

HYDRO ONE'S CUSTOMER CONNECTION PROCESS

Hydro One's customer connection process is described in 6 Phases:

- Phase 1: Connection Application
- Phase 2: Customer Impact Assessment (CIA)
- Phase 3: Connection Estimates
- Phase 4: Connection Approval
- Phase 5: Design and Build
- Phase 6: Commissioning

6 Process Maps that illustrate the steps involved in each phase of the connection process are shown below. Descriptions of the 6 Process Maps and steps within each are also provided.

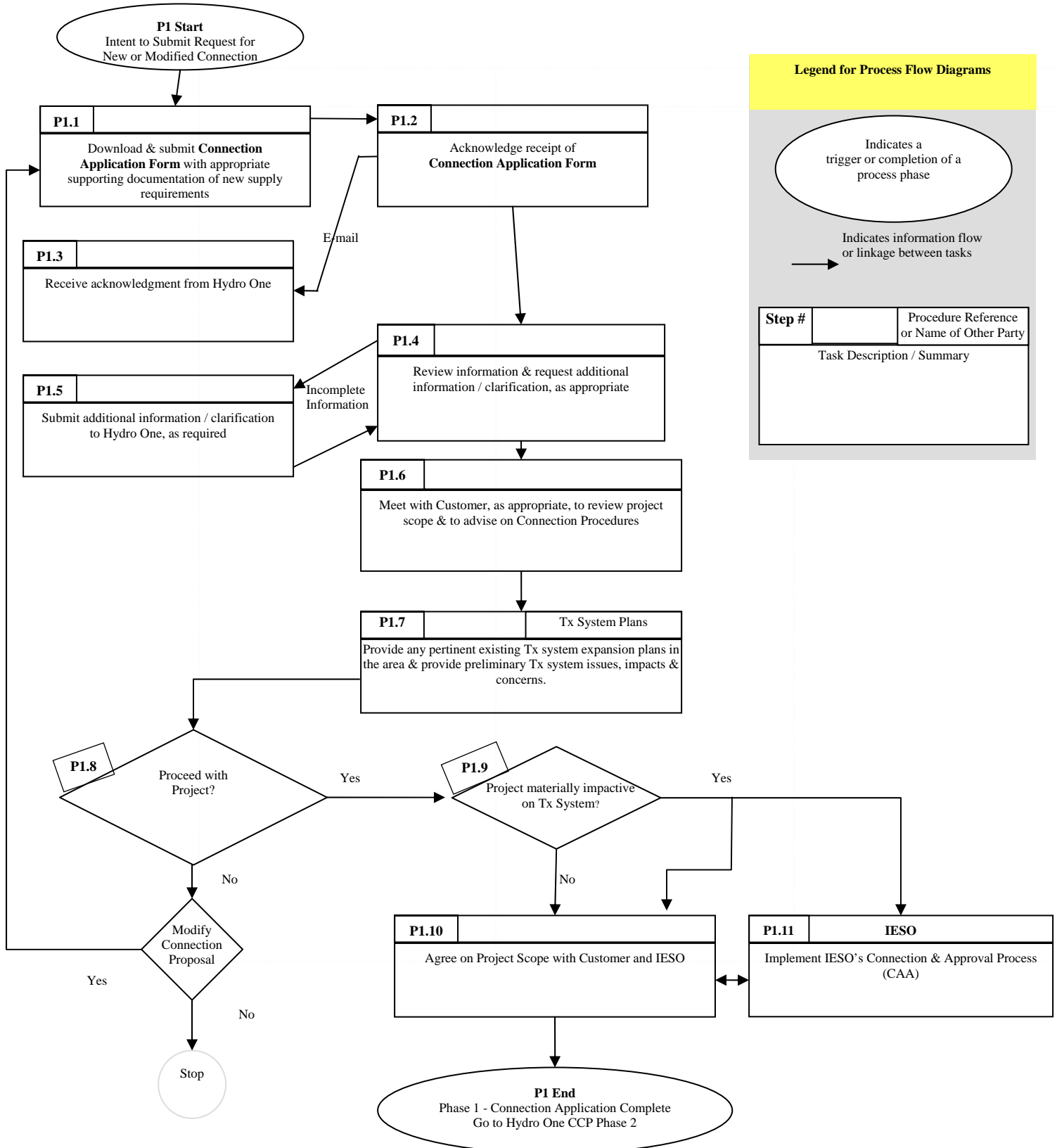
Connection Process Maps

Hydro One Customer Connection Process
Phase 1: Connection Application

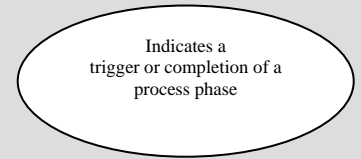
Customer of Connection Applicant

Hydro One

Others Parties



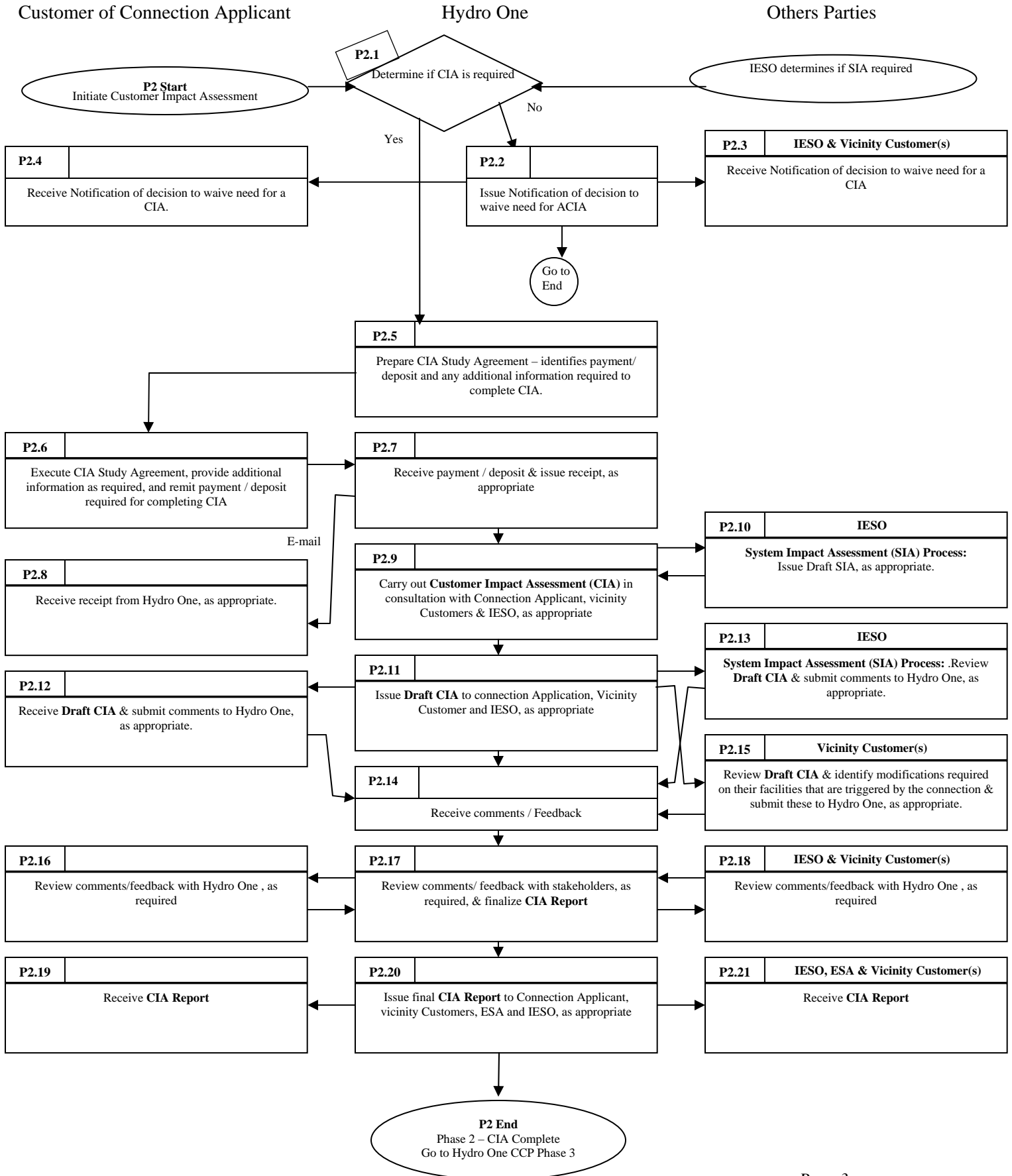
Legend for Process Flow Diagrams



Indicates information flow or linkage between tasks

Step #	Procedure Reference or Name of Other Party
Task Description / Summary	

Hydro One Customer Connection Process Phase 2: Customer Impact Assessment (CIA)

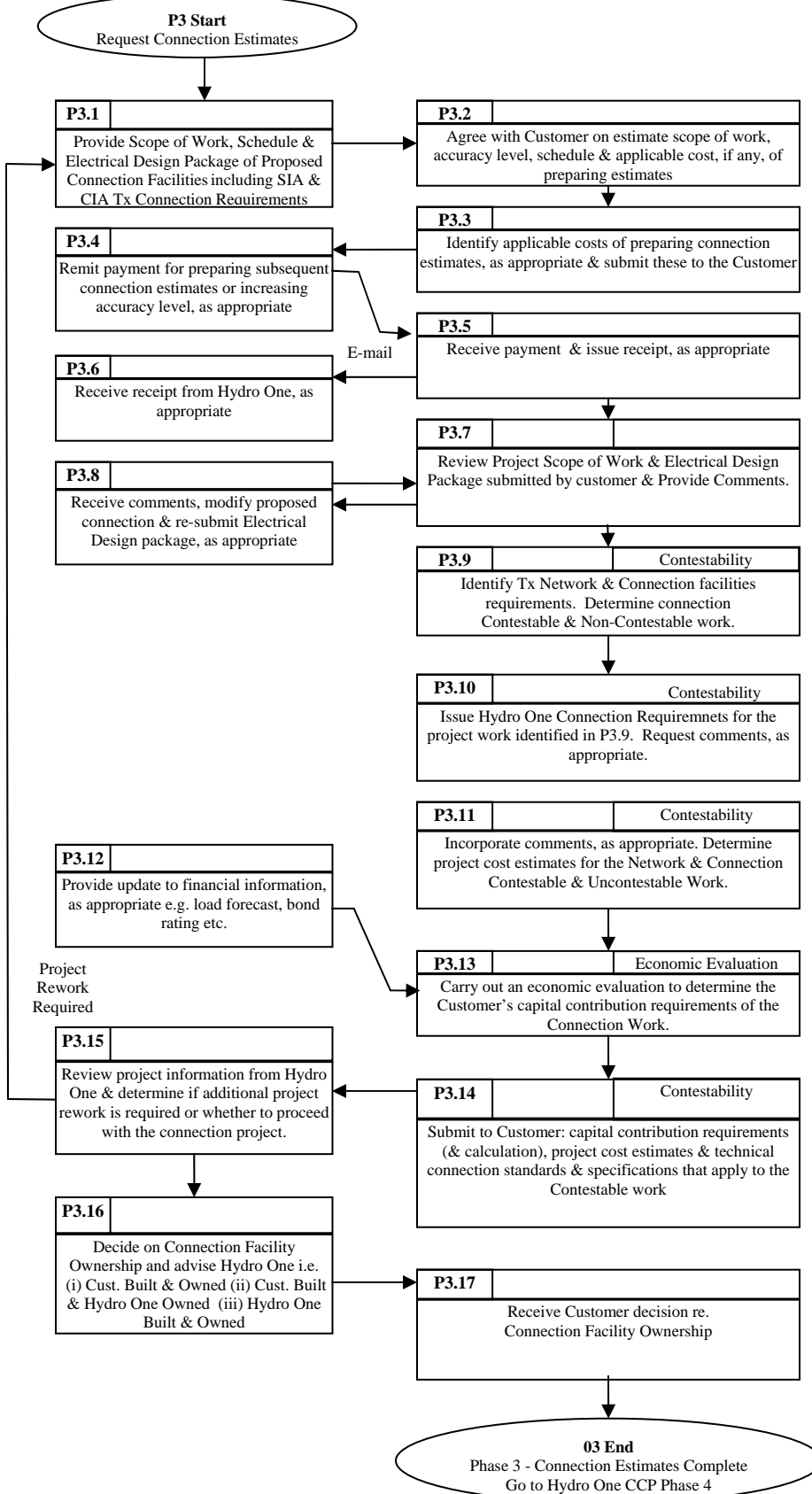


Hydro One Customer Connection Process Phase 3: Connection Estimate

Customer of Connection Applicant

Hydro One

Others Parties

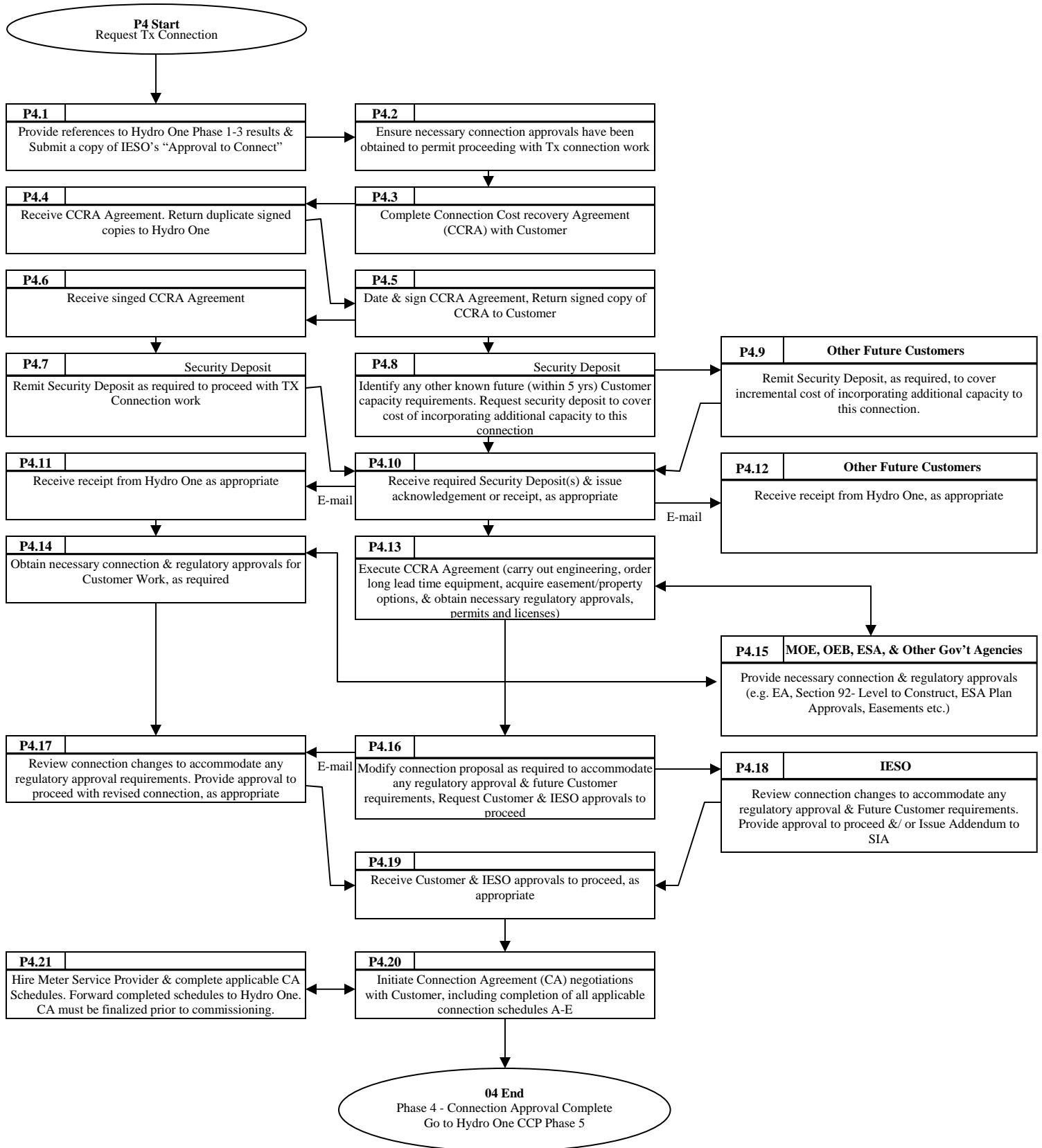


Hydro One Customer Connection Process Phase 4: Connection Approval

Customer of Connection Applicant

Hydro One

Others Parties



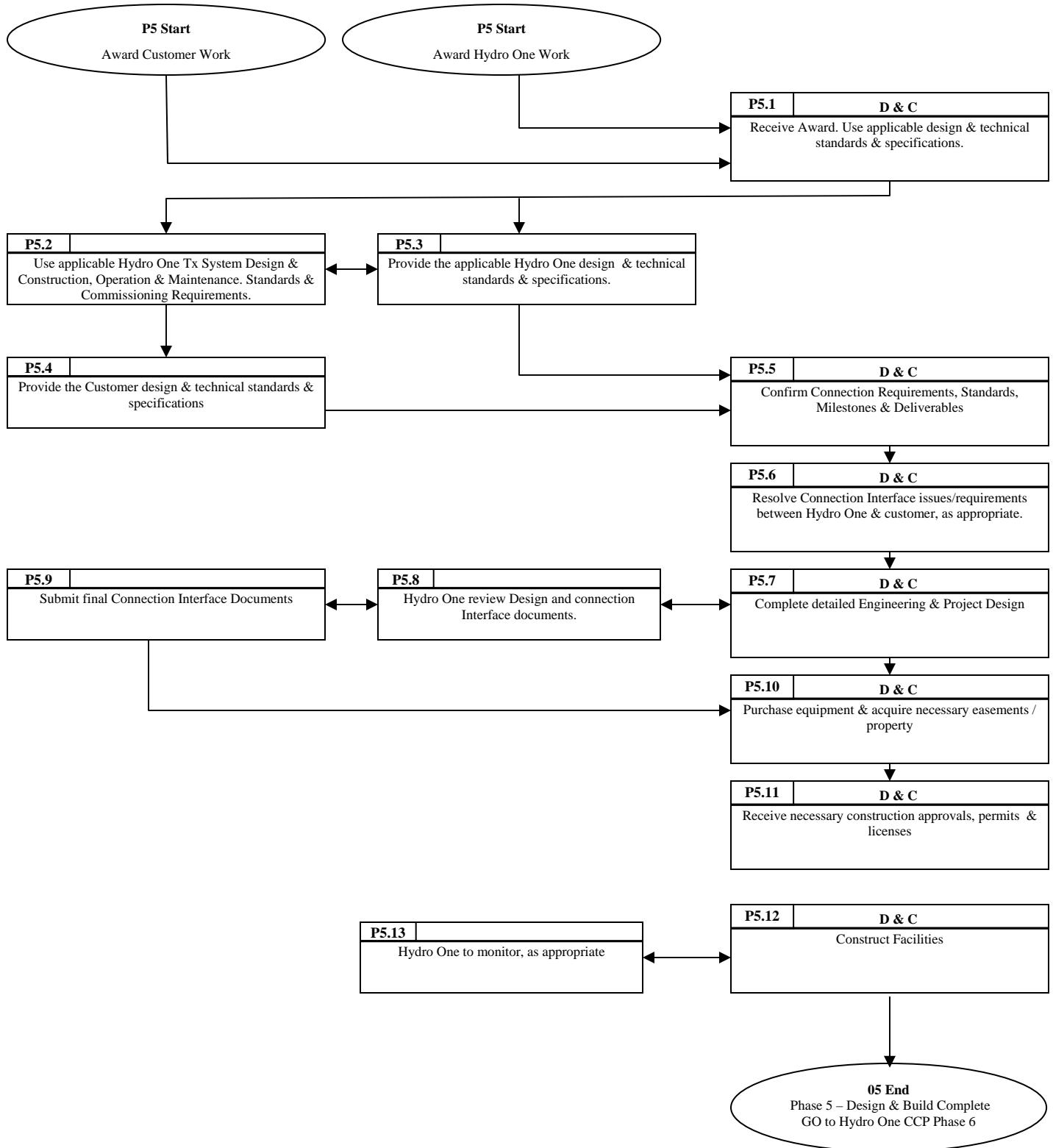


Hydro One Customer Connection Process Phase 5: Design & Build

Customer of Connection Applicant

Hydro One

Design & Constructor (D & C)



Hydro One Customer Connection Process Phase 6: Commissioning

Customer of Connection Applicant

Hydro One

Other Parties



Description of Connection Process

Phase 1 - Connection Application

A Connection Application is required to register the request for a new or modified customer connection (load or generation) with Hydro One. The Connection Applicant is required to complete a Connection Application Form by downloading it from the Hydro One Web site (www.HydroOne.com) and forwarding it to Hydro One.

In many situations, new customers will benefit from reviewing and screening their connection proposals and possible alternatives with Hydro One before submitting their proposal for review through the IESO's Connection Assessment and Approval (CAA) process. This phase provides the customer applicant with the opportunity to have one free consultation meeting with Hydro One staff to

- clarify/agree on project scope
- discuss the connection process, policies and procedures
- provide any pertinent existing transmission system expansion plans in the area
- identify preliminary transmission issues, impacts and concerns

The customer may elect to modify the connection proposal before proceeding to the next phase; or even withdraw the proposal entirely.

The customer will be directed to register the proposed connection with the IESO's CAA process and proceed in parallel with Hydro One's Customer Connection Process. The IESO will determine if a System Impact Assessment is required and Hydro One will determine if a Customer Impact Assessment is required based on the potential impacts of the proposed connection on the transmission system.

Process Steps:

1. **(P1.1 – P1.3) Apply for New or Modified Tx Connection:** The Applicant requests a new or modified connection to the Hydro One transmission system. The customer registers this request by completing and forwarding to Hydro One a Connection Application form that is downloaded from the Hydro One website (www.HydroOne.com). The Application details the supply requirements for the new connection, including, capacity, schedule, load forecast, arrangement of facilities (single line diagram), equipment specifications, etc.
2. **(P1.4 – P1.5) Clarify Information:** Hydro One reviews the Connection Application form and requests additional information / clarification, as appropriate, to ensure proper project scope definition. Also, if the customer cannot provide specific equipment data, Hydro One, in consultation with the customer and/or IESO, may propose suitable typical values to be used in the application. In the event that typical values are used, the customer must be aware that it is committing to these values as design specifications and the customer assumes all liabilities in the use of such values.

3. **(P1.6) Provide Initial Consultation & Preliminary Advice:** One initial, free, consultation meeting may be arranged with Hydro One staff to provide the customer with relevant transmission system information and preliminary advice to help the customer determine a preferred connection solution.

The purpose of this initial consultation meeting is **NOT** to carry out any detailed studies or simulations but rather to provide the customer with relevant information that may help them in their decision making process, including the following:

- Single line diagram illustrating the transmission facilities in the area.
- Equipment ratings and their available capacity to incorporate the proposed connection.
- Basic protection, control and telecommunication philosophy.

Information that is provided on any of the following issues will need to be confirmed in the IESO's CAA process and Hydro One's subsequent connection process phases:

- Alternatives that may be considered for meeting customer functional requirements and TSC connection requirements.
- Adequacy of existing transmission system to incorporate the connection proposal (thermal, voltage and short circuit ratings).
- Connection and operating issues/concerns, including protection, control and telecom.
- Typical lead times and generic cost estimates.

The initial consultation meeting does **NOT** eliminate the need to carry out an assessment of the connection proposal as required by the IESO's CAA process or Hydro One's connection process. Nor will the initial consultation meetings provide information at this stage on:

- Site assessment
- Detailed Cost estimates from Hydro One
- Environmental Assessments
- Commitment on Constructability
- Commitment to Cost or In-service date

4. **(P1.7) Provide Relevant Transmission System Plans:** Hydro One will provide Connection Applicants with information on any pertinent transmission system expansion plans in the area that are required to meet load growth and maintain reliability and integrity of the transmission system. This will be used to identify whether there are any applicable advancement costs to be used in determining the capital contribution requirements in Hydro One's Economic Evaluation Procedure.
5. **(P1.8) Proceed with Project?** Based on information obtained from Hydro One, the customer must decide if they want to proceed with the project or whether they want to modify their proposal. For any proposal that is modified, the customer must return to step P1.1 and re-submit a revised Connection Application form.

6. **(P1.9) Determine if Project Is Materially Impactive:** Certain connection proposals will have material impacts on the reliability of the transmission system. As a guideline, connection proposals with the following characteristics will be considered materially impactful:
 - (i) generation additions of >10MVA;
 - (ii) new network transmission facility additions; or
 - (iii) new connection stations / lines additions that reduce the reliability of the transmission system either due to the length of the line tap, the size of load or the nature of the load associated with large motors, furnaces or other facilities having significant reactive power requirements.

7. **(P1.10-P.11) Define Project Scope & Proceed in Parallel with IESO CAA:** At this point, Hydro One will agree on project scope with the customer and include the IESO in these project scope discussions. The customer will be directed to register the proposed connection with the IESO's CAA and proceed, in parallel, with Hydro One's Customer Connection Process, Phase 2 - Customer Impact Assessment. Proceeding in parallel will reduce overall process timelines. However, there is a risk that additional system requirements for connection may be identified by the IESO in its System Impact Assessment.

Phase 2 – Customer Impact Assessment

See Hydro One's Customer Impact Assessment Procedure.

Phase 3 – Connection Estimates

The Connection Estimates phase provides the Customer with the capital cost estimates and description of the contestable and uncontestable facilities required for connection to the Hydro One transmission system. This includes identifying the customer capital contribution requirements and providing an economic evaluation calculation as well as providing Hydro One's Design, Construction, Operation and Maintenance Standards together with the Connection Requirements that are applicable to the connection work.

An initial estimate with an accuracy of usually +/- 20% is provided at no cost to load customers. However, estimate preparation charges will be applied to prepare subsequent estimates or to increase the estimate accuracy level. For generator connections, estimate preparation charges will be applied in all cases.

Process Steps:

1. **(P3.1) Request Connection Estimates:** The customer requests connection estimates to be prepared and provides the scope of work, high level project schedule and five sets of the electrical design package (requirements listed below) for the proposed connection facilities, some of which may already be available as part of the Connection Application form provided

in Phase 1. The transmission system requirements identified in the SIA and the CIA are also included in the estimate scope.

Connection Electrical Design Package Requirements:

- Connection requirements that describe proposed connection interface
 - General arrangement / site plan
 - Single line diagram showing all equipment specifications (including generators, transformers), proposed connection to the Hydro One transmission system, protection elements and main isolating devices
 - Equipment, protection & operating philosophy and tripping matrix
 - Estimate scope of work information requirements.
 - Estimate accuracy requirements
 - Initial estimate is provided with usually +/- 20% accuracy
 - High level project schedule (Level 1)
2. **(P3.2 – P3.6) Agree on Estimate Scope of Work:** The customer and Hydro One agree on the estimate accuracy level, schedule and applicable costs, if any, of preparing estimates. The initial estimate with an accuracy of usually +/- 20% is provided at no cost to load connection customers. However, estimate charges will be applied to prepare subsequent estimates or to increase the estimate accuracy level. For generator connections, estimate preparation charges will be applied in all cases.
 3. **(P3.7 – P3.8) Review Customer Connection Electrical Design Package:** Hydro One reviews connection electrical design package submitted by the customer and provides comments on the proposed interface design. The customer reviews the comments, modifies the proposed interface design if required and resubmits the Electrical Design Package.
 4. **(P3.9) Determine Contestable & Uncontestable Connection Work:** Implement the Contestability Procedure to determine the contestable and the uncontestable portions of the connection work.
 5. **(P3.10 – P3.11) Issue Connection Requirements & Estimate Project Costs:** Hydro One issues Connection Requirements for the contestable & uncontestable work required to incorporate the proposed connection. These requirements detail the project scope of work and provide the basis for estimating the cost of contestable and uncontestable work.
 6. **(P3.12 – P3.13) Determine Customer Capital Contribution Requirements:** Implement the Economic Evaluation Procedure to determine the customer's capital contribution requirements associated with the connection work. The evaluation determines the customer's financial contribution requirements for holding the connection pool harmless and for managing Hydro One's investment risk exposure based on the customer risk profile and load/revenue guarantees.

7. **(P3.14) Provide Connection Estimates & Other Required Information:** Submit to the customer the following information consistent with the requirements of Section 2.2 of the Contestability Procedure and section 6.6.2 of the Code:

8. **(P3.15 – P3.17) Decide on Connection Facility Ownership:** The customer reviews the connection estimates and decides whether to proceed with the proposed connection project or whether additional project re-work / information is required. Hydro One will provide any project revisions / additional information at the customer's expense, but the customer must effectively return to the start of this phase (go to P3.1). If the customer decides to proceed with the project, the customer must elect one of three options regarding the construction and ownership of each contestable element of the new or modified connection facilities. The available connection facility ownership options include:
 - (i) Hydro One Built & Owned (pool funded)
 - (ii) Customer Built & Transferred to Hydro One (pool funded)
 - (iii) Customer Built & Owned (not pool funded)

Each of these options carries its own set of responsibilities and technical design and construction requirements that must be followed to enable the option to be executed. These are described in Hydro One's Contestability Procedure.

Phase 4 – Connection Approval

Connection approval places both the customer and Hydro One in a position to construct the proposed connection and network facilities to incorporate the customer connection. It involves executing a Connection & Cost Recovery Agreement (CCRA) and a Transmission Connection Agreement and obtaining the necessary OEB, Environmental Assessment (EA), Electrical Safety Authority (ESA) and other authorities' approvals required for connection.

Process Steps:

1. **(P4.1 – P4.2) Provide Mandatory Pre-requisites to Proceed with Connection:** The customer must provide "proof" that all connection process requirements have been satisfied to proceed with the transmission connection. Mandatory pre-requisites to proceeding with the transmission connection work and execution of this phase are
 - successful completion of Hydro One's Connection Process Phases 1-3, and
 - an Approval to Connect certificate granted by the IESO through the IESO's CAA process.

2. **(P4.3 – P4.6) Complete CCRA Agreement:** Based on the agreed scope of work and costs, a Connection & Cost Recovery Agreement (CCRA) is completed with the customer. A template for the CCRA is available on Hydro One's website (www.HydroOne.com). The Security Deposit is determined based on the requirements of Hydro One's Security Deposit

Procedure and incorporated as part of the CCRA terms and conditions. The CCRA forms the basis of amending an existing Connection Agreement with a customer or completing a new Connection Agreement with a customer.

3. **(P4.7 – P41.2) Receive Security Deposit(s):** The customer remits a security deposit as required under the terms & conditions of the CCRA. If Hydro One is aware of another future customer that will need capacity within five years of the construction of the proposed connection facility, then Hydro One will add the capacity to the connection facility provided a security deposit is obtained from the future customer to cover the incremental capacity costs.
4. **(P4.13) Execute CCRA Agreement:** The customer and Hydro One execute the CCRA. This allows the parties to initiate detailed engineering, ordering of long lead time equipment, and the processes for acquiring necessary easements/property rights, regulatory approvals, permits and licenses.
5. **(P4.14-P4.15) Acquire Necessary Regulatory Approvals (i.e. MOE, OEB, ESA, Easements/Property, etc.):** The customer and Hydro One each acquire the necessary regulatory approvals and other permits required prior to construction. These approvals may include environmental assessment approvals from the Ministry of the Environment, Section 92 approvals from the OEB, ESA plan approvals, easements/property rights, etc.
6. **(P4.16 – P4.19) Modify Connection to Accommodate Regulatory Approvals:** The connection proposal may require changes to accommodate the conditions of approvals that have been granted. Any changes required to the connection, including the addition of capacity to accommodate future customer requirements, must be reviewed and approved by the IESO.
7. **(P4.20 – P4.21) Initiate Connection Agreement Negotiations:** Using the executed CCRA as the reference, initiate work on a Connection Agreement with the customer. The Connection Agreement and the required schedules that must be completed by the customer are provided in the Transmission System Code Appendix 1. The Connection Agreement must be executed before the customer's facilities are commissioned and placed in-service.

Phase 5 - Design & Build

This is the longest stage in the Connection Process and its duration will vary depending on the complexity of the project. Major activities during this phase include review and approval of customer and Hydro One connection design, drawings and work plan, acquisition of equipment, easements/property rights and actual construction of customer and Hydro One connection and network facilities.

The Designer & Constructor of the facilities could be Hydro One's own design and construction work forces or a third party that is hired by the customer to design and build the customer built

facilities. In some cases, Hydro One's design and construction work forces may act for the customer as well, if hired to do so.

Process Steps:

1. **(P5.1) Award Work:** Phase 5 begins with the customer and Hydro One awarding the work to the designer & constructor (D&C).
2. **(P5.2 – P5.4) Review Technical Standards:** Compliance with the technical standards that were provided to the customer for the contestable work are reviewed with Hydro One. These will vary depending on the customer facility ownership election made by the customer i.e. (i) Customer Built & Owned; (ii) Customer Built & Transferred to Hydro One; or (iii) Hydro One Built & Owned, as specified in Hydro One's Contestability Procedure.
3. **(P5.5 – P5.6) Confirm Requirements & Deliverables:** The connection requirements, standards, milestones and deliverables are confirmed with the customer and Hydro One. The connection interface requirements are especially critical and agreement should be obtained, as soon as practical, on the following elements:
 - (a) Interfaces
 - line tap to station entrance structures
 - switchyard modifications including breaker upgrades if required
 - protection changes to Hydro One terminal stations & others
 - teleprotection
 - SCADA functionality & telemetry quantities
 - telecommunications
 - revenue metering requirements
 - outage and other operations requirements
 - (b) Interface Milestone Schedule
 - Establish milestones for agreed project interface activities and designate responsibilities. These milestones are to be incorporated into the overall Project Tracking Schedule.
4. **(P5.7-P5.9) Complete Detailed Engineering & Project Design:** Detailed engineering and project design are completed by the appropriate party for the customer and Hydro One work. Also, the customer prepares and submits the final Connection Interface Documents in three packages: Group A, B & C packages as per the Connection Interface Milestone Schedule. The customer must ensure that all required documents for each given Group A, B & C package are provided in a complete and timely manner, as Hydro One's review usually cannot begin until the receipt of all documents within a given package. Hydro One will do a review per Group A, B & C packages. All documents must be submitted complete, in full size, folded and collated.

5. **(P5.10 – P5.11) Procure Equipment & Material & Obtain Construction Approvals:** The D&C procures necessary equipment & project materials, obtains the necessary easements/property and receives the necessary construction approvals & permits.
6. **(P5.12-P.5.13) Construct Facilities:** The D&C builds the required customer connection facilities as proposed in the CCRA, including the line tap, generator, and transformer station, as appropriate. The Hydro One facilities including the line tap, switchyard modifications, tele-protection, protection changes, telemetry quantities, and SCADA meter modifications, as appropriate, are also constructed. Hydro One to monitor as appropriate.

Phase 6 - Commissioning

New or modified load or generation connections require thorough inspection, testing and commissioning to mitigate the potential for unplanned operation and potential damage or degradation of the Hydro One transmission system. Inspection, testing and commissioning are carried out on the customer and Hydro One “as-built” facilities. The Connection Agreement (CA) should be executed before the customer’s facilities are commissioned and placed in-service. Hydro One reserves the right to be a participant in the inspection, testing and commissioning of the customer built facilities and to recover its costs from the customer for these activities.

It is the responsibility of the designer and constructor to draft a suitable Inspection, Testing and Commissioning Plan. The Commissioning Plan must be submitted to Hydro One no later than 30 business days prior to the commissioning test. Failure to comply with this timeline could delay the project in-service date. The Commissioning Plan must be signed and approved by a licensed professional engineer to confirm that the facility will operate as designed. Also, an electronic copy (pdf) of the commissioning results, signed by a licensed professional engineer, must be sent to Hydro One.

Process Steps:

1. **(P6.1 – P6.5) Finalize Connection Agreement:** Customer and Hydro One finalize and sign the Connection Agreement. The customer sends a copy of the signed Connection Agreement (complete with required schedules) to the IESO. This allows the IESO to incorporate new tariff application through assignment of delivery points into the transmission totalization tables for tariff billing purposes. The Connection Agreement should be executed before the customer’s facilities are allowed to be commissioned and placed in-service.
2. **(P6.6) Commission Hydro One Facilities:** Hydro One facilities are commissioned. The Commissioning Agent completes a Field Report of Equipment In-Service (REIS) and notifies the IESO of equipment that is ready for operation.
3. **(P6.7 – P6.9) Submit Customer Commissioning Plan for Comment:** The customer and its Commissioning Agent must develop a Commissioning Plan for all customer built facilities that is to be submitted to Hydro One no later than 30 business days prior to the

commissioning Test. Failure to comply with this timeline could delay the project in-service date. Within 15 days of receiving the plan, Hydro One must notify the customer of its agreement with the plan or that it requires changes to the plan in the interest of safety or reliability of the transmission system. Also, the Commissioning Plan must be signed and approved by a licensed professional engineer to confirm that the facility will operate as designed.

4. **(P6.10 – P6.14) Commission Customer Built Facilities:** The customer and its Commissioning Agent perform and complete all commissioning activities on the customer built facilities, including witness verification tests; witness of rejection and special protection schemes; witness of potential checks; and witness of load checks. At the completion of these activities, the customer and its Commissioning Agent complete and sign a Confirmation of Verification Evidence Report (COVER) and forward the completed COVER Report to Hydro One and the IESO. Failure to comply with the connection requirements or to pass the required commissioning and verification checks will result in **non-connection** of the facilities. These issues must be resolved before connection to the transmission system is allowed.
5. **(P6.15) Transfer Customer Built Facilities to Hydro One Ownership, As Appropriate:** Transfer of customer built facilities to Hydro One ownership based on the customer's election in Phase 3. The transfer price is to be the lesser of the customer's actual cost or Hydro One's reasonable cost to do the same work as per the Code.
6. **(P6.16 – P6.17) Revise CCRA Based on Actual Connection Costs:** Recalculate the customer capital contribution requirements based on actual connection costs (including any appropriate transfer price associated with customer built facilities that are to be transferred to Hydro One ownership) and update the CCRA.
7. **(P6.18) Submit As-Built Prints:** The customer submits to Hydro One one electronic copy (on CD ROM) and four complete sets of the final as-built Interface Connection Documents and three (3) additional sets of the facility line diagrams within 60 days of connection. All hard copy documents are to be submitted in full size, folded and collated.
8. **(P6.19) Manage CCRA & Connection Agreement:** The CCRA and Connection Agreements are managed for the life of the contracts. This includes monitoring the factors that are used to manage "true-up" payments and any by-pass of facilities.