



Toronto Community Housing

**Request for Quotation (RFQ) Specifications**

for

**The Engineering, Procurement and Construction (EPC) of Solar  
Photovoltaic (PV) Rooftop System**

["1/18/2022"]

## PART 1 INTRODUCTION

### 1.1 Overview:

This scope of work is provided by the Toronto Community Housing Corporation (the “TCHC”) to prospective Proponents to submit a Proposal for the Engineering, Procurement and Construction (EPC, Design-Built) of Solar *Photovoltaic* (PV) Rooftop on TCHC-owned properties as outlined in Table 1 below (the “ Project Locations”).

### 1.2 Solar Rooftop Portfolio

The Proponent is required to submit a Proposal that includes its bid for solar rooftop Portfolio Group 1, Group 2 or both Groups. The TCHC will award the Portfolio to the Proposal that obtains the highest score, therefore a Proponent may be awarded one group or both dependent on the score they receive for the Portfolio in their Proposal.

**Table 1. Summary of Solar Rooftop Portfolio Capacities**

Solar Rooftop Portfolio			
Group Number	Project Location	Gross Nameplate Capacity Output*	CIA Approval Date
Group 1	291 George St	62 kW AC per CIA	November 16, 2021
	50 Matilda St	62 kW AC Per CIA	November 09, 2021
Group 2	4175 Lawrence Ave. E	83 kW AC Per CIA	November 09, 2021
	1615 Dundas St E	124 kW AC per CIA	November 16, 2021

### 1.3 Background

The TCHC-owned locations outlined in Table 1 above were assessed by the TCHC as good property candidates for solar rooftops.

The purpose of this project scope is for the successful Proponent to design, supply and install optimal sized solar PV systems based on available roof area and electricity consumption profiles of each property as per this RFQ requirements. The clean electricity produced from the solar PV systems will be consumed by the host buildings and any

surplus of electricity will be supplied to the energy grid, under the Net Metering arrangement with Toronto Hydro.

There are roof anchors installed on the roofs at all Project Location except the 1615 Dundas St. E. The Proponents is expected to retain a TCHC pre-approved roof anchor vendor and work together to prevent obstructing roof anchors on the roofs as much as possible.

In addition, TCHC has retained a roofing consultant to perform condition assessment of the roofs at the Project Locations and perform repairs, as required, prior to solar panel installations on the roof. The Proponent is required to retain the same TCHC pre-approved consultant and/or contractor to perform roofing condition assessment after the solar installations on the roofs.

[End of Part 1]

## PART 2: SCHEDULE A: SCOPE OF WORK

### 2.0 General Scope of Work:

***The following list must be part of the proponent's Scope of Work. However this list is to be used as a minimum guide and does not alleviate the proponent of the responsibility to also carry out, in addition, other work according to the conventional good and current trade practices.***

THE PROPONENT SHALL NOT MODIFY THIS SCOPE AS PART OF THIS RFQ OR THEY MAY BE DISQUALIFIED.

- Proponent acknowledges that the supplied plans and specifications in this RFQ are in some respects not complete. It is the proponent's responsibility to verify the accuracy of the plans and specifications. Proponent agrees that it will perform all Solar Panel works required in accordance with the spirit and intent of these plans and specifications and to conventional and good trade practices, at no extra charge, even if not specifically reflected in the plans and specifications. The proponent shall also fulfil all requirements of the Ontario Building Code, and of all other authorities having jurisdiction, at no expense to the Owner. Furthermore, the proponent acknowledges the Owner's intent to pursue Toronto Green Standards (TGS) Tier 2 by the City of Toronto and consents to make commercial best efforts to assist in this regard on all relevant TGS credits as mentioned below.
- The Proponent shall be responsible to complete the Work for the Contract Price without additional cost to the Owner notwithstanding any errors, omissions, or defects in the Contract Documents. The Contract value will only be adjusted if the Owner requests a material or scope change to the design or if there are new code requirements enacted after execution of this Contract.
- The Proponent to supply all labour, materials, supervision, tools, tackle, plant, equipment, transport, runways, planks, scaffolding, shoring, taxes, insurance, permits, inspection fees, additional assessment and design, etc., necessary to carry out and complete the Proponent's work in all areas on the Project Location as outlined in Table 1.
- This Proponent shall be responsible for daily cleaning relative to the work, storage/staging area and deposit their garbages in their own garbage container. The proponent shall not use the owner's garbage and/or recycle bins. All areas to be left in a broom swept condition. Provide a magnetic broom at each site, use it to pick up any screws, nails and metal, etc. in addition to daily clean up before leaving the site. Failure to comply will result in an automatic back charge without notice. All garbage is to be packaged and removed as per the requirements of Metropolitan

Works Department and all municipal authorities having jurisdiction including Ministry of Environment. The Proponent acknowledges the Owner's intent to reduce construction waste shipments to landfill sites and will review and comply with the site's construction waste management plan, which seeks to achieve a minimum 75% construction waste diversion rate.

- Establish and provide construction schedule within 5 business days from PO issue. Once it is accepted by TCHC, the schedule will be reviewed on weekly basis to ensure it is followed through. Increase manpower in all stages in order to ensure that no delay to the completion date of the schedule.
- The Proponent must have a full-time site foreman/supervisor who will be a responsible representative present for all construction site meetings prior to and during his on-site work to help coordinate the Proponent's work with all other contractors on site. The responsible representative is expected to record, provide progress reports, construction schedule, health and safety documents, submittals requiring Owner's approval, contract closeout, commissioning requirements, and periodically submit relevant documentation to the Owner's representative as it relates to each referenced TGS credit.
- The Proponent shall install a PV system on the roof areas at each Project Location shown in Table 1. System shall fall under "Toronto Hydro's "Net Metering" System and shall be tied into the existing electricity grid.
- The Proponent shall design the system on a ballasted principle. The ballast system must all be designed and sealed by a professional engineer licensed to work in the province of Ontario for all structural, electrical and solar racking designs.
- The Proponent is responsible for hoisting of all equipment and material on the roof level.
- The Proponent must ensure that the work completed is not interfering with any obstacles on the roof, and must work around what has been installed without causing damages i.e, to the fans, duct work, roof anchors, suspended stage outrigger beam locations, plumbing vents, etc.
- Minimum operating lifespan of the system shall be 20 years.
- Roof drainage system shall not be blocked by solar PV panels or solar PV panel mounts, with a minimum of 1 m clearance unless otherwise permitted by the owner in writing.
- TCHC-owned properties outlined in Table 1 shall be inspected and/or repaired by TCHC pre-approved roofing vendors. After the solar system installations, the proponent should retain the same TCHC pre-approved roofing consultant to inspect the roofing assembly. Any damages identified by the original solar contractor shall be repaired by the TCHC pre-approved roofing contractors at the proponent's sole

expense as to maintain the roofing integrity and/or the warranty at no extra costs to the TCHC.

- TCHC shall provide condition assessment of the existing roofing systems. If condition assessment is provided, it is the responsibility of the Proponent to engage the same TCHC pre-approved roofing consultant to provide a similar condition assessment of the roof after the construction to ensure the existing roof is in good condition.
- Roof anchors shall not be blocked by solar PV panels or solar PV panel mounts with a minimum of 1m clearance unless otherwise permitted by the owner in writing. The proponent shall coordinate with TCHC pre-approved roof anchor vendors to ensure that the roof anchors and outrigger beam locations for the suspended stages set up are not blocked by the solar PV panels.
- There are three sites at the proposed Project Locations with existing roof anchor system for suspended stage access for the building's envelope repairs. It is the proponent's responsibility to design the PV panel system not to obstruct the roof anchor system or include a cost in the submission to engage a TCHC pre-approved roof anchor designers and installer to provide a revised roof anchor system and suspended rigging plan for any future building envelope work. This cost will need to include roofer to seal the roof as per recommendations from TCHC pre-approved roofing consultant.
- Project costs for the investigations, design and construction including all material supply, labour and install must not be changed throughout the project. Proponent is required to consider market changes in their pricing, if applicable.

## 2.1 Project Description Overview

Toronto Community Housing Corporation (TCHC) seeks to retain the services of a Solar Developer Proponent (the "Proponent") as "design-build" to produce and lead the engineering design, procurement, construction and administration of solar rooftop systems listed in Table 1 in order to achieve the following high-level objectives for each building in scope:

- Conduct a thorough condition assessment of the existing conditions and to identify existing issues, and opportunities for improvement.
- Provide budget estimate breakdown of the recommended option(s) for each "Project Location".
- Provide construction schedule for each "Project Location".

- Prepare design package by producing all the necessary Engineering design (including roof anchor design), drawings, breakdown items list and specification Documents.
- Obtain building permit and close the permit (by the Proponent).
- Obtain all required Toronto Hydro approvals and provide all close outs (by the Proponent).
- Administrate implementation of the design throughout procurement for construction, construction, and close outs.

## 2.2 Services of the Proponent

The Proponent is responsible for the design and construction including the acquisition of consultant services and specialty trade contractors in delivering the project to TCHC. The services of the Proponent includes, but not limited to:

- Manage and coordinate with all consultants and/or sub-consultants (e.g. Mechanical & Electrical, solar racking sub-consultants, roof anchor and roofing consultants, etc.), general contractor(s) and/or sub-contractor(s) (i.e. solar installers and suppliers, roofers, etc.) to ensure that their works are within the project scope and to ensure that all deficiencies and/or repairs of the project as may arose are rectified.
- Check and collect documents from sub- consultants or sub- trades to ensure:
  - All mechanical and electrical sub-trades are unionized company;
  - Receive suspended stage training if installation of exterior duct work on building envelope is required and/or material delivery on the roof is by suspended stage.
  - All trades meet TCHC health and safety requirements.
  - All design and construction documents are provided for TCHC review and approvals.
- Review all the design drawings of the sub-consultants and/or shop drawings by the contractor(s). Ensure their works are coordinated and their designs have no conflicts or duplications or deviations to the base design and/or the project scope.
- Coordinate between sub-consultants for mandatory site visits.
- Coordinate and provide access for the necessary site visits as requested by sub-consultants.
- Coordinate with all sub-consultants for meeting(s) such as mandatory meetings with the contractor(s), TCHC staff and any other mandatory meetings.
- Coordinate with sub-consultants and contractor(s) to ensure that the design and construction timelines and Construction budget are met.

- Coordinate with sub-consultants, contractor(s) and TCHC during Construction stage for all consulting services and time schedules mentioned in Section 2.9.

### 2.3 Project Phasing Plan

Purchase Order (PO) to successful proponent shall be issued in 3 Phases:

#### Phase 1:

- Investigate, analysis, and provide findings, construction recommendations and budget estimate for each “Project Location”.
- Provide engineering design package and construction cost estimate and construction schedule for each “Project Location”.

#### Phase 2:

- Apply for Building Permit
- Apply for Toronto Hydro Approvals.

#### Phase 3:

- Supply materials essential to complete and execute the contract.
- Manage project construction and provide construction administration services and inspections.
- Close the project and the building permit including all close-outs from Toronto Hydro.
- Provide as-built drawings (in both CAD & PDF formats) and the close-out document in both electronic version and binder (three copies) to the TCHC after completion of the work

Award of phases 2 & 3 depends on Construction Budget availability.

### 2.4 Solar Rooftop Design Requirements

The Proponent must design the system in accordance with the following TCHC technical requirements in addition to the latest requirements by ISO, Utility Providers, Ontario Building Code and Notational Electrical Code. The solar PV system/electrical work must adhere to the latest editions/versions of the following codes/standards/regulations:

- Toronto Hydro, including SCADA requirements
- Electrical Safety Authority (ESA)

- City of Toronto requirements
- Ontario Electrical Safety Code (OESC)
- TCHC Division 26 Requirements

#### 2.4.1 Solar PV Panels, String Configuration, and Electrical Requirements

- .1 All-solar PV system and electrical upgrades are required and must adhere to Toronto Hydro, Electrical Safety Authority (ESA), and the City of Toronto's requirements. In addition, the design must include for all of Toronto Hydro's interconnection requirements for net metering.
- .2 Stamped electrical drawings to be submitted to the City of Toronto for Permit review and approval before procurement and/or tendering.
- .3 The consultant is to apply for a connection impact assessment (CIA) and an Offer to Connect (OTC), as required by Toronto Hydro.
- .4 Design a new meter base and bi-directional meter for net-metering as required.
- .5 Design to include for solar PV panels in the quantities required to meet the solar PV system's size requirements.
- .6 Design to show the Solar PV panels shall have a maximum temperature coefficient of power of  $-0.45\%/^{\circ}\text{C}$ .
- .7 Design to show the Solar PV panel modules must have internal by-pass diodes to minimize impact of shading on the solar PV panel. The shading of one module shall not render the entire solar PV panel or string non-operational during the shading event.
- .8 Supply solar PV panels that are 72 cells and minimum 380Wdc (19% efficiency).
- .9 The design to have a string configuration to ensure all Maximum Power Point Tracker (MPPT) channels are balance within  $\pm 10\%$ . Exceptions must be reviewed and approved by the TCHC.
- .10 No open ended multi-contact 4mm (MC4) connectors will be allowed, all open ended MC4 connectors/home-run cables must be capped to prevent water/moisture getting inside mating connectors.
- .11 Solar PV panels must have product safety certification for use in Canada. In addition, solar PV panels shall be listed in the California Energy Commission Incentive Eligible module listing.
- .12 Solar PV system shall be fire rated per Fire Class C.
- .13 All solar PV panels shall be tested and listed by a recognized laboratory or laboratories. Provide test report for TCHC review.
- .14 Acceptable solar PV modules: Canadian Solar, Longi, Trina, Hanwha, LG, or approved alternatives.
- .15 Certifications shall include, but not limited to:
  - UL1703 Standard for Flat-Plate Photovoltaic Modules and solar PV panels

- IEC 61730 Photovoltaic Module Safety Qualification
- EC 61215 Standards for Terrestrial PV Modules
- Canadian Standards Association and California Energy Commission

#### **2.4.2 Inverters/Balance of Solar PV System**

- .1 String inverters shall be used for solar PV systems.
- .2 Inverters must be UL/CSA listed with minimum efficiency of 97%.
- .3 All components must be UL/CSA listed or recognized and meet all applicable code requirements.
- .4 All component manufacturers, including inverter manufacturer, should have a distribution channel in Canada. It is preferred that they also have a local contact person should issues arise, that they can address in a timely manner.
- .5 Inverters must meet all ESA requirements.
- .6 Inverters must meet all Toronto Hydro requirements.
- .7 EMT Conduit must be used inside and outside of the electrical room. PVC conduit is to be used for all exterior applications.
- .8 Exterior disconnects located in publicly accessible areas shall be mounted inside a lockable stainless steel enclosure, unless otherwise approved by Toronto Hydro.
- .9 Copper wiring throughout, aluminum is not allowed.
- .10 Acceptable inverters; Sungrow, SMA, Fronius, Huawei, Chint, or approved alternatives.
- .11 Transformer weighted efficiency must be 98% or higher.
- .12 For the solar PV rooftop system, it is preferred that the transformer is located on the roof, or inside the building (e.g. electrical room). Outdoor transformer pad is allowed if no other viable option exist.

#### **2.4.3 Monitoring System**

- .1 Design to include for a Cachelan SolarVu with analytic functions to monitor the performance of the system PV systems for each location.
- .2 Monitoring system shall have a client facing, publicly accessible website to view live performance of the solar PV systems.
- .3 Monitoring system shall have a minimum data storage capacity of three months.
- .4 Monitoring system shall have the capability to provide TCHC staff with alarm notifications via e-mail.
- .5 All exposed cabling shall be exterior grade and be placed and supported neatly and in a way to allow for safe travel on the roof

#### **2.4.4 Solar Rooftop Specific Structural and Roofing Design Requirements**

- .1 Prior to proceeding with any work, the Proponent shall engage the services of a professional engineer licensed in Ontario to review the structural integrity and

- load bearing capacity and confirm that the roof at each site is capable of withstanding the additional weight of the solar PV system.
- .2 The Proponent shall consider additional reinforcement to the solar racking system and/or the use of wind deflectors to minimize the effect of loading on the roof structure.
  - .3 The solar rooftop system shall be designed to withstand snow and wind loads as per the latest Building Code requirements.
  - .4 The solar racking system must be wind tunnel tested. Reference of wind tunnel testing must be submitted to TCHC.
  - .5 The solar rooftop structure must be designed with an operating life of a minimum of 20 years.
  - .6 The solar rooftop system shall be designed to be installed on ballasted system.
  - .7 Solar system, equipment and ballasts must not be placed directly on the roofing system. Rubber protection mats or any other protection means shall be provided.
  - .8 No holes or other penetrations are permitted through the roofing membrane system.
  - .9 The solar rooftop system must have a minimum of 2m setback from roof edge as per Canadian Occupational Safety and Health Act (Canadian OSHA) or higher setback as per fire escape requirements.
  - .10 Roof drainage and plumbing vent systems shall not be blocked by solar PV panels or solar PV panel mounts, with a minimum 1m clearance unless otherwise permitted by TCHC in writing.
  - .11 Solar rooftop system must not impact any roof anchor systems at the Project Locations, if present.
  - .12 All mechanical and electrical equipment on roof must have sufficient clearance around the equipment for service technicians.
  - .13 All solar equipment on roof shall be design to avoid any damages to the roofing membrane, parapet walls and metal flashings.
  - .14 Acceptable solar racking system: Terragen TGR, HB Solar - Skyrack / Blockmount, Schletter Fix-Grid, KB Econorack, or approved alternatives.
  - .15 No truck load is allowed on the garage podium deck for the purpose of material delivery on site. If such case is un-avoidable, proponent must assess the podium deck structural load capacity for additional loading by the truck by a professional engineer licensed in Province of Ontario and provide a stamped report to TCHC at no additional costs to TCHC. Provide assessment calculation back up as supporting document if requested by TCHC. If the truck overloads the garage podium deck structural capacity, the proponent must not allow any truck to transport materials on the garage podium deck. Any such negligence by the proponent that causes damages to garage podium deck slab and waterproofing system must be repaired by the proponent at no additional costs to the TCHC.

#### **2.4.5 Transformer**

Refer to TCHC specification section 26 15 15: Dry Type Transformers.

#### **2.4.6 Disconnect Switch**

Refer to TCHC specification section 26 15 55: Disconnect Switches.

#### **2.4.7 Rapid Shutdown**

Refer to article 64-218: Photovoltaic rapid shut down of latest Ontario Electrical Safety Code (OESC) for rapid shutdown requirements

#### **2.4.8 Other Electrical Requirements**

Refer to the following TCHC specification sections for additional electrical requirements:

- 26 05 05: Basic Electrical Materials and Methods
- 26 05 07: Firestopping and Smoke Seal Systems
- 26 05 31: Splitters, Junction and Pull Boxes
- 26 15 20: Conductors (0-1000V)
- 26 15 25: Secondary Grounding and Bonding

### **2.5 Investigations / Schematic Design**

The Proponent scope of work will include but is not limited to the followings:

- Undertake investigations as necessary to fully familiarize the assignment Work in all aspects relating to the scope of the assignment;
- Review reference documents and drawings relating to each Project Location (It is to be understood by the Proponent that the existing documents in the possession of TCHC may not reflect the actual existing conditions and are provided for information only);
- Review the roofs, building surroundings and electrical rooms, etc. at each Project Location and provide recommendations on initial solar rooftop installation and connection plan.
- Assess the existing electrical infrastructure in the building and providing design solutions to integrate new PV system
- The Proponent is required to provide shading analysis of the equipment and/or rooms on the roof level as per attached survey plan at each Project Location.
- The Proponent is required to provide at least three different sets of solar layout plans from three different solar racking companies to TCHC for review and approvals. TCHC will review the plans internally and approve one set of layout plan for the design stage.

- Each solar layout plan to include proposed solar structural assessment or load reports (both local and global load reports), ballast plans, solar racking details, solar system weights, solar panel orientation, row spacing, roof setbacks, roof coordination, etc. (Note that minimum setback to be 2m from roof edge as per Canadian OSHA or higher as per fire escape requirements).
- Provide initial assessment of solar electricity generations (i.e. by providing PVSYST and/or Helioscpe modeling, etc.).
- Provide investigation report which includes sections addressing the following areas:
  - Three sets of solar layout plans with structural load reports. TCHC shall provide roof survey plan (in CAD file) at each of the Project Location.
  - Structural assessment report of the building for additional weight imposed by solar rooftop installations. Provide assessment model and/or structural calculations back up upon TCHC request.
  - Assessment of the existing condition of the electrical system in the building complete with a summary and identification of key scope to support the project.
  - The Proponent is to anticipate and include the cost of any additional foreseeable site conditions that may require additional sub-consultants to produce a complete design package.
  - The Proponent is also to anticipate location of any potential routing of conduit that will require additional infrastructure or create an impact to the building.
  - Provide an overall impact of the new solar PV panels to the buildings electrical and physical infrastructure.
  - Provide construction cost estimate and construction schedule.
  - Provide the amount of electricity that the solar PV panels will be able to generate, and an estimated ROI “rate of return”.
- Provide Final investigation report incorporating any revisions resulting from review from the TCHC.
- The Proponent shall retain the roofing consultant for roofing assembly inspections and condition assessment **after** the installation of the solar system and the roof anchor system. **The roof consultant is required to be the same TCHC pre-qualified consultant who did the roof scan report for the specific site** when TCHC handed over the site to the Proponent before solar construction. Refer to Appendix A for the TCHC pre-approved roofing consultant vendors.
  - If the existing roofing assembly cannot be scanned (i.e. inverted roofing membrane assembly), then, the Proponent shall engage the TCHC pre-approved roofing consultant to carry out inspections.

- The roof condition assessment report and drawings prepared by the TCHC pre-approved roofing consultant shall include the followings:
  - Roof scans (after solar panel and revised roof anchor installations).
  - Locations of roofing system deficiencies by visual inspections.
  - Location of wet areas with their approximate dimensions, if roof is scanned.
  - Locations that are missing aggregates to protect roof from UV radiations.
  - Recommendation for repairs, if any, including brief specification of the repairs with materials/drawing details and a list of breakdown repair items with estimated quantities.
  - Life expectancy after the roof repairs.
  - Photos of the defected roof locations with brief description for each photo.
  - Any roof deficiencies identified as per this roofing condition report (i.e. after the solar panel installations) which are found to be by the Proponent negligence must be repaired by the Proponent at no additional costs to the TCHC. The repairs must be performed by the TCHC pre-approved roofing vendors. If the roof is under warranty, the same roofer who performed the roofing must be used.
- Existing roof replacement conditions and warranties at each Project Location are provided in Table 2.
- Thermaco Engineering is the roof consultant engaged by TCHC to carry out the roof scan report/inspection for these 4 sites. All the roof assessment reports will be ready by mid-June 2022 and TCHC will provide them to the successful proponent.

Table 2. Existing Roof Conditions

<b>Project Location</b>	<b>TCHC Previous Job Numbers</b>	<b>Roof Last Replacement Year</b>	<b>Roofing Consultant (last roof replacement)</b>	<b>Roofing Contractor (last roof replacement)</b>	<b>Roof Warranty (material)</b>	<b>Current TCHC Roofing Consultant</b>
291 George St	435585 (D&C)	2015	Accent Building Sciences	Eileen Roofing Inc.	10 years	Thermaco Engineering
50 Matilda St	N/A	N/A	N/A	N/A	N/A	Thermaco Engineering
4175 Lawrence Ave. E	438707 (C) 438438 (D)	2017	Thermaco	Trinity Roofing Ltd.	10 years	Thermaco Engineering
1615 Dundas St E	434554 (C) 432457 (D)	2015	R and C Engineering	Rooftops and Sheetmetal Corp.	10 years	Thermaco Engineering

Refer to Appendix A for contact info of the roofing consultants/contractors

- The Proponent shall retain the TCHC pre-approved roof anchor vendor to ensure the existing roof anchors and outrigger beam locations for suspended stage installations are not obstructed by the solar panels. Refer to Appendix A for the TCHC pre-approved roof anchor vendors. Scope of work for the roof anchors includes but is not limited to the followings;
  - Coordinate and attend meetings with the TCHC pre-approved roof anchor vendors to review the existing roof anchor drawings and report, architectural and structural drawings and the solar layout plans ensuring that the solar panels will not block access to the existing roof anchors and locations of outrigger beams.
    - Provide an outrigger beam set up layout plan with Solar panels in place for suspended stage access to the entire building elevation perimeter for TCHC review.
  - **Provisional Item:** If Solar panel equipment obstruct the existing roof anchors, Solar proponent needs to work with the TCHC pre-approved roof anchor vendors to design and install new / alternative roof anchor(s) to ensure that roof anchors are accessible for any future balcony and over-cladding repairs and window cleaning. This item also includes:
    - all revisions as may be necessary to solar layout plans to accommodate safe access to the roof anchors.
    - All roof repair cost at the new/alternative roof anchor locations using the **same roofer of the specific site as per Table 2.**
    - The new/alternative roof anchors design and the corresponding outrigger beam layout plan are required in the investigation stage of the project.
    - The new/alternative roof anchors shall be installed prior to solar PV installations.
  - In the new/alternative roof anchor design proposal during the investigation stage, provide a layer out plan which shows the following numbers of new / alternative roof anchors as may be required.
    - Number of new roof anchors
    - Number of new wall anchors
    - Number of new anchor stops
    - New miscellaneous equipment
  - In addition, the corresponding outrigger beam layout plan for the entire (i.e. existing and the new/alternative) roof anchors design has to be submitted at the same time in the investigation stage.

### 2.5.1 Communications:

- Allow two meetings per Project Location with the TCHC to confirm design options/ recommendations and preliminary budget before finalizing the investigation report(s).

- Prepare and submit minutes of the meetings with the TCHC within two business days the meeting was held.

### 2.5.2 Deliverables:

- Provide investigation (Solar) report including all observations, recommendations and cost estimates. Provide photos of the observations with a brief descriptions and their locations.
- Transfer information from record drawings (tiff or pdf) to CAD to create an “As-Found” drawing set. Document the known conditions of the architectural, structural and electrical systems in the building in the aid to design the solar photovoltaic rooftop system.
- Provide TCHC one printed copy of the drawing package with full size prints, an electronic copy in PDF, and CAD files including plot mapping files (ctb). CAD file to be compatible with the latest TCHC CAD version (i.e. version 2017).
- Provide the entire (existing and include the new/alternative) roof anchor system with solar equipment in place
- Provide outrigger beam layout plan corresponding to the entire roof anchor system.

## 2.6 Design Package Development

The Proponent shall use the scope of work and the drawings agreed upon in Section 2.5 to develop the design package. The Proponent’s scope of work for design includes but is not limited to the followings;

- With TCHC’s acceptance of the recommendations, provide a detailed scope of work and prepare the design package which includes drawings and specification and price schedule of the breakdown items as per itemized scope of work.
- Drawings of the design package to include construction operation phasing plan, solar rooftop layout plans / elevations, solar racking detail connections, solar equipment data sheets, electrical layout plans / elevations and single line diagrams, and any other drawing details as necessary for the projects.
- The Proponent to ensure that the structural integrity of the buildings is maintained and the roof structure can sustain additional loads imposed by the solar system.
- The Proponent to ensure that all design works including the works of sub-consultants are well coordinated without any deviations to the project scope.
- **Provisional Item:** if design of any new / alternative roof anchors is required, the proponent must submit at least three competitive pricing for design and installations of the new / alternative roof anchors for TCHC review. TCHC will review the submitted prices and provide written acceptance for this provisional item. The design must also meet requirements of the latest Ontario Building Code (OBC), Occupational Health and Safety Act (OSHA), Canadian codes on the Health and Safety of the suspended equipment.
- Any penetrations into building walls and the garage podium deck must be sealed and fire rated as per the latest code requirements.

- **Provisional Item:** Mark and identify locations of any penetrations into garage podium deck slab or on the below ground foundation walls on a layout plan drawing. Any penetrations into the garage podium deck slab and/or below ground foundation walls for access to electrical room must be sealed and waterproofed. Concrete must be scanned for any live electrical cables embedded into the slab, if any, and to ensure slab reinforcement are not cut. Location of the slab penetrations must be selected in such a way that not to impact the structural integrity of the podium deck slab. Waterproofing around any penetrations into garage podium deck slab and/or below ground foundation walls must be completed by TCHC pre-approved garage restoration contractors. Refer to Appendix A for the TCHC pre-approved garage restoration vendors. Details of the waterproofing and podium deck replacement around the penetrations must be provided to TCHC in the design package for review and approvals.
- Ensure that project construction phasing has minimal interruption on tenants and building occupants, also on operation of site security and safety systems.
- Provide clear direction on 'how' the work is to be implemented during construction, by both specification and drawing details. If the design needs to make changes to the existing condition/structure, this will need written acceptance by TCHC.
- Provide design (draft version) for TCHC to review. The draft version will include scope of work, breakdown items list (if applicable), specifications, drawings, and budget estimate per the breakdown items.
- Make changes to Design Package when such revisions are due to the interpretation of the authorities having jurisdiction.
- Finalize the design package within TCHC planned schedule.
- Prepare and submit estimated costs and estimated construction schedule for each Project Location based on the supplied breakdown items list (for both draft and final versions).
- Include the costs for any revisions that might be necessary to the design package during construction by the Proponent (i.e. by structural, electrical and solar racking consultants, roof anchor design, roofing consultant, etc.). Such revisions costs will not be extra to TCHC during the construction.

### 2.6.1 Cost Control:

- Ensure the cost for design and construction of the project does not exceed the TCHC approved project budget.
- Provide detailed cost estimates based on elemental breakdowns throughout the design / contract document development process to ensure that the budget is not exceeded. Detailed cost estimate to be provided during the design stage.

### 2.6.2 Communications:

- Allow three meetings per Project Location with the TCHC to discuss the design package submission after TCHC review.

- Prepare and submit minutes of the meetings with the TCHC within two business days the meeting was held.

### **2.6.3 Deliverables:**

The Proponent shall provide set of design package in electronic copy, Including, but not limited to:

- Prepare all drawings on a CAD system that is fully compatible with the AutoCAD Version 17, system currently in use by TCHC. Provide TCHC with PDF drawings during the review stage.
- Design of the new/alternative design of the roof anchor system;
- All non-drawing documents shall be in Microsoft Word, PDF, Excel, PowerPoint and Project format.
- Applicable Division Specifications with table of contents (word and/or PDF);
- Detail description (with heading) of the “Scope of Work” which will match the breakdown items list (if applicable) of the design document (Word and/or PDF)
- Cost estimate matching the breakdown items (Excel).

### **2.7 Building Permit and Toronto Hydro Approvals**

The Proponent shall prepare all required documentations and obtain building permit and Toronto Hydro Approvals for each Project Location prior to commencing of the construction. The scope of work includes but is not limited to:

- Provide all documents for permit application and coordinate with City Planner to obtain approval for the application prior to construction commencement.
- Provide all documents for Toronto Hydro (TH) application and coordinate with Toronto Hydro to obtain all required approvals and Notice to proceed prior to construction commencement.
- Provide all necessary design package, additional drawings, product data sheets, specifications, etc. and all other documentations as requested by the City and Toronto Hydro to obtain the permit and TH approvals.
- Permit and Toronto Hydro Approval costs will be reimbursed to the Proponent under related Allowance Items after issuing the building permit and TH approvals by providing supporting documents and receipts to the TCHC. No markups are allowed on the City and Toronto Hydro receipts.
- Prepare and provide construction drawings for Contractor to start the project.

### **2.8 Project Construction**

The Proponent shall provide unit rate pricing per solar watt installation for the complete construction at each Project Location. The scope of work for this unit rate complete construction includes but is not limited to the followings;

- Provide Notice of Construction to Ministry of Labour (MOL) before work commencement and comply with all MOL Construction Act Requirements.
- Provide a “pre-construction schedule” to TCHC Project Manager at least two weeks in advance before any installation.
- Coordinate with site staff to send Notice to Tenants before work commencement.
- If there is noise issue to top floor tenants, specific 5 days’ notice to tenants of the top floor will be required.
- Provide all site safety and protections (i.e. fence protections, walkways, over-head protections, etc.) as maybe required to provide 24/7 safe access to the tenants and the public to all building entrances and the parking garage. Proponent are not allowed to obstruct any entrances / exits to/from the buildings or to obstruct emergency route access.
- Provide 24/7 access to all emergencies (i.e. fire truck, EMS, etc.)
- The construction hour;
  - Mondays to Fridays: 8:00 AM to 5:00PM (no noisy work between 8:00 AM to 9:00 AM,
  - Saturdays: 9:00 AM to 5:00PM (no noisy work)
  - Sundays and Statutory Holidays: No work
  - Work outside the above hours required written TCHC site staff approvals.
  - If the Proponent needs to increase work hours to meet schedule, this needs to be at no extra charge to TCHC.
- If there is any shut down of electricity to residents, provide:
  - 5 business days in advance notice to residents
  - Supply temporary power to boiler room and garage entrance doors.
  - Inform Fire Marshall, if required.
  - Provide fire watch 24/7 at common area at no extra cost to the TCHC. G4S Canada is the only TCHC pre-approved security vendor.
  - Provide a list of equipment which will need to carry out equipment testing after the Utilities are resumed to the TCHC Project Manager for review and acceptance.
  - Provide equipment tests after power resumed at no extra cost to TCHC.
- Provide updated construction schedule to match the completion date of Proponent’s preconstruction schedule approved by the TCHC.
- Include the costs of mobilization and de-mobilization at each Project Location which also include the delivery of materials to the roof level.
- Supply and installation of all materials, equipment, etc. required to complete the project work. This item includes all electrical cables, conduits, cable tray, dura blocks, rubber mats, etc. as required to run the cables from solar systems on the roof to the proposed electrical sources at each Project Location.
- Request solar racking design Engineer to inspect the solar installations during the construction. Provide punch list items to TCHC after the inspections by the solar racking engineer. Also, request and provide final sign- off letter from the solar

racking design engineer to ensure that the solar panels are installed as per their approved drawings.

- **Provisional Item:** if installation of any new / alternative roof anchors is required, the proponent must submit at least three competitive pricing for design and installations of the new / alternative roof anchors for TCHC review. TCHC will review the submitted prices and provide written acceptance for this provisional item. This item includes supply and install any new / alternative roof anchors as per the TCHC approved roof anchor design. This item includes but is not limited to the followings;
  - GPR scanning before any drilling into the roof slab.
  - Repair of the roofing system by the (same) TCHC pre-approved roofing vendor including 5 years of roofing warranty after the repairs (from the date of the roof anchor completion).
  - Provide engineering approved shop drawing(s) stamped in the Province of Ontario. Drawings are to show new and existing roof anchor product/equipment layout, section details and all necessary restrictive and general notes.
  - Provide one 11" x 17" laminated copy of the drawing, replace the existing drawing with the new drawing at site.
  - Provide Load Test of all anchors (existing adhesive anchors and upcoming new additional anchors) in accordance with the CSA standards and MOL Regulation and Guidelines.
  - Provide photo of the posted drawing to the TCHC Project Manager via email.
  - Provide updated / revised roof anchor plan drawings, inspection report and load test report to the TCHC Project Manager and the TCHC Engineer.
- After solar system installations on the roof, the same TCHC pre-approved roofing consultant shall inspect the roofing assembly. If any damages identified by the original solar contractor negligence, they shall be repaired by the TCHC pre-approved roofing contractors at the Proponent's sole expense as to maintain the roofing integrity and/or the warranty at no extra costs to the TCHC. The Proponent shall also retain the same TCHC pre-approved roofing consultant to prepare roofing design package for the repairs at no extra costs to the TCHC.
- Perform any roof structural re-assessment, if required, after installations of solar system on the roof. The Proponent is required to re-assess the roof structure should any changes to the solar systems loading on the roof to occur during the construction. Any such re-assessment, if required, must be reviewed by TCHC, and, at no extra costs to TCHC.
- Perform any revisions and/or modifications, if required, to the pre-approved solar layout plan set as maybe changed during the construction (i.e. relocation, addition and/or removal of solar panels/arrays). Any such revisions and/or modifications, if required, must be reviewed and approved by TCHC in writing, and, at no extra costs to TCHC.

- Perform any revisions and/or modifications, if required, to the pre-approved solar electrical design package as maybe changed during the construction. Any such revisions and/or modifications, if required, must be reviewed and approved by TCHC in writing, and, at no extra costs to TCHC.
- The Proponent is not allowed to change, revise and/or modify any TCHC pre-approved materials, equipment and/or installation procedure related to the project as per pre-approved design package without TCHC review and written approvals. Any such approvals by TCHC must be at NO extra costs to the TCHC.
- Any of above revisions and/or modifications, if required, should be completed within 5 business days when such revisions and/or modifications is accepted by the TCHC.
- A set of PDF Shop Drawings for all manufactured equipment to be submitted by the Proponent for approval no later than four (4) weeks after the signing of the construction Contract between the Proponent and its solar installer(s) / sub-contractor(s). It is this the Proponent's responsibility to review all Shop Drawings and ensure that the solar installer(s)/ sub-contractor(s) determine and verify all applicable field measurements, field construction conditions, material requirements, catalogue numbers and similar data and for checking and coordinating all Shop Drawings with the requirements of the Work and the Contract, all before submitting the Shop Drawings for approval. The Proponent shall ensure that Shop Drawings are submitted and approved early enough such that equipment is available on time. If the submission differs from the Specifications, it is a requirement to have attention drawn to the variance by way of an explanation on the transmittal cover sheet at no extra charge to TCHC.

## **2.9 Construction Administrations, Inspections and Closing Binder**

The Proponent's scope of work for construction administrations, inspections, and, closing documentations includes but is not limited to the followings;

### **2.9.1 Site reviews**

- The Proponent shall provide to TCHC a schedule of proposed site visits based on critical parts of the remedial program for the duration of the project. Allow one site inspection per week per Project Location as a minimum.
- The Proponent shall provide an appropriate level of site review necessary to ensure the quality specified is obtained with a corresponding inspection report.
- The Proponent to ensure that the Contractor complies with all pre-approved design package requirements. Site visit inspection reports to include any deviations from pre-approved design package by the specialty contractor and remediation actions required by the specialty trade contractor to bring the project up as per the scope.
- Site visit reports shall include weather condition, any testing, testing report, approvals, number of workers at site, location of and description of work being

completed, a list of deficiencies and recommendation for correction, and the percent complete of the project at the end of the site visit.

- Site visit reports shall be submitted to TCHC and to its specialty trade contractor within five (5) business days from the date of the inspections.
- Any site instructions which will incur any additional project scope shall be reviewed and approved by TCHC in writing, but, at NO additional costs to TCHC.

### 2.9.2 Project information

- Manage and provide information to TCHC regarding contractor's construction **Bi-Weekly** look ahead schedule, list of material, types, and any work interruption, risk, etc. for review and approval. In case of emergency or safety measures, provide TCHC with required information to develop notices to tenants.
- Provide design package clarifications and/or additional site instructions to the contractor to perform the work at no extra costs to TCHC.
- Provide contract document interpretations and additional instructions, if required, for construction with no extra costs of consultation to TCHC.

### 2.9.3 Change Orders

- TCHC does not expect contract changes.
- If TCHC requests additional scope to the project, prepare Contemplated Change Order Notice for TCHC consideration and approval prior to authorizing any work.
- Inform TCHC of any site instructions that will have cost implications prior to issuing them to the contractor. Provide the Proponent justification and indication of whether it was a "missing item" in investigation stage or design stage or procurement stage or it is a TCHC request. TCHC will review and provide justification before change order approval. **Any work done before TCHC written approval it will be deemed as free of charge to the TCHC.**
- If change order is approved by the TCHC, the Proponent including all sub-consultants must not add mark up to the contractor's price. Contractor must not also include additional mobilization cost or overhead profit to the additional work. TCHC may request material and labour breakdowns of change order quotation before acceptance.

### 2.9.4 Attend all pre-construction and scheduled monthly construction progress meetings

- Progress meeting minutes shall be completed by the Proponent and submitted to TCHC and its specialty trade contractor for review within five (5) business days of the meeting.

- Prepare copies of minutes of previous site meeting for progress site meetings.
- Include cost to the following meetings in addition to the one site inspection per week.
  - Preconstruction meeting
  - Monthly progress site meetings
  - All additional site visits to clarify construction details not detailed in the specification but within scope of work.
  - Any required mock up review meetings at per specification requirements.
  - Any meeting to facilitate materials evaluation/sampling as required.
  - Joint site measurement with Contractor for monthly payment certification.
  - Project close out meetings

### **2.9.5 Proponent's sub-contractors submissions review**

- It is the responsibility of the Proponent to review all specialty trade contractor submissions. These may include shop drawings, material list, data sheets, warranties, site conditions information, testing reports...etc. as per the Proponent / TCHC requests.
- Provide the Proponent comments or approval to shop drawings within five (5) business days from day of submission by the specialty trade contractor.
- Review shop drawings and evaluate conformity with the pre-approved design package. If the shop drawings deviated from the pre-approved design package or the Proponent recommended changes that the changes deviates from the pre-approved design package, any such deviations must be reviewed and approved by TCHC in writing, but, such changes must not cost extra to TCHC.

### **2.9.6 Project Construction Schedule**

- Provide a 2-weeks ahead construction schedule to TCHC Project Manager.
- Provide an updated project progress's construction schedule with comparison to the "Master schedule".
- Provide information to alert TCHC Project Manager for any Construction Delay in progress meetings.

### **2.9.7 Site safety**

- TCHC may retain site safety consultant at each Project Location.
- TCHC expects that the Proponent also acts as an agent of TCHC ensuring that its specialty trade contractor activities are in compliance with the

requirements of the Ministry of Labour and the Occupational Health and Safety Act and its Regulations.

### 2.9.8 Related items with Tenants:

- Ensure minimal interruption of tenants and building occupants, operations of site systems, security and safety.
- Act as the first contact for the Site Superintendent on problems arising from construction.
- Direct all concerns related to the Residential Tenancies Act or other applicable legislation, safety, housekeeping, operations and security to the contractor and site staff and ensure immediate response.

### 2.9.9 Project Substantial Completion

- The following is the criteria set to establish “Project substantial completion” requirements:
  - All works (including debris clean up, deficiencies, etc.) are completely done by its specialty trade contractor. The Proponent needs to have a site walk through to confirm the Work is completed;
  - Provide Roof anchor inspection report by Roof anchor engineer;
  - Provide Roof anchor Load test report with Engineer stamp for the new/alternate roof anchors;
  - Photo taken at site to show that the laminated roof anchor drawing is posted on site.
- When all the above items are done, coordinate and arrange the following meetings, inform TCHC Project Manager to join the meeting:
  - Provide Permit Sign off Letter to City Inspector to close the Building Permit. This includes to attend any site meeting with the City Inspector. Coordinate and arrange with City inspector to visit the site and confirm that building permit can be closed at City’s file;
  - Provide necessary documentation to Toronto Hydro to close the solar project. Coordinate and arrange a site meeting with the Toronto Hydro inspector to accept the work. The Proponent is expected to obtain documentation from Toronto Hydro to confirm the solar project is closed.
- When the above two meetings are done and no outstanding items from inspectors, coordinate with TCHC Project Manager to arrange a Site Walk-Through Meeting with TCHC Project Manager to confirm all Works are accepted and the site can be handed over to TCHC site staff. If there is no deficiency and no outstanding work,

this date can be established as the date of Substantial Performance of the work by TCHC Project Manager to the Proponent.

- If there is any deficiency found during the Walk-Through meeting, both TCHC Project Manager and the Proponent to identify and assess the cost of all the deficiencies and outstanding works for the purpose to establish the substantial completion of the project not to exceed the requirements as mentioned in the main contract between TCHC and the Proponent.
- The Proponents is expected to complete all the deficiencies and outstanding items within two weeks after the walk-through meeting. Provide proofs of rectification or arrange meeting with TCHC Project Manager for the confirmation.

### **2.9.10 Project Close Out Binder:**

0.1 Review close-out documents, providing a digital copy and three hard copies in binders. Information shall include but is not limited to:

- Certification of substantial completion (Form 6 or Form 9). Provide a copy to the contractor.
- Permit Sign Off Letter to City Inspector;
- Document to confirm that the City building permit is closed.
- Toronto Hydro closeout documents
- Record drawings (CAD and PDF format)
- All meeting minutes.
- All Change Orders.
- Design documents/addenda;
- Inspection reports, Testing results;
- Notice of Projects;
- Sign-off compliance contract letter;
- Operating and maintenance manuals;
- Troubleshooting procedures

0.2 Provide list of project close-out documents required from Contractor. Review all the documents to ensure that they meet the pre-approved design package requirements. Provide a digital copy and include them in the Project Document Binders.

- Contractor Warranty letter (minimum 3 years Labour Warranty).
- All material and equipment warranties to be provided separately as below;
  - Racking System: as per manufacturer warranty

- Inverters: 10+ years
- Solar PV Panels: 20+ years
- Transformer: 10 years
- Disconnect Switches: as per manufacturer warranty
- Monitoring device: 5 years
- Roof Repairs: 5 years
- Additional Roof Anchors: 2 years
- Deficiency list and confirmation from the contractor that all deficiencies are corrected.
- Material List and data sheets.
- All the close out documents to be submitted to the TCHC project manager within two weeks from the substantial completion date

### **2.9.11 As-built drawings**

- Field verify and check the accuracy of the Contractor(s) as-built documents prior to acceptance of as-built drawings.
- At completion, incorporate as-built information and all changes to the work into the Record of Drawings in CAD Version
- Provide TCHC with soft copies containing the Record Drawings in CAD Version and symbol libraries to TCHC standards
- Final payment to the Engineer will not be issued until Record of Drawings in CAD Version is received and Close Out documentation reviewed.
- Update energy simulation model and report to reflect the as-constructed scenario based on shop drawings and any changes to the design during the construction stage.
- All the as built drawings to be submitted to the TCHC project manager within two weeks from the substantial completion date.

### **2.9.12 On-site Post-Construction Review meeting**

- Attend the 24-months Post-Construction Review Meeting on site. If any deficiencies found during this meeting which are under the warranty, communicate with the contractor and rectify the deficiencies within maximum four (4) weeks from the time of the meeting.

### **2.9.13 Payments to the Proponent:**

0.1 Investigation, Design, Building Permit / Toronto Hydro Application Stage:

- The Proponent to be paid as per Lump Sum prices in the Bid Submission.
- The Proponent submitted cost is required to include all disbursements, travelling expense, office supply costs, profit, etc.
- All provisional items will require TCHC-Engineer written approval before starting the work.

#### 0.2 Construction Stage:

- The construction costs for all supply and install shall be based on the unit rate per the solar watt installed.
- Award for the Consulting Services during Construction Stage will depend on TCHC fund availability.
- The Construction Administration (CA) service to administer the above noted items shall be based on a Lump Sum price.
- Progress payment to the Proponent services during construction stage will be based on the percentage (%) of construction completion and all the required documents which needs to be submitted to TCHC. This includes but is not limited to: The Proponent's shop drawing review, RFI response to contractor, site meeting minutes, site inspection reports, etc.;
- Payment to bid form item for close-out and as-built documents submission will include all the close out document mentioned in this specification. Documents in the close out documents can be omitted only by TCHC Project Manager's written confirmation.
- Final payment to the Proponent will not be issued until project closeout binder (both digital and three hard copies) in CAD & PDF is received by TCHC Project Manager and TCHC Engineer.
- The Proponent submitted cost is required to include all disbursements, travelling expense, office supply costs, profit, etc.
- The Proponent must remain in good standing with TCHC.

#### 2.9.14 Allowances

- Allowance can only be used with written instructions from the TCHC.
- No overhead or profit or mark-up on the allowance amounts are allowed by the Proponent and/or its specialty trade contractor.
- The Proponent's and/or its specialty trade contractor's overhead and profit for administering and executing Allowance work is to be included in the Proponent's and/or the design and construction costs.
- Provide a detailed cost breakdown for the Allowance expenditures, including supporting documentation, as requested by the TCHC.

- The electrical and mechanical allowance is for the conditions that are not visible upon, or reasonably inferable from an examination of the site, as determined by the TCHC.
- The electrical portion of the Allowance is for the cost of repairing buried electrical conduits, boxes, and other electrical items during the work. The Allowance does not cover the cost of repairs due to Contractor's negligence.
- Arrange and pay for any commissioning and/or testing as requested by the Toronto Hydro. The costs will be reimbursed under this testing allowance upon providing receipts from the Toronto Hydro (no markup is allowed).

## 2.10 Timelines

- Estimated Purchase Order (PO) issue date: May 09, 2022
- Draft Investigation report: 3 weeks after PO issue date
- Final Investigation Report including drawings: 5 weeks after PO issue date
- Draft Design Package: 7 weeks from PO issue date
- Final Design Package: 10 weeks after PO issue date
- Building permit and Toronto Hydro approvals: 6 weeks from Design completion date
- Construction Commencement: 7 weeks from design completion date.
- Construction Completion: 10 weeks after construction commencement date

**End of Specification**