipment.
   - Test results.
   - Acceptance/rejection limits.
   - Remarks regarding conformance with the Contract requirements.
   - Reviewed and signed by the Supplier's Quality Representative.

8. DEFECTS

The Supplier will correct any defects and irregularities identified during inspections at no additional cost to BC Hydro. The Supplier will pay all costs for re-testing and re-inspection.

9. SUPPLIER'S ONGOING QUALITY REPORTS

The Supplier will maintain Quality Reports during the execution of the Work in accordance with the accepted Quality Plan and ITP. Quality Reports will be factual records containing numerical data of the Work and quality control activities. The Supplier will submit Quality Reports on accepted forms.

10. SUPPLIER'S COMPLETION QUALITY REPORT

The Supplier will submit to Hydro's Representative a Final Quality Report within 21 days after completion of the Services. The Completion Quality Report will be certified by the Supplier's Quality Representative. The Supplier will submit two paper copies and one electronic copy. The copies must be properly labelled with complete project information.

All test reports included in the Final Quality Report will be readable and self-explanatory in English, to the extent that the test conditions as recorded can be duplicated without difficulty at a later date. The Supplier's Completion Quality Report will be an audited compilation of Quality documents recorded during the execution of the Services including as applicable, but not limited to:

- Accepted Quality Plan and ITP. (accepted final revision).
- Drawings transmittals.
- Material receiving and inspection records.
- Mill certificates for the lattice tower steel and fasteners (with traceability).
- Prototype tower test reports.
- Component dimensional inspection data reports and trial assembly test reports.
- Weld procedures used in the shop fabrication.
- Completed weld maps.
- Galvanizing inspection reports.
- Copy of Tradesmen's TQ certificates, licenses, and/or permits.
- Accepted test reports from certified independent testing agency in accordance with
- standards/specifications
- All welder qualifications – verifying compliance with the submitted welding procedures.
- All NDE inspection reports – MPI, UT, and Visual Reports – reports are to note areas of inspection on the structures.
- Welding inspector certification documentation.
- Closed Non-conformance reports.
- Completed and closed BC Hydro's quality inspection and audit reports.
- Progress photo documentation (digital and labelled).

Each document within the Completion Quality Report will be clearly traceable to the actual components of the Services to which they apply and to the appropriate ITP activity.

APPENDIX I – ABORIGINAL INCLUSION AND REPORTING REQUIREMENTS

Not Used

APPENDIX J – DRAWINGS

The following drawings are included by reference:

Drawing No.	Rev.	Title
PLS TOWER MODELS		
54a familyfinal	2	
54c familyfinal	2	
54ga familyfinal	2	
54j case 1-5	1	
54j case 6-11		
54j-0be-family- with le	3	
54j-12be-family- with le	4	
54j-3be-family- with le	3	
54j-6be-family- with le	4	
54j-9be-family- with le	3	
TOWER SPECIFICATION, LOADING TABLE, OUTLINE AND TYPICAL DETAIL DRAWINGS		
5L005-T08-00006	1	Type 54 Series Towers, General Notes Drawing
5L005-T08-00023	1	Type 54 Series Towers, Step Bolt Locations
G-T08-A271	2	Standard 5/8 and 3/4 Diameter Step Bolts
Tower Type 54GA		
5L005-T08-00007	1	Type 54GA Guyed Suspension Tower, 0-2 Deg, Specification Drawing
5L005-T08-00008	2	Type 54GA Guyed Suspension Tower, 0-2 Deg, Loading Application Table Drawing
5L005-T08-00009	2	Type 54GA Guyed Suspension Tower, 0-2 Deg, Design Outline Drawing
5L005-T08-00010	1	Type 54GA Guyed Suspension Tower, 0-2 Deg, Typical Details Drawing
Tower Type 54A		
5L005-T08-00011	1	Type 54A Self-Supporting Suspension Tower, 0-2 Deg, Specification Drawing
5L005-T08-00012	2	Type 54A Self-Supporting Suspension Tower, 0-2 Deg, Loading Application Table Drawing
5L005-T08-00013-001	2	Type 54A Self-Supporting Suspension Tower, 0-2 Deg, Design Outline Drawing, Sheet 1 of 2

Drawing No.	Rev.	Title
5L005-T08-00013-002	2	Type 54A Self-Supporting Suspension Tower, 0-2 Deg, Design Outline Drawing, Sheet 2 of 2
5L005-T08-00014	1	Type 54A Self-Supporting Suspension Tower, 0-2 Deg, Typical Details Drawing
Tower Type 54C		
5L005-T08-00015	1	Type 54C Self-Supporting Suspension Tower, 0-8 Deg, Specification Drawing
5L005-T08-00016	2	Type 54C Self-Supporting Suspension Tower, 0-8 Deg, Loading Application Table Drawing
5L005-T08-00017-001	2	Type 54C Self-Supporting Suspension Tower, 0-8 Deg, Design Outline Drawing, Sheet 1 of 2
5L005-T08-00017-002	2	Type 54C Self-Supporting Suspension Tower, 0-8 Deg, Design Outline Drawing, Sheet 2 of 2
5L005-T08-00018	1	Type 54C Self-Supporting Suspension Tower, 0-8 Deg, Typical Details Drawing
Tower Type 54J		
5L005-T08-00019	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Specification Drawing
5L005-T08-00020-001	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Loading Application Table Drawing, Sheet 1 of 4
5L005-T08-00020-002	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Loading Application Table Drawing, Sheet 2 of 4
5L005-T08-00020-003	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Loading Application Table Drawing, Sheet 3 of 4
5L005-T08-00020-004	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Loading Application Table Drawing, Sheet 4 of 4
5L005-T08-00021-001	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Design Outline Drawing, Sheet 1 of 2
5L005-T08-00021-002	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Design Outline Drawing, Sheet 2 of 2
5L005-T08-00022	1	Type 54J Self-Supporting Deadend Tower, 0-45 Deg, Typical Details Drawing
G-T08-00384	1	Specification Control Drawing, Shackle Trunnion Block (Table)

Drawing No.	Rev.	Title
TOWER ORIGINAL STRUCTURAL DETAIL AND/OR ASSEMBLY/ERECTION DRAWINGS		
Tower Type 2AGM		
5L40-T08-00008	1	Circuit 5L40 and 5L41 Type 2AM Self Supporting Tower Crossarm Details
5L40-T08-00009	2	Circuit 5L40 and 5L41 Type 2AM Self Supporting Tower Crossarm View C-C, Sections D-D, E-E, F-F, Details V, W and X Details
5L40-T08-00010	2	Circuit 5L40 and 5L41 Type 2AM Self Supporting Tower Crossarm View G-G, Details K, L, M, N, O, P, Q, S, T, and U Details
5L40-T08-00011	1	Type 2AM Self Supporting Tower Strs 545/2; 545/3; 545/4 and 545/5 (CCT 5L40); Str 544/2 (Circuit 5L41); Bridge; Details
5L40-T08-00012	0	Type 2AM Self Supporting Tower Strs 545/2; 545/3; 545/4 and 545/5 (Circuit 5L40); Str 544/2 (Circuit 5L41); Longitudinal Face of K-Frame; Details
5L40-T08-00013	0	Type 2AM Self Supporting Tower Strs 545/2; 545/3; 545/4 and 545/5 (Circuit 5L40); Str 544/2 (Circuit 5L41); Transverse Face of K-Frame; Details
5L40-T08-00014	1	Type 2AM Self Supporting Tower Strs 545/2; 545/3; 545/4 and 545/5 (Circuit 5L40); Str 544/2 (Circuit 5L41); Pedestal; Details
5L40-T08-00015	1	Type 2AM Self Supporting Tower Strs 545/2; 545/4 and 545/5; Upper Portion 30 Ft Body Extension Details
5L40-T08-00016	2	Type 2AM Self Supporting Tower Strs 545/2; 545/3; 545/4 and 545/5 (Circuit 5L40); Str 544/2 (Circuit 5L41); ±0 and 4 Ft Leg Extensions; Details
5L40-T08-00023	2	Type 2AM Self Supporting Tower Str 545/5 Circuit 5L40; Str 544/2 Circuit 5L41 Bridge Reinforcement Details
5L40-T08-00024	3	Type 2AM Self Supporting Tower Str 545/5 Circuit 5L40; Str 544/2 Circuit 5L41 Bridge Views A-A and B-B Details
5LGS-T08-00555	0	Mark II Tower Type A Self Supporting Tower +8 Ft Leg Extension
5LGS-T08-00556	0	Mark II Tower Type A Self Supporting Tower Oblique Bracing for +4 Ft and +8 Ft Leg Extension
5LGS-T08-00557	0	Mark II Tower Type A Self Supporting Tower 12 Ft Leg Extension and Section A-A

Drawing No.	Rev.	Title
5LGS-T08-00558	0	Mark II Tower Type A Self Supporting Tower Oblique Bracing for +12 Ft Leg Extension
5LGS-T08-00561	0	Mark II Tower Type A Self Supporting Tower Lower Portion of 30 Ft Body Extension
5LGS-T08-00563	0	500 kV Peace River T/L No. 1; Type 2A Self Supporting Tower; Longitudinal Face of K-Frame
5LGS-T08-00566	0	500 kV Peace River T/L No. 1; Type 2A Self Supporting Tower; Crossarm
5LGS-T08-00567	1	Mark II Tower Type A Self Supporting Tower 20 Ft Body Extension
5LGS-T08-00568	0	Mark II Tower Type A Self Supporting Tower Section C-C
5LGS-T08-00569	0	Mark II Tower Type A Self Supporting Tower Section D-D and Oblique Bracing for ±0 Ft Leg Extension
5LGS-T08-00570	0	Mark II Tower Type A Self Supporting Tower 10 Ft Body Extension
Tower Type 8KGT		
5L013-T08-00192	2	Type 8KGT Deadend Tower Ground Wire Peak Details
5L013-T08-00193	1	Type 8KGT Deadend Tower Ground Wire Peak Details
5L013-T08-00194	2	Type 8KGT Deadend Tower Ground Wire Peak Details
5L013-T08-00195	1	Type 8KGT Deadend Tower Ground Crossarm Details
5L013-T08-00196	1	Type 8KGT Deadend Tower Ground Bridge Lateral Portion
5LGS-T08-02780	8	Type 8KG Deadend Tower Bridge Central Portion Details
5LGS-T08-02782	3	Type 8KG Deadend Tower K-Frame Transverse Face
5LGS-T08-02783	2	Type 8KG Deadend Tower K-Frame Internal Long Face
5LGS-T08-02784	2	Type 8KG Deadend Tower K-Frame External Long Face
5LGS-T08-02785	4	Type 8KG Deadend Tower Pedestal
5LGS-T08-02786	2	Type 8KG Deadend Tower Pedestal Section E-E
5LGS-T08-02787	2	Type 8KG Deadend Tower Pedestal Gussets
5LGS-T08-02788	2	Type 8KG Deadend Tower 10 Ft Body Extension

Drawing No.	Rev.	Title
5LGS-T08-02789	3	Type 8KG Deadend Tower 20 Ft Body Extension
5LGS-T08-02790	3	Type 8KG Deadend Tower 20 Ft Body Extension Section F-F
5LGS-T08-02791	2	Type 8KG Deadend Tower 20 Ft Body Extension Section G-G
5LGS-T08-02792	2	Type 8KG Deadend Tower ±0 Ft Leg Extension
5LGS-T08-02793	3	Type 8KG Deadend Tower +4 Ft Leg Extension
5LGS-T08-02794	3	Type 8KG Deadend Tower +8 Ft Leg Extension
5LGS-T08-02795	3	Type 8KG Deadend Tower +12 Ft Leg Extension
5LGS-T08-02796	4	Type 8KG Deadend Tower +12 Ft Leg Extension View N
5LGS-T08-02797	2	Type 8KG Deadend Tower +16 Ft Leg Extension
5LGS-T08-02798	4	Type 8KG Deadend Tower +16 Ft Leg Extension View R
REFERENCE DRAWINGS		
G-T08-00482	3	Specification Control Drawing; Structure Number Signs; Fabrication Details
G-T08-B483	1	Installation of Number Signs on Lattice Towers
G-T08-00619	0	Specification Control Drawing Standard Counterpoise Details for Steel Towers
5LGS-T08-D3929	1	500 kV Single Circuit Lattice Tower Outlines for Helicopter Touch-and-Go Landings on the Bridge of a De-Energized Line
5LGS-T08-D4001	3	500 kV Single Circuit Lattice Tower Helicopter Touch-and-Go Landing on the Bridge of an Energized Line; Landing Width = 2.600 Metres
5LGS-T08-D4002	3	500 kV Single Circuit Lattice Tower Helicopter Touch-and-Go Landing on the Bridge of an Energized Line; Landing Width = 3.600 Metres
TOWER ORIGINAL STRUCTURAL DETAIL AND/OR ASSEMBLY/ERECTION DRAWINGS		
Tower Type 52A		
5L46-T08-00001	0	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Suspension Tower; (0-2 Deg); Specification Drawing
5L46-T08-00028	1	Kelly Lake – Cheekye 500 kV T/L; Loading Tree Table Drawing for Type 52A Guyed Suspension Tower; (0-2 Deg)
5L46-T08-00037	5	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Suspension Tower; (0-2 Deg); Design Drawing

Drawing No.	Rev.	Title
5L46-T08-00038	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Suspension Tower; (0-2 Deg); Design Drawing
5L46-T08-00081	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Bridge; Detail Fabrication Drawing
5L46-T08-00082	3	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Upper Part 1; Detail Fabrication Drawing
5L46-T08-00083	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Upper Part 2; Detail Fabrication Drawing
5L46-T08-00084	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Upper Part 3; Detail Fabrication Drawing
5L46-T08-00085	3	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Upper Part 4; Detail Fabrication Drawing
5L46-T08-00086	3	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Crossarm; Detail Fabrication Drawing
5L46-T08-00087	3	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Upper Mast; Detail Fabrication Drawing
5L46-T08-00088	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Lower Mast 1; Detail Fabrication Drawing
5L46-T08-00089	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Lower Mast 2; Detail Fabrication Drawing
5L46-T08-00090	3	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Mast Extensions; Detail Fabrication Drawing
5L46-T08-00091	2	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Grillage G1 Foundation; Detail Fabrication Drawing
5L46-T08-00092	2	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Grillage G2 Foundation; Detail Fabrication Drawing
5L46-T08-00093	2	Kelly Lake – Cheekye 500 kV T/L; Type 52A Tower; Foundation For Concrete and Rock; Footing; Detail Fabrication Drawing
5L46-T08-00094	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Bridge and Upper Part 1; Erection Diagram
5L46-T08-00095	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Bridge and Upper Part 2; Erection Diagram
5L46-T08-00096	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Bridge and Upper Part 2; Erection Diagram
5L46-T08-00097	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Crossarm; Erection Diagram
5L46-T08-00098	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Upper Mast; Erection Diagram

Drawing No.	Rev.	Title
5L46-T08-00099	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Lower Mast; Erection Diagram
5L46-T08-00100	1	Kelly Lake – Cheekye 500 kV T/L; Type 52A Guyed Tower; Mast Extensions; Erection Diagram
Tower Type 53A		
5L46-T08-00003	0	Kelly Lake – Cheekye 500 kV T/L; Type 53A Self Supporting Tower; (0-2 Deg); Specification Drawing
5L46-T08-00030	1	Kelly Lake – Cheekye 500 kV T/L; Loading Tree Table Drawing for Type 53A Self Supporting; Suspension Tower (0-2 Deg)
5L46-T08-00041	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Self Supporting Suspension; Tower (0-2 Deg); Basic Tower; 3 m; 6 m; 9 m and 12 m Body Extensions; Design Drawing
5L46-T08-00042	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Self Supporting Suspension; Tower (0-2 Deg); 1.0 m and 1.5 m Panel Extensions; -3 m to +8 m Leg Extensions; Design Drawing
5L46-T08-00078	4	Kelly Lake – Cheekye 500 kV T/L; Type 52A; 52C; 53A; 53C; 53D and 53T Towers; General Notes
5L46-T08-00141	1	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Bridge; Detail Fabrication Drawing
5L46-T08-00142	5	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Upper Part 1; Detail Fabrication Drawing
5L46-T08-00143	4	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Upper Part 2; Detail Fabrication Drawing
5L46-T08-00144	4	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Upper Part 3; Detail Fabrication Drawing
5L46-T08-00145	4	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Upper Part 4; Detail Fabrication Drawing
5L46-T08-00146	6	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Crossarm; Detail Fabrication Drawing
5L46-T08-00147	4	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Common Body 1; Detail Fabrication Drawing
5L46-T08-00148	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Common Body 2; Detail Fabrication Drawing
5L46-T08-00149	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Common Body 3; Detail Fabrication Drawing
5L46-T08-00150	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; Horizontal Diaphragm; Detail Fabrication Drawing

Drawing No.	Rev.	Title
5L46-T08-00151	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +3 m Body Extension; Detail Fabrication Drawing
5L46-T08-00152	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +6 m Body Extension; Detail Fabrication Drawing
5L46-T08-00153	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +6 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00154	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +9 m Body Extension 1; Detail Fabrication Drawing
5L46-T08-00155	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +9 m Body Extension 2; Detail Fabrication Drawing
5L46-T08-00156	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +9 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00157	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +12 m Body Extension 1; Detail Fabrication Drawing
5L46-T08-00158	4	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +12 m Body Extension 2; Detail Fabrication Drawing
5L46-T08-00159	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +12 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00160	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; -1 m; -2 m and -3 m Leg Extensions; Detail Fabrication Drawing
5L46-T08-00161	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; ±0 m and +1 m Leg Extensions; Detail Fabrication Drawing
5L46-T08-00162	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +2 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00163	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +3 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00164	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +4 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00165	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +5 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00166	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +6 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00167	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +6 m Leg Oblique Bracing; Detail Fabrication Drawing

Drawing No.	Rev.	Title
5L46-T08-00168	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +7 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00169	2	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +7 m Leg Oblique Bracing; Detail Fabrication Drawing
5L46-T08-00170	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +8 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00171	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +8 m Leg Oblique Bracing; Detail Fabrication Drawing
5L46-T08-00172	3	Kelly Lake – Cheekye 500 kV T/L; Type 53A Tower; +1 m and +1.5 m Panel Extensions; Detail Fabrication Drawing
Tower Type 53C		
5L46-T08-00004	0	Kelly Lake – Cheekye 500 kV T/L; Type 53C Self Supporting Tower; (0-8 Deg); Specification Drawing
5L46-T08-00031	1	Kelly Lake – Cheekye 500 kV T/L; Loading Tree Table Drawing for Type 53C Self Supporting; Suspension Tower (0-8 Deg)
5L46-T08-00046	3	Kelly Lake – Cheekye 500 kV T/L; Type 53C Self Supporting Suspension; Tower (0-8 Deg); Basic Tower; Design Drawing
5L46-T08-00047	3	Kelly Lake – Cheekye 500 kV T/L; Type 53C Self Supporting Suspension; Tower (0-8 Deg); 3 m; 6 m; 9 m; 12 m; 15 m and 18 m Body; Extensions; 1.0 m and 1.5 m Panel Extensions; Design Drawing
5L46-T08-00048	3	Kelly Lake – Cheekye 500 kV T/L; Type 53C Self Supporting Suspension; Tower (0-8 Deg); 3.0 m to +8.0 m Leg Extensions; Design Drawing
5L46-T08-00049	2	Kelly Lake – Cheekye 500 kV T/L; Type 53C Self Supporting Suspension; Tower (0-8 Deg); 3 m; 6 m; 9 m; 12 m; 15 m and 18 m Body; Extensions; 1.0 m and 1.5 m Panel Extensions; Design Drawing
5L46-T08-00050	2	Kelly Lake – Cheekye 500 kV T/L; Type 53C Self Supporting Suspension; Tower (0-8 Deg); ±0 m to +8.0 m Leg Extensions; Design Drawing
5L46-T08-00261	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Bridge; Detail Fabrication Drawing
5L46-T08-00262	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Upper Part 1; Detail Fabrication Drawing
5L46-T08-00263	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Upper Part 2; Detail Fabrication Drawing

Drawing No.	Rev.	Title
5L46-T08-00264	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Upper Part 3; Detail Fabrication Drawing
5L46-T08-00265	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Upper Part 4; Detail Fabrication Drawing
5L46-T08-00266	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Crossarm; Detail Fabrication Drawing
5L46-T08-00267	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Common Body 1; Detail Fabrication Drawing
5L46-T08-00268	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Common Body 2; Detail Fabrication Drawing
5L46-T08-00269	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; Horizontal Diaphragm; Detail Fabrication Drawing
5L46-T08-00270	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +3 m Body Extension; Detail Fabrication Drawing
5L46-T08-00271	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +6 m Body Extension; Detail Fabrication Drawing
5L46-T08-00272	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +6 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00273	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +9 m Body Extension 1; Detail Fabrication Drawing
5L46-T08-00274	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +9 m Body Extension 2; Detail Fabrication Drawing
5L46-T08-00275	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +9 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00276	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +12 m; +15 m and +18 m Body Extensions 1; Detail Fabrication Drawing
5L46-T08-00277	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +12 m Body Extension 2; Detail Fabrication Drawing
5L46-T08-00278	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +12 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00279	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +15 m Body Extension 2; Detail Fabrication Drawing
5L46-T08-00280	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +15 m Body Extension 3; Detail Fabrication Drawing

Drawing No.	Rev.	Title
5L46-T08-00281	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +15 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00282	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +18 m Body Extension 2; Detail Fabrication Drawing
5L46-T08-00283	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +18 m Body Extension 3; Detail Fabrication Drawing
5L46-T08-00284	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +18 m Body Extension – Diaphragm; Detail Fabrication Drawing
5L46-T08-00285	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; -2 m and -3 m Leg Extensions; Detail Fabrication Drawing
5L46-T08-00286	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; -1 m and ±0 m Leg Extensions; Detail Fabrication Drawing
5L46-T08-00287	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +1 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00288	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +2 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00289	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +3 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00290	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +4 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00291	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +5 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00292	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +5 m Leg Oblique Bracing; Detail Fabrication Drawing
5L46-T08-00293	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +6 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00294	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +6 m Leg Oblique Bracing; Detail Fabrication Drawing
5L46-T08-00295	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +7 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00296	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +7 m Leg Oblique Bracing; Detail Fabrication Drawing
5L46-T08-00297	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +8 m Leg Extension; Detail Fabrication Drawing
5L46-T08-00298	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +8 m Leg Oblique Bracing; Detail Fabrication Drawing

Drawing No.	Rev.	Title
5L46-T08-00299	1	Kelly Lake – Cheekye 500 kV T/L; Type 53C Tower; +1 m and 1.5 m Panel Extensions; Detail Fabrication Drawing
Tower Type 53J		
5L46-T08-00007-001	0	Kelly Lake – Cheekye 500 kV T/L; Type 53J Self Supporting Deadend; Tower (0-45 Deg); Specification Drawing
5L46-T08-00007-002	0	Kelly Lake – Cheekye 500 kV T/L; Type 53J Self Supporting Deadend; Tower (0-45 Deg); Specification Drawing
5L46-T08-00691	4	Detail Fabrication Drawing of 53J Type Tower (Upper Part 1)
5L46-T08-00692	4	Detail Fabrication Drawing of 53J Type Tower (Upper Part 2)
5L46-T08-00693	5	Detail Fabrication Drawing of 53J Type Tower (Top Conductor Arm)
5L46-T08-00694	5	Detail Fabrication Drawing of 53J Type Tower (Upper Part 3)
5L46-T08-00695	3	Detail Fabrication Drawing of 53J Type Tower (Jumper Crossarm)
5L46-T08-00696	5	Detail Fabrication Drawing of 53J Type Tower (Conductor Crossarm)
5L46-T08-00697	5	Detail Fabrication Drawing of 53J Type Tower (Plan of Conductor Crossarm)
5L46-T08-00698	4	Detail Fabrication Drawing of 53J Type Tower (Common Body 1)
5L46-T08-00699	3	Detail Fabrication Drawing of 53J Type Tower (Common Body 2)
5L46-T08-00700	3	Detail Fabrication Drawing of 53J Type Tower (Common Body 3)
5L46-T08-00701	4	Detail Fabrication Drawing of 53J Type Tower (Horizontal Diaphragm)
5L46-T08-00702	1	Detail Fabrication Drawing of 53J Type Tower (+3 m Body Extension)
5L46-T08-00703	2	Detail Fabrication Drawing of 53J Type Tower (+6 m Body Extension)
5L46-T08-00704	1	Detail Fabrication Drawing of 53J Type Tower (+ 6 m Body Extension Diaphragm)

Drawing No.	Rev.	Title
5L46-T08-00705	1	Detail Fabrication Drawing of 53J Type Tower (+9 m Body Extension 1)
5L46-T08-00706	1	Detail Fabrication Drawing of 53J Type Tower (+9 m Body Extension 2)
5L46-T08-00707	1	Detail Fabrication Drawing of 53J Type Tower (+9 m Body Extension Diaphragm)
5L46-T08-00708	3	Detail Fabrication Drawing of 53J Type Tower (+12 m Body Extension 1)
5L46-T08-00709	3	Detail Fabrication Drawing of 53J Type Tower (+12 m Body Extension 2)
5L46-T08-00710	3	Detail Fabrication Drawing of 53J Type Tower (+12 m Body Extension Diaphragm)
5L46-T08-00711	1	Detail Fabrication Drawing of 53J Type Tower (-3 m, -2 m and -1 m Leg Extensions)
5L46-T08-00712	1	Detail Fabrication Drawing of 53J Type Tower (±0 m Leg Extension)
5L46-T08-00713	1	Detail Fabrication Drawing of 53J Type Tower (+1 m Leg Extension)
5L46-T08-00714	1	Detail Fabrication Drawing of 53J Type Tower (+2 m Leg Extension)
5L46-T08-00715	1	Detail Fabrication Drawing of 53J Type Tower (+3 m Leg Extension)
5L46-T08-00716	1	Detail Fabrication Drawing of 53J Type Tower (+4 m Leg Extension)
5L46-T08-00717	1	Detail Fabrication Drawing of 53J Type Tower (+4 m Leg Oblique Bracing)
5L46-T08-00718	1	Detail Fabrication Drawing of 53J Type Tower (+5 m Leg Extension)
5L46-T08-00719	2	Detail Fabrication Drawing of 53J Type Tower (+5 m Leg Oblique Bracing)
5L46-T08-00720	4	Detail Fabrication Drawing of 53J Type Tower (+6 m Leg Extension)
5L46-T08-00721	4	Detail Fabrication Drawing of 53J Type Tower (+6 m Leg Oblique Bracing)
5L46-T08-00722	2	Detail Fabrication Drawing of 53J Type Tower (+1 m and +1.5 m Panel Extensions)

Drawing No.	Rev.	Title
Tower Type 3JGX		
5L44-T08-00038-001	1	Meridian – Ingledow 500 kV T/L; Rebuild Project; Type 3JGX Self Supporting; River Crossing Deadend Tower; Tower Layout – Design Layout
5L44-T08-00038-002	1	Meridian – Ingledow 500 kV T/L; Rebuild Project; Type 3JGX Self Supporting; River Crossing Deadend Tower; Tower Layout – Upper Part
5L44-T08-00038-003	1	Meridian – Ingledow 500 kV T/L; Rebuild Project; Type 3JGX Self Supporting; River Crossing Deadend Tower; Tower Layout – Lower Part – Body and Legs
5L44-T08-00038-004	1	Meridian – Ingledow 500 kV T/L; Rebuild Project; Type 3JGX Self Supporting; River Crossing Deadend Tower; Tower Layout – Ladder and Platform
5L44-T08-00038-005	1	Meridian – Ingledow 500 kV T/L; Rebuild Project; Type 3JGX Self Supporting; River Crossing Deadend Tower; Tower Layout – Member Schedule for Tower 542-2
5L44-T08-00038-006	1	Meridian – Ingledow 500 kV T/L; Rebuild Project; Type 3JGX Self Supporting; River Crossing Deadend Tower; Tower Layout – Member Schedule for Tower 543-1
2L099 RIVER CROSSING DEAD END TOWER		
2L099-T08-00538-001	A	Terrace – Kitimat 287 kV T/L; River Crossing Dead End Tower (0-30 Deg); Design Outline Drawing (Preliminary)
2L099-T08-00538-002	A	Terrace – Kitimat 287 kV T/L; River Crossing Dead End Tower (0-30 Deg); Design Outline Drawing (Preliminary)
SAMPLE DRAWINGS		
5LGS-T08-00291	1	500 kV Peace River T/L No. 1; Type 3H Strain Tower; Diaphragm of Standard Tower
5LGS-T08-00292	0	500 kV Peace River T/L No. 1; Type 3H Strain Tower; 10 Ft Body Extension
5LGS-T08-00574	1	500 kV Peace River T/L No. 1; Type 3A Suspension Tower; -4 and -16 Ft Leg Extensions for 20 and 30 Ft Body Extensions
5LGS-T08-02381	0	500 kV Transmission Lines; Type 6A Suspension Tower; Bill of Material
5LGS-T08-03038	5	500 kV Single Circuit; Type 3C Self Supporting Tower; Crossarm and Bridge; Erection Diagram

Drawing No.	Rev.	Title
5LGS-T08-03040	2	500 kV Single Circuit; Type 3C Self Supporting Tower; Pedestal; 10 and 20 Ft Body Extensions; Erection Diagram
5LGS-T08-03042	1	500 kV Single Circuit; Type 3C Self Supporting Tower; 60 Ft Body Extension; Erection Diagram
5LGS-T08-03044	1	500 kV Single Circuit; Type 3C Self Supporting Tower; +8, +12 and +16 Ft Leg Extensions; Erection Diagram
MECHANICAL DRAWINGS		
5L005-T08-00024	Preliminary	Double 160 kN Insulator Vee String Suspension Hardware Assembly for SP-926.7, 4 Conductor Bundle Used on Tower Type 54C
5L005-T08-00025	Preliminary	Single 160 kN Insulator Vee String Suspension Hardware Assembly for SP-926.7, 4 Conductor Bundle Used on Tower Types 54A
5L005-T08-00027	Preliminary	Double 220 kN Insulator String Deadend Hardware Assembly for SP-926.7, 4 Conductor Bundle
5L005-T08-00028	Preliminary	Quad 220 kN Insulator String Deadend Hardware Assembly for SP-926.7, 4 Conductor Bundle
5L005-T08-00029	Preliminary	Single 160 kN Insulator String Jumper Suspension Hardware Assembly for SP-2303.5, 2-Conductor Bundle
5LGS-T08-04003	2	500 kV Transmission Line; Double 220 kN Insulator String Deadend Hardware Assembly for 4 Conductor Bundle Use on Type 2, 3, 7 and 8 Self Supporting Towers; Supercedes Drawings 5LGS-508-D1662, D1662M, D1667, D1667M, D1669 and D1699M
5LGS-T08-04057	2	500 kV Transmission Line; Single 160 kN Suspension Insulator; String Jumper Hardware Assembly for 1167.2 mm²; 2 Conductor Bundle for Tower Types 2, 3, 7 and 8
5LGS-T08-04059	1	500 kV Transmission Line; Single 160 kN; 210 kN or 220 kN; Insulator String Suspension; Hardware Assembly for 4 Conductor Bundle for Tower Types 2, 3, 4, 6 and 7

Drawing No.	Rev.	Title
5LGS-T08-04124	0	500 kV Transmission Line Type 2KG, 3JG, 7JG, 8KG Towers and Substation Single Insulator String Slack Span Deadend Hardware Assembly for 44.5 mm Diameter 2 Conductor Bundle
G-T08-00576	4	Steel Pole or Tower T/L; Guy Assembly for 5/8 Inch Diameter and 1 Inch Diameter Guy Wire with Compression or Formed Wire Terminations
G-T08-B579	0	Steel Structure T/L; Groundwire Deadend; Hardware Assembly; Steel Pole Attachment

GENERAL NOTES:

1. ALL STRUCTURAL STEEL SHALL MEET CSA G40.20-13 / G40.21-13 GRADE 350W MINIMUM.
2. ALL STRUCTURAL STEEL SHAPES AND PLATES TO BE LOCATED UP TO 2m ABOVE GRADE SHALL BE 1/4" (6.4mm) THICK MINIMUM, OTHERWISE THE MINIMUM THICKNESS SHALL BE 3/16" (4.8mm). FOR DETAILING PURPOSES, GRADE LEVEL SHALL BE THE TOP OF CONCRETE FOOTING OR THE TOP OF THE GRILLAGE FOOTING.
3. ALL TOWER BOLTS SHALL BE IN ACCORDANCE WITH ASTM A-394 STANDARD TYPE 1. EACH BOLT ASSEMBLY SHALL BE SUPPLIED WITH HEX NUT IN ACCORDANCE WITH ASTM A563-15 AND HEAVY SERIES HELICAL SPRING WASHERS IN ACCORDANCE WITH CSA STANDARD B19.2.
4. ALL STRUCTURAL STEEL, TOWER BOLTS AND STEP BOLTS SHALL CONFORM TO IMPACT REQUIREMENTS OF 20 JOULES AT MINUS 20°C.
5. TOWER BOLT DIAMETER SHALL BE EITHER 5/8" FOR TOWER TYPES 54GA, 54A, AND 54C. FOR TOWER TYPE 54J, BOLT DIAMETER SHALL BE 3/4".
6. ALL TOWER BOLT ASSEMBLIES SHALL MEET BC HYDRO SPECIFICATION NUMBER 243-1000, UNLESS OTHERWISE NOTED.
7. BOLT HOLES FOR 5/8" DIAMETER BOLTS SHALL BE 11/16" (18mm) AND, FOR 3/4" BOLTS, 13/16" (21mm). THESE DIMENSIONS DO NOT INCLUDE MANUFACTURING TOLERANCE.
8. OUTSIDE DIAMETER FOR STANDARD 5/8" RINGFILL SHALL BE 1-1/4" (32mm) AND, FOR STANDARD 3/4" RINGFILL, 1-1/2" (38mm).
9. MINIMUM EDGE DISTANCE FOR 5/8" BOLTS SHALL BE 19mm FOR A ROLLED EDGE AND 25mm FOR A SHEARED EDGE, UNLESS OTHERWISE NOTED.
10. MINIMUM EDGE DISTANCE FOR 3/4" BOLTS SHALL BE 25mm FOR A ROLLED EDGE AND 30mm FOR A SHEARED EDGE, UNLESS OTHERWISE NOTED.
11. THE EDGE DISTANCE REQUIREMENTS IN NOTE NUMBERS 9 AND 10 DO NOT INCLUDE MANUFACTURING TOLERANCES FOR STRUCTURAL STEEL SHAPES. TOWER DETAILING TO ACCOUNT FOR MANUFACTURING TOLERANCES WHILE MEETING THESE REQUIREMENTS.
12. ALL FINISHED MATERIAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH THE CSA-G164 STANDARD, EXCEPT ALL ROLLED ANGLES SHALL BE CONSIDERED AS "5MM THICK AND HEAVIER" ON TABLE 1 – MASS OF ZINC COATING FOR VARIOUS CLASSES OF MATERIAL (CSA-G164, 1981, PAGE 14).
13. STRUCTURAL SHAPES TO BE SHOWN IN ACCORDANCE WITH NORTH AMERICAN PRACTICE. PLATE THICKNESSES, BOLTS AND WASHERS TO BE SHOWN IN INCHES. PLATE WIDTHS AND ALL OTHER DIMENSIONS TO BE SHOWN IN MILLIMETRES.
14. ALL STEP BOLTS SHALL BE ASTM A394 TYPE 1, 3/4" DIA x 8" LONG UNLESS OTHERWISE SPECIFIED.
15. ALL MARK NUMBERS TO BE PREFIXED AS FOLLOWS:

TOWER TYPE	PREFIX
54GA	X54GA
54A	X54A
54C	X54C
54J	X54J

WHERE 'X' IS THE MANUFACTURER'S IDENTIFICATION CODE.

16. BILL OF MATERIALS FOR EACH TOWER TYPE TO BE SHOWN ON ONE DRAWING (SEE SAMPLE DRAWING NUMBER SLGS-T08-02381).
17. WHERE C.F. (CUT FLANGE) IS REQUIRED, THE FLANGE IS TO BE GROUND FLUSH AFTER CUTTING.
18. STRUCTURAL ANGLES SHALL NOT BE MODIFIED TO THE EXTENT THAT THE TWO LEGS OF THE ANGLE MEMBER ARE TRANSFORMED TO A FLAT PLATE, FOR EXAMPLE, MARK NUMBERS 1001L, 1001R, 1041L AND 1041L ON DRAWING NUMBER SLGS-T08-00574.
19. QUANTITIES OF BOLTS, STEPBOLTS, NUTS AND WASHERS SHOWN ON BILL OF MATERIAL DRAWINGS SHALL BE NET.
20. FOR CONTRACT PURPOSES, GROSS QUANTITY OF BOLTS, NUTS AND WASHERS TO BE SUPPLIED SHALL INCLUDE A MINIMUM 5% EXTRA.
21. FOR SPECIFICATIONS FOR HELICOPTER TOUCH AND GO SEE DRAWING NO. SLGS-T08-D3929, SLGS-T08-D4001, SLGS-T08-D4002.
22. FOR LOCATION FOR TOWER NO. SIGN SEE DRAWING NO. G-T08-8483.

LEGENDS:

1. ⊙ DENOTES HOLE FOR STEP BOLT.
2. * DENOTES REDUNDANT MEMBERS WITH 2 BOLTS.

[redacted]

ABBREVIATIONS:

ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING MATERIAL
CF	CUT FLANGE
CSA	CANADIAN STANDARDS ASSOCIATION
DWG	DRAWING
EXT'NS	EXTENSION
KN	KILO-NEWTON
L	ANGLE
LA	LINE ANGLE
NA-	WIND NORMAL TO ALL SPAN IN NEGATIVE OFFSET
NA+	WIND NORMAL TO ALL SPAN IN POSITIVE OFFSET
Pa	PASCAL

CONDUCTOR:

SP-926.7-45/7

DIAMETER	29.16	mm
ULTIMATE STRENGTH	116,000	N
MAXIMUM TENSION WITH 19mm ICE, NO WIND @ -20°C	57,859	N
TENSION WITH 12.5mm ICE, 300 Pa WIND @ -20°C	50,473	N
TENSION WITH 600PA WIND @ -20°C	37,825	N
WEIGHT OF BARE CONDUCTOR	15.202	N/m
WEIGHT OF CONDUCTOR WITH 19mm ICE	40.582	N/m
WEIGHT OF CONDUCTOR WITH 12.5mm ICE	29.646	N/m
300Pa WIND ON CONDUCTOR WITH 12.5mm ICE	16.250	N/m
600Pa WIND ON CONDUCTOR	17.500	N/m

NO	REMARKS	DATE	DESIGNED	INDEP CHK	DFTG	DFTG CHK	INSP	REV	ACPT
1.	ISSUED FOR DETAILING	APR. 2017	K.CHING	MK	TP			RL	YOO

REVISIONS

DSGN [redacted]
INDEP CHK
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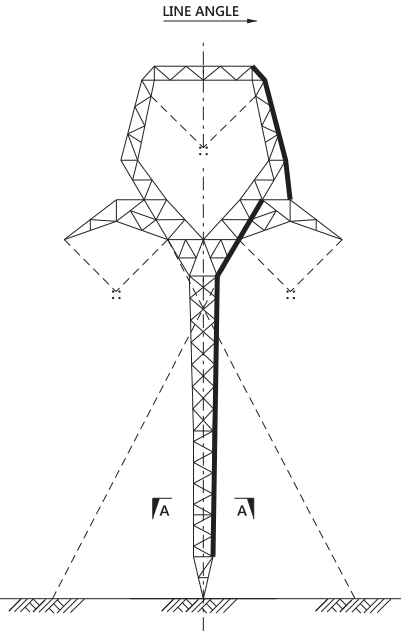
BC Hydro ENGINEERING

SOUTH BANK SUB. - PEACE CANYON 500 kV/TL

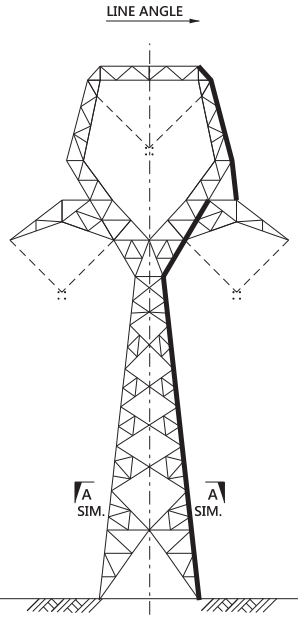
TYPE 54 SERIES TOWER

GENERAL NOTES

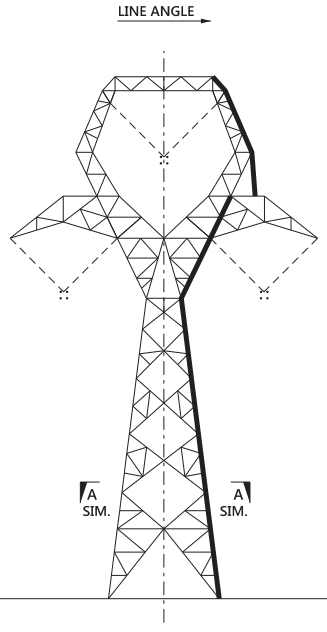
DATE SEPT. 8, 2016 | DISTR | DWG NO 5L005-T08-00006 | SIZE B | R 1



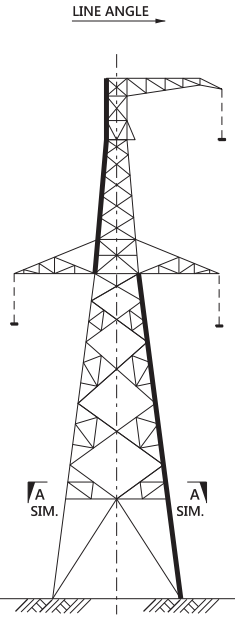
GUYED SUSPENSION
(54GA)



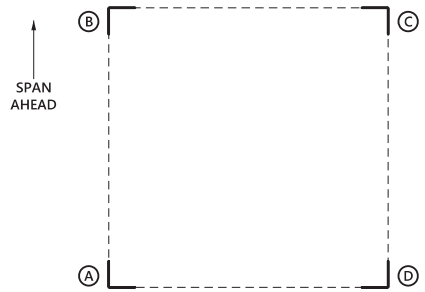
SELF SUPPORTING SUSPENSION
(54A)



SELF SUPPORTING SUSPENSION
(54C)



SELF SUPPORTING DEAD-END
(54J)



SECTION A-A
(SEE NOTE 8)

NOTES:

1. STEP BOLTS SHALL ENSURE A CLEAR 120mm PROJECTION OF BOLT SHANK.
2. THE MAXIMUM VERTICAL SPACING SHALL NOT EXCEED 380mm.
3. IN GENERAL, STEP BOLTS SHALL BE PLACED ON ALTERNATE LEGS OF THE ANGLE BELOW THE TOWER WAIST AND ON ONE LEG OF THE ANGLE ABOVE THAT POINT.
4. HOLES FOR STEP BOLTS SHALL BE PROVIDED IN ALL LEG EXTENSIONS.
5. STEP BOLTS SHALL BE KEPT CLEAR OF LEG SPLICES WHEREVER POSSIBLE. IF STEP BOLTS ARE USED AT SPLICE THEY SHALL NOT BE CONSIDERED IN THE SPLICE DESIGN.
6. FOR STEP BOLTS SPECIFICATIONS, REFER TO BC HYDRO TRANSMISSION ENGINEERING TECHNICAL SPECIFICATION 243-1000.
7. FOR STEP BOLTS ASSEMBLY, SEE BC HYDRO DRAWING G-T08-00271 FOR DETAILS.
8. HOLES SHALL BE PROVIDED ON BOTH LEG B AND LEG D, SEE SECTION A-A. STEP BOLTS SHALL BE INSTALLED ON ONLY ONE LEG, WHICH HAS THE LEAST INTERFERENCE WITH LINE ANGLE, FOLLOWING THE GIVEN CLIMBING PATH.

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NO	REMARKS	DATE	DESIGNED	INDEP CHK	DFTG	DFTG CHK	INSP	REV	ACPT
1.	ISSUED FOR DETAILING	APR. 2017	K. CHING	MK	TP			RL	YOO

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REV	
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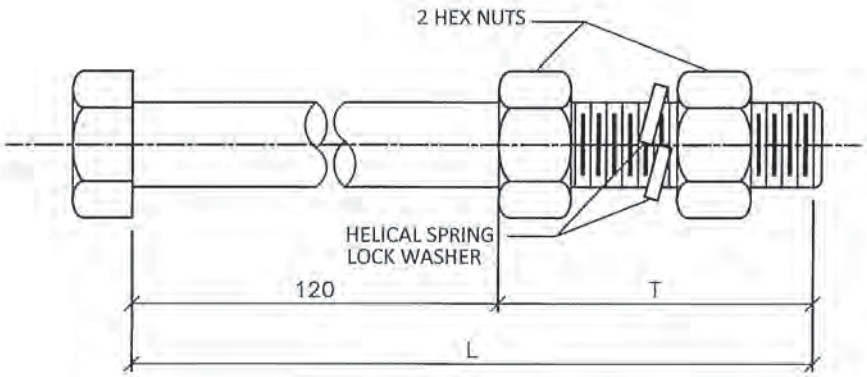
DATE SEPT. 8, 2016 | DISTR | DWG NO 5L005-T08-00023 | SIZE B | R 1

BC Hydro ENGINEERING

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54 SERIES TOWERS
STEP BOLT LOCATIONS



NOMINAL BOLT DIAMETER , 'D'	NOMINAL BOLT LENGTH , 'L'	THREAD LENGTH , 'T'
5/8"	178	57
5/8"	203	83
3/4"	203	83
3/4"	216	95
3/4"	241	121

NOTES:

1. STEP BOLTS SHALL BE IN ACCORDANCE WITH ASTM A394 T1 (HEAD MARKED T-1) AND BC HYDRO SPECIFICATION 243-1000-R1
2. EACH STEP BOLT SHALL BE SUPPLIED COMPLETE WITH TWO REGULAR SERIES HEX NUTS PER ASTM A563, GRADE DH, GALVANIZED AND HELICAL SPRING LOCK WASHER PER ASME B18.2.1 HEAVY SERIES , CARBON STEEL , GALVANIZED.
3. BOLTS SHALL BE SUPPLIED ASSEMBLED AS A UNIT WITH NUT ENGAGED ON THE BOLTS TO SHANK END. ALL MATERIAL SHALL BE HOT DIP GALVANIZED PER CSA G164-M OR ASTM F2329.
4. BOLTS DIAMETERS ARE INCHES. ALL OTHER DIMENSIONS ARE IN MILLIMETERS.

FOR INFORMATION ONLY

NO	REMARKS	DATE	DESIGNED	INDEP CHK	DFTG	DFTG CHK	INSP	REV	ACPT

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BC Hydro

STANDARD STEP BOLTS

DATE	DIST	DWG NO	SIZE	R
		G–T08–A271	A	2

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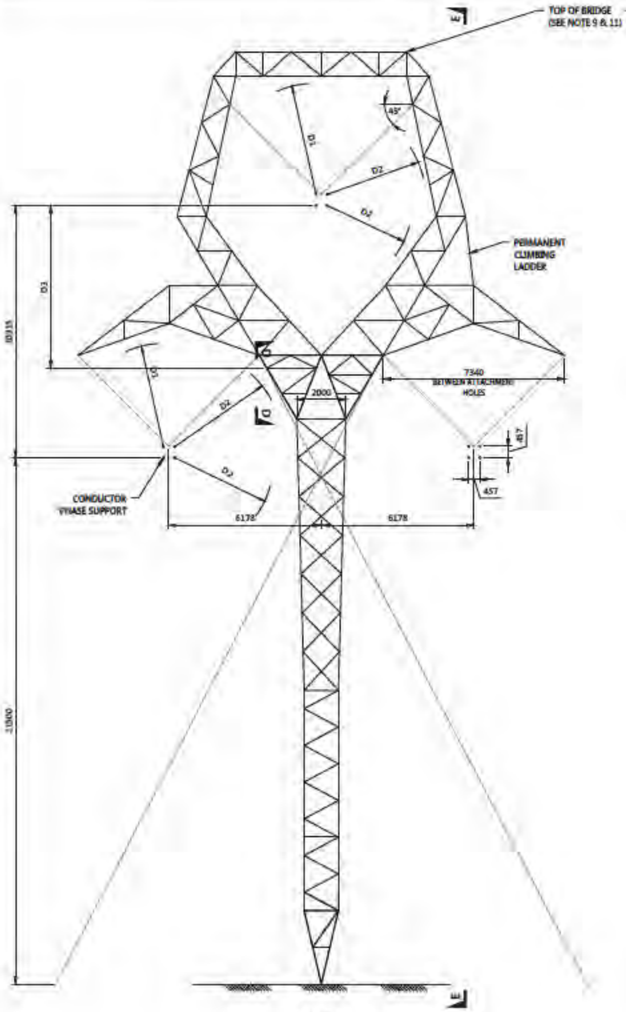
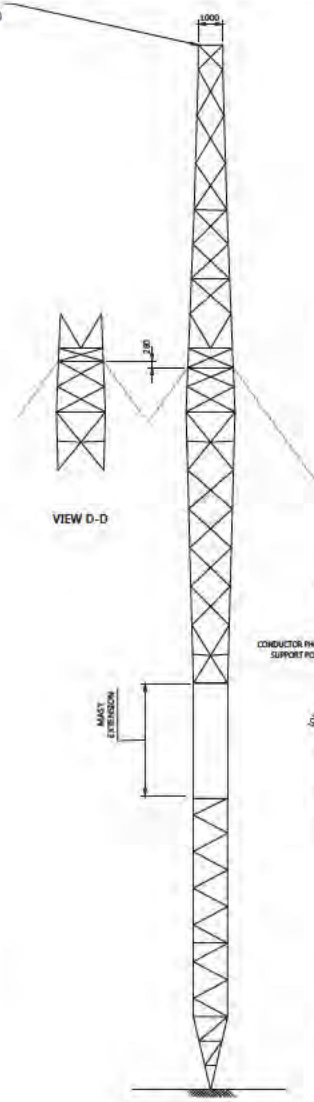


ELEVATION

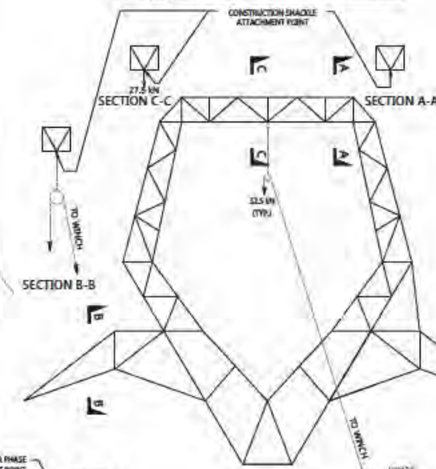


VIEW D-D

VIEW E-E

PERMISSIBLE MAST EXTENSION COMBINATIONS

TOWER HEIGHT (m)	MAST EXTENSIONS (m) 1.5	3.0	4.5	6.0
21.5	0	0	0	0
23.0	1	0	0	0
24.5	0	1	0	0
26.0	0	0	1	0
27.5	0	0	0	1
29.0	1	0	0	1
30.5	0	1	0	1
32.0	0	0	1	1
33.5	0	0	0	2

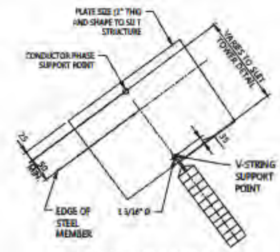


DETAIL Z
(SEE NOTE 7)

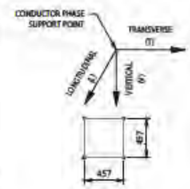
SPECIFIED DESIGN LOADS AND APPLICATIONS

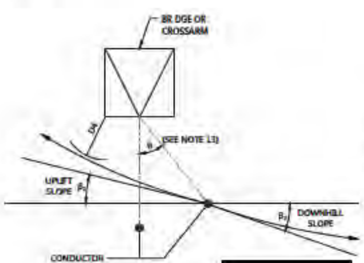
LOAD CASE		DESCRIPTION	CONDUCTOR PHASE LOAD (kN) V	T	L	STRENGTH FACTOR	LOAD APPLICATION*
1		MAXIMUM ICE	95.4	7.9	0.0	0.80	V, T AND L SHALL BE APPLIED TO ANY ONE, ANY TWO OR ALL THREE PHASE SUPPORT POINTS
2		HIGH WIND	37.6	41.7	0.0	0.90	
3		ICE AND WIND	69.8	40.1	0.0	0.90	
4		CONSTRUCTION	68.4	4.2	5.1	0.50	
5		EVERYDAY LOAD	65.0	5.5	0.0	0.50	
6	A	UNEQUAL ICE	58.6	4.8	10.0	0.67	LOAD A SHALL BE APPLIED TO ANY ONE, ANY TWO OR ALL THREE PHASE SUPPORT POINTS AND LOAD B TO THE REMAINING SUPPORT POINTS
	B		95.5	8.0	0.0		

CASES 1 TO 5 SHALL BE IN COMBINATION WITH WIND APPLIED ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT. CASE 6 SHALL BE IN COMBINATION WITH WIND APPLIED ON TOWER IN THE LONGITUDINAL DIRECTION OR AT 45° TO IT.



TYPICAL HOLE ALIGNMENT





CONDUCTOR SLOPE
(SEE NOTE 14)

[redacted]

NOTES:

1. SEE DRAWING NO. 5LG5-T08-0000 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. LOAD CASES:
   - CASE 1: 1/200 ICE, 19 mm ICE 0 WIND, -20°C
   - CASE 2: 1/200 WIND, 0 ICE, 900 Pa WIND, -20°C
   - CASE 3: 1/200 ICE AND WIND, 13 mm ICE, 300 Pa WIND.
   - CASE 4: CONSTRUCTION, 0 ICE, 0 WIND, -20°C SNUB ANGLE = 20° WITH THE HORIZONTAL.
   - CASE 5: EVERYDAY LOADING 0 ICE 0 WIND, -1°C
   - CASE 6: 13 mm UNEQUAL ICE 0 WIND, -20°C
4. TOWER DESIGN LOADS:
   - a. FOR ALL LOAD CASES, TOWER PHASE LOADS SHALL BE THE WORKING CONDUCTOR PHASE LOADS AS SPECIFIED IN THE LOAD TABLE.
   - b. FOR CASE 2 APPLY 900 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   - c. FOR CASE 3 APPLY 300 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   - d. FOR CASE 4 AND 5 APPLY 85 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   - e. FOR CASE 6 APPLY 300 Pa WIND ON TOWER IN THE LONGITUDINAL DIRECTION OR AT 45° TO IT.
   - f. WIND PRESSURE DISTRIBUTION ON TOWER SHALL FOLLOW THE CSA-C22.3 No.60826 - TERRAIN CATEGORY B.
5. STRENGTH FACTORS FOR EACH LOAD CASE SHALL BE AS SPECIFIED IN THE LOAD TABLE.
6. LOAD APPLICATION
   - a. TRANSVERSE LOADS SHOWN IN LOAD TABLE ARE REVERSIBLE.
   - b. LONGITUDINAL LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   - c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING WITHOUT PERMANENT DEFORMATIONS CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-97.
7. THE TOWER SHALL ALSO BE DESIGNED TO SUPPORT A POINT LOAD OF 12.5 kN IN THE PULLEY SYSTEM AS SHOWN IN DETAIL "Z" IN COMBINATION WITH THE LOADS OF CASE 4 APPLIED TO NONE, ANY ONE OR ANY TWO OF THE REMAINING PHASE SUPPORT POINTS.
8. CONSTRUCTION HOLES 33 mm IN DIAMETER SHALL BE PROVIDED AT JOINTS WHERE THE CONSTRUCTION SHACKLES ARE TO BE ATTACHED.
9. THE BRIDGE SHALL BE DESIGNED TO SUPPORT A VERTICAL LOAD OF 27.5 kN CONCENTRATED AT THE CENTRE OF THE BRIDGE.
10. THE OUTSTANDING LEG OF ALL STEEL ANGLES ON THE TOP PLANE OF THE BRIDGE SHALL POINT DOWNWARDS.
11. THE BRIDGE MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 1.8 kN CONCENTRATED AT THE CENTRE OF ITS UNSUPPORTED LENGTH IN COMBINATION WITH THE AXIAL FORCE CALCULATED FROM LOAD CASE 1 WITHOUT ANY PERMANENT DEFORMATION.
12. THE MINIMUM ELECTRICAL CLEARANCES FROM CONDUCTOR TO THE EDGE OF STEEL OR GUY WIRE SHALL BE AS FOLLOWS:
    - a. D1 = 4700 mm
    - b. D2 = 1150 mm
    - c. D3 = 3000 mm
    - d. D4 = 3000 mm
13. THE MAXIMUM INSULATOR SWING ANGLE (θ) IN THE LONGITUDINAL DIRECTION TO BE 28°.
14. THE MAXIMUM CONDUCTOR SLOPE FROM THE HORIZONTAL IS:
    β_1 = 10° (UPLIFT) β_2 = 20° (DOWNHILL)
15. FOR SPECIFICATIONS FOR STEP BOLTS, SEE DRAWING NO. G-T08-A771 AND 5LG5-T08-0461.
16. FOR DETAILS OF V-STRING, SEE DRAWING NO. 5LG5-T08-00021.
17. FOR SPECIFICATIONS FOR HELICOPTER TOUCH AND GO SEE DRAWING NO. 5LG5-T08-D-0001, 5LG5-T08-D-0001 AND 5LG5-T08-D-0002.
18. FOR LOCATION FOR TOWER NO. SIGN SEE DRAWING NO. G-T08-B481.

NO	REMARKS	DATE	DESIGNED	INSP CHK	TPTO	OPTO CHK	INSP	REV	APPT
1	GUY ATTACHMENT LOCATION CHANGED GENERAL REV SIONS. ISSUED FOR DETAILING	APR. 2017	M. KHEDR	H.K.	T.P.		R.H.	R.L.	D.G.

REVISIONS

NO	DRAWING NUMBER	TITLE

REFERENCE DRAWINGS

DESIGN / INSP CHK / APPD / OPTO CHK / INSP / REV / APPT [redacted] [redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54GA GUYED SUSPENSION TOWER
0 DEG - 2 DEG
SPECIFICATION DRAWING

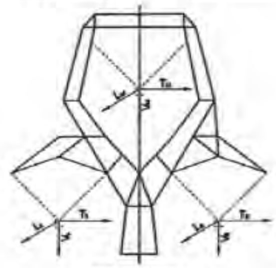
DATE		DWG NO	SIZE	R
SEPTEMBER 2016		5L005-T08-00007	D	1

CASE	DESCRIPTION	LOAD CASE No.	UNFACTORED DESIGN LOAD (kN)									STRENGTH FACTOR	WIND ON TOWER (Pa)	
			LEFT PHASE			MIDDLE PHASE			RIGHT PHASE				TRANS.	LONG.
			V	T	L	V	T	L	V	T	L			
1	1/200 ICE	1A	93.4	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	300	0
		1B	0.0	0.0	0.0	93.4	7.9	0.0	0.0	0.0	0.0			
		1C	0.0	0.0	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
		1D	93.4	7.9	0.0	93.4	7.9	0.0	0.0	0.0	0.0			
		1E	93.4	7.9	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
		1F	0.0	0.0	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
		1G	93.4	7.9	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
2	1/200 HIGH WIND	2A	37.6	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	800	0
		2B	0.0	0.0	0.0	37.6	41.7	0.0	0.0	0.0	0.0			
		2C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
		2D	37.6	41.7	0.0	37.6	41.7	0.0	0.0	0.0	0.0			
		2E	37.6	41.7	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
		2F	0.0	0.0	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
		2G	37.6	41.7	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
3	1/200 ICE WITH WIND	3A	69.4	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	300	0
		3B	0.0	0.0	0.0	69.4	40.2	0.0	0.0	0.0	0.0			
		3C	0.0	0.0	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
		3D	69.4	40.2	0.0	69.4	40.2	0.0	0.0	0.0	0.0			
		3E	69.4	40.2	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
		3F	0.0	0.0	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
		3G	69.4	40.2	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
4	EVERYDAY LOADING	4A	37.6	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	45	0
		4B	0.0	0.0	0.0	37.6	6.1	0.0	0.0	0.0	0.0			
		4C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
		4D	37.6	6.1	0.0	37.6	6.1	0.0	0.0	0.0	0.0			
		4E	37.6	6.1	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
		4F	0.0	0.0	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
		4G	37.6	6.1	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
5	CONSTRUCTION	5A	68.4	4.2	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.50	45	0
		5B	0.0	0.0	0.0	68.4	4.2	5.3	0.0	0.0	0.0			
		5C	0.0	0.0	0.0	0.0	0.0	0.0	68.4	4.2	5.3			
		5D	68.4	4.2	5.3	68.4	4.2	5.3	0.0	0.0	0.0			
		5E	68.4	4.2	5.3	0.0	0.0	0.0	68.4	4.2	5.3			
		5F	0.0	0.0	0.0	68.4	4.2	5.3	68.4	4.2	5.3			
		5G	68.4	4.2	5.3	68.4	4.2	5.3	68.4	4.2	5.3			
6	UNEQUAL ICE	6A	53.6	4.9	30.0	93.7	8.0	0.0	93.7	8.0	0.0	0.67	0	300
		6B	93.7	8.0	0.0	53.6	4.9	30.0	93.7	8.0	0.0			
		6C	93.7	8.0	0.0	93.7	8.0	0.0	53.6	4.9	30.0			
		6D	53.6	4.9	30.0	53.6	4.9	30.0	93.7	8.0	0.0			
		6E	53.6	4.9	30.0	93.7	8.0	0.0	53.6	4.9	30.0			
		6F	93.7	8.0	0.0	53.6	4.9	30.0	53.6	4.9	30.0			
		6G	53.6	4.9	30.0	53.6	4.9	30.0	53.6	4.9	30.0			

CASE	DESCRIPTION	LOAD CASE No.	UNFACTORED DESIGN LOAD (kN)									STRENGTH FACTOR	WIND ON TOWER (Pa)	
			LEFT PHASE			MIDDLE PHASE			RIGHT PHASE				TRANS.	LONG.
			V	T	L	V	T	L	V	T	L			
7	1/200 ICE	1A	93.4	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	150	150
		1B	0.0	0.0	0.0	93.4	7.9	0.0	0.0	0.0	0.0			
		1C	0.0	0.0	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
		1D	93.4	7.9	0.0	93.4	7.9	0.0	0.0	0.0	0.0			
		1E	93.4	7.9	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
		1F	0.0	0.0	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
		1G	93.4	7.9	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
8	1/200 HIGH WIND	7A	37.6	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	300	300
		7B	0.0	0.0	0.0	37.6	41.7	0.0	0.0	0.0	0.0			
		7C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
		7D	37.6	41.7	0.0	37.6	41.7	0.0	0.0	0.0	0.0			
		7E	37.6	41.7	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
		7F	0.0	0.0	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
		7G	37.6	41.7	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
9	1/200 ICE WITH WIND	8A	69.4	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	150	150
		8B	0.0	0.0	0.0	69.4	40.2	0.0	0.0	0.0	0.0			
		8C	0.0	0.0	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
		8D	69.4	40.2	0.0	69.4	40.2	0.0	0.0	0.0	0.0			
		8E	69.4	40.2	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
		8F	0.0	0.0	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
		8G	69.4	40.2	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
10	EVERYDAY LOADING	9A	37.6	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	23	23
		9B	0.0	0.0	0.0	37.6	6.1	0.0	0.0	0.0	0.0			
		9C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
		9D	37.6	6.1	0.0	37.6	6.1	0.0	0.0	0.0	0.0			
		9E	37.6	6.1	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
		9F	0.0	0.0	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
		9G	37.6	6.1	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
11	CONSTUCTION	10A	68.4	4.2	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.50	23	23
		10B	0.0	0.0	0.0	68.4	4.2	5.3	0.0	0.0	0.0			
		10C	0.0	0.0	0.0	0.0	0.0	0.0	68.4	4.2	5.3			
		10D	68.4	4.2	5.3	68.4	4.2	5.3	0.0	0.0	0.0			
		10E	68.4	4.2	5.3	0.0	0.0	0.0	68.4	4.2	5.3			
		10F	0.0	0.0	0.0	68.4	4.2	5.3	68.4	4.2	5.3			
		10G	68.4	4.2	5.3	68.4	4.2	5.3	68.4	4.2	5.3			
12	UNEQUAL ICE	11A	53.6	4.9	30.0	93.7	8.0	0.0	93.7	8.0	0.0	0.67	150	150
		11B	93.7	8.0	0.0	53.6	4.9	30.0	93.7	8.0	0.0			
		11C	93.7	8.0	0.0	93.7	8.0	0.0	53.6	4.9	30.0			
		11D	53.6	4.9	30.0	53.6	4.9	30.0	93.7	8.0	0.0			
		11E	53.6	4.9	30.0	93.7	8.0	0.0	53.6	4.9	30.0			
		11F	93.7	8.0	0.0	53.6	4.9	30.0	53.6	4.9	30.0			
		11G	53.6	4.9	30.0	53.6	4.9	30.0	53.6	4.9	30.0			

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. LOAD APPLICATION
   a. TRANSVERSE LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   b. LONGITUDINAL LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-15.
   d. THE TOWER SHALL ALSO BE DESIGNED TO SUPPORT A POINT LOAD OF 32.5 kN IN THE PULLEY SYSTEM AS SHOWN IN DETAIL "2" IN COMBINATION WITH THE LOADS OF CASE 4 APPLIED TO NONE, ANY ONE, OR ANY TWO OF THE REMAINING PHASE SUPPORT POINTS.
   e. THE BRIDGE SHALL BE DESIGNED TO SUPPORT A VERTICAL LOAD OF 27.5 kN CONCENTRATED AT THE CENTRE OF THE BRIDGE.
   f. THE BRIDGE MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.4 kN CONCENTRATED AT THE CENTRE OF ITS UNSUPPORTED LENGTH IN COMBINATION WITH THE AXIAL FORCE CALCULATED FROM LOAD CASE 5 WITHOUT ANY PERMANENT DEFORMATION.
3. V, T AND L DENOTE VERTICAL, TRANSVERSE AND LONGITUDINAL.
4. UNLESS OTHERWISE NOTED, REFER TO SPECIFICATION DRAWING NO. SL005-T08-00007



KEY LOAD MARK

REV	DESCRIPTION	DATE	DRAWN					
2	LOADING APPLICATION TABLE UPDATED	MAY 2017						
1	GUY ATTACHMENT LOCATION CHANGED; GENERAL REVISIONS. ISSUED FOR TENDERING	APR. 2017	M. EVEDR	H.E.	T.F.	R.B.	R.L.	D.O.

[redacted]

[redacted]

[redacted]

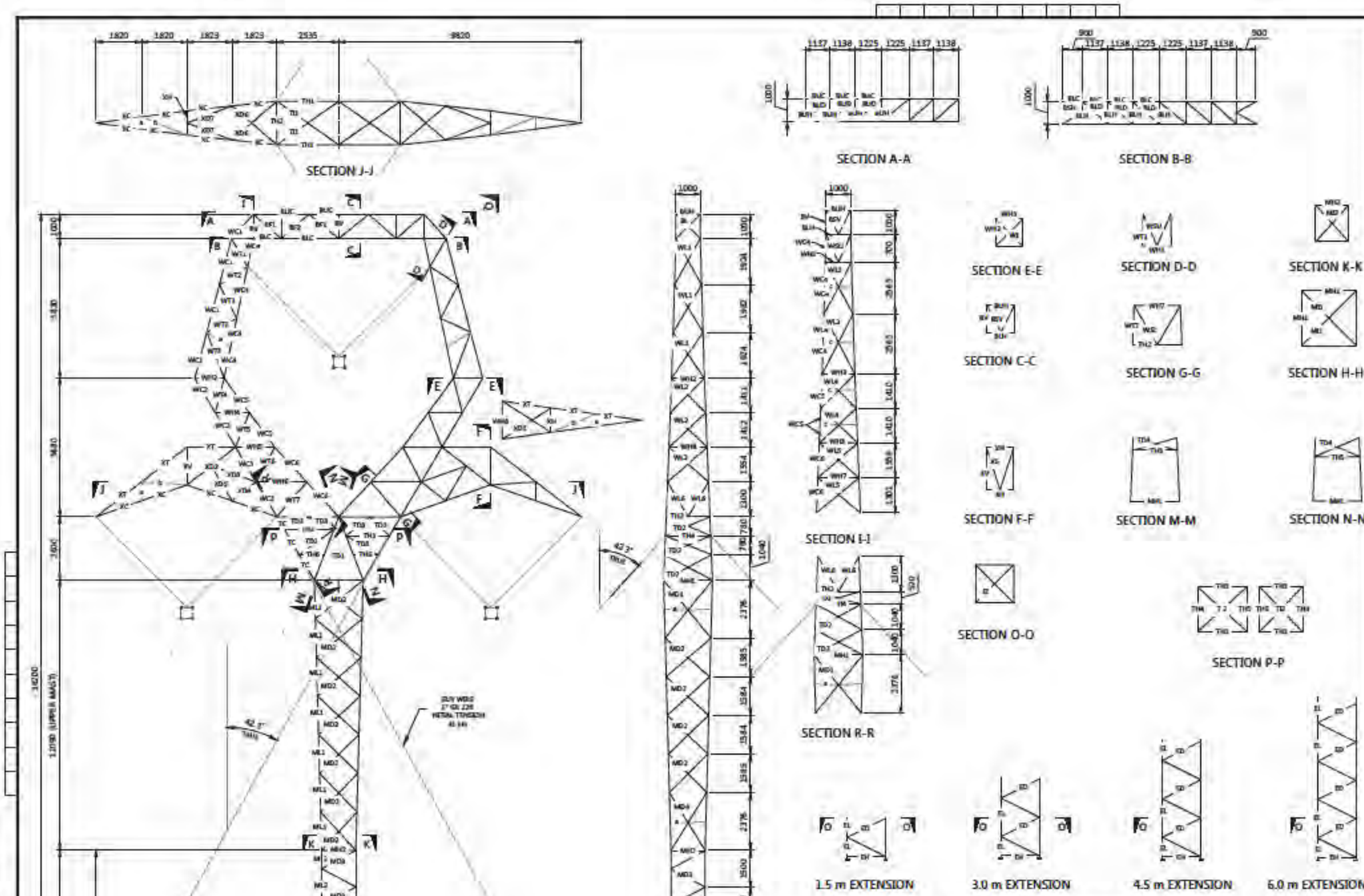
BC Hydro

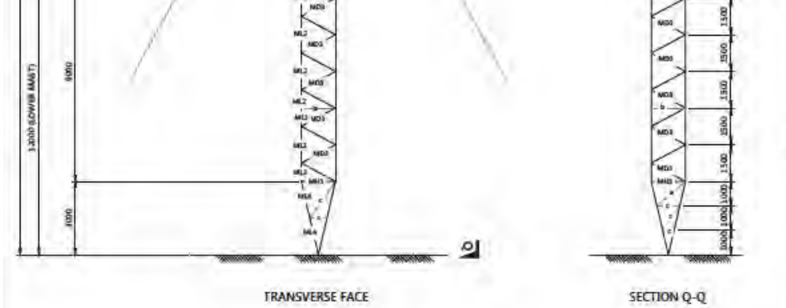
SOUTH BANK SUB. – PEACE CANYON 500 kV T/L

TYPE S4GA GUYED SUSPENSION TOWER
0 DEG – 2 DEG
LOADING APPLICATION TABLE

SEPTEMBER 2016

SL005-T08-00008 | D | 2





REDUNDANT MEMBERS		
MEMBER	SECTION	NO. BOLTS
a	L 1-3/4" x 1-3/4" x 3/16"	1
b	L 2" x 2" x 3/16"	1
c	L 1 3/4" x 1 3/4" x 1/4"	1

NOTES:

1. ALL STEEL ANGLE, PLATE AND MISCELLANEOUS MEMBERS SHALL CONFORM TO CSA G40.20/G40.21 STRUCTURAL GRADE 350W MINIMUM.
2. BOLTS SHALL BE 5/8" CONFORMING TO ASTM A394 TYPE 1 WITH REGULAR HEXAGONAL NUT (ASTM A563-07a) AND HEAVY SPRING LOCK WASHER TO CSA B19.2.
3. ALL STEEL AND BOLTS SHALL CONFORM TO THE IMPACT REQUIREMENT OF A MINIMUM AVERAGE ENERGY OF 20J AT -20°C.
4. ALL EXPOSED STEEL AND HARDWARE SHALL BE HOT-DIPPED GALVANIZED PER CSA STANDARD G164 AFTER FABRICATION.
5. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL FORCES ARE IN kN. MINUS SIGN DENOTES COMPRESSION AND POSITIVE SIGN DENOTES TENSION.
6. SEE DRAWING NO. 5L005-T08-00010 FOR TYPICAL TOWER CONNECTION DETAILS.

GROUP LABLE	GROUP SIZE	MAXIMUM FORCE (kN)				BOLTS	
		COMPRESSION	CASE	TENSION	CASE	No.	REMOVED HOLES
BUC	3X3X0.25	-37.5	Stringing -E Wind 45	16.9	High Wind E	2	1.0
BLC	2.5X2.5X0.1875	-38.0	High Wind B	29.9	Stringing -B Wind 45	2	1.0
BF1	1.75X1.75X0.1875	-16.5	High Wind -G	30.2	Heli - 75kN Ultimate	1	1.0
BF2	2X2X0.1875	-29.2	Heli - 75kN Ultimate	15.5	High Wind -G	1	1.0
BV	1.75X1.75X0.1875	-39.9	High Wind B	56.9	1/200 Ice With Wind -G	2	1.0
BUD	2X2X0.1875	-5.2	Unequal Ice -D	4.6	Unequal Ice F	1	1.0
BLD	1.75X1.75X0.1875	-2.1	Unequal Ice -D Wind 45	1.1	Unequal Ice B	1	1.0
BUH	2X2X0.1875	-8.6	Stringing -C Wind 45	16.8	Unequal Ice A Wind 45	1	1.0
BLH	1.75X1.75X0.1875	-4.6	Unequal Ice -B	7.5	Unequal Ice -D	1	1.0
BSV	1.75X1.75X0.1875	-8.4	Unequal Ice -B	18.4	Stringing -E Wind 45	1	1.0
BSH	2X2X0.1875	-4.7	Unequal Ice -D	4.7	Unequal Ice -D	2	1.0
BL	1.75X1.75X0.1875	-27.9	Unequal Ice A	4.7	High Wind B Wind 45	1	1.0
WC1	3X3X0.1875	-53.7	1/200 Ice With Wind -G	51.8	Unequal Ice B	4	2.0
WC2	3X3X0.1875	-44.6	Unequal Ice -G	30.8	Unequal Ice D	4	2.0
WC3	4X4X0.25	-167.6	Unequal Ice B	92.4	Unequal Ice B	6	2.0
WC4	3X3X0.1875	-72.9	Unequal Ice D	58.7	High Wind -G	3	2.0
WC5	3X3X0.1875	-82.2	Unequal Ice -B	47.1	High Wind B Wind 45	4	2.0
WC6	3X3X0.25	-57.1	High Wind -D Wind 45	117.8	Unequal Ice F	4	1.0
WSU	2X2X0.25	-11.1	Unequal Ice -B	43.5	Unequal Ice -C	2	1.0
WSL	2.5X2.5X0.1875	-7.1	Unequal Ice -E Wind 45	50.3	Unequal Ice -E	2	1.0
WL1	1.75X1.75X0.1875	-20.6	Unequal Ice -B	17.9	Unequal Ice -B	1	1.0
WL2	1.75X1.75X0.1875	-11.4	Unequal Ice -B	13.7	Unequal Ice -B	1	1.0
WL3	2X2X0.1875	-13.8	Unequal Ice -F	14.5	Unequal Ice G	1	1.0
WL4	2X2X0.1875	-26.2	Unequal Ice -F	21.9	Unequal Ice -F	1	1.0
WL5	2X2X0.1875	-20.1	High Wind -D Wind 45	32.2	Unequal Ice -B	2	1.0
WL6	1.75X1.75X0.1875	-7.6	Unequal Ice -D	7.2	Unequal Ice -B	2	1.0
WT1	2.5X2.5X0.1875	-30.7	Unequal Ice -B	13.6	High Wind B Wind 45	2	1.0
WT2	2X2X0.1875	-17.7	High Wind B Wind 45	40.1	Unequal Ice -B	2	1.0
WT3	3X3X0.1875	-33.5	Unequal Ice B Wind 45	15.2	High Wind B Wind 45	2	1.0
WT4	2.5X2.5X0.25	-64.2	Unequal Ice D	46.7	Unequal Ice D	2	2.0
WT5	3X3X0.1875	-51.4	Unequal Ice D	35.7	Unequal Ice D	2	2.0
WT6	3.5X3.5X0.25	-100.7	Unequal Ice B	0.0		3	1.0
WT7	3.5X3.5X0.25	-81.8	Unequal Ice -B Wind 45	11.2	High Wind -D Wind 45	3	1.0
WI	1.75X1.75X0.1875	-23.8	Unequal Ice B	11.3	Unequal Ice -B	1	1.0
WH1	2X2X0.1875	-6.0	Unequal Ice -F Wind 45	3.7	Unequal Ice G Wind 45	1	1.0
WH2	2X2X0.1875	-33.3	Unequal Ice B Wind 45	11.8	High Wind B Wind 45	2	1.0
WH3	2X2X0.1875	-7.2	Unequal Ice A Wind 45	8.6	Unequal Ice -C Wind 45	1	1.0
WH4	2.5X2.5X0.25	-38.1	Unequal Ice D	53.1	Unequal Ice D	2	1.0
WH5	3.5X3.5X0.25	0.0		113.5	Unequal Ice B	4	1.0
WH6	2.5X2.5X0.1875	-16.0	High Wind -D Wind 45	72.4	Unequal Ice B	3	1.0
WH7	2.5X2.5X0.1875	-31.8	Unequal Ice A Wind 45	15.8	High Wind -D	2	1.0
WH8	2.5X2.5X0.1875	-18.9	Unequal Ice -B	3.8	1/200 Ice With Wind B	1	1.0
XC	3.5X3.5X0.3125	-110.9	Unequal Ice D	19.2	High Wind F Wind 45	4	1.0
XT	3.5X3.5X0.1875	-0.7	High Wind F Wind 45	89.4	Unequal Ice -B	4	1.0
XH	1.75X1.75X0.1875	-10.4	Unequal Ice -B Wind 45	2.8	Unequal Ice -A	1	1.0
XV	3X3X0.25	-56.4	Unequal Ice F Wind 45	0.0		2	1.0
XS	2.5X2.5X0.1875	-20.5	Unequal Ice A	17.8	Stringing -F Wind 45	2	1.0
XD1	1.75X1.75X0.1875	-0.6	Stringing F Wind 45	17.4	Unequal Ice F	1	1.0
XD2	2.5X2.5X0.1875	-28.6	Unequal Ice -G	31.8	Unequal Ice -F	2	1.0
XD3	3X3X0.25	-21.5	Unequal Ice -E	11.1	High Wind B	2	1.0
XD4	2X2X0.1875	-15.9	Unequal Ice -E	9.1	High Wind B	2	1.0
XD5	1.75X1.75X0.1875	-10.1	High Wind B	19.1	Unequal Ice -E	2	1.0
XD6	1.75X1.75X0.1875	-7.2	Unequal Ice A	7.6	Unequal Ice A	1	1.0
XD7	2.5X2.5X0.1875	-19.5	Unequal Ice A	19.5	Unequal Ice A	2	1.0
TC	4X4X0.4375	-228.8	Unequal Ice -F Wind 45	82.2	High Wind -D Wind 45	6	2.0
TD1	3.5X3.5X0.375	-137.1	High Wind -D Wind 45	160.4	Unequal Ice -F Wind 45	4	1.0
TD2	1.75X1.75X0.1875	-29.5	Unequal Ice -C	37.5	Unequal Ice -C	2	1.0
TD3	2X2X0.1875	-10.9	Unequal Ice -B	9.3	Unequal Ice -B	1	1.0
TD4	1.75X1.75X0.1875	-10.1	Unequal Ice D Wind 45	13.6	Unequal Ice -B	1	1.0
TT2	2X2X0.1875	-14.2	Unequal Ice -B	19.4	Unequal Ice B	1	1.0
TH1	3X3X0.1875	-20.3	Unequal Ice -C	68.9	Unequal Ice E Wind 45	3	1.0
TH2	2.5X2.5X0.1875	-28.5	High Wind -G Wind 45	34.2	Unequal Ice -E Wind 45	3	1.0
TH3	2.5X2.5X0.1875	-7.2	High Wind -G Wind 45	7.2	High Wind -G Wind 45	1	1.0
TH4	2.5X2.5X0.25	-1.7	High Wind E	118.0	High Wind -G	3	1.0
TH5	2X2X0.1875	-7.9	High Wind A Wind 45	3.8	Stringing G	0	0.0
TH6	1.75X1.75X0.1875	-2.5	Unequal Ice -C Wind 45	1.7	Unequal Ice E Wind 45	1	1.0
TI1	3X3X0.1875	-38.6	High Wind -E Wind 45	16.4	Unequal Ice A Wind 45	2	1.0
ML1	4X4X0.4375	-351.1	Unequal Ice -F Wind 45	199.2	High Wind -D	6	2.0
ML2	4X4X0.3125	-284.9	Unequal Ice -F Wind 45	162.1	1/200 Ice With Wind -D	6	2.0
ML3	4X4X0.25	-215.4	Unequal Ice -F Wind 45	0.0		6	2.0
ML4	3.5X3.5X0.3125	-196.0	Unequal Ice -F Wind 45	0.0		6	2.0
MD1	2X2X0.1875	-17.8	High Wind -D Wind 45	11.8	High Wind -D Wind 45	1	1.0
MD2	1.75X1.75X0.1875	-8.4	Unequal Ice -F Wind 45	16.1	High Wind -G Wind 45	1	1.0
MD3	2.5X2.5X0.1875	-31.3	High Wind -D	30.8	1/200 Ice With Wind -D	1	1.0
MD4	2.5X2.5X0.1875	-32.4	High Wind -D Wind 45	15.1	High Wind -D Wind 45	1	1.0
MH1	3.5X3.5X0.3125	-133.2	Unequal Ice -C	0.0		3	1.0
MH2	1.75X1.75X0.1875	-12.6	High Wind -D	11.2	High Wind -D	1	1.0
MH3	1.75X1.75X0.1875	0.0		28.6	Unequal Ice -F Wind 45	2	1.0
MHL	2.5X2.5X0.1875	-12.9	High Wind F	48.6	High Wind G	2	1.0
MI1	2.5X2.5X0.1875	-16.1	Unequal Ice A Wind 45	0.0		1	1.0
MI2	1.75X1.75X0.1875	-0.3	Unequal Ice D Wind 45	1.0	Unequal Ice D Wind 45	1	1.0
MI3	1.75X1.75X0.1875	0.0		21.1	Unequal Ice -F Wind 45	1	1.0
EL	4X4X0.375	-321.1	Unequal Ice -F Wind 45	171.1	1/200 Ice With Wind -D	6	2.0
ED	2.5X2.5X0.1875	-30.8	High Wind -D	28.5	High Wind -D	1	1.0
EH	1.75X1.75X0.1875	-1.2	1/200 Ice With Wind -D Wind 45	3.3	1/200 Ice With Wind -D Wind 45	1	1.0
EI	1.75X1.75X0.1875	0.0		1.1	Unequal Ice A	1	1.0

[redacted]

NO.	REMARKS	DATE	DESIGNED						
2	GUY ATTACHMENT LOCATION CHANGED GENERAL REVISIONS. ISSUED FOR DETAILING.	APR. 2017	M. KHEDR	HK	TP		RH	RL	OO
1	GROUP LABELS / REDUNDANTS CHANGED	OCT. 2016	M. KHEDR	HK	TP		RH	RL	OO

REVISIONS

REFERENCE DRAWINGS

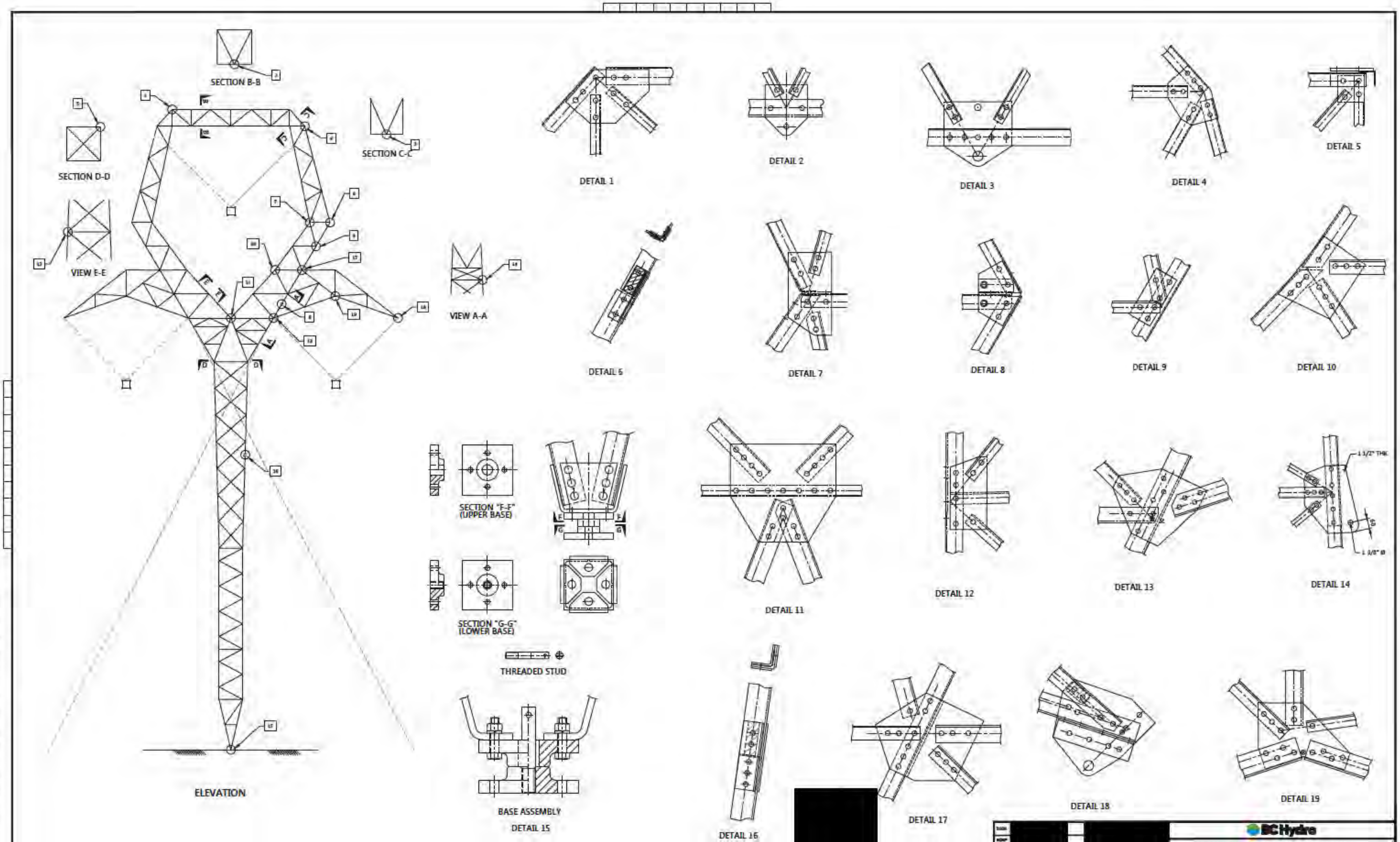
[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54GA GUYED SUSPENSION TOWER
0 DEG - 2 DEG
DESIGN OUTLINE DRAWING

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00009 | SIZE: D | R: 2



[redacted]

NO	REMARKS	DATE	DESIGNED						
1	GUY ATTACHMENT LOCATION CHANGED GENERAL REVISIONS. ISSUED FOR DETAILING.	APRIL 2017	M. KHEDR	H. K.	T.P.		R.H.	R.L.	O.O.

REVISIONS

REFERENCE DRAWINGS

[redacted]

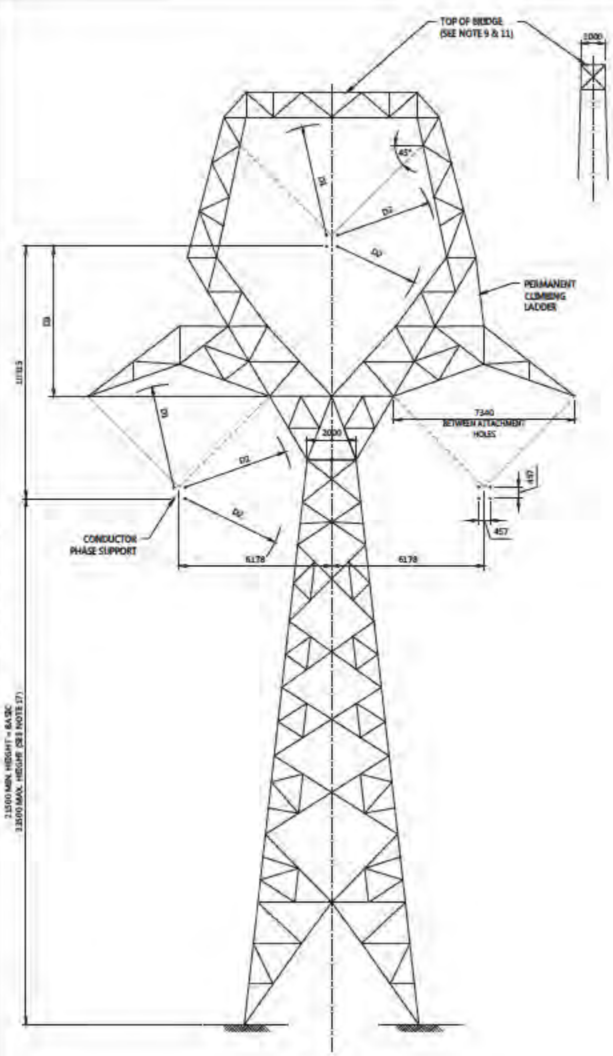
BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

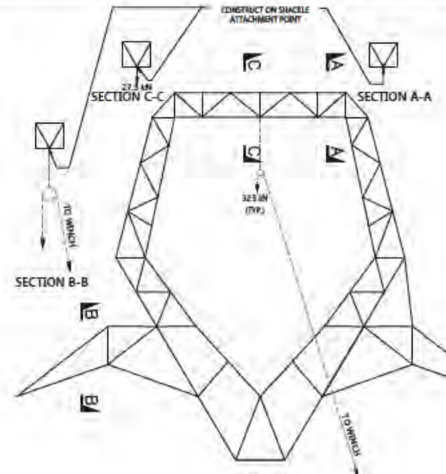
TYPE 54GA GUYED SUSPENSION TOWER
0 DEG - 2 DEG
TYPICAL DETAILS

DATE: SEPTEMBER 2016

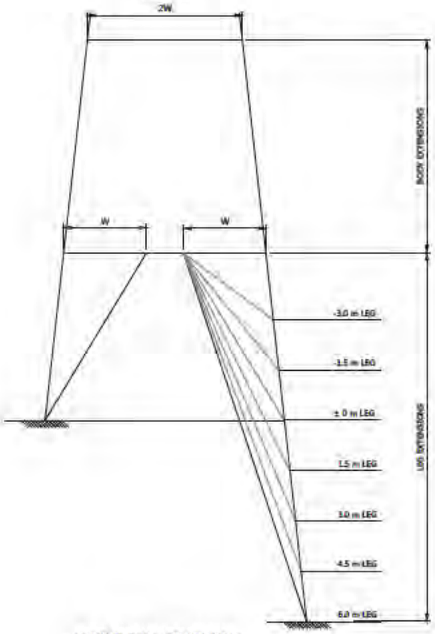
DWG NO: 5L005-T08-00010 | SIZE: D | 1



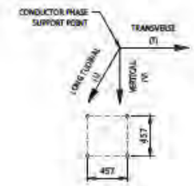
ELEVATION



DETAIL Z
(SEE NOTE 7)

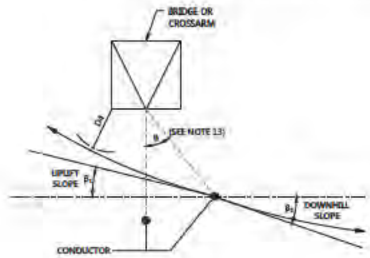


BODY AND LEG EXTENSIONS
(SEE NOTE 17)

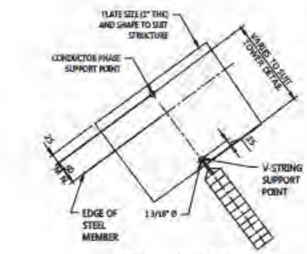


SPECIFIED DESIGN LOADS AND APPLICATIONS							
LOAD CASE		DESCRIPTION	CONDUCTOR PHASE LOAD (kN)			STRENGTH FACTOR	LOAD APPLICATION*
			V	T	L		
1		MAXIMUM ICE	93.4	7.9	0.0	0.90	V, T AND L SHALL BE APPLIED TO ANY ONE, ANY TWO OR ALL THREE PHASE SUPPORT POINTS.
2		HIGH WIND	37.6	41.7	0.0	0.90	
3		ICE AND WIND	69.4	40.2	0.0	0.90	
4		CONSTRUCTION	68.4	4.2	5.3	0.50	
5		EVERYDAY LOAD	66.0	5.5	0.0	0.50	
6	A	UNEQUAL ICE	53.6	4.9	30.0	0.67	LOADS A SHALL BE APPLIED TO ANY ONE, ANY TWO OR ALL THREE PHASE SUPPORT POINTS AND LOAD BS TO THE REMAINING SUPPORT POINTS.
	B		93.7	8.0	0.0		

* CASES 2 to 5 SHALL BE IN COMBINATION WITH WIND APPLIED ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT. CASE 6 SHALL BE IN COMBINATION WITH WIND APPLIED ON TOWER IN THE LONGITUDINAL DIRECTION OR AT 45° TO IT.



CONDUCTOR SLOPE
(SEE NOTE 14)



TYPICAL HOLE ALIGNMENT

NOTES:

1. SEE DRAWING 5L005-T08-00004 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. LOAD CASES:
   - CASE 1: 1/200 ICE, 19.0 mm ICE, 0 WIND, -20°C
   - CASE 2: 1/200 WIND, 0 ICE, 600 Pa WIND, -20°C
   - CASE 3: 1/200 ICE AND WIND, 12.5 mm ICE, 300 Pa WIND
   - CASE 4: CONSTRUCTION, 0 ICE, 45 Pa WIND, -20°C SNUB ANGLE = 30° WITH THE HORIZONTAL
   - CASE 5: EVERYDAY LOADING, 0 ICE, 45 Pa WIND, -1°C
   - CASE 6: 12.5 mm UNEQUAL ICE, 0 WIND, -20°C
4. TOWER DESIGN LOADS:
   a. FOR ALL LOAD CASES, TOWER PHASE LOADS SHALL BE THE WORKING CONDUCTOR PHASE LOADS AS SPECIFIED IN THE LOAD TABLE.
   b. FOR CASE 2 APPLY 600 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   c. FOR CASE 3 APPLY 300 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   d. FOR CASE 4 AND 5 APPLY 45 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   e. FOR CASE 6 APPLY 300 Pa WIND ON TOWER IN THE LONGITUDINAL DIRECTION OR AT 45° TO IT.
   f. WIND PRESSURE DISTRIBUTION ON TOWER SHALL FOLLOW THE CSA C22.3 No 60826 - TERRAIN CATEGORY B.
5. STRENGTH FACTORS FOR EACH LOAD CASE SHALL BE AS SPECIFIED IN THE LOAD TABLE.
6. LOAD APPLICATION
   a. TRANSVERSE LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   b. LONGITUDINAL LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD OF 1.1 kN AS SPECIFIED BY ASCE STANDARD ASCE/SEI 10-97.
7. THE TOWER SHALL ALSO BE DESIGNED TO SUPPORT A POINT LOAD OF 32.5 kN IN THE PULLEY SYSTEM AS SHOWN IN DETAIL 'Z' IN COMBINATION WITH THE LOADS OF CASE 4 APPLIED TO NONE, ANY ONE, OR ANY TWO OF THE REMAINING PHASE SUPPORT POINTS.
8. CONSTRUCTION HOLES, 21 mm IN DIAMETER SHALL BE PROVIDED AT JOINTS WHERE THE CONSTRUCTION SHACKLES ARE TO BE ATTACHED.
9. THE BRIDGE SHALL BE DESIGNED TO SUPPORT A VERTICAL LOAD OF 27.5 kN CONCENTRATED AT THE CENTRE OF THE BRIDGE.
10. THE OUTSTANDING LEG OF ALL STEEL ANGLES ON THE TOP PLANE OF THE BRIDGE SHALL POINT DOWNWARDS.
11. THE BRIDGE MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.4 kN CONCENTRATED AT THE CENTRE OF ITS UNSUPPORTED LENGTH IN COMBINATION WITH THE AXIAL FORCE CALCULATED FROM LOAD CASE 5 WITHOUT ANY PERMANENT DEFORMATION.
12. THE MINIMUM ELECTRICAL CLEARANCES FROM CONDUCTOR TO THE EDGE OF STEEL SHALL BE AS FOLLOWS:
   a. D1 = 4700 mm
   b. D2 = 4350 mm
   c. D3 = 5000 mm
   d. D4 = 3900 mm
13. THE MAXIMUM INSULATOR SWING ANGLE (θ) IN THE LONGITUDINAL DIRECTION TO 60.38°
14. THE MAXIMUM CONDUCTOR SLOPE FROM THE HORIZONTAL IS:
   β_1 = -10° (UPHILL) β_2 = 30° (DOWNHILL)
15. FOR SPECIFICATIONS FOR STEP BOLTS, SEE DRAWING NO. G-T08-A271 AND 5200S-T08-00023.
16. FOR DETAILS OF V-STRING, SEE DRAWING NO. 5L005-T08-00029.
17. COMPONENTS FOR EXTENSION OF STRUCTURE HEIGHT:
   a. BODY EXTENSIONS TO BE +3.0 m, +6.0 m, +9.0 m AND +12.0 m
   b. LEG EXTENSIONS TO BE FROM -3.0 m TO +6.0 m IN 1.5 m INCREMENTS.
   THE MAXIMUM HEIGHT OF THE LOWEST CONDUCTOR OF THE BOTTOM PHASE FROM THE GROUND SHALL NOT EXCEED 33.5 m.
18. FOR SPECIFICATIONS FOR HELICOPTER TOUCH AND GO SEE DRAWINGS NO. 5L05-T08-D1929, 5L05-T08-D4001 AND 5L05-T08-D4002.
19. FOR LOCATION FOR TOWER NO. SIGN SEE DRAWING NO. G-T08-8483.

[redacted]

NO	REVISIONS	DATE	REVISED					
L	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H.K.	T.P.	R.H.	R.L.	D.D.

DRAWING NUMBER | TITLE — REFERENCE DRAWINGS

DSGN [redacted] INSP CHK [redacted] DRWN [redacted] ENG [redacted] APP [redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54A SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 2 DEG
SPECIFICATION DRAWING

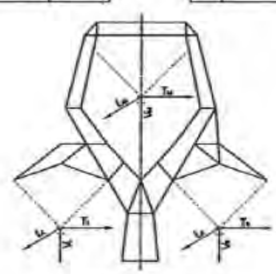
DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00011 | SIZE: D | REV: 1

CASE	DESCRIPTION	LOAD CASE No.	UNFACTORED DESIGN LOAD (kN)									STRENGTH FACTOR	WIND ON TOWER (Pa)	
			LEFT PHASE			MIDDLE PHASE			RIGHT PHASE				TRANS.	LONG.
			V	T	L	V	T	L	V	T	L			
		1A	93.4	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		1B	0.0	0.0	0.0	93.4	7.9	0.0	0.0	0.0	0.0			
		1C	0.0	0.0	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
1	1/200 ICE	1D	93.4	7.9	0.0	93.4	7.9	0.0	0.0	0.0	0.0	0.90	300	0
		1E	93.4	7.9	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
		1F	0.0	0.0	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
		1G	93.4	7.9	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
		2A	37.6	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		2B	0.0	0.0	0.0	37.6	41.7	0.0	0.0	0.0	0.0			
		2C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
2	1/200 HIGH WIND	2D	37.6	41.7	0.0	37.6	41.7	0.0	0.0	0.0	0.0	0.90	600	0
		2E	37.6	41.7	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
		2F	0.0	0.0	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
		2G	37.6	41.7	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
		3A	69.4	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		3B	0.0	0.0	0.0	69.4	40.2	0.0	0.0	0.0	0.0			
		3C	0.0	0.0	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
3	1/200 ICE WITH WIND	3D	69.4	40.2	0.0	69.4	40.2	0.0	0.0	0.0	0.0	0.90	300	0
		3E	69.4	40.2	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
		3F	0.0	0.0	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
		3G	69.4	40.2	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
		4A	37.6	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		4B	0.0	0.0	0.0	37.6	6.1	0.0	0.0	0.0	0.0			
		4C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
4	EVERYDAY LOADING	4D	37.6	6.1	0.0	37.6	6.1	0.0	0.0	0.0	0.0	0.50	45	0
		4E	37.6	6.1	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
		4F	0.0	0.0	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
		4G	37.6	6.1	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
		5A	68.4	4.2	5.3	0.0	0.0	0.0	0.0	0.0	0.0			
		5B	0.0	0.0	0.0	68.4	4.2	5.3	0.0	0.0	0.0			
		5C	0.0	0.0	0.0	0.0	0.0	0.0	68.4	4.2	5.3			
5	CONSTRUCTION	5D	68.4	4.2	5.3	68.4	4.2	5.3	0.0	0.0	0.0	0.50	45	0
		5E	68.4	4.2	5.3	0.0	0.0	0.0	68.4	4.2	5.3			
		5F	0.0	0.0	0.0	68.4	4.2	5.3	68.4	4.2	5.3			
		5G	68.4	4.2	5.3	68.4	4.2	5.3	68.4	4.2	5.3			
		6A	53.6	4.9	30.0	93.7	8.0	0.0	93.7	8.0	0.0			
		6B	93.7	8.0	0.0	53.6	4.9	30.0	93.7	8.0	0.0			
		6C	93.7	8.0	0.0	93.7	8.0	0.0	53.6	4.9	30.0			
6	UNEQUAL ICE	6D	53.6	4.9	30.0	53.6	4.9	30.0	93.7	8.0	0.0	0.67	0	300
		6E	53.6	4.9	30.0	93.7	8.0	0.0	53.6	4.9	30.0			
		6F	93.7	8.0	0.0	53.6	4.9	30.0	53.6	4.9	30.0			
		6G	53.6	4.9	30.0	53.6	4.9	30.0	53.6	4.9	30.0			

CASE	DESCRIPTION	LOAD CASE No.	UNFACTORED DESIGN LOAD (kN)									STRENGTH FACTOR	WIND ON TOWER (Pa)	
			LEFT PHASE			MIDDLE PHASE			RIGHT PHASE				TRANS.	LONG.
			V	T	L	V	T	L	V	T	L			
		1A	93.4	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		1B	0.0	0.0	0.0	93.4	7.9	0.0	0.0	0.0	0.0			
		1C	0.0	0.0	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
7	1/200 ICE	1D	93.4	7.9	0.0	93.4	7.9	0.0	0.0	0.0	0.0	0.90	150	150
		1E	93.4	7.9	0.0	0.0	0.0	0.0	93.4	7.9	0.0			
		1F	0.0	0.0	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
		1G	93.4	7.9	0.0	93.4	7.9	0.0	93.4	7.9	0.0			
		7A	37.6	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		7B	0.0	0.0	0.0	37.6	41.7	0.0	0.0	0.0	0.0			
		7C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
8	1/200 HIGH WIND	7D	37.6	41.7	0.0	37.6	41.7	0.0	0.0	0.0	0.0	0.90	300	300
		7E	37.6	41.7	0.0	0.0	0.0	0.0	37.6	41.7	0.0			
		7F	0.0	0.0	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
		7G	37.6	41.7	0.0	37.6	41.7	0.0	37.6	41.7	0.0			
		8A	69.4	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		8B	0.0	0.0	0.0	69.4	40.2	0.0	0.0	0.0	0.0			
		8C	0.0	0.0	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
9	1/200 ICE WITH WIND	8D	69.4	40.2	0.0	69.4	40.2	0.0	0.0	0.0	0.0	0.90	150	150
		8E	69.4	40.2	0.0	0.0	0.0	0.0	69.4	40.2	0.0			
		8F	0.0	0.0	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
		8G	69.4	40.2	0.0	69.4	40.2	0.0	69.4	40.2	0.0			
		9A	37.6	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		9B	0.0	0.0	0.0	37.6	6.1	0.0	0.0	0.0	0.0			
		9C	0.0	0.0	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
10	EVERYDAY LOADING	9D	37.6	6.1	0.0	37.6	6.1	0.0	0.0	0.0	0.0	0.50	23	23
		9E	37.6	6.1	0.0	0.0	0.0	0.0	37.6	6.1	0.0			
		9F	0.0	0.0	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
		9G	37.6	6.1	0.0	37.6	6.1	0.0	37.6	6.1	0.0			
		10A	68.4	4.2	5.3	0.0	0.0	0.0	0.0	0.0	0.0			
		10B	0.0	0.0	0.0	68.4	4.2	5.3	0.0	0.0	0.0			
		10C	0.0	0.0	0.0	0.0	0.0	0.0	68.4	4.2	5.3			
11	CONSTUCTION	10D	68.4	4.2	5.3	68.4	4.2	5.3	0.0	0.0	0.0	0.50	23	23
		10E	68.4	4.2	5.3	0.0	0.0	0.0	68.4	4.2	5.3			
		10F	0.0	0.0	0.0	68.4	4.2	5.3	68.4	4.2	5.3			
		10G	68.4	4.2	5.3	68.4	4.2	5.3	68.4	4.2	5.3			
		11A	53.6	4.9	30.0	93.7	8.0	0.0	93.7	8.0	0.0			
		11B	93.7	8.0	0.0	53.6	4.9	30.0	93.7	8.0	0.0			
		11C	93.7	8.0	0.0	93.7	8.0	0.0	53.6	4.9	30.0			
12	UNEQUAL ICE	11D	53.6	4.9	30.0	53.6	4.9	30.0	93.7	8.0	0.0	0.67	150	150
		11E	53.6	4.9	30.0	93.7	8.0	0.0	53.6	4.9	30.0			
		11F	93.7	8.0	0.0	53.6	4.9	30.0	53.6	4.9	30.0			
		11G	53.6	4.9	30.0	53.6	4.9	30.0	53.6	4.9	30.0			

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. LOAD APPLICATION
   a. TRANSVERSE LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   b. LONGITUDINAL LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-15.
   d. THE TOWER SHALL ALSO BE DESIGNED TO SUPPORT A POINT LOAD OF 32.5 kN IN THE PULLEY SYSTEM AS SHOWN IN DETAIL "Z" IN COMBINATION WITH THE LOADS OF CASE 4 APPLIED TO NONE, ANY ONE, OR ANY TWO OF THE REMAINING PHASE SUPPORT POINTS.
   e. THE BRIDGE SHALL BE DESIGNED TO SUPPORT A VERTICAL LOAD OF 27.5 kN CONCENTRATED AT THE CENTRE OF THE BRIDGE.
   f. THE BRIDGE MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.4 kN CONCENTRATED AT THE CENTRE OF ITS UNSUPPORTED LENGTH IN COMBINATION WITH THE AXIAL FORCE CALCULATED FROM LOAD CASE 5 WITHOUT ANY PERMANENT DEFORMATION.
3. V, T AND L DENOTE VERTICAL, TRANSVERSE AND LONGITUDINAL.
4. UNLESS OTHERWISE NOTED, REFER TO SPECIFICATION DRAWING NO. SL005-T08-00007



KEY LOAD MARK

[redacted]

NO.	REVISIONS	DATE	
2.	LOADING APPLICATION TABLE UPDATED	MAY 2017	
1.	ISSUED FOR DETAILING	APR 2017	

[redacted]

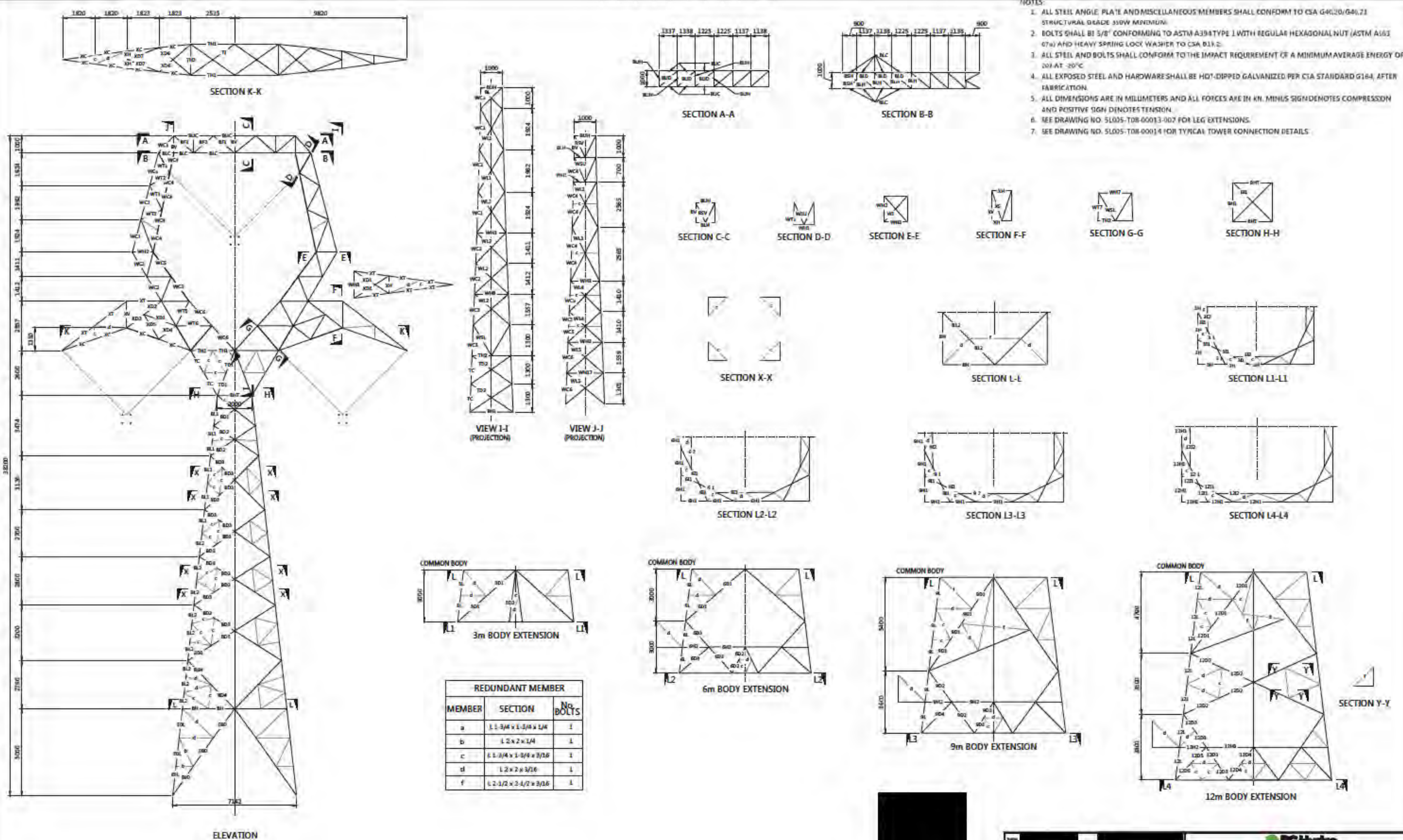
SEPTEMBER 2016

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 5AA SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 2 DEG
LOADING APPLICATION TABLE

SL005-T08-00012 | D | 2



NOTES:

1. ALL STEEL ANGLE, PLATE AND MISCELLANEOUS MEMBERS SHALL CONFORM TO CSA G40.20/G40.21 STRUCTURAL GRADE 350W MINIMUM.
2. BOLTS SHALL BE 5/8" CONFORMING TO ASTM A394 TYPE 1 WITH REGULAR HEXAGONAL NUT (ASTM A563 07a) AND HEAVY SPRING LOCK WASHER TO CSA B18.2.
3. ALL STEEL AND BOLTS SHALL CONFORM TO THE IMPACT REQUIREMENT OF A MINIMUM AVERAGE ENERGY OF 20J AT -20°C.
4. ALL EXPOSED STEEL AND HARDWARE SHALL BE HOT-DIPPED GALVANIZED PER CSA STANDARD G164, AFTER FABRICATION.
5. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL FORCES ARE IN KN. MINUS SIGN DENOTES COMPRESSION AND POSITIVE SIGN DENOTES TENSION.
6. SEE DRAWING NO. 5L005-T08-00013-007 FOR LEG EXTENSIONS.
7. SEE DRAWING NO. 5L005-T08-00014 FOR TYPICAL TOWER CONNECTION DETAILS.

REDUNDANT MEMBER		
MEMBER	SECTION	No. BOLTS
a	L 1-3/4 x 1-3/4 x 1/4	1
b	L 2 x 2 x 1/4	1
c	L 1-3/4 x 1-3/4 x 3/16	1
d	L 2 x 2 x 3/16	1
f	L 2-1/2 x 2-1/2 x 3/16	1

[redacted]

NO	REMARKS	DATE	DESIGNED						
2	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H. K.	T.P.		R.H.	R.L.	O.O.
1	GROUP LABELS / REDUNDANTS CHANGED	OCT. 2016	M. KHEDR	H.K.	T.P.		R.H.	R.L.	O.O.

REVISIONS

REFERENCE DRAWINGS

[redacted]

[redacted]

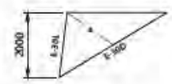
BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

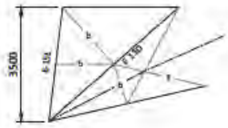
TYPE 54A SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 2 DEG
DESIGN OUTLINE DRAWING
SHEET 1 OF 2

DATE: SEPTEMBER 2016

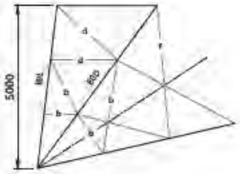
DWG NO: 5L005-T08-00013-001 | SIZE: D | R: 2



-3 m LEG EXTENSION



-1.5 m LEG EXTENSION



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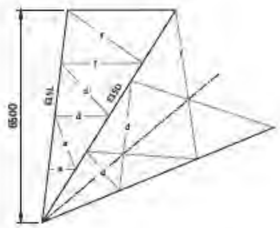
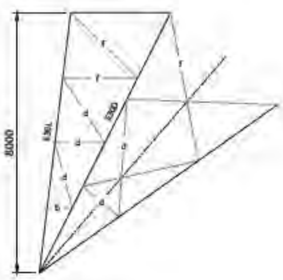
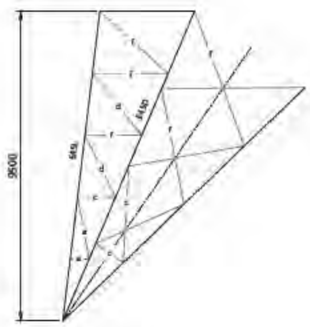


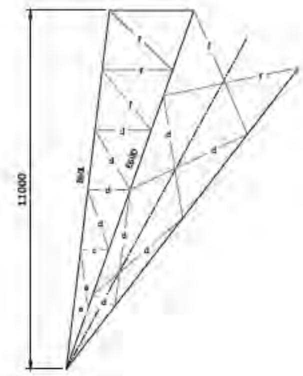
+1.5 m LEG EXTENSION



+3 m LEG EXTENSION



+4.5 m LEG EXTENSION



+6 m LEG EXTENSION

GROUP	GROUP SIZE	MAXIMUM FORCE (kN) COMPRESSION	CASE	TENSION	CASE	BOLT No.	REMOVED HOLES
BLK	3X3X0.25	-17.1	Stringing E	79.4	High Wind B Wind 45	2	1.0
BLC	2.5X2.5X0.1875	-37.4	High Wind F Wind 45	29.7	Stringing E	2	1.0
BFX	2X2X0.1875	[illegible]	High Wind B	30.5	[illegible]	1	1.0
BFB	[illegible]	[illegible]	[illegible]	[illegible]	High Wind B	[illegible]	[illegible]
BX	2X2X0.1875	40.0	[illegible]	56.2	1/200 Ice With Wind G	2	1.0
BUO	2X2X0.1875	-3.2	Unequal Ice A	-4.5	Unequal Ice F	1	1.0
BLD	2X2X0.1875	-2.4	Unequal Ice F Wind 45	1.2	Unequal Ice B	1	1.0
BUH	2X2X0.1875	-6.5	Stringing C Wind 45	16.5	Unequal Ice A Wind 45	1	1.0
BLH	2X2X0.1875	-5.0	Unequal Ice B	7.8	Unequal Ice B	1	1.0
BSV	2X2X0.1875	-5.5	Unequal Ice B	18.3	Stringing E	1	1.0
BSH	2X2X0.1875	-4.3	Unequal Ice B	4.3	Unequal Ice B	2	1.0
BL	2X2X0.1875	-37.4	Unequal Ice C	5.2	High Wind B Wind 45	1	1.0
WC1	3X3X0.1875	-53.0	1/200 Ice With Wind G Wind 45	54.0	Unequal Ice B	4	2.0
WC2	[illegible]	-45.9	Unequal Ice G	[illegible]	Unequal Ice B	4	2.0
WC3	4X3X0.25	-164.0	Unequal Ice B	87.3	Unequal Ice B	6	2.0
WC4	2.5X2.5X0.25	-79.0	Unequal Ice D	56.4	1/200 Ice With Wind G	3	2.0
WC5	3X3X0.1875	-44.4	Unequal Ice B	51.6	High Wind F Wind 45	4	2.0
WC6	3X3X0.25	-50.3	High Wind F Wind 45	133.2	Unequal Ice F	4	1.0
WSU	2X2X0.25	-11.7	Unequal Ice B	42.7	Unequal Ice E Wind 45	2	1.0
WS1	2.5X2.5X0.25	-8.7	Unequal Ice F Wind 45	52.4	Unequal Ice B	2	1.0
WL1	2X2X0.1875	-23.0	Unequal Ice B	20.0	Unequal Ice B	3	1.0
WL2	2X2X0.1875	-16.9	Unequal Ice B	15.4	Unequal Ice D	3	1.0
WL3	2X2X0.1875	-12.5	Unequal Ice G	13.5	Unequal Ice G	3	1.0
WL4	2X2X0.25	[illegible]	Unequal Ice D	[illegible]	Unequal Ice D	1	1.0
WL5	2X2X0.1875	-18.4	High Wind B Wind 45	46.3	Unequal Ice B	2	1.0
WT1	2.5X2.5X0.1875	-32.2	Unequal Ice B	15.3	High Wind B Wind 45	2	1.0
WT2	2X2X0.1875	-19.7	High Wind F Wind 45	47.1	Unequal Ice B	3	1.0
WT3	2X2X0.1875	-35.2	Unequal Ice B	16.6	High Wind B Wind 45	2	1.0
WT4	3X3X0.1875	-40.8	Unequal Ice D	42.2	Unequal Ice D	2	2.0
WT5	2.5X2.5X0.1875	-46.5	Unequal Ice D	32.4	Unequal Ice D	2	2.0
WT6	3.5X3.5X0.25	-101.2	Unequal Ice B	0.0		3	1.0
WT7	3.5X3.5X0.1875	-77.1	Unequal Ice G Wind 45	6.2	High Wind F Wind 45	3	1.0
WI	2X2X0.1875	-29.5	Unequal Ice B	12.7	Unequal Ice B	1	1.0
WH1	2X2X0.1875	-5.2	Unequal Ice G Wind 45	3.6	Unequal Ice G Wind 45	1	1.0
WH2	2X2X0.1875	-34.4	Unequal Ice B	14.5	High Wind B Wind 45	2	1.0
WH3	2X2X0.1875	-7.0	Unequal Ice A Wind 45	7.0	Stringing G	1	1.0
WH4	2.5X2.5X0.1875	-74.6	Unequal Ice D	59.1	Unequal Ice D	2	2.0
WH5	2.5X2.5X0.25	0.0		111.1	Unequal Ice B	4	1.0
WH6	2.5X2.5X0.1875	-33.3	High Wind C Wind 45	99.4	Unequal Ice B	3	1.0
WH7	2.5X2.5X0.1875	-33.7	Unequal Ice B	38.4	High Wind F	2	1.0
WH8	2.5X2.5X0.1875	-18.6	Unequal Ice B	4.0	1/200 Ice With Wind B	1	1.0
XC	3.5X3.5X0.3125	-172.2	Unequal Ice D	17.5	High Wind B Wind 45	4	1.0
XT	3.5X3.5X0.1875	-6.2	High Wind D Wind 45	89.0	Unequal Ice B	4	1.0
XH	2X2X0.1875	-11.3	Unequal Ice C Wind 45	2.2	Unequal Ice C	1	1.0
XW	3X3X0.1875	-58.9	Unequal Ice F Wind 45	0.0		2	1.0
XS	2.5X2.5X0.1875	-11.5	Unequal Ice F Wind 45	17.8	Stringing F Wind 45	2	1.0
XD1	2X2X0.1875	-5.6	Stringing F Wind 45	19.0	Unequal Ice F Wind 45	1	1.0
XD2	2.5X2.5X0.1875	-39.3	Unequal Ice G	32.2	Unequal Ice D	3	1.0
XD3	3X3X0.25	-21.0	Unequal Ice A	11.2	High Wind B	2	1.0
XD4	2X2X0.1875	-17.0	Unequal Ice A	9.4	High Wind B	1	1.0
XD5	2X2X0.1875	-16.4	High Wind B	21.1	Unequal Ice A	2	1.0
XD6	2X2X0.1875	-6.6	Unequal Ice C Wind 45	7.0	Unequal Ice E Wind 45	1	1.0
XD7	2.5X2.5X0.1875	-19.4	Unequal Ice C Wind 45	18.3	Unequal Ice E Wind 45	2	1.0
TC	4X4X0.375	-273.2	Unequal Ice B	88.1	Unequal Ice D	8	1.0
TD1	3.5X3.5X0.3125	-179.2	High Wind E Wind 45	189.2	1/200 Ice With Wind E Wind 45	5	1.0
TD2	2X2X0.25	-44.0	Unequal Ice D	42.6	Unequal Ice D	2	1.0
THI	3X3X0.1875	-39.7	Unequal Ice E Wind 45	[illegible]	Unequal Ice E Wind 45	3	1.0
THD	3X3X0.1875	-10.0	Unequal Ice F Wind 45	40.1	Unequal Ice F Wind 45	3	1.0
TI	3X3X0.25	-51.7	Unequal Ice B	28.1	Unequal Ice F	2	1.0
[illegible]	4X4X0.4375	-398.1	Unequal Ice G	370.6	High Wind G Wind 45	6	2.0
BL3	4X4X0.4375	-384.0	Unequal Ice D	218.9	Unequal Ice D	8	2.0
BD1	3X3X0.1875	-56.3	Unequal Ice D	50.6	Unequal Ice F	2	1.0
BD2	2.5X2.5X0.1875	-30.6	Unequal Ice F	41.0	Unequal Ice D	2	1.0
BD3	2.5X2.5X0.1875	-41.5	Unequal Ice D	42.0	Unequal Ice F	2	1.0
BD4	3X3X0.25	-35.9	Unequal Ice D	30.4	Unequal Ice D	2	1.0
BHT	4X4X0.3125	-143.6	Unequal Ice B	18.5	Unequal Ice G	3	1.0
BHL	2.5X2.5X0.1875	-7.8	High Wind F	9.3	Unequal Ice C Wind 45	2	1.0
BH	2.5X2.5X0.1875	-5.7	High Wind G Wind 45	3.6	High Wind A	1	1.0
BI1	2.5X2.5X0.1875	-28.9	Unequal Ice D	7.8	Unequal Ice D	1	1.0
BI2	2X2X0.1875	-34.9	High Wind B	14.6	High Wind B	1	1.0
3L	5X5X0.375	-477.1	Unequal Ice G	358.0	High Wind G Wind 45	6	2.0
3D1	3.5X3.5X0.25	-37.2	Unequal Ice D	49.7	Unequal Ice G	2	1.0
3D2	3X3X0.25	-43.8	Unequal Ice F Wind 45	50.3	Unequal Ice F Wind 45	3	1.0
3H	2.5X2.5X0.1875	-30.2	Unequal Ice G	24.2	Unequal Ice D	2	1.0
3I1	3X3X0.1875	-4.8	High Wind G Wind 45	5.6	High Wind G Wind 45	1	1.0
3I2	2.5X2.5X0.1875	-6.7	High Wind G	6.9	High Wind G	1	1.0
4L	5X5X0.375	-432.9	Unequal Ice G	417.6	High Wind G Wind 45	8	2.0
4D1	3X3X0.1875	-38.1	High Wind G	[illegible]	Unequal Ice D	2	1.0
4D2	2.5X2.5X0.1875	-77.1	High Wind E	73.7	High Wind E	2	1.0
4D3	3X3X0.1875	-46.6	Unequal Ice G	32.5	Unequal Ice G	2	1.0
4D4	3X3X0.1875	-38.8	Unequal Ice D	40.4	Unequal Ice G	2	1.0
4H1	2.5X2.5X0.25	-73.6	Unequal Ice G	42.0	Unequal Ice G	2	1.0
4H2	3.5X3.5X0.25	-42.6	Unequal Ice G	67.6	Unequal Ice G	2	1.0
4I1	3X3X0.1875	-5.9	High Wind G	6.1	High Wind G	1	1.0
4I2	2.5X2.5X0.1875	-18.8	High Wind G	9.5	High Wind G	1	1.0
5L	5X5X0.4375	-436.5	Unequal Ice G	438.3	High Wind G Wind 45	8	2.0
5D1	3X3X0.1875	-52.8	High Wind G	47.5	High Wind G	2	1.0
5D2	3X3X0.1875	-31.8	Unequal Ice G	23.3	Unequal Ice D	2	1.0
5D3	2.5X2.5X0.1875	-63.8	High Wind E	60.0	High Wind E	2	1.0
5D4	3X3X0.1875	-35.5	Unequal Ice D	34.6	Unequal Ice D Wind 45	2	1.0
5H1	3X3X0.1875	-47.8	Unequal Ice G	28.0	Unequal Ice G	3	1.0
5H2	3X3X0.1875	-34.0	Unequal Ice D	47.0	Unequal Ice D Wind 45	0	0.0
5I1	3X3X0.1875	-6.8	High Wind C Wind 45	7.8	High Wind C Wind 45	1	1.0
5I2	3X3X0.1875	-9.8	High Wind G	8.1	High Wind G	1	1.0
12L	5X5X0.4375	-412.3	Unequal Ice G	426.2	High Wind G Wind 45	8	2.0
12D1	2.5X2.5X0.1875	-36.0	Unequal Ice D Wind 45	32.0	Unequal Ice F Wind 45	2	1.0
12D2	3X3X0.1875	-33.1	Unequal Ice F Wind 45	25.4	High Wind G	1	1.0
12D3	2.5X2.5X0.1875	-27.3	Unequal Ice G	26.4	Unequal Ice F Wind 45	1	1.0
12D4	2.5X2.5X0.1875	-48.8	High Wind E	47.2	High Wind E	2	1.0
[illegible]	2.5X2.5X0.1875	-15.0	Unequal Ice F Wind 45	13.2	Unequal Ice D Wind 45	2	1.0
12H1	3X3X0.1875	-31.8	Unequal Ice G	21.8	Unequal Ice G	2	1.0
12H2	2.5X2.5X0.1875	-5.0	High Wind G Wind 45	4.5	Unequal Ice G Wind 45	1	1.0
[illegible]	2.5X2.5X0.1875	-26.7	Unequal Ice D Wind 45	26.5	Unequal Ice D Wind 45	2	2.0
12I1	2.5X2.5X0.1875	-5.8	High Wind G Wind 45	6.3	High Wind G Wind 45	1	1.0
12I2	3X3X0.1875	-9.1	High Wind G	8.1	High Wind G	1	1.0
[illegible]	5X5X0.4375	-421.3	Unequal Ice G	419.9	High Wind G Wind 45	6	3.0
[illegible]	3X3X0.25	-41.0	Unequal Ice D Wind 45	37.8	Unequal Ice F Wind 45	2	1.0
[illegible]	5X5X0.4375	-408.3	Unequal Ice G	405.8	High Wind G Wind 45	6	3.0
[illegible]	3X3X0.25	-36.5	Unequal Ice D Wind 45	34.7	Unequal Ice F Wind 45	2	1.0
[illegible]	5X5X0.4375	[illegible]	Unequal Ice G	368.4	High Wind G Wind 45	6	2.0
[illegible]	3X3X0.25	-45.3	Unequal Ice D Wind 45	35.4	Unequal Ice F Wind 45	2	1.0
[illegible]	5X5X0.4375	-378.8	Unequal Ice G	371.8	High Wind G Wind 45	6	3.0
[illegible]	3X3X0.25	[illegible]	Unequal Ice D Wind 45	[illegible]	Unequal Ice F Wind 45	2	1.0
[illegible]	5X5X0.4375	-360.9	Unequal Ice G	351.7	High Wind G Wind 45	6	3.0
[illegible]	3.5X3.5X0.25	-80.6	Unequal Ice D Wind 45	49.2	Unequal Ice F Wind 45	2	1.0
[illegible]	5X5X0.4375	-350.3	Unequal Ice G	338.4	High Wind G Wind 45	6	3.0
[illegible]	3.5X3.5X0.25	-49.2	Unequal Ice D Wind 45	56.3	Unequal Ice F Wind 45	3	1.0
[illegible]	5X5X0.4375	[illegible]	Unequal Ice G	333.2	High Wind G Wind 45	6	3.0
[illegible]	3.5X3.5X0.25	-75.3	Unequal Ice D Wind 45	42.6	Unequal Ice F Wind 45	2	1.0

[redacted]

No.	REVISIONS	DATE	REVISED	CHKD					
1	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H.K.	T.P.	R.H.	R.L.	O.O.
L	GROUP LABELS / REDUNDANTS CHANGED	OCT. 2016	M. KHEDR	HK	TP	RH	RL	OO

DRAWING NUMBER | TITLE — REFERENCE DRAWINGS

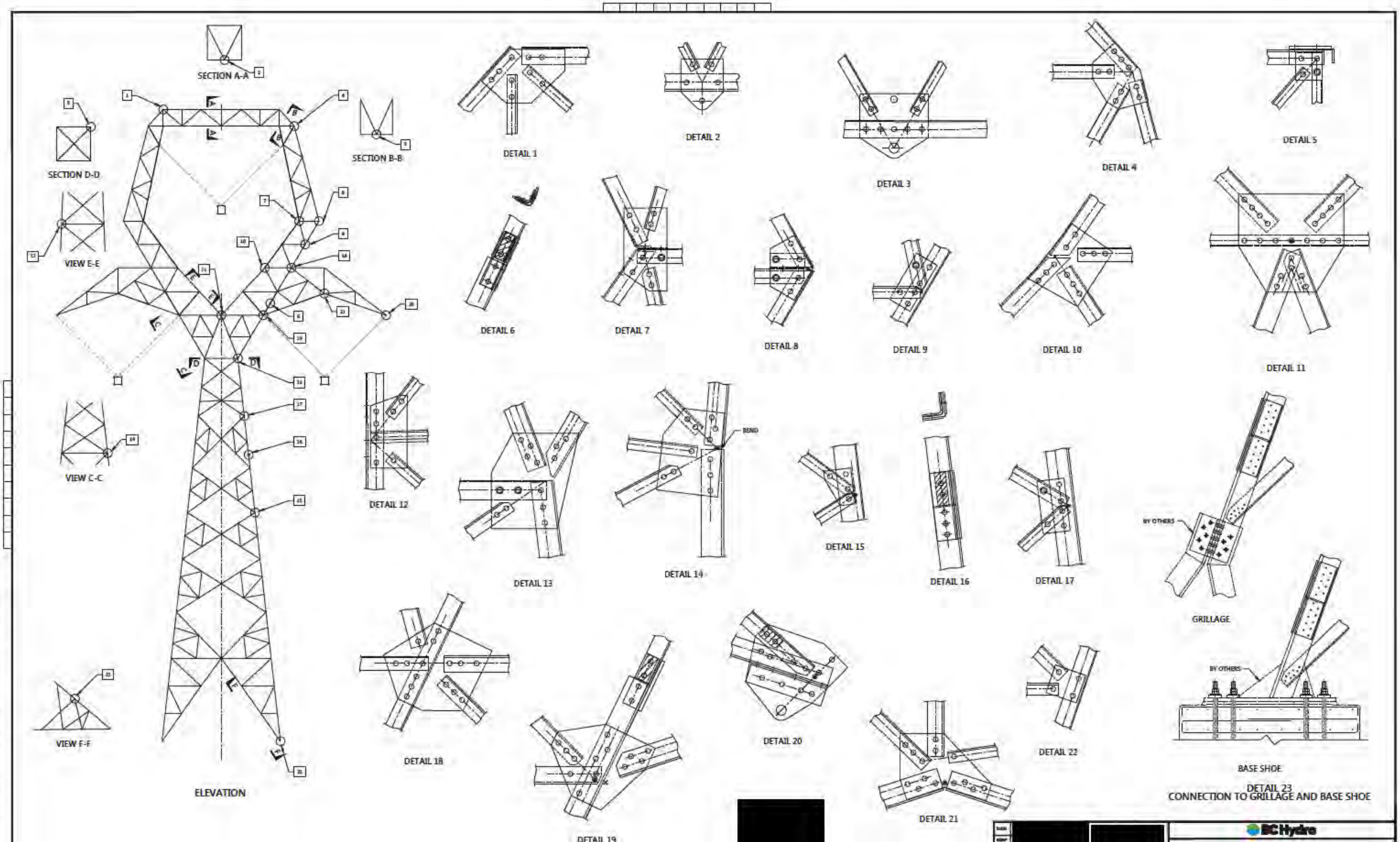
[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54A SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 2 DEG
DESIGN OUTLINE DRAWING
SHEET 2 OF 2

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00013-002 | SIZE: D | 2



[redacted]

1	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H.K. T.P.	R.H. R.L. O.D.

REFERENCE DRAWINGS — REVISIONS — REVISIONS

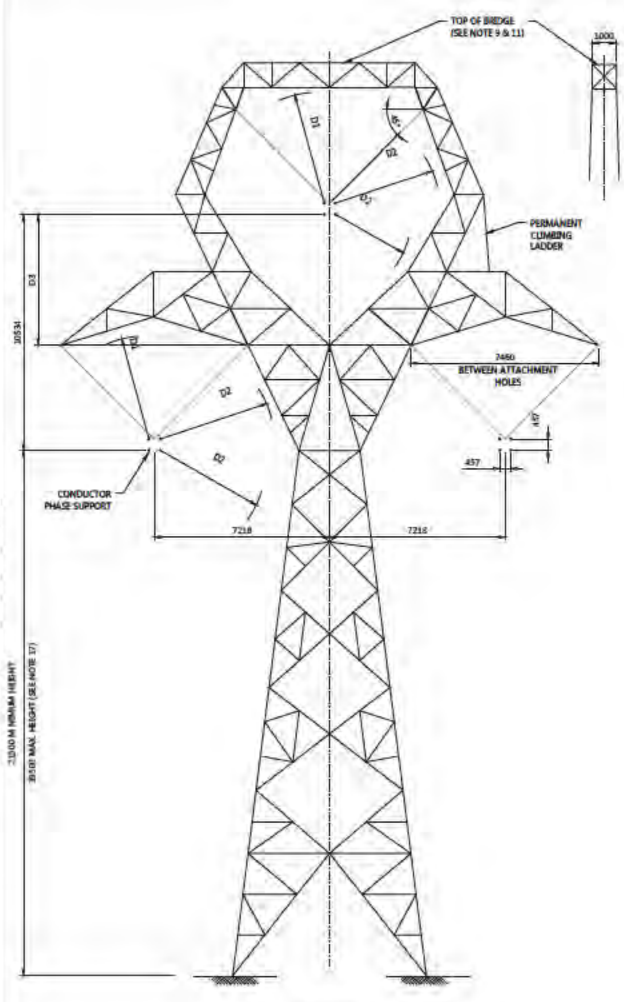
[redacted]

BC Hydro

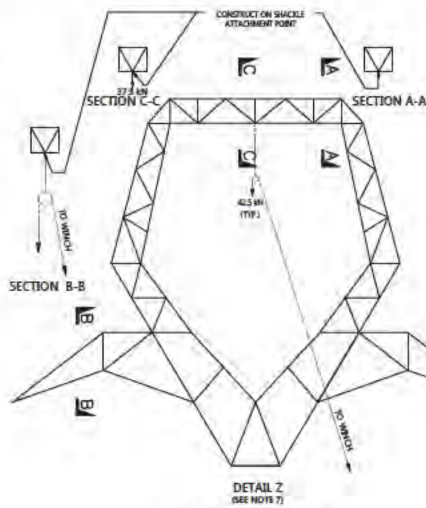
SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54A SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 2 DEG
TYPICAL DETAILS

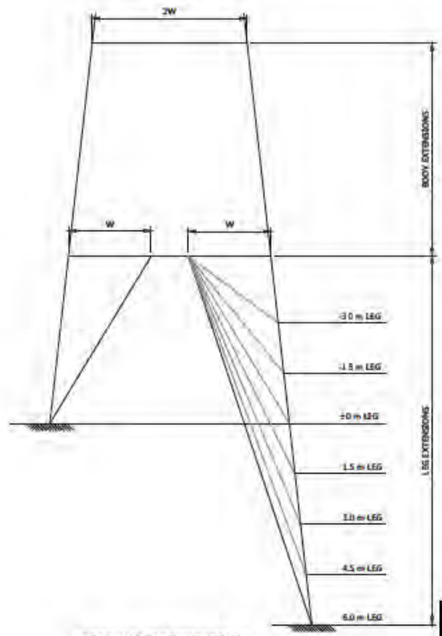
SEPTEMBER 2016 — 5L005-T08-00014 — D — 1



ELEVATION



DETAIL Z
(SEE NOTE 7)

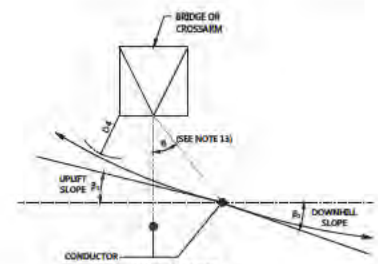


BODY AND LEG EXTENSIONS
(SEE NOTE 17)

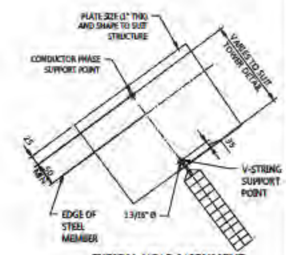
SPECIFIED DESIGN LOADS AND APPLICATIONS

LOAD CASE		DESCRIPTION	CONDUCTOR PHASE LOAD (kN)			STRENGTH FACTOR	LOAD APPLICATION*
			V	T	L		
1		MAXIMUM ICE	129.7	31.4	0.0	0.80	V, T AND L SHALL BE APPLIED TO ANY ONE, ANY TWO OR ALL THREE PHASE SUPPORT POINTS.
2		HIGH WIND	52.6	50.8	0.0	0.80	
3		ICE AND WIND	96.5	61.6	0.0	0.80	
4		CONSTRUCTION	88.2	16.6	7.7	0.50	
5		EVERYDAY LOAD	79.6	16.5	0.0	0.50	
6	A	UNEQUAL ICE	72.8	21.3	45.5	0.57	LOADS A SHALL BE APPLIED TO ANY ONE, ANY TWO OR ALL THREE PHASE SUPPORT POINTS AND LOAD B TO THE REMAINING SUPPORT POINTS.
	B		128.2	32.0	0.0		

CASES 2 to 5 SHALL BE IN COMBINATION WITH WIND APPLIED ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT. CASE 6 SHALL BE IN COMBINATION WITH WIND APPLIED ON TOWER IN THE LONGITUDINAL DIRECTION OR AT 45° TO IT.



CONDUCTOR SLOPE
(SEE NOTE 14)



TYPICAL HOLE ALIGNMENT

NOTES:

1. SEE DRAWING 5L005-T08-00006 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. LOAD CASES:
   - CASE 1: 1/200 ICE, 19.0 mm ICE, 0 WIND, -20°C
   - CASE 2: 1/200 WIND, 0 ICE, 600 Pa WIND, -20°C
   - CASE 3: 1/200 ICE AND WIND, 12.5 mm ICE, 300 Pa WIND
   - CASE 4: CONSTRUCTION, 0 ICE, 45 Pa WIND, -20°C SNUB ANGLE = 20° WITH THE HORIZONTAL
   - CASE 5: EVERYDAY LOADING, 0 ICE, 45 Pa WIND, -1°C
   - CASE 6: 12.5 mm UNEQUAL ICE, 0 WIND, -20°C
4. TOWER DESIGN LOADS:
   a. FOR ALL LOAD CASES, TOWER PHASE LOADS SHALL BE THE WORKING CONDUCTOR PHASE LOADS AS SPECIFIED IN THE LOAD TABLE.
   b. FOR CASE 2 APPLY 600 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   c. FOR CASE 3 APPLY 300 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   d. FOR CASE 4 AND 5 APPLY 45 Pa WIND ON TOWER IN THE TRANSVERSE DIRECTION OR AT 45° TO IT.
   e. FOR CASE 6 APPLY 300 Pa WIND ON TOWER IN THE LONGITUDINAL DIRECTION OR AT 45° TO IT.
   f. WIND PRESSURE DISTRIBUTION ON TOWER SHALL FOLLOW THE CSA C22.3 No.60826 – TERRAIN CATEGORY B.
5. STRENGTH FACTORS FOR EACH LOAD CASE SHALL BE AS SPECIFIED IN THE LOAD TABLE.
6. LOAD APPLICATION:
   a. TRANSVERSE LOADS SHOWN IN LOAD TABLE ARE REVERSIBLE.
   b. LONGITUDINAL LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-97.
7. THE TOWER SHALL ALSO BE DESIGNED TO SUPPORT A POINT LOAD OF 42.5 kN IN THE PULLEY SYSTEM AS SHOWN IN DETAIL 'Z' IN COMBINATION WITH THE LOADS OF CASE 4 APPLIED TO NONE, ANY ONE, OR ANY TWO OF THE REMAINING PHASE SUPPORT POINTS.
8. CONSTRUCTION HOLES, 21 mm IN DIAMETER SHALL BE PROVIDED AT JOINTS WHERE THE CONSTRUCTION SHACKLES ARE TO BE ATTACHED.
9. THE BRIDGE SHALL BE DESIGNED TO SUPPORT A VERTICAL LOAD OF 37.5 kN CONCENTRATED AT THE CENTRE OF THE BRIDGE.
10. THE OUTSTANDING LEG OF ALL STEEL ANGLES ON THE TOP PLANE OF THE BRIDGE SHALL POINT DOWNWARDS.
11. THE BRIDGE MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.4 kN CONCENTRATED AT THE CENTRE OF ITS UNSUPPORTED LENGTH IN COMBINATION WITH THE AXIAL FORCE CALCULATED FROM LOAD CASE 5 WITHOUT ANY PERMANENT DEFORMATION.
12. THE MINIMUM ELECTRICAL CLEARANCES FROM CONDUCTOR TO THE EDGE OF STEEL OR GUY WIRE SHALL BE AS FOLLOWS:
    a. D1 = 4700 mm
    b. D2 = 3500 mm
    c. D3 = 3000 mm
    e. D4 = 1000 mm
13. THE MAXIMUM INSULATOR SWING ANGLE (θ) IN THE LONGITUDINAL DIRECTION TO BE 20°.
14. THE MAXIMUM CONDUCTOR SLOPE FROM THE HORIZONTAL IS:
    β_1 = 10° (UPLIFT) β_2 = 30° (DOWNHILL)
15. FOR SPECIFICATIONS FOR STEP BOLTS, SEE DRAWING NO. G-T08-A271 AND 5L005-T08-00007.
16. FOR DETAILS OF V-STRING, SEE DRAWING NO. 5L005-T08-00026.
17. COMPONENTS FOR EXTENSION OF STRUCTURE HEIGHT:
    a. BODY EXTENSIONS TO BE +3.0 m, +6.0 m, +9.0 m, +12.0 m, +15.0 m AND +18.0 m.
    b. LEG EXTENSIONS TO BE FROM -3.0 m TO +6.0 m IN 1.5 m INCREMENTS.

THE MAXIMUM HEIGHT OF THE LOWEST CONDUCTOR OF THE BOTTOM PHASE FROM THE GROUND SHALL NOT EXCEED 19.5 m.

[redacted]

L	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H.K.	T.P.	R.H.	R.L.	O.O.
NO	REVISIONS	DATE	DESIGNED					

REFERENCE DRAWINGS — DWG NUMBER | TITLE

[redacted]

BC Hydro

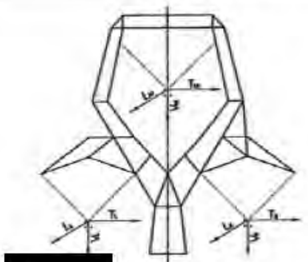
SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54C SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 8 DEG
SPECIFICATION DRAWING

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00015 | SIZE: D | 1

CASE	DESCRIPTION	LOAD CASE No.	UNFACTORED DESIGN LOAD (kN)									STRENGTH FACTOR	WIND ON TOWER (Pa)	
			LEFT PHASE			MIDDLE PHASE			RIGHT PHASE				TRANS.	LONG.
			V	T	L	V	T	L	V	T	L			
1	1/200 ICE	1A	129.7	31.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	300	0
		1B	0.0	0.0	0.0	129.7	31.4	0.0	0.0	0.0	0.0			
		1C	0.0	0.0	0.0	0.0	0.0	0.0	129.7	31.4	0.0			
		1D	129.7	31.4	0.0	129.7	31.4	0.0	0.0	0.0	0.0			
		1E	129.7	31.4	0.0	0.0	0.0	0.0	129.7	31.4	0.0			
		1F	0.0	0.0	0.0	129.7	31.4	0.0	129.7	31.4	0.0			
		1G	129.7	31.4	0.0	129.7	31.4	0.0	129.7	31.4	0.0			
2	1/200 HIGH WIND	2A	52.6	58.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	600	0
		2B	0.0	0.0	0.0	52.6	58.8	0.0	0.0	0.0	0.0			
		2C	0.0	0.0	0.0	0.0	0.0	0.0	52.6	58.8	0.0			
		2D	52.6	58.8	0.0	52.6	58.8	0.0	0.0	0.0	0.0			
		2E	52.6	58.8	0.0	0.0	0.0	0.0	52.6	58.8	0.0			
		2F	0.0	0.0	0.0	52.6	58.8	0.0	52.6	58.8	0.0			
		2G	52.6	58.8	0.0	52.6	58.8	0.0	52.6	58.8	0.0			
3	1/200 ICE WITH WIND	3A	96.5	61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	300	0
		3B	0.0	0.0	0.0	96.5	61.6	0.0	0.0	0.0	0.0			
		3C	0.0	0.0	0.0	0.0	0.0	0.0	96.5	61.6	0.0			
		3D	96.5	61.6	0.0	96.5	61.6	0.0	0.0	0.0	0.0			
		3E	96.5	61.6	0.0	0.0	0.0	0.0	96.5	61.6	0.0			
		3F	0.0	0.0	0.0	96.5	61.6	0.0	96.5	61.6	0.0			
		3G	96.5	61.6	0.0	96.5	61.6	0.0	96.5	61.6	0.0			
4	EVERYDAY LOADING	4A	52.6	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	45	0
		4B	0.0	0.0	0.0	52.6	16.5	0.0	0.0	0.0	0.0			
		4C	0.0	0.0	0.0	0.0	0.0	0.0	52.6	16.5	0.0			
		4D	52.6	16.5	0.0	52.6	16.5	0.0	0.0	0.0	0.0			
		4E	52.6	16.5	0.0	0.0	0.0	0.0	52.6	16.5	0.0			
		4F	0.0	0.0	0.0	52.6	16.5	0.0	52.6	16.5	0.0			
		4G	52.6	16.5	0.0	52.6	16.5	0.0	52.6	16.5	0.0			
5	STRINGING	5A	88.2	16.6	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.50	45	0
		5B	0.0	0.0	0.0	88.2	16.6	7.7	0.0	0.0	0.0			
		5C	0.0	0.0	0.0	0.0	0.0	0.0	88.2	16.6	7.7			
		5D	88.2	16.6	7.7	88.2	16.6	7.7	0.0	0.0	0.0			
		5E	88.2	16.6	7.7	0.0	0.0	0.0	88.2	16.6	7.7			
		5F	0.0	0.0	0.0	88.2	16.6	7.7	88.2	16.6	7.7			
		5G	88.2	16.6	7.7	88.2	16.6	7.7	88.2	16.6	7.7			
6	UNEQUAL ICE	6A	72.8	21.3	45.5	128.2	32.0	0.0	128.2	32.0	0.0	0.67	0	300
		6B	128.2	32.0	0.0	72.8	21.3	45.5	128.2	32.0	0.0			
		6C	128.2	32.0	0.0	128.2	32.0	0.0	72.8	21.3	45.5			
		6D	72.8	21.3	45.5	72.8	21.3	45.5	128.2	32.0	0.0			
		6E	72.8	21.3	45.5	128.2	32.0	0.0	72.8	21.3	45.5			
		6F	128.2	32.0	0.0	72.8	21.3	45.5	72.8	21.3	45.5			
		6G	72.8	21.3	45.5	72.8	21.3	45.5	72.8	21.3	45.5			

CASE	DESCRIPTION	LOAD CASE No.	UNFACTORED DESIGN LOAD (kN)									STRENGTH FACTOR	WIND ON TOWER (Pa)	
			LEFT PHASE			MIDDLE PHASE			RIGHT PHASE				TRANS.	LONG.
			V	T	L	V	T	L	V	T	L			
7	1/200 ICE	1A	129.7	31.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	150	150
		1B	0.0	0.0	0.0	129.7	31.4	0.0	0.0	0.0	0.0			
		1C	0.0	0.0	0.0	0.0	0.0	0.0	129.7	31.4	0.0			
		1D	129.7	31.4	0.0	129.7	31.4	0.0	0.0	0.0	0.0			
		1E	129.7	31.4	0.0	0.0	0.0	0.0	129.7	31.4	0.0			
		1F	0.0	0.0	0.0	129.7	31.4	0.0	129.7	31.4	0.0			
		1G	129.7	31.4	0.0	129.7	31.4	0.0	129.7	31.4	0.0			
8	1/200 HIGH WIND	7A	52.6	58.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	300	300
		7B	0.0	0.0	0.0	52.6	58.8	0.0	0.0	0.0	0.0			
		7C	0.0	0.0	0.0	0.0	0.0	0.0	52.6	58.8	0.0			
		7D	52.6	58.8	0.0	52.6	58.8	0.0	0.0	0.0	0.0			
		7E	52.6	58.8	0.0	0.0	0.0	0.0	52.6	58.8	0.0			
		7F	0.0	0.0	0.0	52.6	58.8	0.0	52.6	58.8	0.0			
		7G	52.6	58.8	0.0	52.6	58.8	0.0	52.6	58.8	0.0			
9	1/200 ICE WITH WIND	8A	96.5	61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80	150	150
		8B	0.0	0.0	0.0	96.5	61.6	0.0	0.0	0.0	0.0			
		8C	0.0	0.0	0.0	0.0	0.0	0.0	96.5	61.6	0.0			
		8D	96.5	61.6	0.0	96.5	61.6	0.0	0.0	0.0	0.0			
		8E	96.5	61.6	0.0	0.0	0.0	0.0	96.5	61.6	0.0			
		8F	0.0	0.0	0.0	96.5	61.6	0.0	96.5	61.6	0.0			
		8G	96.5	61.6	0.0	96.5	61.6	0.0	96.5	61.6	0.0			
10	EVERYDAY LOADING	9A	52.6	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	23	23
		9B	0.0	0.0	0.0	52.6	16.5	0.0	0.0	0.0	0.0			
		9C	0.0	0.0	0.0	0.0	0.0	0.0	52.6	16.5	0.0			
		9D	52.6	16.5	0.0	52.6	16.5	0.0	0.0	0.0	0.0			
		9E	52.6	16.5	0.0	0.0	0.0	0.0	52.6	16.5	0.0			
		9F	0.0	0.0	0.0	52.6	16.5	0.0	52.6	16.5	0.0			
		9G	52.6	16.5	0.0	52.6	16.5	0.0	52.6	16.5	0.0			
11	CONSTUCTION	10A	88.2	16.6	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.50	23	23
		10B	0.0	0.0	0.0	88.2	16.6	7.7	0.0	0.0	0.0			
		10C	0.0	0.0	0.0	0.0	0.0	0.0	88.2	16.6	7.7			
		10D	88.2	16.6	7.7	88.2	16.6	7.7	0.0	0.0	0.0			
		10E	88.2	16.6	7.7	0.0	0.0	0.0	88.2	16.6	7.7			
		10F	0.0	0.0	0.0	88.2	16.6	7.7	88.2	16.6	7.7			
		10G	88.2	16.6	7.7	88.2	16.6	7.7	88.2	16.6	7.7			
12	UNEQUAL ICE	11A	72.8	21.3	45.5	128.2	32.0	0.0	128.2	32.0	0.0	0.67	150	150
		11B	128.2	32.0	0.0	72.8	21.3	45.5	128.2	32.0	0.0			
		11C	128.2	32.0	0.0	128.2	32.0	0.0	72.8	21.3	45.5			
		11D	72.8	21.3	45.5	72.8	21.3	45.5	128.2	32.0	0.0			
		11E	72.8	21.3	45.5	128.2	32.0	0.0	72.8	21.3	45.5			
		11F	128.2	32.0	0.0	72.8	21.3	45.5	72.8	21.3	45.5			
		11G	72.8	21.3	45.5	72.8	21.3	45.5	72.8	21.3	45.5			



KEY LOAD MARK

[redacted]

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. LOAD APPLICATION
   a. TRANSVERSE LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   b. LONGITUDINAL LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-15.
   d. THE TOWER SHALL ALSO BE DESIGNED TO SUPPORT A POINT LOAD OF 42.5 kN IN THE PULLEY SYSTEM AS SHOWN IN DETAIL 'Z' IN COMBINATION WITH THE LOADS OF CASE 4 APPLIED TO NONE, ANY ONE, OR ANY TWO OF THE REMAINING PHASE SUPPORT POINTS.
   e. THE BRIDGE SHALL BE DESIGNED TO SUPPORT A VERTICAL LOAD OF 37.5 kN CONCENTRATED AT THE CENTRE OF THE BRIDGE.
   f. THE BRIDGE MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.4 kN CONCENTRATED AT THE CENTRE OF ITS UNSUPPORTED LENGTH IN COMBINATION WITH THE AXIAL FORCE CALCULATED FROM LOAD CASE 5 WITHOUT ANY PERMANENT DEFORMATION.
3. V, T AND L DENOTE VERTICAL, TRANSVERSE AND LONGITUDINAL.
4. UNLESS OTHERWISE NOTED, REFER TO SPECIFICATION DRAWING NO. 5L005-T08-00015.

REV.	REVISIONS	DATE	DRAWN
2	LOADING APPLICATION TABLE UPDATED	MAY 2017	
1	ISSUED FOR DETAILING	APR 2017	SL SHEDD

[redacted]

[redacted]

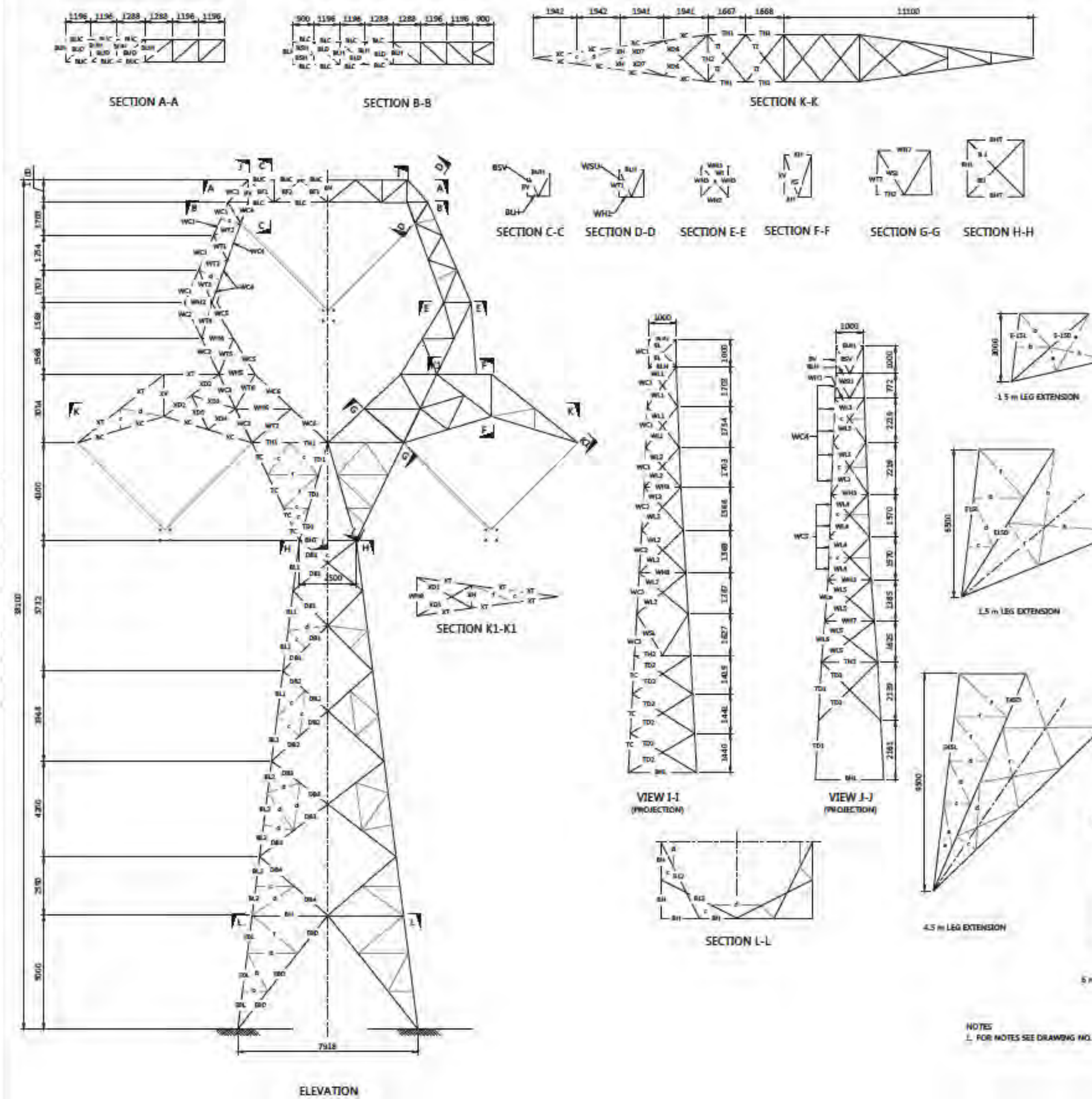
BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

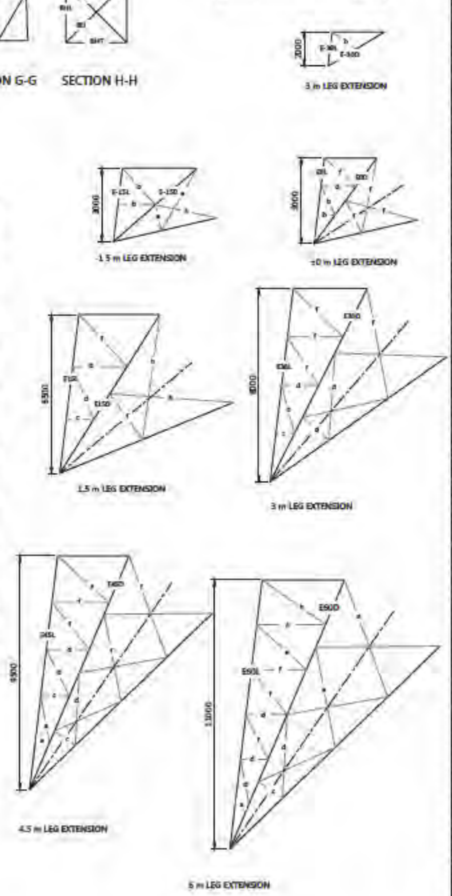
TYPE 54C SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 8 DEG
LOADING APPLICATION TABLE

DATE: SEPTEMBER 2016

DWG NO. 5L005-T08-00016 | REV. D | 2



REDUNDANT MEMBER		
MEMBER	SECTION	No. BOLTS
a	L 1.75 x 1.75 x 1/4	1
b	2 x 2 x 1/4	1
c	L 1-3/4 x 1-3/4 x 3/16	1
d	L 2 x 2 x 3/16	1
e	L 2-1/2 x 2-1/2 x 1/4	1
f	L 2-1/2 x 2-1/2 x 3/16	1
h	L 3 x 3 x 3/16	1
i	L 3 x 3 x 1/4	1



GROUP LABEL	GROUP SIZE	MAXIMUM FORCE (kN)				BOLTS	
		COMPRESSION	CASE	TENSION	CASE	No.	REMOVED HOLES
BUC	3X3X0.25	57.3	Stringing E	19.4	High Wind B Wind 45	2	1.0
BLC	2.5X2.5X0.1875	17.4	High Wind B Wind 45	29.7	Stringing E	2	1.0
BF1	2X2X0.1875	16.3	High Wind B	30.5	Hell - 75kN Ultimate	1	1.0
BFC	2X2X0.1875	26.5	Hell - 75kN Ultimate	15.3	High Wind E	1	1.0
BV	2X2X0.1875	38.0	Hell - 75kN Ultimate	56.2	1/200 Ice With Wind G	2	1.0
BSE	2X2X0.1875	-3.2	Unequal Ice A	4.5	Unequal Ice F	1	1.0
BLD	2X2X0.1875	-2.4	Unequal Ice E Wind 45	1.2	Unequal Ice B	1	1.0
BUR	2X2X0.1875	-8.5	Stringing L Wind 45	16.9	Unequal Ice A Wind 45	1	1.0
BUH	2X2X0.1875	-5.0	Unequal Ice B	7.6	Unequal Ice B	1	1.0
BSV	2X2X0.1875	9.5	Unequal Ice B	13.3	Stringing E	1	1.0
BRH?	2X2X0.1875	-4.2	Unequal Ice B	4.3	Unequal Ice B	2	1.0
BL	2X2X0.1875	27.9	Unequal Ice C	5.6	High Wind B Wind 45	2	1.0
WC1	3X3X0.1875	34.0	1/200 Ice With Wind G Wind 45	33.5	Unequal Ice B	4	2.0
WC2	3X3X0.1875	-44.5	Unequal Ice G	90.0	Unequal Ice B	4	2.0
WC3	4X4X0.25	-164.0	Unequal Ice B	87.0	Unequal Ice B	4	2.0
WC4	2.5X2.5X0.25	-69.9	Unequal Ice D	56.5	1/200 Ice With Wind G	3	2.0
WC5	3X3X0.1875	-84.0	Unequal Ice B	53.6	High Wind F Wind 45	4	2.0
WC6	3X3X0.25	55.1	High Wind F Wind 45	133.3	Unequal Ice F	4	1.0
WSU	2X2X0.25	11.7	Unequal Ice B	42.7	Unequal Ice E Wind 45	2	1.0
WSL	2.5X2.5X0.25	-6.6	Unequal Ice E Wind 45	52.4	Unequal Ice B	2	1.0
WL1	2X2X0.1875	23.5	Unequal Ice B	19.5	Unequal Ice B	1	1.0
WL2	2X2X0.1875	16.5	Unequal Ice B	16.9	Unequal Ice D	1	1.0
WL3	2X2X0.1875	12.6	Unequal Ice G	13.6	Unequal Ice G	1	1.0
WL4	2X2X0.25	39.6	Unequal Ice D	38.8	Unequal Ice D	1	1.0
WL5	2X2X0.1875	18.4	High Wind B Wind 45	46.3	Unequal Ice B	2	1.0
WT1	2.5X2.5X0.1875	37.2	Unequal Ice B	15.1	High Wind B Wind 45	2	1.0
WT2	2X2X0.1875	19.7	High Wind B Wind 45	42.1	Unequal Ice B	2	1.0
WT3	3X3X0.1875	55.1	Unequal Ice B	16.6	High Wind B Wind 45	2	1.0
WT4	3X3X0.1875	-96.6	Unequal Ice D	42.2	Unequal Ice D	2	2.0
WT5	2.5X2.5X0.1875	-48.5	Unequal Ice D	32.4	Unequal Ice D	2	2.0
WT6	3.5X3.5X0.25	-101.1	Unequal Ice B	0.0		2	1.0
WT7	3.5X3.5X0.1875	77.0	Unequal Ice D Wind 45	6.2	High Wind F Wind 45	2	1.0
WB	2X2X0.1875	22.7	Unequal Ice B	16.1	Unequal Ice B	1	1.0
WH1	2X2X0.1875	6.3	Unequal Ice G Wind 45	3.3	Unequal Ice G Wind 45	1	1.0
WH2	2X2X0.1875	36.8	Unequal Ice B	17.2	High Wind B Wind 45	2	1.0
WH3	2X2X0.1875	-8.0	Unequal Ice A Wind 45	4.6	Stringing E	2	1.0
WH4	2.5X2.5X0.1875	34.5	Unequal Ice D	30.1	Unequal Ice D	2	1.0
WH5	3.5X3.5X0.25	0.0		111.0	Unequal Ice B	4	1.0
WH6	2.5X2.5X0.1875	13.3	High Wind C Wind 45	69.4	Unequal Ice B	3	1.0
WH7	2.5X2.5X0.1875	33.7	Unequal Ice B	16.4	High Wind F	2	1.0
WH8	2.5X2.5X0.1875	18.6	Unequal Ice B	3.3	1/200 Ice With Wind B	3	1.0
XC	3.5X3.5X0.3125	-111.2	Unequal Ice D	17.5	High Wind B Wind 45	4	1.0
XT	3.5X3.5X0.1875	-0.7	High Wind D Wind 45	88.0	Unequal Ice B	4	1.0
XH	2X2X0.1875	-11.5	Unequal Ice C Wind 45	2.7	Unequal Ice C	1	1.0
XV	3X3X0.1875	56.2	Unequal Ice F Wind 45	0.0		2	1.0
XS	2.5X2.5X0.1875	-19.9	Unequal Ice E Wind 45	17.8	Stringing F Wind 45	2	1.0
XD1	2X2X0.1875	-5.5	Stringing F Wind 45	19.2	Unequal Ice F	1	1.0
XD2	2.5X2.5X0.1875	30.3	Unequal Ice D	32.8	Unequal Ice D	2	1.0
XD3	3X3X0.25	23.8	Unequal Ice A	11.5	High Wind B	2	1.0
XD4	2X2X0.1875	17.8	Unequal Ice A	9.4	High Wind B	2	1.0
XD5	2X2X0.1875	-10.4	High Wind B	21.1	Unequal Ice A	1	1.0
XD6	2X2X0.1875	-6.6	Unequal Ice E Wind 45	7.0	Unequal Ice E Wind 45	1	1.0
XD7	2.5X2.5X0.1875	16.4	Unequal Ice E Wind 45	18.1	Unequal Ice E Wind 45	2	1.0
TC	4X4X0.375	-273.3	Unequal Ice B	68.0	Unequal Ice D	8	1.0
TD1	3.5X3.5X0.3125	-179.0	High Wind F Wind 45	199.7	1/200 Ice With Wind F Wind 45	5	1.0
TD2	2X2X0.25	-44.0	Unequal Ice D	42.6	Unequal Ice D	2	1.0
TH1	3X3X0.1875	36.7	Unequal Ice E Wind 45	66.9	Unequal Ice E Wind 45	3	1.0
TH2	3X3X0.1875	-10.6	Unequal Ice E Wind 45	40.2	Unequal Ice E Wind 45	3	1.0
TE	3X3X0.25	59.7	Unequal Ice B	28.1	Unequal Ice F	2	1.0
BL2	4X4X0.4375	-358.1	Unequal Ice G	370.4	High Wind G Wind 45	8	2.0
BL1	4X4X0.4375	-404.0	Unequal Ice D	218.5	Unequal Ice D	8	2.0
BD1	3X3X0.1875	55.8	Unequal Ice D	50.6	Unequal Ice F	2	1.0
BD2	2.5X2.5X0.1875	-36.6	Unequal Ice F	41.0	Unequal Ice D	2	1.0
BD3	2.5X2.5X0.1875	-43.5	Unequal Ice D	42.0	Unequal Ice F	2	1.0
BD4	3X3X0.25	35.9	Unequal Ice D	39.4	Unequal Ice D	2	1.0
BHT	4X4X0.3125	-145.6	Unequal Ice B	18.4	Unequal Ice G	3	1.0
RHI?	2.5X2.5X0.1875	7.8	High Wind F	9.3	Unequal Ice C Wind 45	2	1.0
BH	2.5X2.5X0.1875	-6.7	High Wind G Wind 45	3.6	High Wind A	1	1.0
BI1	2.5X2.5X0.1875	28.9	Unequal Ice D	7.8	Unequal Ice D	1	1.0
BI2	3X3X0.1875	14.9	High Wind G	14.6	High Wind G	1	1.0
E-30L	5X5X0.4375	-421.5	Unequal Ice G	419.8	High Wind G Wind 45	8	3.0
E-30D	3X3X0.25	41.6	Unequal Ice D Wind 45	47.5	Unequal Ice F Wind 45	2	1.0
E-15L	5X5X0.4375	-408.3	Unequal Ice G	405.1	High Wind G Wind 45	8	3.0
E-15D	3X3X0.25	38.9	Unequal Ice D Wind 45	44.2	Unequal Ice F Wind 45	2	1.0
E0L	5X5X0.4375	-173.6	Unequal Ice G	168.1	High Wind G Wind 45	8	2.0
E0D	3X3X0.25	46.3	Unequal Ice D Wind 45	35.4	Unequal Ice F Wind 45	2	1.0
E15L	5X5X0.4375	-179.8	Unequal Ice G	271.4	High Wind G Wind 45	8	2.0
E150	3X3X0.25	64.9	Unequal Ice D Wind 45	56.6	Unequal Ice F Wind 45	2	1.0
E30L	5X5X0.4375	-160.9	Unequal Ice G	191.3	High Wind G Wind 45	8	3.0
E30D	3.5X3.5X0.25	41.6	Unequal Ice D Wind 45	49.2	Unequal Ice F Wind 45	2	1.0
E45L	5X5X0.4375	-150.4	Unequal Ice G	334.3	High Wind G Wind 45	8	3.0
E45D	3.5X3.5X0.25	-88.8	Unequal Ice D Wind 45	64.8	Unequal Ice F Wind 45	2	1.0
E60L	5X5X0.4375	-151.3	Unequal Ice G	331.1	High Wind G Wind 45	8	3.0
E60D	3.5X3.5X0.25	-76.5	Unequal Ice D Wind 45	62.8	Unequal Ice F Wind 45	2	1.0

NOTES
1. FOR NOTES SEE DRAWING NO. 5L005-T08-00017-002.

[redacted]

NO.	REMARKS	DATE	DESIGNED	DESIGN CHK	OPS CHK	APPROVED
L	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H.K. T.P.	R.H. R.L.	O.O.
L	GROUP LABELS / REDUNDANTS CHANGED	OCT. 2016	M. KHEDR	HK TP	RH RL	OO

REFERENCE DRAWINGS — REVISIONS — REVISIONS

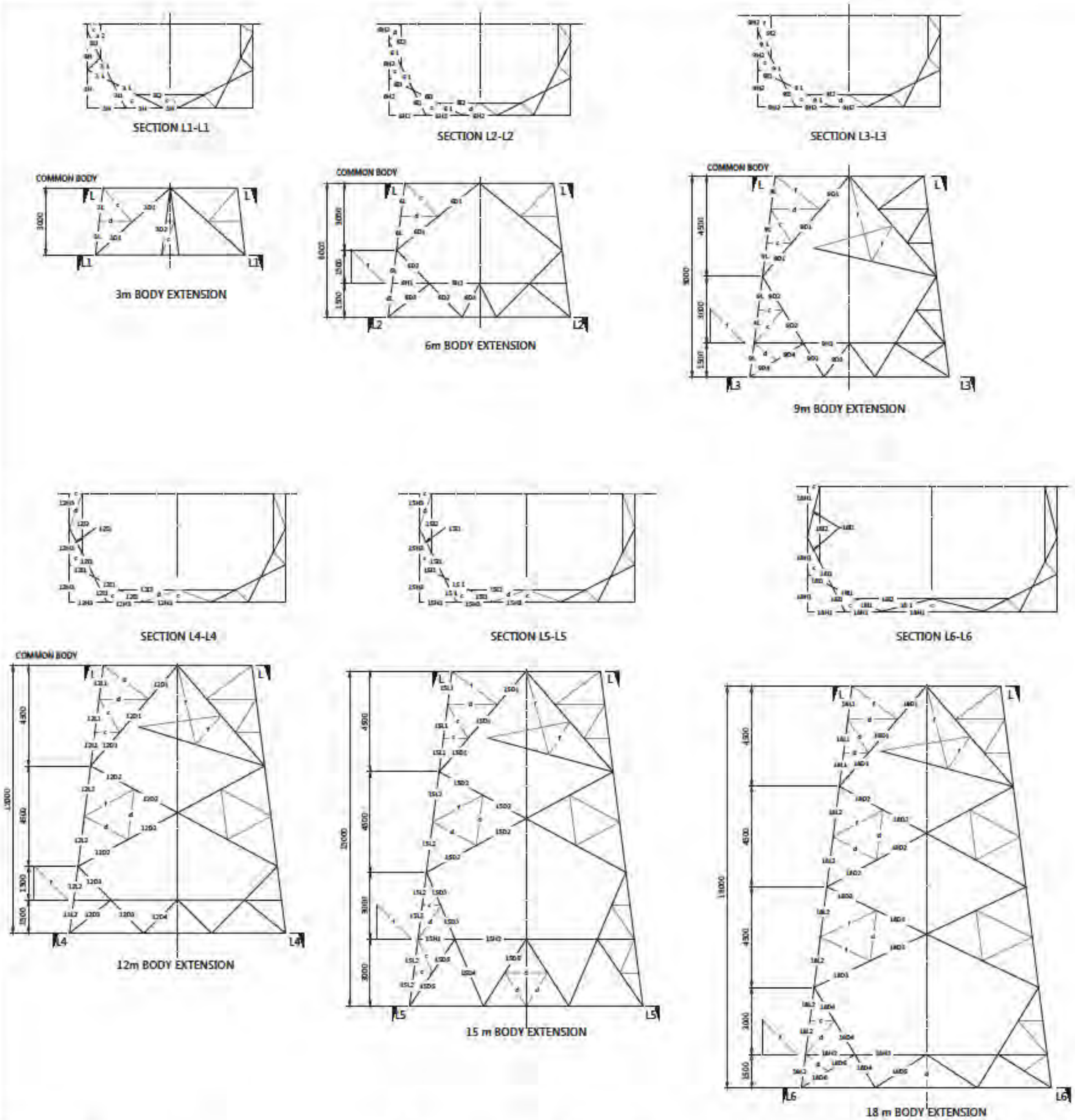
[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54C SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 8 DEG
DESIGN OUTLINE DRAWING
SHEET 1 OF 2

DATE: SEPTEMBER 2016 — DWG NO: 5L005-T08-00017-001 — SIZE: D — REV: 2



GROUP LABEL	GROUP SIZE	MAXIMUM FORCE (kN)				BOLTS	
		COMPRESSION	CASE	TENSION	CASE	No.	REMOVED HOLES
3L	5X5X0.375	-377.0	Unequal Ice G	357.5	High Wind G Wind 45	8	2.0
3D1	3.5X3.5X0.25	-37.2	Unequal Ice D	49.7	Unequal Ice G	2	1.0
3D2	3X3X0.25	-65.8	Unequal Ice D Wind 45	50.2	Unequal Ice F Wind 45	3	1.0
3H	2.5X2.5X0.1875	-30.2	Unequal Ice G	24.2	Unequal Ice D	2	1.0
3I1	3X3X0.1875	-4.8	High Wind G Wind 45	5.6	High Wind G Wind 45	1	1.0
3I2	2.5X2.5X0.1875	-8.7	High Wind G	6.9	High Wind G	1	1.0
6L	5X5X0.375	-422.9	Unequal Ice G	417.5	High Wind G Wind 45	8	2.0
6D1	3X3X0.1875	-38.1	High Wind G	25.41	Unequal Ice D	2	1.0
6D2	2.5X2.5X0.1875	72.1	High Wind E	71.7	High Wind I	2	1.0
6D3	3X3X0.1875	-46.6	Unequal Ice G	44.4	Unequal Ice G	2	1.0
6H1	2.5X2.5X0.25	70.7	Unequal Ice G	42.0	Unequal Ice G	2	1.0
6H2	3.5X3.5X0.25	-42.9	Unequal Ice G	67.5	Unequal Ice G	2	1.0
6I1	3X3X0.1875	-5.9	High Wind G	6.1	High Wind G	1	1.0
6I2	2.5X2.5X0.1875	10.8	High Wind G	9.5	High Wind F	1	1.0
9L	5X5X0.4375	-436.5	Unequal Ice G	439.2	High Wind G Wind 45	8	2.0
9D1	3X3X0.1875	-52.8	High Wind G	47.9	High Wind E	2	1.0
9D2	3X3X0.1875	-31.3	Unequal Ice G	34.6	Unequal Ice D Wind 45	2	1.0
9D3	2.5X2.5X0.1875	-60.8	High Wind E	60.0	High Wind J	2	1.0
9H1	3X3X0.1875	-47.4	Unequal Ice G	28.0	Unequal Ice G	3	1.0
9H2	3X3X0.1875	-34.0	Unequal Ice D	47.9	Unequal Ice D Wind 45	1	0.0
9I1	3X3X0.1875	-6.1	High Wind G Wind 45	7.0	High Wind G Wind 45	1	1.0
9I2	3X3X0.1875	-9.8	High Wind G	8.5	High Wind G	1	1.0
12L	5X5X0.4375	-417.5	Unequal Ice G	426.5	High Wind G Wind 45	8	2.0
12D1	3.5X3.5X0.1875	-36.0	Unequal Ice D Wind 45	32.0	Unequal Ice F Wind 45	2	1.0
12D2	3X3X0.1875	-13.1	Unequal Ice F Wind 45	25.4	High Wind I	1	1.0
12D3	2.5X2.5X0.1875	-27.7	Unequal Ice G	26.4	Unequal Ice F Wind 45	1	1.0
12H1	3X3X0.1875	-35.6	Unequal Ice G	21.8	Unequal Ice G	2	1.0
12H2	2.5X2.5X0.1875	-5.9	High Wind G Wind 45	4.9	Unequal Ice G Wind 45	1	1.0
12H3	2.5X2.5X0.1875	21.7	Unequal Ice F Wind 45	25.2	Unequal Ice D Wind 45	2	2.0
12I1	2.5X2.5X0.1875	-5.8	High Wind G Wind 45	6.9	High Wind G Wind 45	1	1.0
12I2	3X3X0.1875	-9.7	High Wind G	8.5	High Wind I	1	1.0

NOTES:
1. ALL STEEL ANGLE, PLATE AND MISCELLANEOUS MEMBERS SHALL CONFORM TO CSA G40.20/G40.21 STRUCTURAL GRADE 350W MINIMUM.
2. BOLTS SHALL BE 5/8" CONFORMING TO ASTM A394 TYPE 1 WITH REGULAR HEXAGONAL NUT (ASTM A563 DH) AND HEAVY SPRING LOCK WASHER TO CSA B19.7.
3. ALL STEEL AND BOLTS SHALL CONFORM TO THE IMPACT REQUIREMENT OF A MINIMUM AVERAGE ENERGY OF 20J AT -20°C.
4. ALL EXPOSED STEEL AND HARDWARE SHALL BE HOT DIPPED GALVANIZED PER CSA STANDARD G164 AFTER FABRICATION.
5. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL FORCES ARE IN kN. MINUS SIGN DENOTES COMPRESSION AND POSITIVE SIGN DENOTES TENSION.
6. SEE DRAWING NO. 5L005-T08-00017-001 FOR LEG EXTENSIONS.
7. SEE DRAWING 5L005-T08-00018 FOR TYPICAL TOWER CONNECTION DETAILS.

[redacted]

NO	REMARKS	DATE	DESIGNED	DESIGN CHK	DRFTG	DRFTG CHK	INSP	REV	APPT
2	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H. K.	T.P.		R.H.	R.L.	O.O.
1	GROUP LABELS / REDUNDANTS CHANGED	OCT. 2016	M. KHEDR	HK	TP		RH	RL	OO

REVISIONS

REFERENCE DRAWINGS — DRAWING NUMBER | TITLE

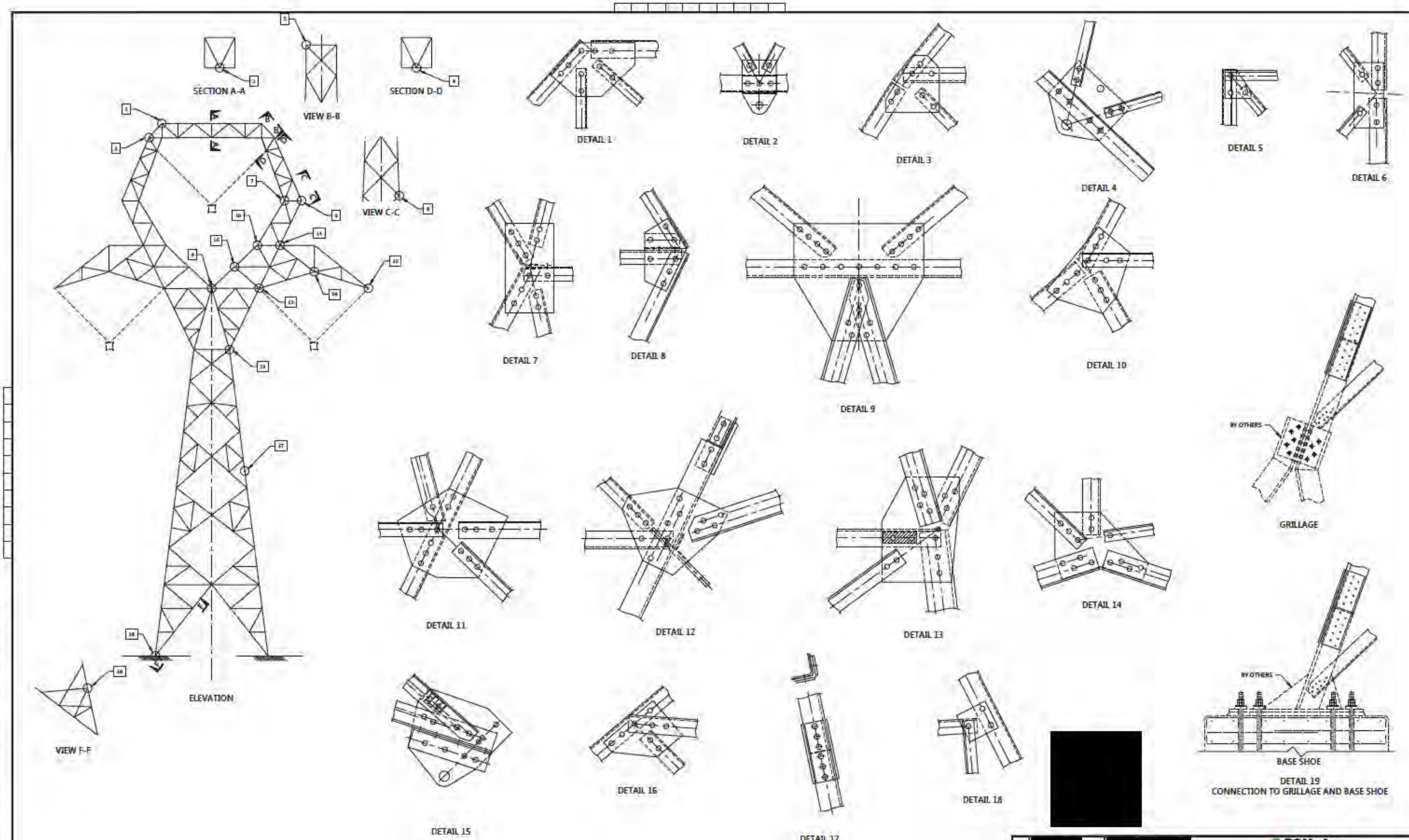
[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54C SELF - SUPPORTING SUSPENSION TOWER
0 DEG - 8 DEG
DESIGN OUTLINE DRAWING
SHEET 2 OF 2

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00017-002 | SIZE: D | R: 2



[redacted]

L	ISSUED FOR DETAILING	APRIL 2017	M. KHEDR	H.K.	T.P.		R.H.	R.L.	O.O.	
NO	REMARKS	DATE	DESIGNED							

REFERENCE DRAWINGS — REVISIONS — REVISIONS

[redacted]

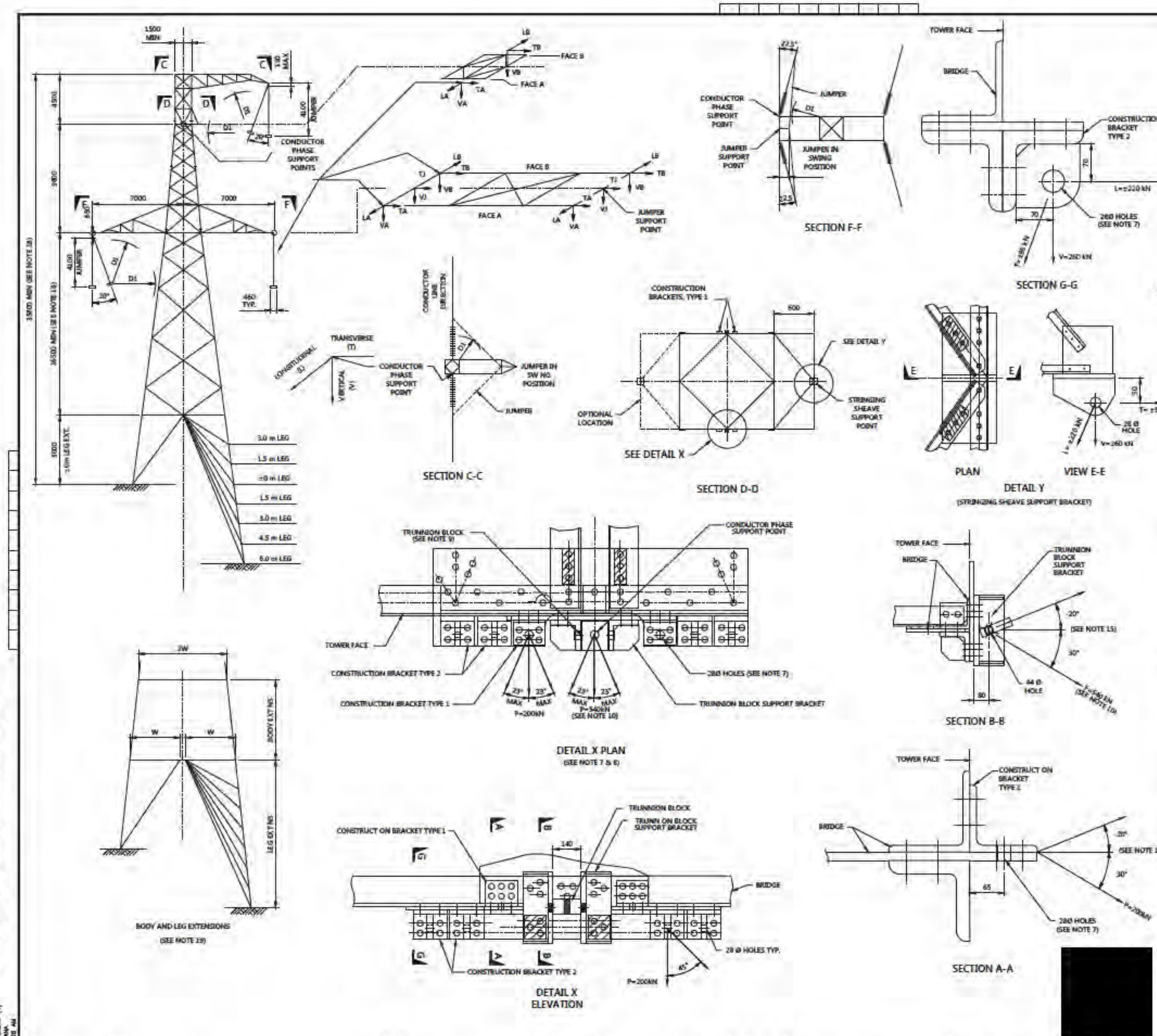
BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54C SELF SUPPORTING SUSPENSION TOWER
0 DEG - 8 DEG
TYPICAL DETAILS

DATE: SEPTEMBER 2016

DWG NO: 5L005-T08-00018 | SIZE: D | 1



LOAD CASE	DESCRIPTION	FACE A VT	FACE A TT	FACE A LT	FACE B VT	FACE B TT	FACE B LT	STRENGTH FACTOR	LOADING REMARKS
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
5	ICE AND WIND [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
6	ICE AND WIND [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
7	CONSTRUCTION	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
8	EVERYDAY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	UNBALANCED ICE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	UNEQUAL ICE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

NOTES:

1. SEE DRAWING 5L005-T08-00004 FOR GENERAL NOTES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. LOAD CASES:
   - CASE 1 — 1/200 ICE, 19.0 mm ICE, 0 WIND, -20°C, L.A. = 0°
   - CASE 2 — 1/200 ICE, 19.0 mm ICE, 0 WIND, -20°C, L.A. = 45°
   - CASE 3 — 1/200 WIND, 0 ICE, 600 Pa WIND, -20°C, L.A. = 0°
   - CASE 4 — 1/200 WIND, 0 ICE, 600 Pa WIND, -20°C, L.A. = 45°
   - CASE 5 — 1/200 ICE AND WIND, 12.5 mm ICE, 300 Pa WIND, -20°C, L.A. = 0°
   - CASE 6 — 1/200 ICE AND WIND, 12.5 mm ICE, 300 Pa WIND, -20°C, L.A. = 45°
   - CASE 7 — CONSTRUCTION, 0 ICE, 45Pa WIND, -20°C, L.A. = 45°
   - CASE 8 — EVERYDAY, 0 ICE, 45Pa WIND, 1°C, L.A. = 45°
   - CASE 9 — UNBALANCED ICE, 1/50 ICE + BARE, L.A. = 45°
   - CASE 10 — UNEQUAL ICE, 1/200 ICE AND WIND, 70% AND 20%, L.A. = 45°
4. TOWER DESIGN LOADS:
   - a. FOR ALL LOAD CASES, TOWER PHASE LOADS SHALL BE THE WORKING CONDUCTOR PHASE LOADS AS SPECIFIED IN THE LOAD TABLE.
   - b. FOR CASE 1 AND 2 APPLY 300 Pa BASE WIND PRESSURE ON TOWER IN THE TRANSVERSE DIRECTION, OR AT 45° TO IT.
   - c. FOR CASE 3 AND 4 APPLY 600 Pa BASE WIND PRESSURE ON TOWER IN THE TRANSVERSE DIRECTION, OR AT 45° TO IT.
   - d. FOR CASE 5 AND 6 APPLY 300 Pa BASE WIND PRESSURE ON TOWER IN THE TRANSVERSE DIRECTION, OR AT 45° TO IT.
   - e. FOR CASE 7 AND 8 APPLY 45 Pa BASE WIND PRESSURE ON TOWER IN THE TRANSVERSE DIRECTION, OR AT 45° TO IT.
   - f. FOR CASE 9 AND 11 APPLY 300 Pa BASE WIND PRESSURE ON TOWER IN THE LONGITUDINAL DIRECTION, OR AT 45° TO IT.
   - g. WIND PRESSURE DISTRIBUTION ON TOWER SHALL FOLLOW THE CSA C22.3 No 60826 - TERRAIN CATEGORY B.
5. STRENGTH FACTORS FOR EACH LOAD CASE SHALL BE AS SPECIFIED IN THE LOAD TABLE.
6. LOAD APPLICATION:
   - a. THE POSITION OF FACE A AND FACE B ARE REVERSIBLE.
   - b. LONGITUDINAL AND TRANSVERSE LOADS SHOWN IN THE LOAD TABLE ARE REVERSIBLE.
   - c. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-97.
   - d. FOR ALL LOAD CASES, THE COMBINATION OF LOADS SHALL INCLUDE A VERTICAL LOAD OF 5.5 kN (V) AND A TRANSVERSE LOAD OF 8.0 kN (T) APPLIED AT THE JUMPER SUPPORT POINTS.
7. CONSTRUCTION HOLES, 28mm IN DIAMETER SHALL BE PROVIDED AT JOINTS WHERE THE CONSTRUCTION SHACKLES ARE TO BE ATTACHED. PLATE THICKNESS SHALL BE 15mm.
8. SPECIFICATIONS FOR DESIGN OF THE TRUNNION BLOCK SUPPORT BRACKET AND THE CONSTRUCTION BRACKET OF TYPE 1 AND TYPE 2 ARE SHOWN IN DETAIL 'X'. ALL LOADS SHALL BE APPLIED WITHIN THE LIMIT OF DIRECTION SPECIFIED.
9. FOR TRUNNION BLOCK DETAILS, SEE DRAWING NO. D-T08-384, ITEM 7.
10. TRUNNION BLOCK COMPONENTS SHALL WITHSTAND A LOAD OF 540kN WITHOUT ANY SIGNIFICANT PERMANENT DEFORMATION WHICH WOULD IMPAIR THE FUNCTION OR REUSABILITY.
11. THE OUTSTANDING LEG OF ALL STEEL ANGLES ON THE TOP PLANE OF THE JUMPER ARM SHALL FACE DOWNWARDS.
12. THE JUMPER ARM MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.45 kN CONCENTRATED AT THE CENTRE OF THE UNSUPPORTED LENGTH OF THE MEMBER IN COMBINATION WITH THE AXIAL MEMBER FORCE DERIVED FROM STRUCTURAL ANALYSIS WITHOUT PERMANENT DEFORMATION. 24mm DIAMETER HOLES SHALL BE PROVIDED AT JOINTS WHERE THE JUMPER HARDWARE ASSEMBLIES TO BE ATTACHED. PLATE THICKNESS SHALL BE 23mm. EDGE DISTANCE SHALL BE 35mm.
13. THE MINIMUM ELECTRICAL CLEARANCE FROM CONDUCTOR (INCLUDING JUMPER) TO THE EDGE OF STEEL SHALL BE AS FOLLOWS: D1 = 3300 mm
14. THE MAXIMUM INSULATOR SWING ANGLE (γ) IN THE LONGITUDINAL DIRECTION TO BE 22.5°.
15. THE MAXIMUM CONDUCTOR SLOPE FROM THE HORIZONTAL IS:
    - ( ) = 20° (UPHILL) ( ) = +30° (DOWNHILL)
16. FOR SPECIFICATIONS FOR STEP BOLTS, SEE DRAWING NO. 5L005-T08-00024 AND G-T08-A271.
17. FOR DETAILS OF DEAD-END INSULATOR STRING AND JUMPER INSULATOR STRING SEE DWG NOS. 5L005-T08-00027, 5L005-T08-00028 AND 5L005-T08-00029.
18. COMPONENTS FOR EXTENSION OF STRUCTURE HEIGHT:
    - a. BODY EXTENSIONS TO BE +3.0 m, +6.0 m, +9.0 m AND +12.0 m.
    - b. LEG EXTENSIONS TO BE -3.0 m TO +6.0 m IN 1.5 m INCREMENTS.
19. DIMENSION 'W' SHALL BE CONSTANT TO ENABLE BODY AND LEG EXTENSIONS TO BE INTERCHANGEABLE.
20. A HORIZONTAL FRAME OR DIAPHRAGM IS REQUIRED AT THE BOTTOM OF ALL BODY EXTENSIONS AND, IF NO BODY EXTENSIONS ARE REQUIRED, AT THE BOTTOM OF THE BASIC TOWER BODY.
21. FOR SPECIFICATIONS FOR HELICOPTER TOUCH AND GO SEE DRAWING NO. 5L005-T08-00026, 5L005-T08-00031 AND 5L005-T08-00032.
22. FOR LOCATION FOR TOWER NO. SIGN SEE DRAWING NO. G-T08-B483.
23. THE GEOMETRY, CONFIGURATION, AND CONNECTIONS OF TYPE 54J SELF SUPPORTING DEAD END TOWER ARE BASED ON FULLY DESIGNED AND TESTED BC HYDRO TYPE 53J TOWER. SEE BELOW FOR TYPE 53J DRAWINGS AND TEST REPORT:
    - a. SPECIFICATION DRAWINGS: 5L046-T08-00007 SHEET 1 AND 2.
    - b. TEST REPORT: QC50645 (HYUNDAI STEEL TOWER INDUSTRIES CO., MAY 1992).
    - c. DESIGN DRAWINGS: 5L046-T08-00087 TO 5L046-T08-00088.
    - d. STRUCTURAL DETAIL DRAWINGS: 5L046-T08-00690 TO 5L046-T08-00722.

    THUS, TYPE 54J TOWER SHALL BE DETAILED IN THE SAME MANNER AS 53J UNLESS NOTED OTHERWISE.

[redacted]

NO.	REVISIONS	DATE	DESIGNED			
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.	R.H. / R.L. / O.O.

REFERENCE DRAWINGS — REVISIONS — REVISIONS

[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
SPECIFICATION DRAWING

DATE: SEPTEMBER 2016 — DWG NO: 5L005-T08-00019 — SIZE: D — SHEET: 1

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. TRANSVERSE DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN)									UNFACTORED DESIGN LOAD OF FACE B (kN)									STRENGTH FACTOR
				TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			
				VA1	TA1	LA1	VA2	TA2	LA2	VA3	TA3	LA3	VB1	TB1	LB1	VB2	TB2	LB2	VB3	TB3	LB3	
1	1/200 ICE L.A. = 0° WIND ON TOWER = 100 Pa TRANS. OR AT 45° TO T	1A	1OA	124.8	3.0	222.4																0.75
		1B	1OB				124.8	3.0	222.4													0.75
		1C	1OC							124.8	3.0	222.4										0.75
		1D	1OD	124.8	3.0	222.4	124.8	3.0	222.4													0.75
		1E	1OE	124.8	3.0	222.4				124.8	3.0	222.4										0.75
		1F	1OF				124.8	3.0	222.4	124.8	3.0	222.4										0.75
		1G	1OG	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4										0.75
		1H	1OH	124.8	3.0	222.4							85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1J	1OJ				124.8	3.0	222.4				85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1K	1OK							124.8	3.0	222.4	85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1L	1OL	124.8	3.0	222.4	124.8	3.0	222.4				85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1M	1OM	124.8	3.0	222.4				124.8	3.0	222.4	85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1N	1ON				124.8	3.0	222.4	124.8	3.0	222.4	85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1P	1OP	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4	85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1Q	1OQ										85.3 -56.7	3.0	222.4							0.75
		1R	1OR													85.8 -56.7	3.0	222.4				0.75
		1S	1OS																85.8 -56.7	3.0	222.4	0.75
		1T	1OT										85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4				0.75
		1W	1OW										85.3 -56.7	3.0	222.4				85.8 -56.7	3.0	222.4	0.75
		1X	1OX													85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1Y	1OY										85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1Z	1OZ	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4	85.3 -56.7	3.0	222.4							0.75
		1AA	1OAA	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4				85.8 -56.7	3.0	222.4				0.75
		1AB	1OAB	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4							85.8 -56.7	3.0	222.4	0.75
		1AC	1OAC	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4	85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4				0.75
		1AD	1OAD	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4	85.3 -56.7	3.0	222.4				85.8 -56.7	3.0	222.4	0.75
		1AE	1OAE	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4				85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
		1AF	1OAF	124.8	3.0	222.4	124.8	3.0	222.4	124.8	3.0	222.4	85.3 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	85.8 -56.7	3.0	222.4	0.75
2	1/200 ICE L.A. = 45° WIND ON TOWER = 300 Pa TRANS. OR AT 45° TO T	2A	2OA	124.8	87.7	205.4																0.75
		2B	2OB				124.8	87.7	205.4													0.75
		2C	2OC							124.8	87.7	205.4										0.75
		2D	2OD	124.8	87.7	205.4	124.8	87.7	205.4													0.75
		2E	2OE	124.8	87.7	205.4				124.8	87.7	205.4										0.75
		2F	2OF				124.8	87.7	205.4	124.8	87.7	205.4										0.75
		2G	2OG	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4										0.75
		2H	2OH	124.8	87.7	205.4							85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2J	2OJ				124.8	87.7	205.4				85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2K	2OK							124.8	87.7	205.4	85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2L	2OL	124.8	87.7	205.4	124.8	87.7	205.4				85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2M	2OM	124.8	87.7	205.4				124.8	87.7	205.4	85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2N	2ON				124.8	87.7	205.4	124.8	87.7	205.4	85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2P	2OP	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4	85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2Q	2OQ										85.3 -56.7	87.7	205.4							0.75
		2R	2OR													85.8 -56.7	87.7	205.4				0.75
		2S	2OS																85.8 -56.7	87.7	205.4	0.75
		2T	2OT										85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4				0.75
		2W	2OW										85.3 -56.7	87.7	205.4				85.8 -56.7	87.7	205.4	0.75
		2X	2OX													85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2Y	2OY										85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2Z	2OZ	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4	85.3 -56.7	87.7	205.4							0.75
		2AA	2OAA	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4				85.8 -56.7	87.7	205.4				0.75
		2AB	2OAB	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4							85.8 -56.7	87.7	205.4	0.75
		2AC	2OAC	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4	85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4				0.75
		2AD	2OAD	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4	85.3 -56.7	87.7	205.4				85.8 -56.7	87.7	205.4	0.75
		2AE	2OAE	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4				85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75
		2AF	2OAF	124.8	87.7	205.4	124.8	87.7	205.4	124.8	87.7	205.4	85.3 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	85.8 -56.7	87.7	205.4	0.75

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. TRANSVERSE DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN)									UNFACTORED DESIGN LOAD OF FACE B (kN)									STRENGTH FACTOR
				TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			
				VA1	TA1	LA1	VA2	TA2	LA2	VA3	TA3	LA3	VB1	TB1	LB1	VB2	TB2	LB2	VB3	TB3	LB3	
3	1/200 HIGH WIND L.A. = 0° (NA+) WIND ON TOWER = 600 Pa TRANS OR AT 45° TO T	3A+	3OA+	51.8	36.2	148.5																0.75
		3B+	3OB+				51.8	36.2	148.5													0.75
		3C+	3OC+							51.8	36.2	148.5										0.75
		3D+	3OD+	51.8	36.2	148.5	51.8	36.2	148.5													0.75
		3E+	3OE+	51.8	36.2	148.5				51.8	36.2	148.5										0.75
		3F+	3OF+				51.8	36.2	148.5	51.8	36.2	148.5										0.75
		3G+	3OG+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5										0.75
		3H+	3OH+	51.8	36.2	148.5							37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3J+	3OJ+				51.8	36.2	148.5				37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3K+	3OK+							51.8	36.2	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3L+	3OL+	51.8	36.2	148.5	51.8	36.2	148.5				37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3M+	3OM+	51.8	36.2	148.5				51.8	36.2	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3N+	3ON+				51.8	36.2	148.5	51.8	36.2	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3P+	3OP+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3Q+	3OQ+										37.2 -16.3	25.0	148.5							0.75
		3R+	3OR+													37.2 -16.3	25.0	148.5				0.75
		3S+	3OS+																37.2 -16.3	25.0	148.5	0.75
		3T+	3OT+										37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5				0.75
		3W+	3OW+										37.2 -16.3	25.0	148.5				37.2 -16.3	25.0	148.5	0.75
		3X+	3OX+													37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3Y+	3OY+										37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3Z+	3OZ+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5	37.2 -16.3	25.0	148.5							0.75
		3AA+	3OAA+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5				37.2 -16.3	25.0	148.5				0.75
		3AB+	3OAB+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5							37.2 -16.3	25.0	148.5	0.75
		3AC+	3OAC+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5				0.75
		3AD+	3OAD+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5	37.2 -16.3	25.0	148.5				37.2 -16.3	25.0	148.5	0.75
		3AE+	3OAE+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5				37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
		3AF+	3OAF+	51.8	36.2	148.5	51.8	36.2	148.5	51.8	36.2	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	37.2 -16.3	25.0	148.5	0.75
	1/200 HIGH WIND L.A. = 0° (NA-), WIND ON TOWER = 600 Pa TRANS OR AT 45° TO T	3A-	3OA-	51.8	-36.2	148.5																0.75
		3B-	3OB-				51.8	-36.2	148.5													0.75
		3C-	3OC-							51.8	-36.2	148.5										0.75
		3D-	3OD-	51.8	-36.2	148.5	51.8	-36.2	148.5													0.75
		3E-	3OE-	51.8	-36.2	148.5				51.8	-36.2	148.5										0.75
		3F-	3OF-				51.8	-36.2	148.5	51.8	-36.2	148.5										0.75
		3G-	3OG-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5										0.75
		3H-	3OH-	51.8	-36.2	148.5							37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3J-	3OJ-				51.8	-36.2	148.5				37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3K-	3OK-							51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3L-	3OL-	51.8	-36.2	148.5	51.8	-36.2	148.5				37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3M-	3OM-	51.8	-36.2	148.5				51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3N-	3ON-				51.8	-36.2	148.5	51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3P-	3OP-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3Q-	3OQ-										37.2 -16.3	-25.0	148.5							0.75
		3R-	3OR-													37.2 -16.3	-25.0	148.5				0.75
		3S-	3OS-																37.2 -16.3	-25.0	148.5	0.75
		3T-	3OT-										37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5				0.75
		3W-	3OW-										37.2 -16.3	-25.0	148.5				37.2 -16.3	-25.0	148.5	0.75
		3X-	3OX-													37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3Y-	3OY-										37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3Z-	3OZ-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5							0.75
		3AA-	3OAA-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5				37.2 -16.3	-25.0	148.5				0.75
		3AB-	3OAB-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5							37.2 -16.3	-25.0	148.5	0.75
		3AC-	3OAC-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5				0.75
		3AD-	3OAD-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5				37.2 -16.3	-25.0	148.5	0.75
		3AE-	3OAE-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5				37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75
		3AF-	3OAF-	51.8	-36.2	148.5	51.8	-36.2	148.5	51.8	-36.2	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	37.2 -16.3	-25.0	148.5	0.75

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE NOTES ON DRAWING No. 5L005-T08-00020-004

[redacted]

April 2017

NO	REMARKS	DATE	REVISED	
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C. T.P. R.H. R.L. O.O.

REFERENCE DRAWINGS

REVISIONS

[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
LOADING APPLICATION TABLE
SHEET 1 OF 4

DATE: SEPTEMBER 2016

DWG NO: 5L005-T08-00020-001 | SIZE: D | R: 1

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. TRANSVERSE DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN)									UNFACTORED DESIGN LOAD OF FACE B (kN)									STRENGTH FACTOR
				TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			
				VA1	TA1	LA1	VA2	TA2	LA2	VA3	TA3	LA3	VB1	TB1	LB1	VB2	TB2	LB2	VB3	TB3	LB3	
4	1/200 HIGH WIND, L.A. = 45° (NA+), WIND ON TOWER = 600 Pa TRANS. OR AT 45° TO TT	4A+	40A+	51.8	93.0	137.2																1.75
		4B+	40B+				51.8	93.0	137.2													1.75
		4C+	40C+							51.8	93.0	137.2										1.75
		4D+	40D+	51.8	93.0	137.2	51.8	93.0	137.2													1.75
		4E+	40E+	51.8	93.0	137.2				51.8	93.0	137.2										1.75
		4F+	40F+				51.8	93.0	137.2	51.8	93.0	137.2										1.75
		4G+	40G+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2										1.75
		4H+	40H+	51.8	93.0	137.2							37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4J+	40J+				51.8	93.0	137.2				37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4K+	40K+							51.8	93.0	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4L+	40L+	51.8	93.0	137.2	51.8	93.0	137.2				37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4M+	40M+	51.8	93.0	137.2				51.8	93.0	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4N+	40N+				51.8	93.0	137.2	51.8	93.0	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4P+	40P+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4Q+	40Q+										37.2 / -16.3	81.8	137.2							1.75
		4R+	40R+													37.2 / -16.3	81.8	137.2				1.75
		4S+	40S+																37.2 / -16.3	81.8	137.2	1.75
		4T+	40T+										37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2				1.75
		4W+	40W+										37.2 / -16.3	81.8	137.2				37.2 / -16.3	81.8	137.2	1.75
		4X+	40X+													37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4Y+	40Y+										37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4Z+	40Z+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2	37.2 / -16.3	81.8	137.2							1.75
		4AA+	40AA+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2				37.2 / -16.3	81.8	137.2				1.75
		4AB+	40AB+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2							37.2 / -16.3	81.8	137.2	1.75
		4AC+	40AC+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2				1.75
		4AD+	40AD+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2	37.2 / -16.3	81.8	137.2				37.2 / -16.3	81.8	137.2	1.75
		4AE+	40AE+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2				37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
		4AF+	40AF+	51.8	93.0	137.2	51.8	93.0	137.2	51.8	93.0	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	37.2 / -16.3	81.8	137.2	1.75
	1/200 HIGH WIND, L.A. = 45° (NA-), WIND ON TOWER = 600 Pa TRANS. OR AT 45° TO TT	4A-	40A-	51.8	20.6	137.2																1.75
		4B-	40B-				51.8	20.6	137.2													1.75
		4C-	40C-							51.8	20.6	137.2										1.75
		4D-	40D-	51.8	20.6	137.2	51.8	20.6	137.2													1.75
		4E-	40E-	51.8	20.6	137.2				51.8	20.6	137.2										1.75
		4F-	40F-				51.8	20.6	137.2	51.8	20.6	137.2										1.75
		4G-	40G-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2										1.75
		4H-	40H-	51.8	20.6	137.2							37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4J-	40J-				51.8	20.6	137.2				37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4K-	40K-							51.8	20.6	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4L-	40L-	51.8	20.6	137.2	51.8	20.6	137.2				37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4M-	40M-	51.8	20.6	137.2				51.8	20.6	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4N-	40N-				51.8	20.6	137.2	51.8	20.6	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4P-	40P-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4Q-	40Q-										37.2 / -16.3	31.8	137.2							1.75
		4R-	40R-													37.2 / -16.3	31.8	137.2				1.75
		4S-	40S-																37.2 / -16.3	31.8	137.2	1.75
		4T-	40T-										37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2				1.75
		4W-	40W-										37.2 / -16.3	31.8	137.2				37.2 / -16.3	31.8	137.2	1.75
		4X-	40X-													37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4Y-	40Y-										37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4Z-	40Z-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2	37.2 / -16.3	31.8	137.2							1.75
		4AA-	40AA-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2				37.2 / -16.3	31.8	137.2				1.75
		4AB-	40AB-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2							37.2 / -16.3	31.8	137.2	1.75
		4AC-	40AC-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2				1.75
		4AD-	40AD-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2	37.2 / -16.3	31.8	137.2				37.2 / -16.3	31.8	137.2	1.75
		4AE-	40AE-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2				37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75
		4AF-	40AF-	51.8	20.6	137.2	51.8	20.6	137.2	51.8	20.6	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	37.2 / -16.3	31.8	137.2	1.75

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. TRANSVERSE DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN)									UNFACTORED DESIGN LOAD OF FACE B (kN)									STRENGTH FACTOR
				TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			
				VA1	TA1	LA1	VA2	TA2	LA2	VA3	TA3	LA3	VB1	TB1	LB1	VB2	TB2	LB2	VB3	TB3	LB3	
5	1/200 ICE AND WIND, L.A. = 0° (NA+), WIND ON TOWER = 400 Pa TRANS. OR AT 45° TO TT	5A+	50A+	93.3	33.8	195.8																1.75
		5B+	50B+				93.3	33.8	195.8													1.75
		5C+	50C+							93.3	33.8	195.8										1.75
		5D+	50D+	93.3	33.8	195.8	93.3	33.8	195.8													1.75
		5E+	50E+	93.3	33.8	195.8				93.3	33.8	195.8										1.75
		5F+	50F+				93.3	33.8	195.8	93.3	33.8	195.8										1.75
		5G+	50G+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8										1.75
		5H+	50H+	93.3	33.8	195.8							64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5J+	50J+				93.3	33.8	195.8				64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5K+	50K+							93.3	33.8	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5L+	50L+	93.3	33.8	195.8	93.3	33.8	195.8				64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5M+	50M+	93.3	33.8	195.8				93.3	33.8	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5N+	50N+				93.3	33.8	195.8	93.3	33.8	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5P+	50P+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5Q+	50Q+										64.9 / -39.4	23.5	195.8							1.75
		5R+	50R+													64.9 / -39.4	23.5	195.8				1.75
		5S+	50S+																64.9 / -39.4	23.5	195.8	1.75
		5T+	50T+										64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8				1.75
		5W+	50W+										64.9 / -39.4	23.5	195.8				64.9 / -39.4	23.5	195.8	1.75
		5X+	50X+													64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5Y+	50Y+										64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5Z+	50Z+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8	64.9 / -39.4	23.5	195.8							1.75
		5AA+	50AA+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8				64.9 / -39.4	23.5	195.8				1.75
		5AB+	50AB+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8							64.9 / -39.4	23.5	195.8	1.75
		5AC+	50AC+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8				1.75
		5AD+	50AD+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8	64.9 / -39.4	23.5	195.8				64.9 / -39.4	23.5	195.8	1.75
		5AE+	50AE+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8				64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
		5AF+	50AF+	93.3	33.8	195.8	93.3	33.8	195.8	93.3	33.8	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	64.9 / -39.4	23.5	195.8	1.75
	1/200 ICE AND WIND, L.A. = 0° (NA-), WIND ON TOWER = 400 Pa TRANS. OR AT 45° TO TT	5A-	50A-	93.3	-33.8	195.8																1.75
		5B-	50B-				93.3	-33.8	195.8													1.75
		5C-	50C-							93.3	-33.8	195.8										1.75
		5D-	50D-	93.3	-33.8	195.8	93.3	-33.8	195.8													1.75
		5E-	50E-	93.3	-33.8	195.8				93.3	-33.8	195.8										1.75
		5F-	50F-				93.3	-33.8	195.8	93.3	-33.8	195.8										1.75
		5G-	50G-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8										1.75
		5H-	50H-	93.3	-33.8	195.8							64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5J-	50J-				93.3	-33.8	195.8				64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5K-	50K-							93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5L-	50L-	93.3	-33.8	195.8	93.3	-33.8	195.8				64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5M-	50M-	93.3	-33.8	195.8				93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5N-	50N-				93.3	-33.8	195.8	93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5P-	50P-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5Q-	50Q-										64.9 / -39.4	-23.5	195.8							1.75
		5R-	50R-													64.9 / -39.4	-23.5	195.8				1.75
		5S-	50S-																64.9 / -39.4	-23.5	195.8	1.75
		5T-	50T-										64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8				1.75
		5W-	50W-										64.9 / -39.4	-23.5	195.8				64.9 / -39.4	-23.5	195.8	1.75
		5X-	50X-													64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5Y-	50Y-										64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5Z-	50Z-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8							1.75
		5AA-	50AA-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8				64.9 / -39.4	-23.5	195.8				1.75
		5AB-	50AB-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8							64.9 / -39.4	-23.5	195.8	1.75
		5AC-	50AC-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8				1.75
		5AD-	50AD-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8				64.9 / -39.4	-23.5	195.8	1.75
		5AE-	50AE-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8				64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75
		5AF-	50AF-	93.3	-33.8	195.8	93.3	-33.8	195.8	93.3	-33.8	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	64.9 / -39.4	-23.5	195.8	1.75

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE NOTES ON DRAWING No. 5L005-T08-00020-004

[redacted]

April 2017

NO	REMARKS	DATE	ENG/PREP						
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.		R.H.	R.L.	O.O.

REVISIONS

REFERENCE DRAWINGS

[redacted]

[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
LOADING APPLICATION TABLE
SHEET 2 OF 4

DATE: SEPTEMBER 2016

DWG NO: 5L005-T08-00020-002 | SIZE: D | REV: 1

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. TRANSVERSE DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN)									UNFACTORED DESIGN LOAD OF FACE B (kN)									STRENGTH FACTOR
				TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			
				VA1	TA1	LA1	VA2	TA2	LA2	VA3	TA3	LA3	VB1	TB1	LB1	VB2	TB2	LB2	VB3	TB3	LB3	
6	1/200 ICE AND WIND, LA = 45° (NA-1), WIND ON TOWER = 500 Pa, TRANS. OR AT 45° TO IT	6A	60A	93.3	108.8	180.9																0.75
		6B	60B				93.3	108.8	180.9													0.75
		6C	60C							93.3	108.8	180.9										0.75
		6D	60D	93.3	108.8	180.9	93.3	108.8	180.9													0.75
		6E	60E	93.3	108.8	180.9				93.3	108.8	180.9										0.75
		6F	60F				93.3	108.8	180.9	93.3	108.8	180.9										0.75
		6G	60G	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9										0.75
		6H	60H	93.3	108.8	180.9							64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6J	60J				93.3	108.8	180.9				64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6K	60K							93.3	108.8	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6L	60L	93.3	108.8	180.9	93.3	108.8	180.9				64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6M	60M	93.3	108.8	180.9				93.3	108.8	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6N	60N				93.3	108.8	180.9	93.3	108.8	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6P	60P	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6Q	60Q										64.9 -39.4	98.4	180.9							0.75
		6R	60R													64.9 -39.4	98.4	180.9				0.75
		6S	60S																64.9 -39.4	98.4	180.9	0.75
		6T	60T										64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9				0.75
		6W	60W										64.9 -39.4	98.4	180.9				64.9 -39.4	98.4	180.9	0.75
		6X	60X													64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6Y	60Y										64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6Z	60Z	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9	64.9 -39.4	98.4	180.9							0.75
		6AA	60AA	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9				64.9 -39.4	98.4	180.9				0.75
		6AB	60AB	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9							64.9 -39.4	98.4	180.9	0.75
		6AC	60AC	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9				0.75
		6AD	60AD	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9	64.9 -39.4	98.4	180.9				64.9 -39.4	98.4	180.9	0.75
		6AE	60AE	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9				64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
		6AF	60AF	93.3	108.8	180.9	93.3	108.8	180.9	93.3	108.8	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	64.9 -39.4	98.4	180.9	0.75
	1/200 ICE AND WIND, LA = 45° (NA-1), WIND ON TOWER = 310 Pa, TRANS. OR AT 45° TO IT	6A	60A	93.3	41.1	180.9																0.75
		6B	60B				93.3	41.1	180.9													0.75
		6C	60C							93.3	41.1	180.9										0.75
		6D	60D	93.3	41.1	180.9	93.3	41.1	180.9													0.75
		6E	60E	93.3	41.1	180.9				93.3	41.1	180.9										0.75
		6F	60F				93.3	41.1	180.9	93.3	41.1	180.9										0.75
		6G	60G	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9										0.75
		6H	60H	93.3	41.1	180.9							64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6J	60J				93.3	41.1	180.9				64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6K	60K							93.3	41.1	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6L	60L	93.3	41.1	180.9	93.3	41.1	180.9				64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6M	60M	93.3	41.1	180.9				93.3	41.1	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6N	60N				93.3	41.1	180.9	93.3	41.1	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6P	60P	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6Q	60Q										64.9 -39.4	51.5	180.9							0.75
		6R	60R													64.9 -39.4	51.5	180.9				0.75
		6S	60S																64.9 -39.4	51.5	180.9	0.75
		6T	60T										64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9				0.75
		6W	60W										64.9 -39.4	51.5	180.9				64.9 -39.4	51.5	180.9	0.75
		6X	60X													64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6Y	60Y										64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6Z	60Z	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9	64.9 -39.4	51.5	180.9							0.75
		6AA	60AA	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9				64.9 -39.4	51.5	180.9				0.75
		6AB	60AB	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9							64.9 -39.4	51.5	180.9	0.75
		6AC	60AC	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9				0.75
		6AD	60AD	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9	64.9 -39.4	51.5	180.9				64.9 -39.4	51.5	180.9	0.75
		6AE	60AE	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9				64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75
		6AF	60AF	93.3	41.1	180.9	93.3	41.1	180.9	93.3	41.1	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	64.9 -39.4	51.5	180.9	0.75

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. TRANSVERSE DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN)									UNFACTORED DESIGN LOAD OF FACE B (kN)									STRENGTH FACTOR
				TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			TOP CONDUCTOR PHASE			LEFT CONDUCTOR PHASE			RIGHT CONDUCTOR PHASE			
				VA1	TA1	LA1	VA2	TA2	LA2	VA3	TA3	LA3	VB1	TB1	LB1	VB2	TB2	LB2	VB3	TB3	LB3	
7	CONSTRUCTION, 0 ICE, 45 Pa WIND, LA = 45°, WIND ON TOWER = 45 Pa TRANS. OR AT 45° TO IT	7A	70A	179.0	47.1	90.7																0.5
		7B	70B				179.0	47.1	90.7													0.5
		7C	70C							179.0	47.1	90.7										0.5
		7D	70D	179.0	47.1	90.7	51.0	44.0	99.0													0.5
		7E	70E	179.0	47.1	90.7				51.0	44.0	99.0										0.5
		7F	70F	51.0	44.0	99.0	179.0	47.1	90.7													0.5
		7G	70G				179.0	47.1	90.7	51.0	44.0	99.0										0.5
		7H	70H	51.0	44.0	99.0				179.0	47.1	90.7										0.5
		7J	70J				51.0	44.0	99.0	179.0	47.1	90.7										0.5
		7K	70K	179.0	47.1	90.7	51.0	44.0	99.0	51.0	44.0	99.0										0.5
		7L	70L	51.0	44.0	99.0	179.0	47.1	90.7	51.0	44.0	99.0										0.5
		7M	70M	51.0	44.0	99.0	51.0	44.0	99.0	179.0	47.1	90.7										0.5
		7N	70N	179.0	47.1	90.7							37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7P	70P				179.0	47.1	90.7				37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7Q	70Q							179.0	47.1	90.7	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7R	70R	179.0	47.1	90.7	51.0	44.0	99.0				37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7S	70S	179.0	47.1	90.7				51.0	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7T	70T	51.0	44.0	99.0	179.0	47.1	90.7				37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7W	70W				179.0	47.1	90.7	51.0	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7X	70X	51.0	44.0	99.0				179.0	47.1	90.7	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7Y	70Y				51.0	44.0	99.0	179.0	47.1	90.7	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7Z	70Z	179.0	47.1	90.7	51.0	44.0	99.0	51.0	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7AA	70AA	51.0	44.0	99.0	179.0	47.1	90.7	51.0	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
		7AB	70AB	51.0	44.0	99.0	51.0	44.0	99.0	179.0	47.1	90.7	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	37.0 -39.4	44.0	99.0	0.5
8	EVERYDAY	8A	80A	48.6	47.1	-18.6	51.0	44.0	99.0	51.0	44.0	99.0	130.3	0.0	-109.3							1.0
		8B	80B	51.0	44.0	99.0	48.6	47.1	-18.6	51.0	44.0	99.0				130.3	0.0	-109.3				1.0
		8C	80C	51.0	44.0	99.0	51.0	44.0	99.0	48.6	47.1	-18.6							130.3	0.0	-109.3	1.0

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE NOTES ON DRAWING No. 5L005-T08-00020-004

[redacted]

NO	REMARKS	DATE	DESIGNED	DESIGN CHK.	DRAWN	DRAWN CHK.	SUPT	REVIEWED	APPROVED
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.		R.H.	R.L.	O.O.

REVISIONS

REFERENCE DRAWINGS

[redacted]

BC Hydro

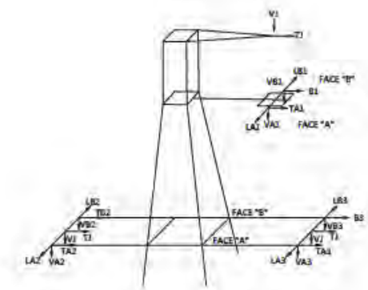
SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
LOADING APPLICATION TABLE
SHEET 3 OF 4

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00020-003 | SIZE: D | R: 1

TOWER LOAD APPLICATION TABLE

CASE	DESCRIPTION	LOAD CASE NO. LONGITUDINAL DIRECTION WIND	LOAD CASE NO. 45° DIRECTION WIND	UNFACTORED DESIGN LOAD OF FACE A (kN) – TOP CONDUCTOR PHASE VA1	TA1	LA1	LEFT CONDUCTOR PHASE VA2	TA2	LA2	RIGHT CONDUCTOR PHASE VA3	TA3	LA3	UNFACTORED DESIGN LOAD OF FACE B (kN) – TOP CONDUCTOR PHASE VB1	TB1	LB1	LEFT CONDUCTOR PHASE VB2	TB2	LB2	RIGHT CONDUCTOR PHASE VB3	TB3	LB3	STRENGTH FACTOR
9	UNBALANCED ICE 1/50, 100% + BARE, L.A. = 45°, WIND ON TOWER = 330 Pa, LONG. OR AT 45° TO IT	9A	90A	94.0	70.8	165.0	51.0	44.0	99.0	51.0	44.0	99.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9B	90B	51.0	44.0	99.0	94.0	70.8	165.0	51.0	44.0	99.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9C	90C	51.0	44.0	99.0	51.0	44.0	99.0	94.0	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9D	90D	94.0	70.8	165.0	94.0	70.8	165.0	51.0	44.0	99.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9E	90E	94.0	70.8	165.0	51.0	44.0	99.0	94.0	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9F	90F	51.0	44.0	99.0	94.0	70.8	165.0	94.0	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9G	90G	94.0	70.8	165.0	94.0	70.8	165.0	94.0	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9H	90H	51.0	44.0	99.0	51.0	44.0	99.0	51.0	44.0	99.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
		9J	90J	94.0	70.8	165.0	51.0	44.0	99.0	51.0	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9K	90K	51.0	44.0	99.0	94.0	70.8	165.0	51.0	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9L	90L	51.0	44.0	99.0	51.0	44.0	99.0	94.0	70.8	165.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9M	90M	94.0	70.8	165.0	94.0	70.8	165.0	51.0	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9N	90N	94.0	70.8	165.0	51.0	44.0	99.0	94.0	70.8	165.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9P	90P	51.0	44.0	99.0	94.0	70.8	165.0	94.0	70.8	165.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9Q	90Q	94.0	70.8	165.0	94.0	70.8	165.0	94.0	70.8	165.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9R	90R	51.0	44.0	99.0	51.0	44.0	99.0	51.0	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9S	90S	94.0	70.8	165.0	51.0	44.0	99.0	51.0	44.0	99.0	65.0 / -19.4	70.8	165.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	0.67
		9T	90T	51.0	44.0	99.0	94.0	70.8	165.0	51.0	44.0	99.0	37.0 / -19.4	44.0	99.0	65.0 / -19.4	70.8	165.0	37.0 / -19.4	44.0	99.0	0.67
		9W	90W	51.0	44.0	99.0	51.0	44.0	99.0	94.0	70.8	165.0	37.0 / -19.4	44.0	99.0	37.0 / -19.4	44.0	99.0	65.0 / -19.4	70.8	165.0	0.67
		9X	90X	94.0	70.8	165.0	94.0	70.8	165.0	51.0	44.0	99.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	37.0 / -19.4	44.0	99.0	0.67
		9Y	90Y	94.0	70.8	165.0	51.0	44.0	99.0	94.0	70.8	165.0	65.0 / -19.4	70.8	165.0	37.0 / -19.4	44.0	99.0	65.0 / -19.4	70.8	165.0	0.67
		9Z	90Z	51.0	44.0	99.0	94.0	70.8	165.0	94.0	70.8	165.0	37.0 / -19.4	44.0	99.0	65.0 / -19.4	70.8	165.0	65.0 / -19.4	70.8	165.0	0.67
11	UNEQUAL ICE 1/200 ICE AND WIND, 70% AND 28%, L.A. = 45°, WIND ON TOWER = 300 Pa LONG. OR AT 45° TO IT	11A	110A	96.8	72.8	170.0	65.0	54.0	124.0	65.0	54.0	124.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11B	110B	65.0	54.0	124.0	96.8	72.8	170.0	65.0	54.0	124.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11C	110C	65.0	54.0	124.0	65.0	54.0	124.0	96.8	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11D	110D	96.8	72.8	170.0	96.8	72.8	170.0	65.0	54.0	124.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11E	110E	96.8	72.8	170.0	65.0	54.0	124.0	96.8	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11F	110F	65.0	54.0	124.0	96.8	72.8	170.0	96.8	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11G	110G	96.8	72.8	170.0	96.8	72.8	170.0	96.8	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11H	110H	65.0	54.0	124.0	65.0	54.0	124.0	65.0	54.0	124.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67
		11J	110J	96.8	72.8	170.0	65.0	54.0	124.0	65.0	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11K	110K	65.0	54.0	124.0	96.8	72.8	170.0	65.0	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11L	110L	65.0	54.0	124.0	65.0	54.0	124.0	96.8	72.8	170.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11M	110M	96.8	72.8	170.0	96.8	72.8	170.0	65.0	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11N	110N	96.8	72.8	170.0	65.0	54.0	124.0	96.8	72.8	170.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11P	110P	65.0	54.0	124.0	96.8	72.8	170.0	96.8	72.8	170.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11Q	110Q	96.8	72.8	170.0	96.8	72.8	170.0	96.8	72.8	170.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11R	110R	65.0	54.0	124.0	65.0	54.0	124.0	65.0	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11S	110S	96.8	72.8	170.0	65.0	54.0	124.0	65.0	54.0	124.0	67.3 / -41.36	72.8	170.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	0.67
		11T	110T	65.0	54.0	124.0	96.8	72.8	170.0	65.0	54.0	124.0	47.0 / -25.13	54.0	124.0	67.3 / -41.36	72.8	170.0	47.0 / -25.13	54.0	124.0	0.67
		11W	110W	65.0	54.0	124.0	65.0	54.0	124.0	96.8	72.8	170.0	47.0 / -25.13	54.0	124.0	47.0 / -25.13	54.0	124.0	67.3 / -41.36	72.8	170.0	0.67
		11X	110X	96.8	72.8	170.0	96.8	72.8	170.0	65.0	54.0	124.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	47.0 / -25.13	54.0	124.0	0.67
		11Y	110Y	96.8	72.8	170.0	65.0	54.0	124.0	96.8	72.8	170.0	67.3 / -41.36	72.8	170.0	47.0 / -25.13	54.0	124.0	67.3 / -41.36	72.8	170.0	0.67
		11Z	110Z	65.0	54.0	124.0	96.8	72.8	170.0	96.8	72.8	170.0	47.0 / -25.13	54.0	124.0	67.3 / -41.36	72.8	170.0	67.3 / -41.36	72.8	170.0	0.67



KEY LOAD MARK

NOTES:

1. ALL LOADS ARE IN "kN" EXCEPT AS OTHERWISE NOTED.
2. LOAD APPLICATION
   a. THE POSITION OF FACE A AND FACE B ARE REVERSIBLE.
   b. TRANSVERSE LOADS SHOWN IN LOAD TABLE ARE REVERSIBLE.
   c. LONGITUDINAL LOADS SHOWN IN LOAD TABLE ARE REVERSIBLE.
   d. ALL ACCESSIBLE MEMBERS WITH INCLINATION ANGLE LESS THAN OR EQUAL TO 30° WITH THE HORIZONTAL SHALL BE CAPABLE OF SUPPORTING, WITHOUT PERMANENT DEFORMATIONS, CLIMBING LOAD AS SPECIFIED IN ASCE STANDARD ASCE/SEI 10-97.
   e. FOR ALL LOAD CASES, THE COMBINATION OF LOADS SHALL INCLUDE A VERTICAL LOAD OF 6.5 kN (VJ) AND A TRANSVERSE LOAD OF 4.3 kN (TJ) APPLIED AT THE JUMPER SUPPORT POINTS.
   f. THE OUTSTANDING LEG OF ALL STEEL ANGLES ON THE TOP PLANE OF THE JUMPER ARM SHALL FACE DOWNWARDS. THE JUMPER ARM MAIN TOP CHORD MEMBERS SHALL BE CAPABLE OF SUPPORTING A VERTICAL LOAD OF 4.45 kN CONCENTRATED AT THE CENTRE OF THE UNSUPPORTED LENGTH OF THE MEMBER IN COMBINATION WITH THE AXIAL MEMBER FORCE DERIVED FROM STRUCTURAL ANALYSIS WITHOUT PERMANENT DEFORMATION.
3. V1-V3, T1-T3 AND L1-L3 DENOTE THE VERTICAL, TRANSVERSE AND LONGITUDINAL LOADS AS SHOWN IN "KEY LOAD MARK".
4. UNLESS OTHERWISE NOTED, REFER TO SPECIFICATION DRAWING NO. 5L005-T08-00019.

[redacted]

NO	REMARKS	DATE	DESIGNED	DRAWN CHK	DES	DES CHK	SUPV	REV	APPROVED
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.		R.H.	R.L.	O.O.

REFERENCE DRAWINGS — DRAWING NUMBER | TITLE

REVISIONS

REVISIONS

[redacted]

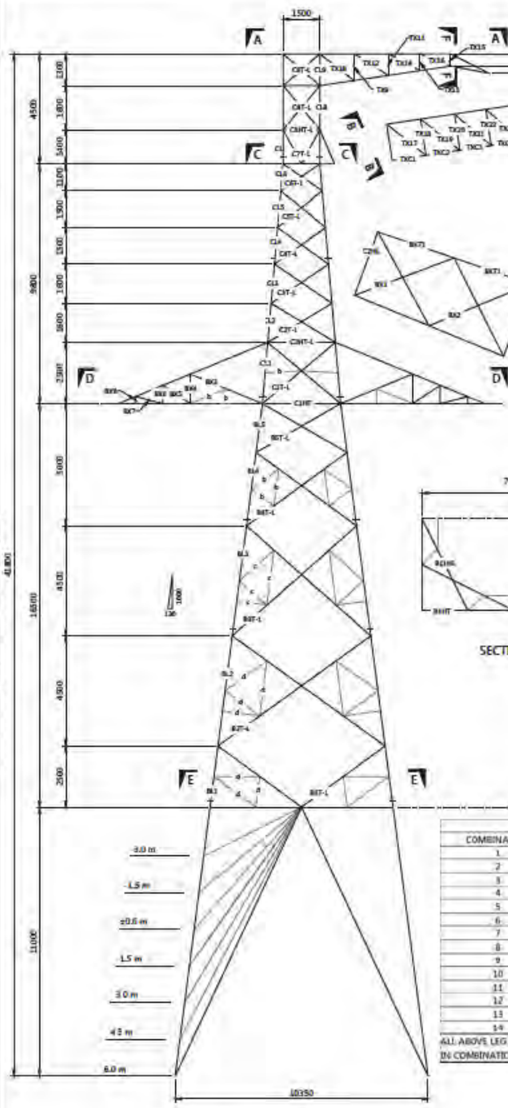
BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

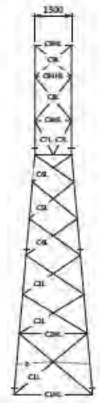
TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
LOADING APPLICATION TABLE
SHEET 4 OF 4

DATE: SEPTEMBER 2016

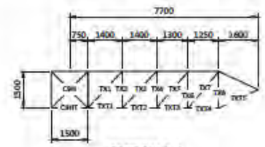
DWG NO: 5L005-T08-00020-004 | SIZE: D | 1



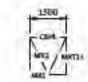
TRANSVERSE FACE



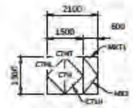
LONGITUDINAL FACE



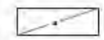
SECTION A-A



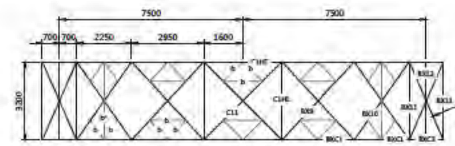
SECTION B-B



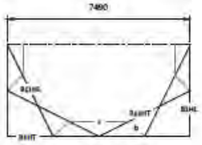
SECTION C-C



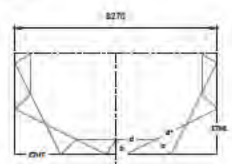
SECTION F-F



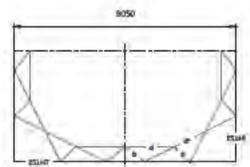
SECTION D-D



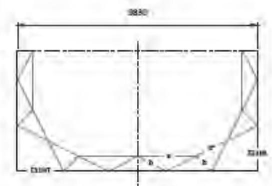
SECTION E-E



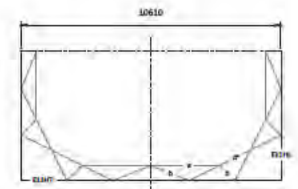
SECTION E1-E1



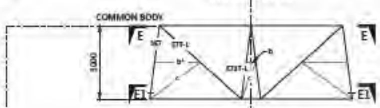
SECTION E2-E2



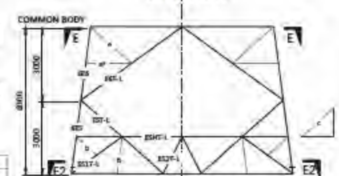
SECTION E3-E3



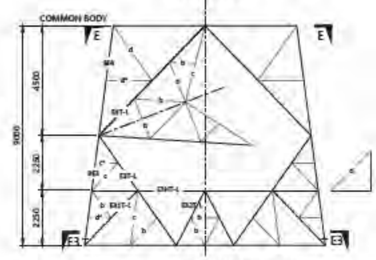
SECTION E4-E4



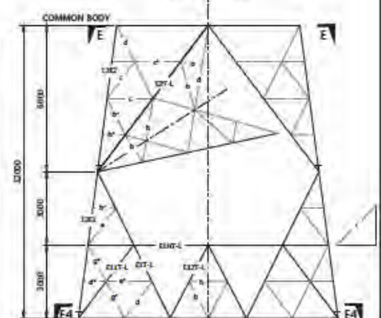
3m BODY EXTENSION



6m BODY EXTENSION



9m BODY EXTENSION



12m BODY EXTENSION

COMBINATION	LEG A	LEG B	LEG C	LEG D
1	-3.0m	3.0m	3.0m	-3.0m
2	+6.0m	+6.0m	+6.0m	+6.0m
3	+1.5m	+1.5m	3.0m	-3.0m
4	-3.0m	+1.5m	+1.5m	-3.0m
5	+1.5m	+1.5m	+1.5m	3.0m
6	-3.0m	-3.0m	+1.5m	+1.5m
7	+1.5m	3.0m	3.0m	+1.5m
8	+1.5m	3.0m	+1.5m	+1.5m
9	+6.0m	+6.0m	+1.5m	+1.5m
10	+1.5m	+6.0m	+6.0m	+1.5m
11	+6.0m	+6.0m	+6.0m	+1.5m
12	+1.5m	+1.5m	+6.0m	+6.0m
13	+6.0m	+1.5m	+1.5m	+6.0m
14	+6.0m	+1.5m	+6.0m	+6.0m

ALL ABOVE LEG COMBINATIONS WERE CHECKED IN COMBINATION WITH DIFFERENT BODY EXTENSIONS

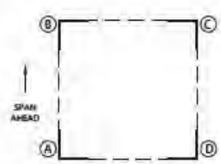
REDUNDANT MEMBER		
MEMBER	SECTION	No. BOLTS
a	L 2X2X0.125	1
b	L 2X2X0.1875	1
c	L 2.5X2.5X0.1875	1
d	L 3X3X0.1875	1
e	L 3X3X0.25	1
f	L 3X3X0.375	1
g	L 3X3X0.4375	1

MARK "+" : 2-3/4"Ø BOLT

MARK ( )' : SEE NOTE 7 FOR DETAILS

NOTES:

1. ALL STEEL ANGLE, PLATE AND MISCELLANEOUS MEMBERS SHALL CONFORM TO CSA G40.20/G40.21 STRUCTURAL GRADE 350W MINIMUM.
2. BOLTS SHALL BE 3/4" CONFORMING TO ASTM A394 TYPE 1 WITH REGULAR HEXAGONAL NUT (ASTM A563-07A) AND HEAVY SPRING LOCK WASHER TO CSA B18.2.
3. ALL STEEL AND BOLTS SHALL CONFORM TO THE IMPACT REQUIREMENT OF A MINIMUM AVERAGE ENERGY OF 20J AT -20°C.
4. ALL EXPOSED STEEL AND HARDWARE SHALL BE HOT DIPPED GALVANIZED PER CSA STANDARD G164 AFTER FABRICATION.
5. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL FORCES ARE IN kN. MINUS SIGN DENOTES COMPRESSION AND POSITIVE SIGN DENOTES TENSION.
6. SEE DRAWING NO. 5L005-T08-00021-002 FOR LEG EXTENSION AND MEMBER GROUP TABLE.
7. REDUNDANT MEMBERS WITH MARK ( )' SHALL MEET THE MINIMUM THICKNESS REQUIREMENT AS PER DRAWING NO. 5L005-T08-00006 NOTE 2.



TOWER CROSS SECTION

[redacted]

NO	REMARKS	DATE	REVISED	RESP CHK	STFD	SPEC CHK	SUPV	REV	APPT
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.		R.H.	R.L.	O.O.

REVISIONS

REFERENCE DRAWINGS

[redacted]

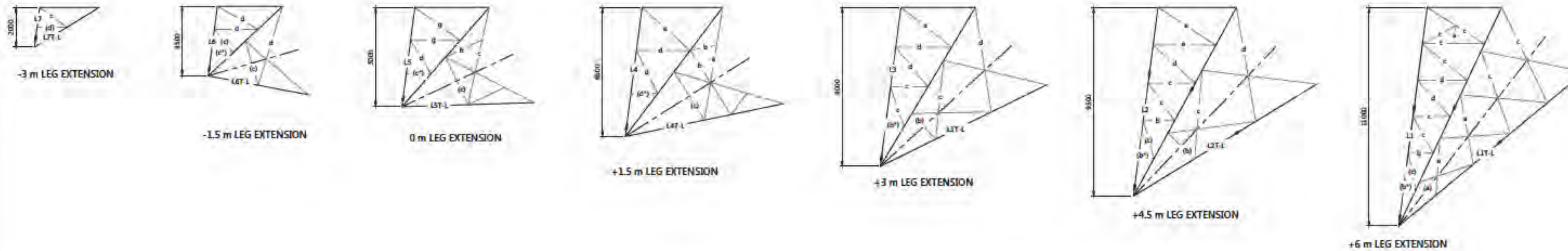
[redacted]

BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
DESIGN OUTLINE DRAWING
SHEET 1 OF 2

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00021-001 | SIZE: D | R: 1



Group Label	Angle Size	Max Comp. Force (kN)	Max Comp. Control Load Case	Max Tension Force (kN)	Max Tension Control Load Case	BOLTS No.	BOLTS Removed Holes
12B1	8X8X0.875	-1677.70	20G-NA+	1401.80	2Y-2-NA+	12	1.46
12B2	8X8X0.75	-1496.08	20G-NA+	1202.08	2Y-2-NA+	12	1.46
4B3	8X8X0.875	-1593.09	20G-NA+	1404.11	2Y-2-NA+	12	1.46
4B4	8X8X0.875	-1513.37	20G-NA+	1250.00	2Y-2-NA+	12	1.46
4B5	8X8X0.875	-1666.92	20G-NA+	1383.73	2Y-2-NA+	12	1.46
6B5	8X8X0.875	-1538.21	20G-NA+	1273.93	2Y-2-NA+	12	1.46
8B7	8X8X0.75	-1571.83	20G-NA+	1306.70	2Y-2-NA+	12	1.46
B1HL	4X4X0.25	-118.87	6N-2-NA+	143.07	60AC-1-NA+	1	1
B1HT	4X4X0.25	-126.01	2J-2-NA+	157.34	20AB-2-NA+	1	1
B1L	5X5X0.3125	-133.48	20AC-1-NA+	148.23	20B-2-NA	1	1
B1T	5X5X0.3125	-173.09	2AB-2-NA+	143.53	2J-2-NA+	1	1
B1XHT	2.5X2.5X0.25	-22.24	48P-1-NA+	10.33	4AP-1-NA+	2	1
B2L	5X5X0.375	-162.80	20B-2-NA	152.69	20E-2-NA	1	1
B2T	5X5X0.375	-168.21	6AB-2-NA+	178.57	2AB-2-NA+	1	1
B3L	6X6X0.375	-198.39	10E-NA+	217.40	20E-2-NA	1	1
B3T	6X6X0.375	-260.86	2AB-2-NA+	211.70	2J-2-NA+	1	1
B4L	5X5X0.5	-228.55	20E-2-NA+	212.25	20E-2-NA	1	1
B4T	5X5X0.5	-222.91	6AB-2-NA+	166.87	2AB-2-NA+	1	1
B5L	5X5X0.5	-330.28	30W-2-NA	245.24	2Y-2-NA+	4	1.52
B5T	5X5X0.5	-302.01	2AB-2-NA+	235.97	2J-2-NA+	4	1.52
BL1	8X8X0.75	-1562.92	20G-NA+	1304.17	2Y-2-NA+	12	3.46
BL2	8X8X0.75	-1450.91	20G-NA+	1199.48	2Y-2-NA+	10	3.80
BL3	8X8X0.625	-1292.60	20G-NA+	963.45	2Y-2-NA+	15	2.29
BL4	6X6X0.75	-1066.75	20AB-1-NA+	781.77	2Y-2-NA+	6	2.27
BL5	6X6X0.75	-481.15	20AB-1-NA+	615.24	20AA-2-NA+	6	1
BX1	4X4X0.3125	-153.02	10G-NA+	141.74	10G-NA+	1	1
BX2	4X4X0.3125	-109.63	10G-NA+	96.10	10G-NA+	1	1
BX3	3X3X0.1875	-26.78	2AD-1-NA+	4.51	10C-NA+	2	1
BX4	3X3X0.1875	-13.45	2AD-1-NA+	7.64	3N-2-NA+	1	1
BX5	2.5X2.5X0.1875	-12.09	7W-2-STRING	4.01	2K-2-NA+	1	1
BX6	2.5X2.5X0.1875	-4.27	20A-2-NA+	14.09	7Q	1	1
BX7	4X4X0.375	-84.85	7OB	27.24	2K-2-NA+	1	1
BX8	3.5X3.5X0.25	-10.68	2R-2-NA+	28.06	7B	1	1
BX9	4X4X0.375	-140.65	10R-2-NA	141.50	20L-2-NA	1	1
BX10	4X4X0.375	-119.09	1S-2-NA+	118.60	1R-2-NA+	1	1
BX11	3.5X3.5X0.25	8.05	8OC	12.11	1AB-1-NA+	1	1
BX12	6X6X0.375	-84.13	8R-STRING	118.13	1AA-2-NA	1	1
BX14	2.5X2.5X0.25	-74.38	1P-2-NA+	41.08	1S-2-NA	1	1
BXC1	6X6X0.5	-516.40	20B-NA+	213.13	10E-2-NA	8	1.80
BXC2	6X6X0.5	-412.12	7W-1	154.78	2W-2-NA+	8	0
BXT2	6X6X0.5	-200.15	10Y-2-NA	404.90	7Q-1	8	1.82
C1HL	3.5X3.5X0.3125	-43.70	6N-2-NA+	42.22	3P-1-NA+	1	1
C1HT	6X6X0.5	-408.33	10F-NA+	315.73	10R-2-NA+	8	1.80
C1L	5X5X0.5	-178.04	20E-NA+	146.28	20AB-1-NA+	8	1
C1T	5X5X0.5	-368.30	3P-1-NA+	316.24	10E-NA+	8	1
C1I	4X4X0.3125	-148.50	2AD-1-NA+	126.64	2M-2-NA+	1	1
C2HL	3.5X3.5X0.25	-49.28	6N-2-NA+	61.31	2M-1-NA+	1	1

Group Label	Angle Size	Max Comp. Force (kN)	Max Comp. Control Load Case	Max Tension Force (kN)	Max Tension Control Load Case	BOLTS No.	BOLTS Removed Holes
C2HT	5X5X0.375	-141.87	10H-2-NA+	151.96	10AE-1-NA+	1	5.71
C2L	3X3X0.25	-47.87	20T-1-NA	45.48	20T-2-NA	1	1
C2T	3X3X0.25	-40.29	60H-2-NA+	46.96	8M-1-NA+	1	1
C3L	3X3X0.25	-54.22	20T-1-NA	54.57	20T-1-NA	1	1
C3T	3X3X0.25	-50.72	6N-1-NA+	43.33	60H-2-NA+	1	1
C4L	3X3X0.1875	-61.50	20T-2-NA	61.21	20T-2-NA	1	1
C4T	3X3X0.1875	-50.80	6AC-2-NA+	63.87	6M-1-NA+	1	1
C5L	3X3X0.25	-74.84	20T-2-NA+	74.85	20T-2-NA+	1	1
C5T	3X3X0.25	-83.21	6AC-2-NA+	41.08	6AC-2-NA+	1	1
C6L	3X3X0.25	-78.37	20T-2-NA+	78.32	20T-2-NA+	1	1
C6T	3X3X0.25	-65.06	6AC-2-NA+	45.82	60AD-2-NA+	2	1
C7H	3.5X3.5X0.375	-64.06	50A	222.74	50Z-2-NA+	4	2
C7HL	3X3X0.1875	-67.67	20AB-2-NA	69.65	20T-2-NA+	1	1
C7HT	6X6X0.5	61.03	7E-STRING	58.90	60AD-2-NA+	4	2
C7L	3X3X0.3125	-11.83	70D-STRING	12.46	70D-STRING	1	1
C7T	3.5X3.5X0.3125	68.36	7R-1-STRING	108.06	7D	1	1
C71H	3X3X0.25	-96.10	2AB-2-NA+	96.23	2AB-2-NA+	1	1
C8HL	2.5X2.5X0.1875	-2.11	3J-1-NA+	1.81	3D-2-NA+	1	1
C8HT	3X3X0.1875	-43.99	7K-2	34.50	70B-1-STRING	1	1
C8L	2X2X0.1875	-11.92	7S-2-STRING	11.51	7S-2-STRING	1	1
C8T	2X2X0.1875	-10.34	10AD-2-NA	9.90	70S-2-STRING	1	1
C9H	2X2X0.1875	-5.73	7S-2-STRING	10.71	7S-2-STRING	1	1
C9HL	2X2X0.1875	-2.16	3D-2-NA+	0	0	1	1
C9HT	3X3X0.1875	0	0	53.13	40W-2-NA+	1	1
C9L	2X2X0.1875	-9.06	7S-2-STRING	7.74	7S-2-STRING	1	1
C9T	2X2X0.1875	31.46	70S-2-STRING	31.43	70S-2-STRING	1	1
C91HL	2X2X0.1875	-1.94	3N-1-NA+	1.55	4Q-2-NA+	1	1
C91HT	3X3X0.1875	12.99	4Q-2-NA	0	0	1	1
CL1	5X5X0.5	-379.63	20AB-1-NA+	401.34	60M-2-NA+	4	1
CL2	5X5X0.5	-515.20	20AA-2-NA+	439.16	20AD-2-NA+	4	0
CL3	5X5X0.5	-442.85	20AA-2-NA+	382.30	20AD-2-NA+	4	0
CL4	5X5X0.375	-364.66	20AA-2-NA+	258.04	20AD-2-NA+	1	2
CL5	5X5X0.375	-303.21	70E-STRING	201.80	20AD-2-NA+	1	2
CL6	5X5X0.375	-236.87	70R-1-STRING	109.03	70E-STRING	1	2
CL7	4X4X0.375	-234.53	70R-1-STRING	92.38	70S-1-STRING	1	2
CL8	4X4X0.375	-56.05	7S-2-STRING	51.83	70S-2-STRING	4	0
CL9	4X4X0.375	-20.81	7S-2-STRING	18.78	7S-2-STRING	1	2
E1HL	5X5X0.5	-167.41	6M-2-NA+	184.74	20AC-1-NA+	1	1
E1HT	5X5X0.5	-160.90	2J-2-NA+	214.29	2AB-2-NA+	1	1
E1L	4X4X0.375	-149.59	60AC-1-NA+	156.85	20M-2-NA	1	1
E1T	4X4X0.375	-172.71	2AB-2-NA+	154.79	2J-2-NA+	1	1
E11HL	5X5X0.25	-171.44	6F-1-NA+	116.28	6F-2-NA+	4	2
E11HT	5X5X0.25	-178.74	10G-NA+	120.99	10F-2-NA	4	2
E11L	5X5X0.375	-132.25	2AB-1-NA+	102.57	2AA-2-NA+	1	1
E11T	5X5X0.375	-135.33	20AA-2-NA+	114.65	2AB-2-NA+	1	1
E12L	5X5X0.375	-282.11	20B-2-NA	229.11	10I-2-NA	4	1
E12T	5X5X0.375	-266.18	4A5-2-NA+	263.82	4A5-2-NA+	4	1

Group Label	Angle Size	Max Comp. Force (kN)	Max Comp. Control Load Case	Max Tension Force (kN)	Max Tension Control Load Case	BOLTS No.	BOLTS Removed Holes
E2L	4X4X0.5	201.61	10E-NA+	214.44	20E-1-NA	1	1
E2T	6X6X0.5	-250.08	2AB-2-NA+	211.88	2J-2-NA+	1	1
E3HL	5X5X0.375	-149.34	20M-2-NA	160.41	20AC-1-NA+	4	1
E3HT	5X5X0.375	-153.27	2J-2-NA+	191.25	2AB-2-NA+	1	1
E3L	4X4X0.25	-141.96	6AB-2-NA+	181.95	20M-2-NA	1	1
E3T	4X4X0.25	-146.02	2AB-2-NA+	132.23	2J-2-NA+	1	1
E31HL	3.5X3.5X0.3125	-87.33	6F-1-NA+	98.22	6M-2-NA+	4	2
E31HT	3.5X3.5X0.3125	-192.87	10G-NA+	103.88	10F-2-NA	4	2
E31L	3.5X3.5X0.3125	-102.32	20M-2-NA	109.51	20AC-1-NA+	1	1
E31T	3.5X3.5X0.3125	-103.18	2J-2-NA+	131.74	2AB-2-NA+	1	1
E32L	5X5X0.3125	-229.95	10J-2-NA	226.80	10J-2-NA	4	0.90
E32T	5X5X0.3125	-257.47	6AB-2-NA+	256.59	6AB-2-NA+	4	0.90
E4L	4X4X0.375	-161.87	10J-2-NA	179.70	20E-2-NA+	1	1
E4T	4X4X0.375	-188.28	6AB-2-NA+	158.67	6AB-2-NA+	1	1
E5HL	5X5X0.3125	-150.58	20M-2-NA	166.47	20AC-1-NA+	4	2
E5HT	5X5X0.3125	-155.89	2J-2-NA+	197.28	2AB-2-NA+	4	2
E5L	4X4X0.3125	-111.95	20AC-1-NA+	120.37	20M-2-NA	1	1
E5T	4X4X0.3125	-130.49	2AB-2-NA+	118.11	2J-2-NA+	1	1
E51HL	4X4X0.375	-152.38	6F-1-NA+	53.79	20M-2-NA	1	1
E51HT	4X4X0.375	-157.14	10G-NA+	62.28	2J-2-NA+	1	1
E51L	2.5X2.5X0.25	-75.26	20M-2-NA	76.60	20AC-1-NA+	1	1
E51T	2.5X2.5X0.25	-74.68	2J-2-NA+	92.00	2AB-2-NA+	1	1
E52L	5X5X0.375	-329.86	10J-2-NA	228.13	10J-2-NA	4	1
E52T	5X5X0.375	-354.60	6AB-2-NA+	254.49	6AB-2-NA+	4	1
E6L	5X5X0.3125	-190.21	20E-2-NA	131.64	20E-2-NA	1	1
E6T	5X5X0.3125	-153.60	6AB-2-NA+	134.24	6AB-2-NA+	1	1
E7HL	5X5X0.25*	-161.57	6F-1-NA+	122.74	6M-2-NA+	4	0
E7HT	5X5X0.25*	-168.50	10G-NA+	124.60	10F-2-NA	1	0
E7L	5X5X0.3125	-173.23	60AC-1-NA+	168.88	6M-2-NA+	1	1
E7T	5X5X0.3125	-192.01	20AB-2-NA+	153.67	2J-2-NA+	1	1
E71L	5X5X0.375	-212.98	10J-2-NA	181.89	20E-2-NA+	4	1
E71T	5X5X0.375	-276.91	2AB-2-NA+	204.82	2AA-1-NA+	4	1
L1	8X8X0.875	-1488.55	20G-NA+	1152.70	2Y-2-NA+	8	4
L1L	6X6X0.375	-290.02	20AC-1-NA+	286.16	20E-2-NA	4	1.14
L1T	6X6X0.375	-359.05	2AB-2-NA+	297.14	2J-2-NA+	4	1
L2	8X8X0.875	-1499.59	20G-NA+	1161.44	2Y-2-NA+	8	4
L2L	6X6X0.375	-246.66	20AC-1-NA+	245.78	20B-2-NA	4	2
L2T	6X6X0.375	-366.78	2AB-2-NA+	251.44	2J-2-NA+	4	2
L3	8X8X0.875	-1516.93	20G-NA+	1201.69	2Y-2-NA+	8	4
L3L	5X5X0.375	-235.18	20AC-1-NA+	229.76	20B-2-NA	4	1
L3T	5X5X0.375	-289.49	2AB-2-NA+	238.22	2J-2-NA+	4	1
L4	8X8X0.875	-1600.79	20G-NA+	1296.61	2Y-2-NA+	8	4
L4L	6X6X0.375	-234.74	20AC-1-NA+	252.97	20B-2-NA	4	1
L4T	6X6X0.375	-312.98	2AB-2-NA+	260.61	2J-2-NA+	4	1
L5	8X8X0.875	-1566.47	20G-NA+	1270.13	2Y-2-NA+	13	3.46
L5L	6X6X0.375	-196.25	20AC-1-NA+	184.07	20B-2-NA	4	1
L5T	6X6X0.375	-237.80	2AB-2-NA+	189.63	2J-2-NA+	4	1

Group Label	Angle Size	Max Comp. Force (kN)	Max Comp. Control Load Case	Max Tension Force (kN)	Max Tension Control Load Case	BOLTS No.	BOLTS Removed Holes
L6	10X10X0.875	-1588.05	20G-NA+	1289.89	2Y-2-NA+	0	4
L6L	5X5X0.375	-187.80	20AC-1-NA+	155.19	20M-2-NA	4	1
L6T	5X5X0.375	-203.29	2AB-2-NA+	159.28	2J-2-NA+	4	1
L7	8X8X0.875	-1702.66	20G-NA+	1411.52	2Y-2-NA+	12	4
L7L	6X6X0.375	-182.68	20AC-1-NA+	183.47	20M-2-NA	3	1
L7T	6X6X0.375	-223.91	2AB-2-NA+	181.48	2J-2-NA+	3	1
MX1	3.5X3.5X0.3125	-109.79	80A-STRING	99.21	70F-STRING	3	1
MX2	3X3X0.25	-23.76	7E-STRING	24.30	7E-STRING	3	1
MX3	3.5X3.5X0.3125	-60.69	7W-2-STRING	68.47	7W-2-STRING	4	1
MXT1	2.5X2.5X0.25	-55.38	80A-STRING	51.36	7P-2-STRING	4	2
MXT11	4X4X0.375	-17.62	7Q-2-STRING	194.81	7N-1-STRING	4	1
TX1	2.5X2.5X0.1875	-2.50	40W-1-NA+	2.31	30T-2-NA	1	1
TX2	2X2X0.1875	-1.47	30T-2-NA	1.61	40W-1-NA+	1	1
TX3	2.5X2.5X0.1875	-1.91	40W-1-NA+	1.72	30T-2-NA	1	1
TX4	2X2X0.1875	-1.04	30T-2-NA	1.18	40W-1-NA+	1	1
TX5	2X2X0.1875	-1.28	40W-1-NA+	1.19	30T-2-NA	1	1
TX6	2X2X0.1875	-0.60	30T-2-NA	0.75	40W-1-NA+	1	1
TX7	2X2X0.1875	-0.70	40W-1-NA+	0.71	7S-2-STRING	1	1
TX8	2X2X0.1875	-5.52	30AC-1-NA	0	0	1	1
TX9	2X2X0.1875	-2.24	40W-1-NA+	0	0	1	1
TX10	2X2X0.1875	0	0	3.51	40W-1-NA+	1	1
TX11	2X2X0.1875	-2.36	40W-1-NA+	0	0	1	1
TX12	2X2X0.1875	0	0	3.94	40W-1-NA+	1	1
TX13	2X2X0.1875	-2.48	40W-1-NA+	0	0	1	1
TX14	2X2X0.1875	0	0	4.54	40W-1-NA+	1	1
TX15	2.5X2.5X0.1875	-5.90	30AC-1-NA	0	0	1	1
TX16	2.5X2.5X0.1875	0	0	6.08	40W-1-NA+	1	1
TX17	2.5X2.5X0.1875	-2.92	40W-1-NA	2.42	40AA-2-NA+	1	1
TX18	2X2X0.1875	-1.64	40AA-2-NA+	1.91	40W-1-NA	1	1
TX19	2.5X2.5X0.1875	-2.33	40W-1-NA	2.23	40AA-2-NA+	1	1
TX20	2X2X0.1875	-1.30	40AA-2-NA+	1.48	40W-1-NA	1	1
TX21	2X2X0.1875	-1.88	40W-1-NA	1.37	40AA-2-NA+	1	1
TX22	2X2X0.1875	-0.97	40AA-2-NA+	1.05	40W-1-NA	1	1
TX23	2X2X0.1875	-1.04	40W-1-NA	0.88	40AA-2-NA+	1	1
TX24	2X2X0.1875	0	0	4.63	30T-1-NA	1	1
TXC1	2.5X2.5X0.1875	-29.31	40AA-2-NA+	0	0	2	1
TXC2	2.5X2.5X0.1875	-24.75	40AA-2-NA+	0	0	0	0
TXC3	2.5X2.5X0.1875	-20.05	40AA-2-NA+	0	0	0	0
TXC4	2.5X2.5X0.1875	-15.20	40AA-2-NA+	0	0	2	1
TXC5	2.5X2.5X0.1875	-10.54	3AB-2-NA	0	0	2	1
TXT1	3X3X0.1875	0	0	28.59	40W-2-NA+	0	1
TXT2	3X3X0.1875	0	0	23.30	40W-2-NA+	0	0
TXT3	3X3X0.1875	0	0	18.13	40W-1-NA+	0	0
TXT4	3X3X0.1875	0	0	11.61	30B-NA+	1	1
TXT5	3X3X0.1875	0	0	13.72	30AC-1-NA	2	1

NOTE: THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE NOTES ON DRAWING 5L005-T08-00021-001

[redacted]

DRAWING NUMBER	TITLE	NO	REVISIONS	DATE	DESIGNED	NO	REVISIONS	DATE	DESIGNED				
REFERENCE DRAWINGS						1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.	R.H. R.L.	D.O.

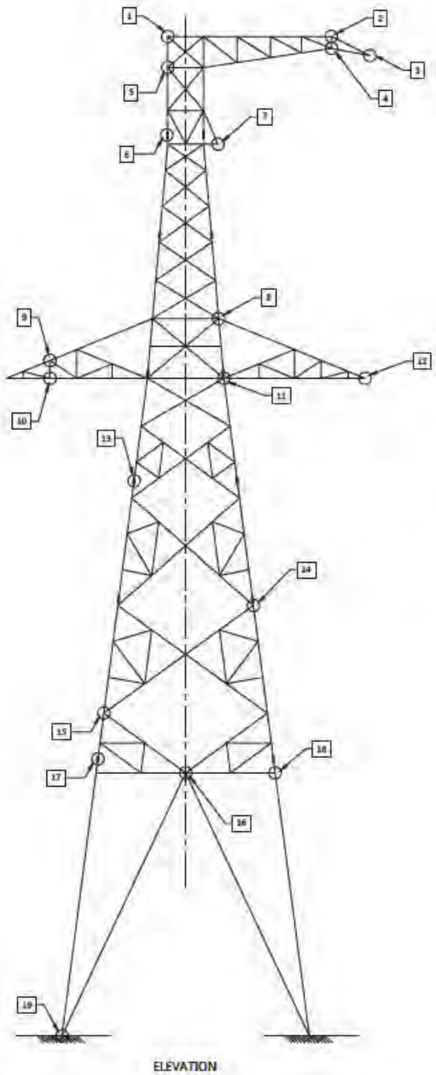
[redacted]

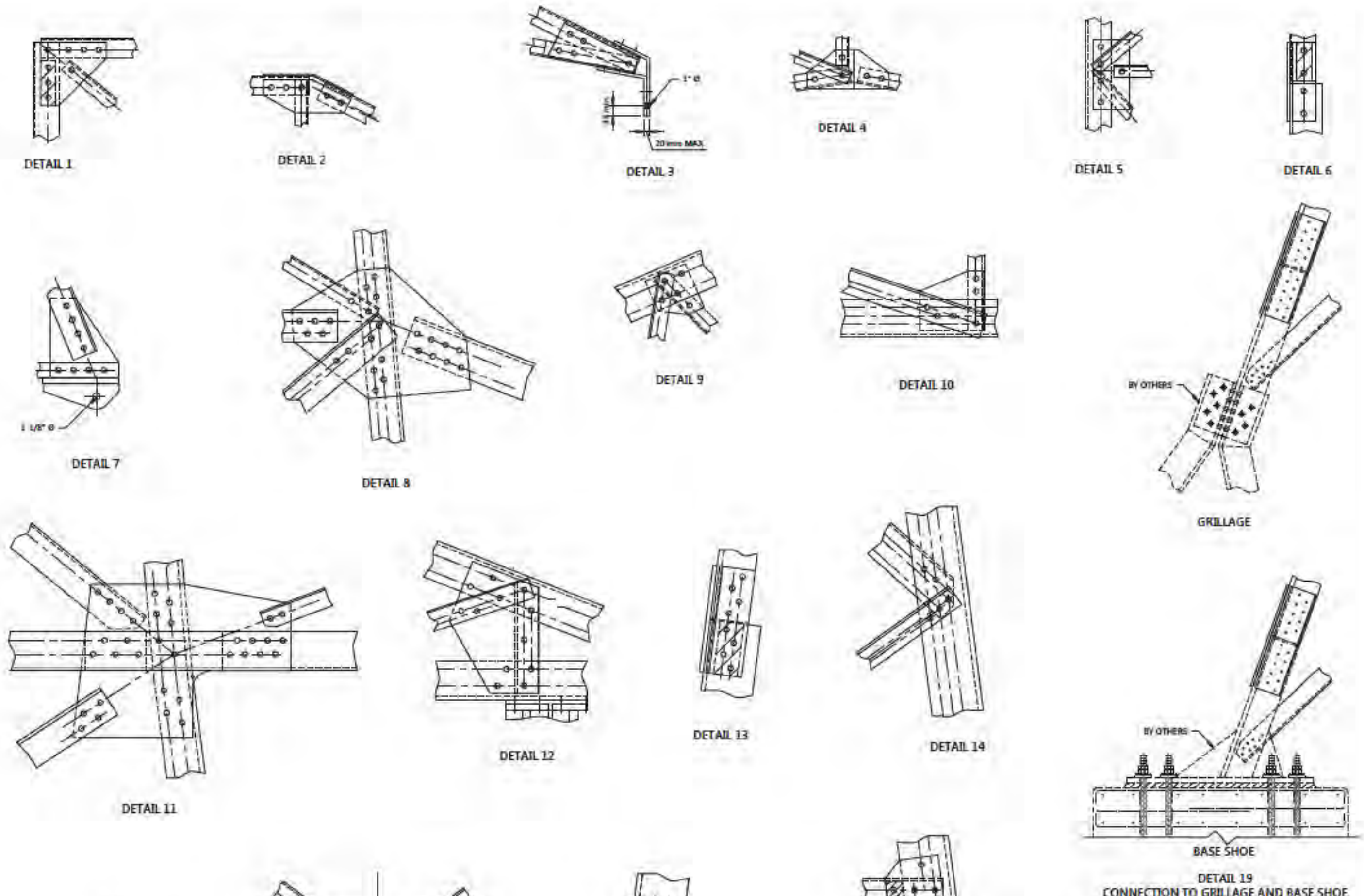
BC Hydro

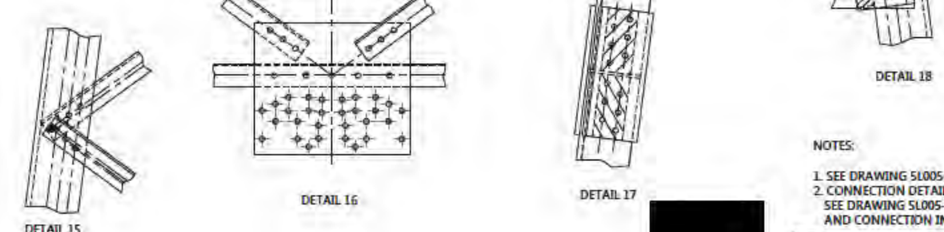
SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
DESIGN OUTLINE DRAWING
SHEET 2 OF 2

DATE: SEPTEMBER 2016 | DWG NO: 5L005-T08-00021-002 | SIZE: D | 1







NOTES:

1. SEE DRAWING 5L005-T08-00019 FOR TOWER SPECIFICATIONS.
2. CONNECTION DETAILS ARE FOR REFERENCE PURPOSE ONLY. SEE DRAWING 5L005-T08-00021-002 FOR FINAL MEMBER SIZES AND CONNECTION INFORMATION.

[redacted]

	H. KEYHAN
	K. CHENG
	T. PELESHOK
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	B. LORD
	O. ONIFADE

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BC Hydro

SOUTH BANK SUB. - PEACE CANYON 500 kV T/L

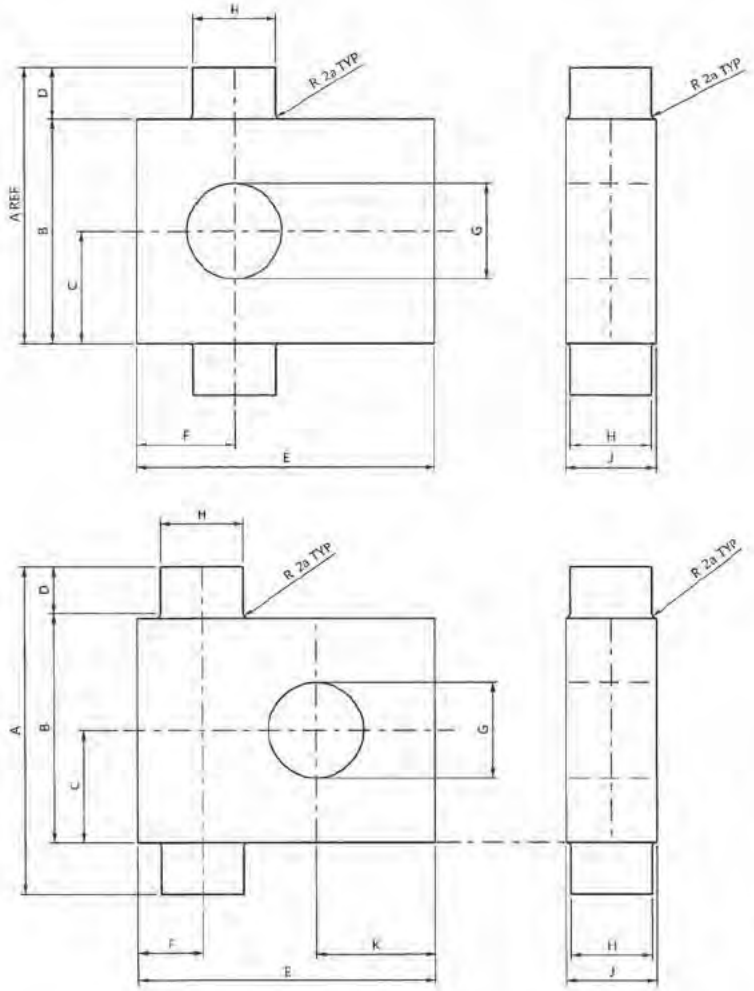
TYPE 54J SELF SUPPORTING DEAD-END TOWER
0 DEG - 45 DEG
TYPICAL DETAILS

SEPTEMBER 2016

5L005-T08-00022 D 1

NO	REMARKS	DATE	DESIGNED						
1	ISSUED FOR DETAILING	APRIL 2017	H. KEYHAN	K.C.	T.P.		B.H.	B.L.	O.O.

REFERENCE DRAWINGS — REVISIONS — REVISIONS



BILL OF MATERIAL	
DESCRIPTION	MATERIAL
TRUNNION BLOCK	STEEL, GALVANIZED

DIMENSION / TOLERANCE	TOWER TYPE									
	230 kV - KG	7J, 7JG	7K	2J1, 3J, 3JG 3H	2KG	8KG	52H	8J	8JS	54J
A REF	260	166	258	163	137	185	195	166	186	185
B zb	220	116	208	92	94	116	136	116	116	136
C za	110	58	104	46	47	58	68	58	58	68
D b	20	25	25	35	22	35	30	25	25	25
E b	110	152	152	96	125	180	120	152	152	130
F a	55	76	76	48	27	50	60	76	40	65
G Ø ba	33	33	33	38	40	40	40	40	40	41
H Ø a	44	40	40	35	35	44	40	44	57	40
J zc	44	44	44	35	35	57	40	57	57	44
K a	-	-	-	-	48	50	-	-	76	-
*	360	445	445	445	445	535	600	670	670	540
**	450	535	535	535	535	645	720	800	800	650
	ITEM A	ITEM B	ITEM C	ITEM D	ITEM E	ITEM F	ITEM G	ITEM H	ITEM I	ITEM J

PERFORMANCE:

THE COMPONENT SHALL WITHSTAND THE FOLLOWING LOADS IN TENSION:
- * kN WITHOUT ANY SIGNIFICATANT PERMANENT DEFORMATION WHICH WOULD IMPAIR THE FUNCTION OR REUSABILITY OF THIS COMPONENT.
- ** kN WITHOUT FAILURE.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES ±2 mm TOLERANCE UNLESS OTHERWISE NOTED.
2. FOR GENERAL SPECIFICATION DATA SEE BCH SPECIFICATION 413-0000.
3. MATERIAL SHALL BE HOT DIPPED GALVANIZED TO CSA G164.
4. MATERIAL SHALL MEET CSA G40.21, CATEGORY 2, CHARPY V-NOTCH IMPACT AVERAGE ENERGY ABSORBTION IMPACT VALUES OF 20 JOULES AT -20°C.

TOLERANCES	
a	± 0.5
b	± 1.0
za	+ 0 - 0.5
zb	+ 0 - 1.0
zc	+ 0 - 2.0
ba	+ 1.0 - 0.5

FOR REV 1 ONLY
OCT 29- 2016

NO	REMARKS	DATE	DESIGNED	INDEP CHK	DFTG	DFTG CHK	INSP	REV	ACPT
1	REDRAWN IN CAD, 54J TRUNNION ADDED	10-2016	R.HINE	KD	BE		KC		YOO

REVISIONS

DSGN	[redacted]
INDEP CHK	
DFTG	
DFTG CHK	
INSP	
REV	
ACPT	

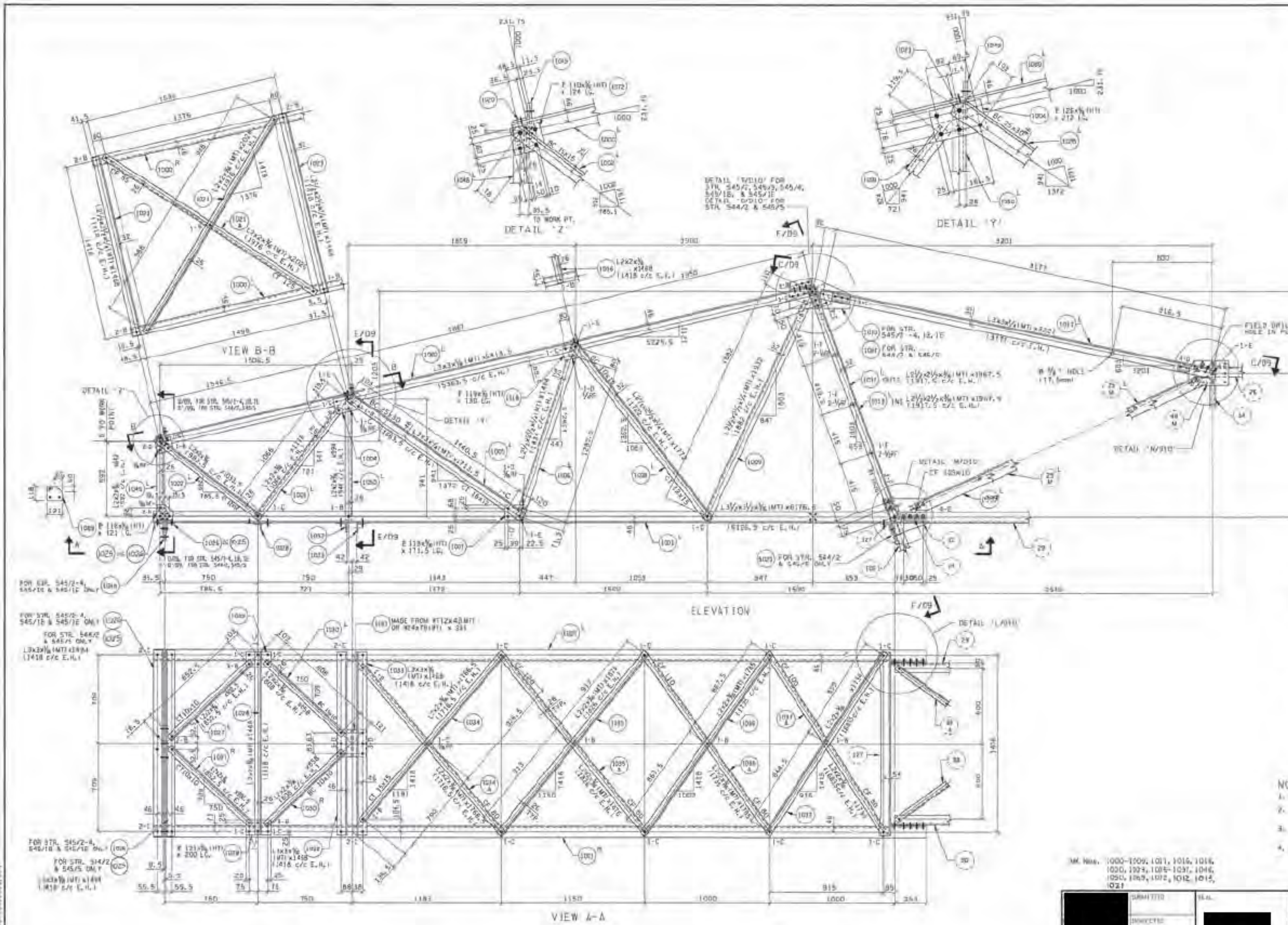
[redacted]

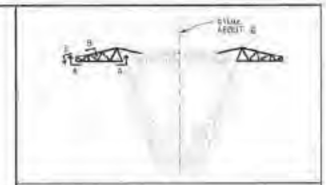
BC Hydro ENGINEERING

SPECIFICATION CONTROL DRAWING

SHACKLE TRUNNION BLOCK (TABLE)

DATE	DISTR	DWG NO	SIZE	R
03-FEB-83		G-T08-00384	B	1





BOLT LIST PER TOWER FOR STR. 545/2-4, 545/1B, 545/1E			
TYPE	DIA.	LENGTH	REQ'D
B	5/8	1 1/2	80
C	5/8	1 3/4	110
D	5/8	2	56
E	5/8	2 1/4	32
F	5/8	2 1/2	36
RING FILL 1/4 THK.			4
RING FILL 5/8 THK.			2
RING FILL 3/8 THK.			16
RING FILL 1/2 THK.			24

BOLT LIST PER TOWER FOR STR. 544/2, 545/5			
TYPE	DIA.	LENGTH	REQ'D
B	5/8	1 1/2	84
C	5/8	1 3/4	138
D	5/8	2	56
E	5/8	2 1/4	32
F	5/8	2 1/2	36
RING FILL 1/4 THK.			4
RING FILL 5/8 THK.			2
RING FILL 3/8 THK.			10
RING FILL 1/2 THK.			24

LEGEND:

- DENOTES NEW MEMBERS
- DENOTES MODIFIED EXISTING MEMBERS
- DENOTES EXISTING MEMBERS
- DENOTES EXISTING HOLES
- DENOTES FIELD/SHOP DRILLED HOLES FOR NEW MEMBERS
- DENOTES EXISTING BOLTS TO BE REPLACED WITH GRADE 5 BOLTS
- DENOTES WORK POINT

NOTES:

1. FOR GENERAL NOTES SEE DRAWING D-TOE-BP02
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DWG. 5L40-T08-D9 AND D10.
3. ALL BOLTS SHALL BE NEW 5/8" Ø GRADE 5 UNLESS SHOWN OTHERWISE.
4. DETAILS APPLIED TO ALL STRUCTURES UNLESS SHOWN OTHERWISE.

MK. Nos. 1000-1009, 1011, 1016, 1018, 1020, 1024, 1026-1037, 1046, 1050, 1069, 1072, 1012, 1015, 1021

FUNCTIONAL CODE 4.02/2AM

[redacted] SUBMITTED / INSPECTED / INSPECTED / INSPECTED

SEAL [redacted]

[redacted]

DATE

BC Hydro
TRANSMISSION ENGINEERING DIVISION

KELLY LAKE-CLAYBURN-INGLEDOW 500 KV T/L CLAYBURN LOOP

CIRCUIT No. 5L40 & 5L41
TYPE 2AM SELF SUPPORTING TOWER
CROSSARM
DETAILS

SCALE — DWG. No. 5L40-T08-D8 R 1

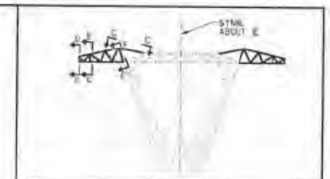
No.	REVISIONS	MADE	DATE
1	Revised bolts		

REFERENCE DRAWINGS | REFERENCE DRAWINGS | REVISIONS | REVISIONS

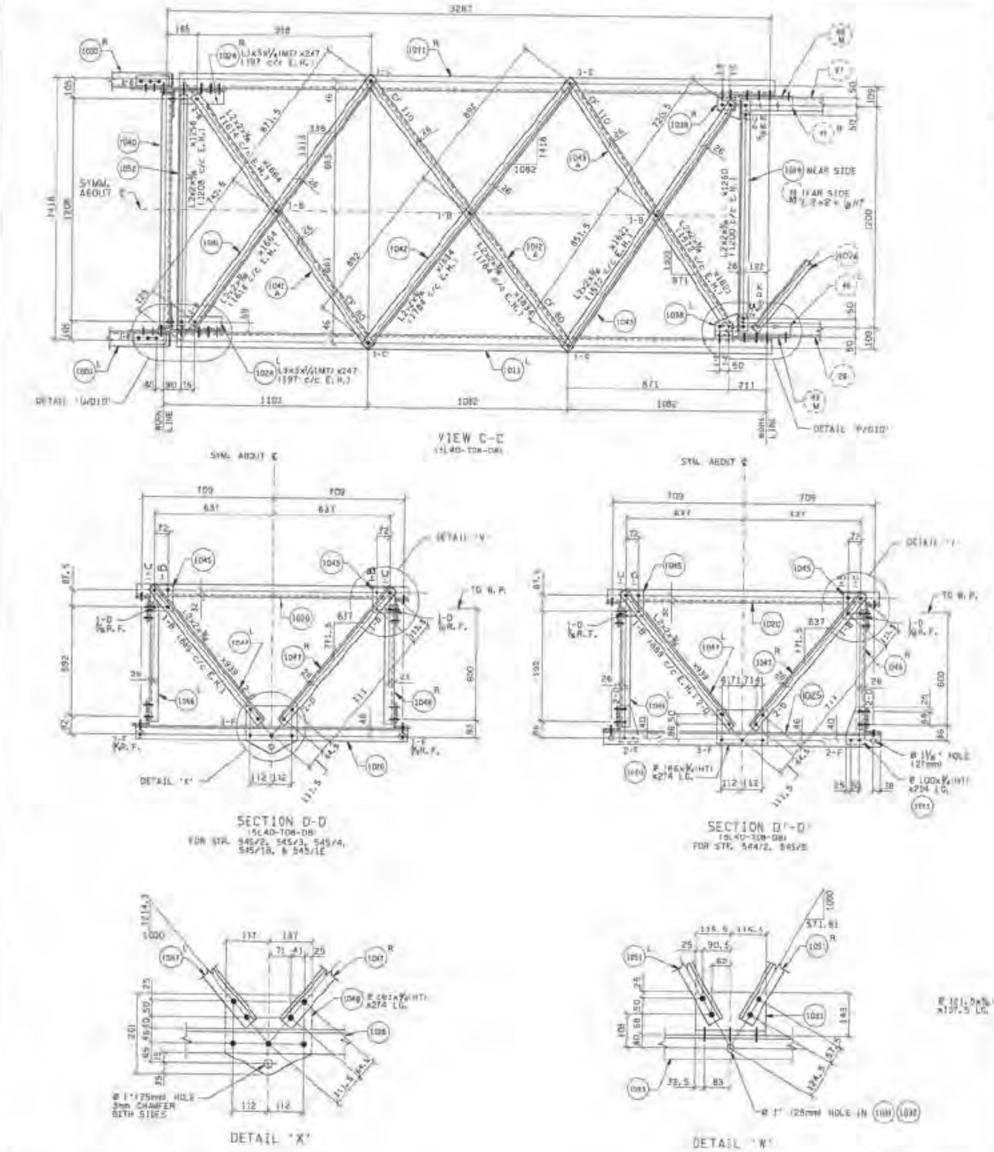
D

BOLT LIST PER TOWER FOR STR. 545/2-4, 545/1B, 545/1E			
TYPE	DIA.	LENGTH	REQ'D
B	⅝	1½	74
C	⅝	1¾	52
D	⅝	2	24
F	⅝	2½	10
RING FILL ⅛ THK.			4
RING FILL ¼ THK.			4
RING FILL ⅜ THK.			4
RING FILL ½ THK.			4

BOLT LIST PER TOWER FOR STR. 544/2, 545/5			
TYPE	DIA.	LENGTH	REQ'D
B	⅝	1½	74
C	⅝	1¾	52
D	⅝	2	32
F	⅝	2½	14
RING FILL ⅛ THK.			4
RING FILL ¼ THK.			4
RING FILL ⅜ THK.			4



KEY PLAN



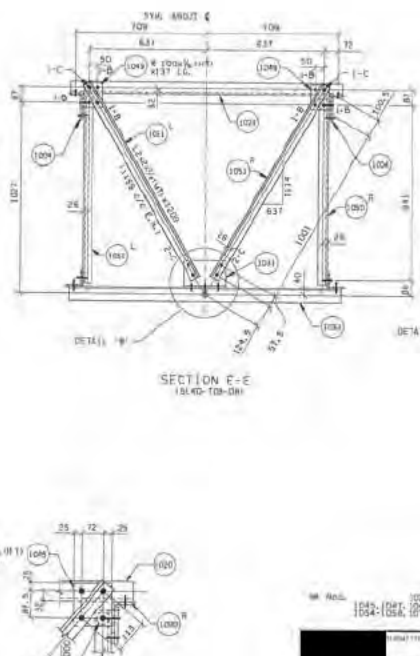
VIEW C-C (5L40-T08-D8)

SECTION D-D (5L40-T08-D8) FOR STR. 545/2, 545/3, 545/4, 545/1B, & 545/1E

SECTION D'-D' (5L40-T08-D8) FOR STR. 544/2, 545/5

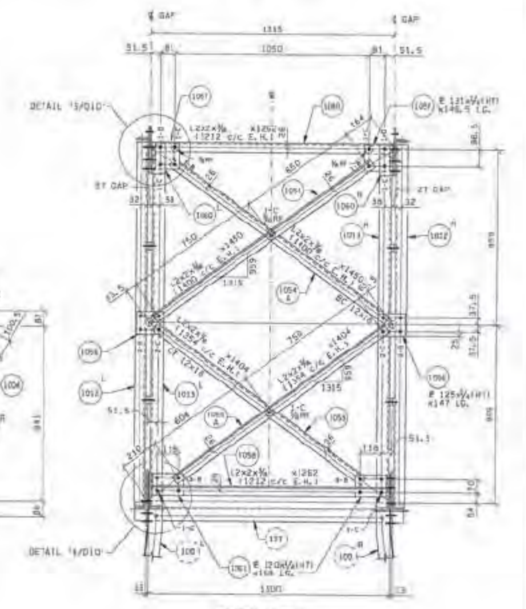
DETAIL 'X'

DETAIL 'W'



SECTION E-E (5L40-T08-D8)

DETAIL 'V'



SECTION F-F (5L40-T08-D8)

NOTES:
1) FOR NOTES AND LEGEND SEE DWG. 5L40-T08-D8.

MK Nos. 1024, 1039-1043, 1045, 1047, 1049, 1051, 1052, 1054-1058, 1070, 1071

2	Revised as built	[redacted]
1	Revised bolts	

[redacted] SUBMITTED / INSPECTED / INSPECTED / INSPECTED

[redacted]

DATE 2 Dec 93

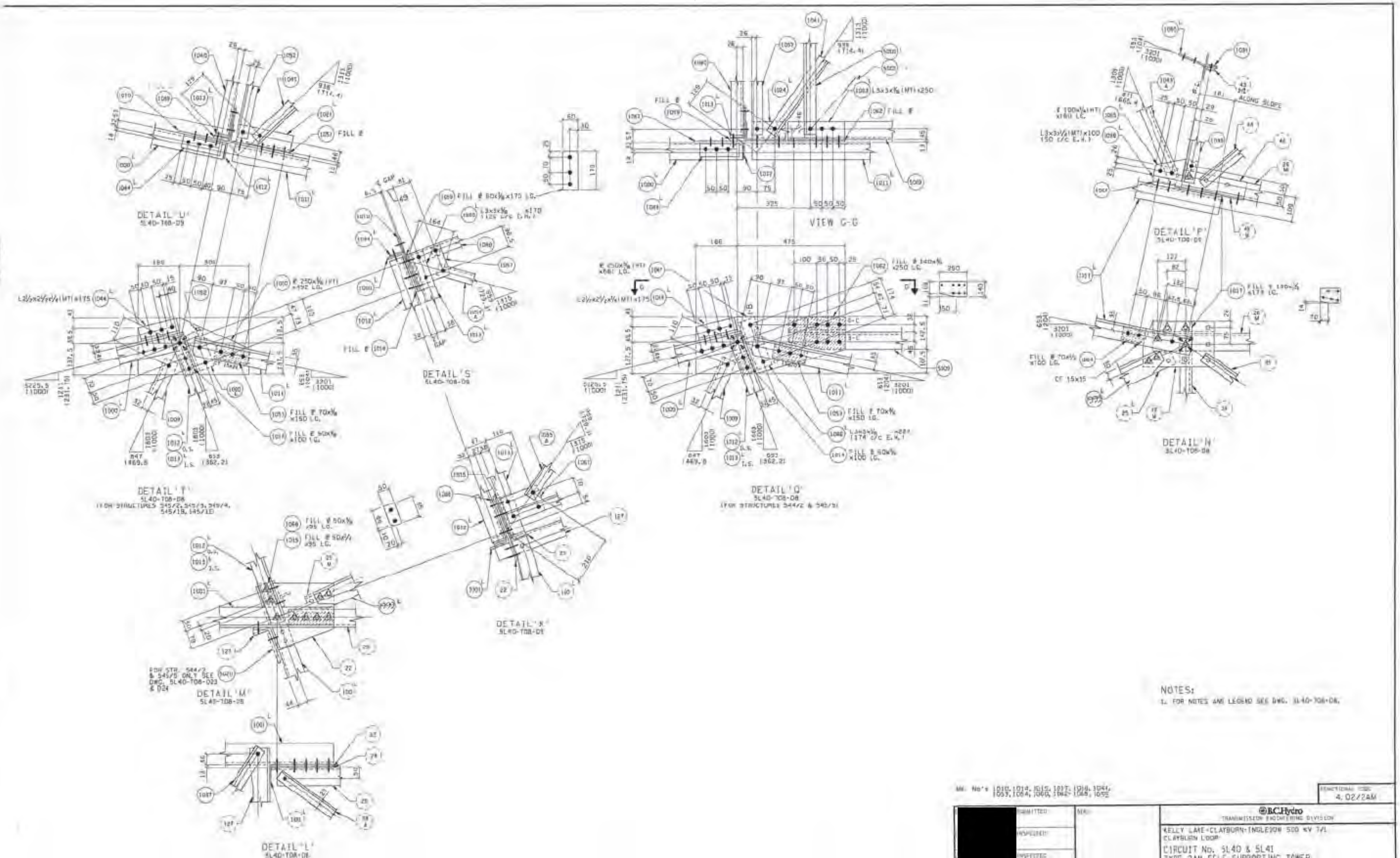
FUNCTIONAL CODE 4.02/2AM

B.C.Hydro
TRANSMISSION ENGINEERING DIVISION

KELLY LAKE-CLAYBURN-INGLEDOW 500 kV T/L
CLAYBURN LOOP
CIRCUIT No. 5L40 & 5L41
TYPE 2AM SELF SUPPORTING TOWER
CROSSARM
VIEW C-C, SECTIONS D-D, E-E, F-F, DETAILS V, W & X
DETAILS

SCALE — DWG. No. 5L40-T08-D9 R 2

D



NOTES:
1. FOR NOTES AND LEGEND SEE DWG. 5L40-T08-08.

MK. No's 1010, 1014, 1015, 1017, 1018, 1044, 1053, 1054, 1060, 1062, 1068, 1052

Rev	Revisions		Date
2	Revised as built	[redacted]	
1	Added bolt		

[redacted]

SUBMITTED / INSPECTED / INSPECTED / INSPECTED

DATE 8 Dec 93

B.C.Hydro
TRANSMISSION ENGINEERING DIVISION

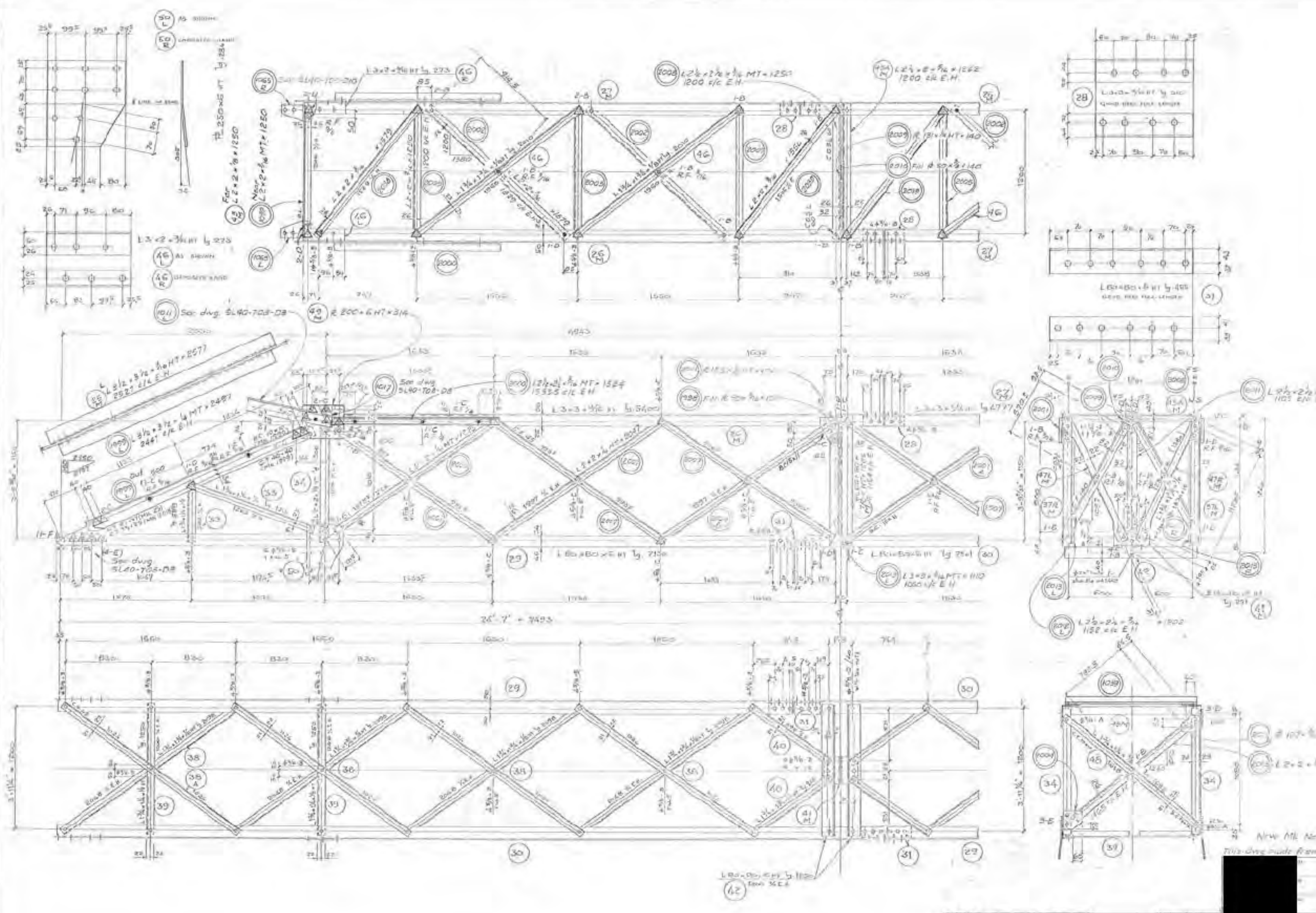
KELLY LAKE-CLAYBURN-INGLEDOW 500 KV T/L
CLAYBURN LOOP
CIRCUIT No. 5L40 & 5L41
TYPE 2AM SELF SUPPORTING TOWER
CROSSARM
VIEW G-G, DETAILS K, L, M, N, P, Q, S, T & U
DETAILS

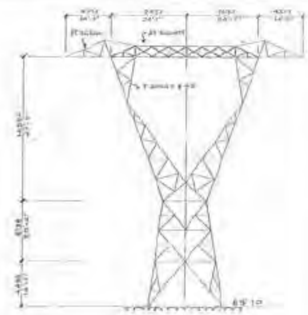
FUNCTIONAL CODE 4.02/2AM

SCALE —

DWG. NO. 5L40-T08-010 R 2

REFERENCE DRAWINGS | REFERENCE DRAWINGS | REVISIONS





ADDITIONAL BOLTS REQ'D FOR REINFORCEMENT			
TYPE	DIA	LENGTH	NO. REQ'D
B	5/8	1 1/2	61
C	5/8	1 3/4	80
D	5/8	2	30
E	5/8	2 1/4	1
R.F. 3 (7/8)			2
R.F. 5 (11/16)			15
R.F. C (1/4)			12
R.F. 16 (7/8)			4
R.F. 8 (5/16)			12

NOTE:
For General Notes see dwg. No. 5-70?-B952

LEGEND:

(1000) Denotes new members

(34/M) Denotes modified existing members

(45) Denotes existing members

* Denotes field drilled holes/shop drilled holes

B. Denotes existing bolts to be replaced with Grade 5 bolts

# Denotes existing holes

New Mk No's 1998, 2013, 2058, 2059

This dwg made from 5LG5-708-E568

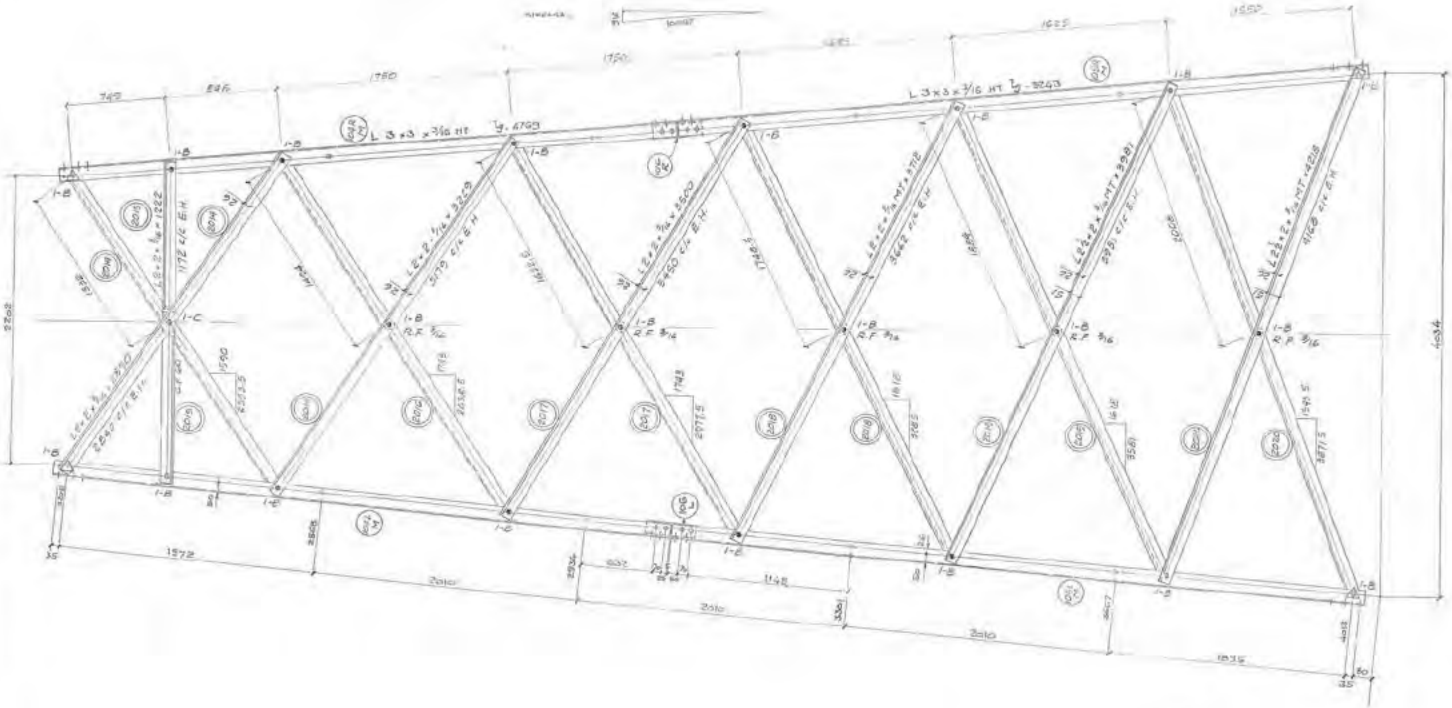
M	1	B.C. MK 2007A revised, Bolts & R.F.s revised	[redacted]

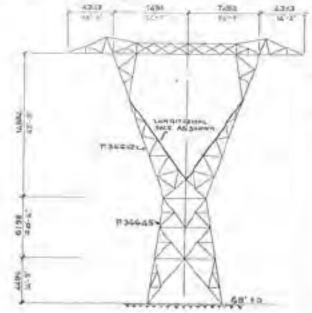
[redacted]

BC Hydro

KELLY LAKE-CLAYBURN-INGLEDOW 500 KV TL
CLAYBURN LOOP
TYPE 2AM SELF SUPPORTING TOWER
STR's. 545/2, 545/3, 545/4 & 545/5 (CIR. 5L41)
STR. 544/2 (CIR. 5L41)
BRIDGE DETAILS

5L40-708-E11





BOLT LIST PER TOWER			
Type	Dia.	Length	No. Req'd
B	5/8	1 1/2	42
C	5/8	1 7/8	2
R.F. 3/16 Thk.			10

NOTE:
For General Notes see dwg. No. G-T08-8452.

LEGEND:

(2014) Denotes new members

(105L M) Denotes modified existing members

(106 L) Denotes existing members

Denotes field drilled holes/shop drilled holes

Denotes existing bolts to be replaced with Grade 5 bolts

Denotes existing holes

New Mk No's 2014-2020

This dwg made from 5L65-T08-2509

[redacted]

FUNCTIONAL CODE 4-05/2AM

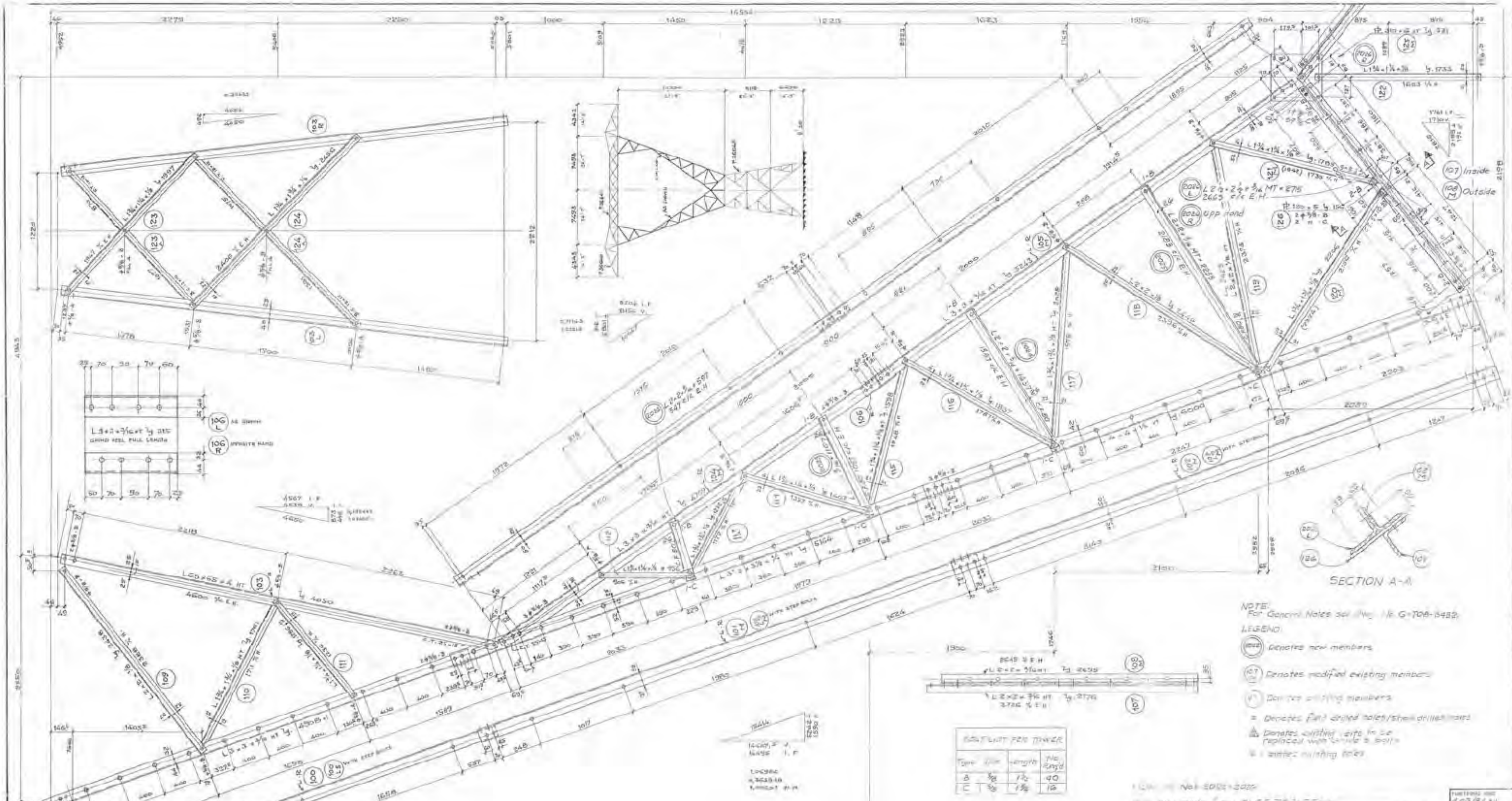
BC Hydro

TRANSMISSION ENGINEERING DIVISION

KELLY LAKE-CLAYBURN-INGLEDOW 500 kV T/L
CLAYBURN LOOP
TYPE 2AM SELF SUPPORTING TOWER
STR's. 545/2, 545/3, 545/4 & 545/5 (CIR. 5L40)
STR. 544/2 (CIR. 5L41) LONGITUDINAL FACE
OF K FRAME DETAILS

[redacted]

DWG No. 5L40-T08-E12



SECTION A-A

NOTE:
For General Notes see Dwg. No. G-T08-5482.

LEGEND:

(2042) Denotes new members

(107) Denotes modified existing members

( ) Denotes existing members

= Denotes field drilled holes/shop drilled holes

△ Denotes existing [illegible] to be replaced with [illegible] bolts

[illegible] existing holes

BOLT/NUT PER TOWER			
Type	Dia	Length	No. Req'd
B	5/8	1 1/2	40
C	5/8	1 3/4	16

[illegible] No. 2002-2037

[illegible] made from 5LG5-T03-E5[illegible]

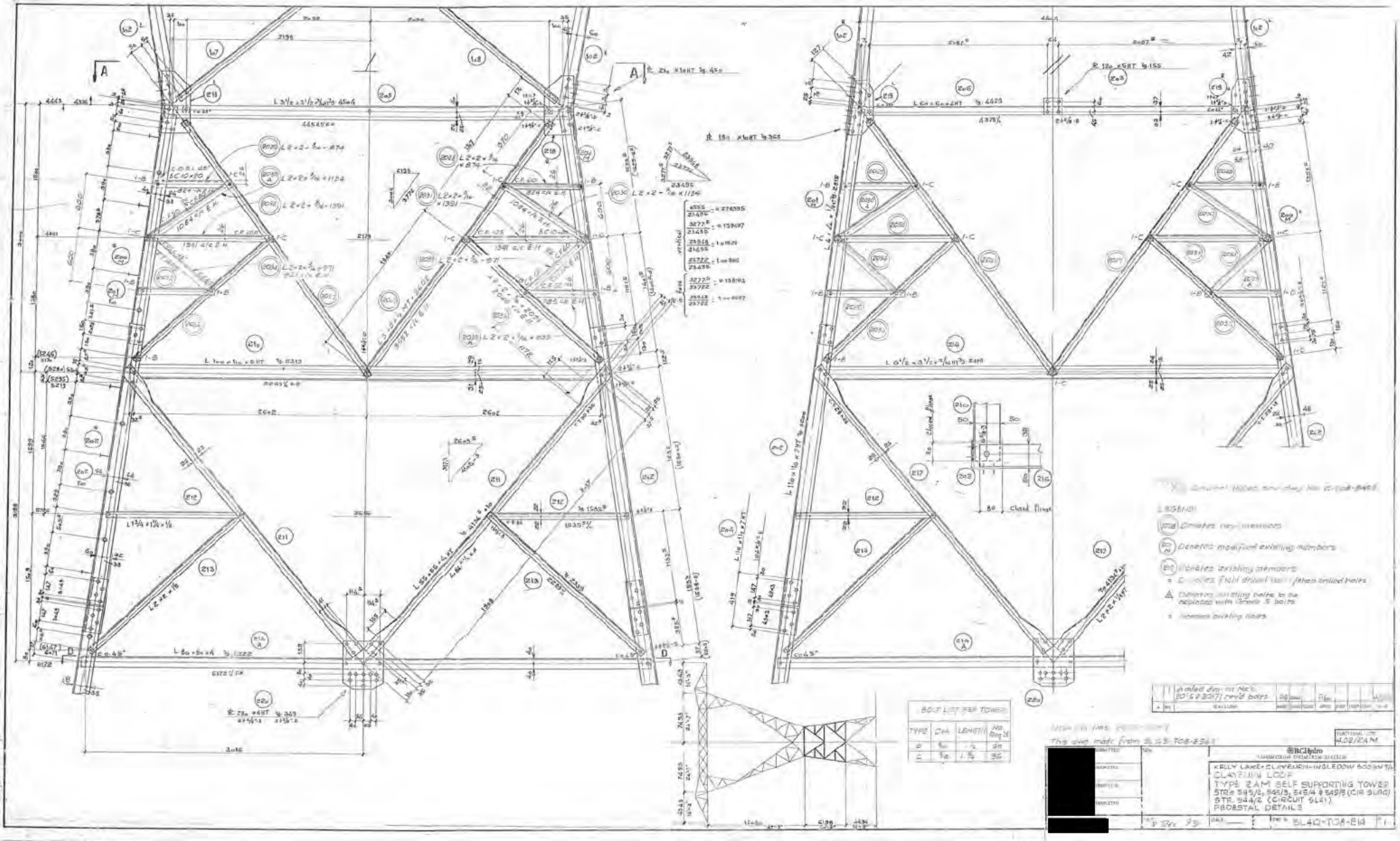
Functional Code 402/2AN

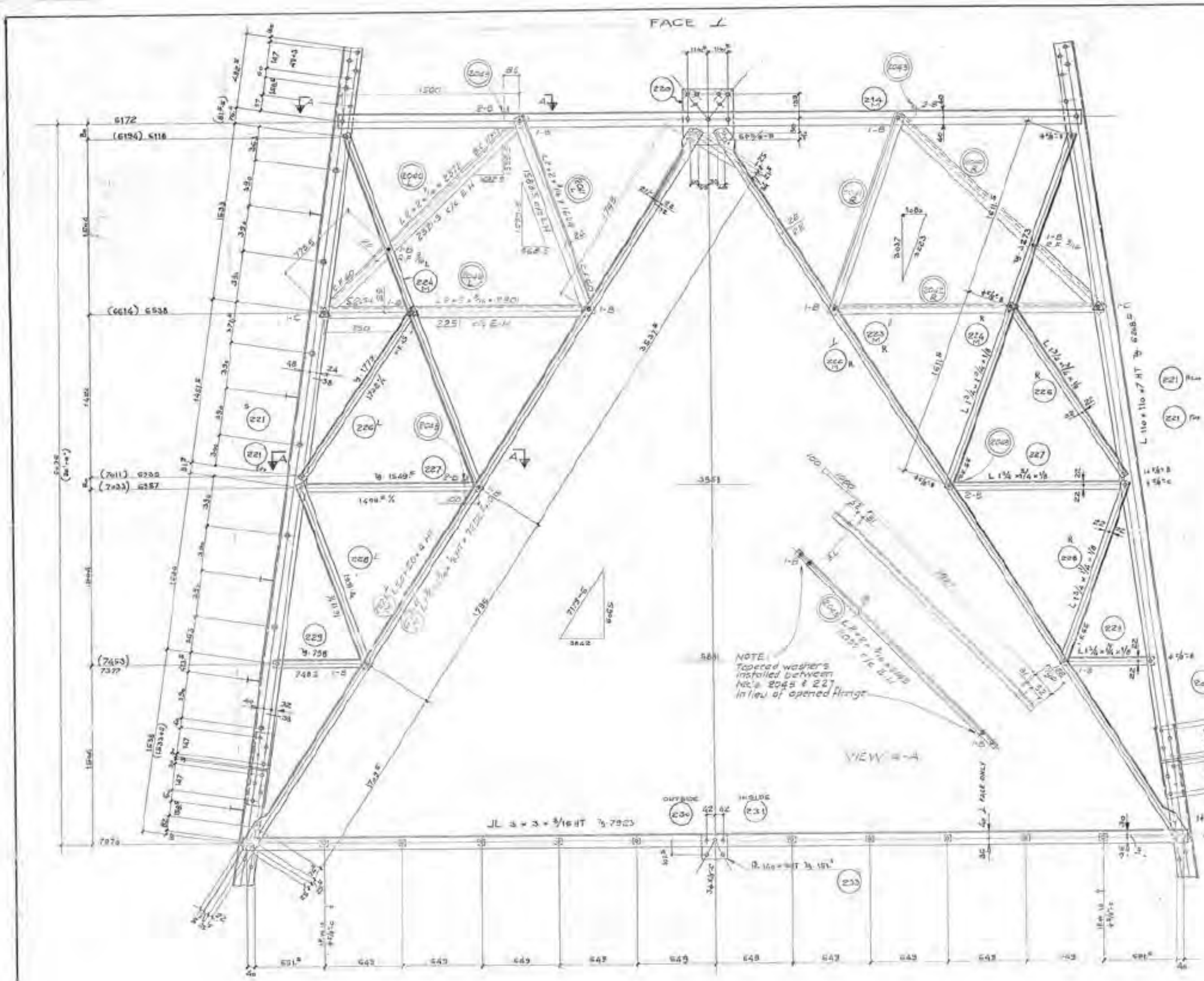
[redacted]

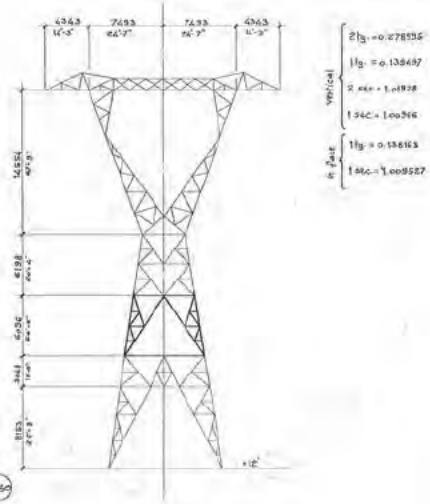
BC Hydro
TRANSMISSION ENGINEERING DIVISION

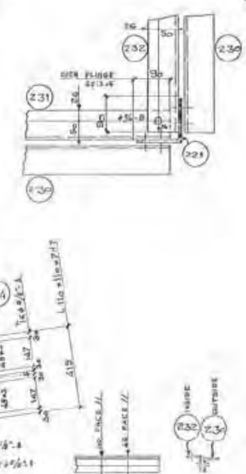
KELLY LAKE-CLAYBURN-INGLEDOW 500 kV T/L
CLAYBURN LOOP
TYPE 2AM SELF SUPPORTING TOWER
STRS. 545/2, 545/3, 545/4 & 545/5 (CIR. 5L40)
STR. 544/2 (CIRCUIT 5L41)
TRANSVERSE FACE OF K FRAME DETAILS

5L40-T08-E15


LEGEND
Denotes new members
Denotes modified existing members
Denotes existing members
Denotes field drilled holes
Denotes existing bolts to be replaced with Grade 8 bolts
Denotes existing rivets
BOLT LIST PER TOWER
TYPE | DIA | LENGTH | NO. REQ'D
KELLY LAKE - CLAYBURN - INGLEDOW 500kV T/L
CLAYBURN LOOP
TYPE 3AM SELF SUPPORTING TOWER
STR. 545/2, 545/3, 545/4 & 545/5 (CIR 5L40)
STR. 544/2 (CIRCUIT 5L41)
PEDESTAL DETAILS
5L40-TOB-E14 P1







BOLT LIST PER TOWER			
Type	Dia.	Length	No. Req'd
E	5/8	1 7/8	64
C	5/8	1 3/4	6
F.W.	1/16 Thk		8

NOTE:
For General Notes see dwg. [illegible] -T08-B452

LEGEND
(2040) Denotes new members
(221 14) Denotes modified existing members
(204) Denotes existing members
• Denotes field drilled holes [illegible] drilled [illegible]
[illegible]
[illegible]

New Mk No's [illegible] 2045

[illegible] dwg made from 5L65-T06-E560

FACT. DWG. REF.	402/2AM
[redacted]	
DESIGNED	
CHECKED	
APPROVED	
DATE	[illegible]

BCHydro
TRANSMISSION ENGINEERING DIVISION

CLAYBURN - INGLEDOW 500 kV T/L
CLAYBURN LOOP
TYPE 5AM SELF SUPPORTING TOWER
STR's 545/2, 545/4 & 545/5
UPPER PORTION 50' BODY EXT. DETAILS

SCALE — | DWG. No. 5L40-T08-E15 | 1

	1	L/R added to 2040-42; Bolts revised

[redacted]