



- **Canadian Solar Developers Ltd.**

Draft Design and Operations Report

Type of Document

Draft Report

Project Name

Draft Design and Operations Report
Proposed Groundmount Solar Facility L.P #6
8338 Scotchmere Drive, Strathroy, ON
OPA FIT Program: FIT-FV2CJ1A

Project Number

V00002250-00

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Canadian Solar Developers Ltd.
Draft Design and Operations Report

Prepared for:
Canadian Solar Developers Ltd.
Ground Mount Solar PV Power Project – L.P #6

August 10, 2012

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Executive Summary

Canadian Solar Developers Ltd. is the proponent for the development of a 100 kilowatt solar power project in the Municipality of Strathroy-Caradoc at 8338 Scotchmere Drive. An application has been made for the site L.P#6 and a file opened under the OPA FIT Program (FIT-FV2CJ1A). **Exp** Services Inc is completing all REA-related reports and will be representing Canadian Solar Developers Ltd during the application and approval process.

The Design and Operations Report (DOR) has been prepared as part of an application for a Class 3 Solar Facility under O.Reg.359/09 Renewable Energy Approval (REA) under Part V.0.1 of the Ontario Environmental Protection Act as amended by O.Reg. 521/10 and O.Reg. 231/11.

This report follows the protocols and procedures set out for REA projects. A detailed Facility Site Plan, Facility Design Plan, Facility Operational Plan, and Environmental Effects Monitoring Plan has been prepared. In addition, an outline specifying the requirements for an Emergency Response Plan with an Emergency Communications Plan to facilitate the municipal ERP has been presented.

The site plan shows the layout of the solar array field, the associated electrical components, topographical features and other amenities within the study area. This layout has been designed to minimize the footprint and the potential environmental effects, yet maximize the system capability for power generation. The setting is an actively cultivated farm field next to a farmyard.

The DOR is supported by several background studies that have assessed the potential impacts of the proposed works on the environment / natural heritage, as well as other social and cultural aspects of the site. The environmental impacts during the construction, operation and decommissioning phases have been determined to be able to be mitigated and/or manageable. There are no provincial parks, ANSIs or water bodies within 120 metres of the proposed solar array field. There is a Provincially Significant Wetland (PSW) in the general area. The Natural Heritage Site Investigation has determined that neither the PSW or any other natural feature are within the development setback. The Project has been determined to have no impact on the identified features. The acoustical assessment determined that all MOE requirements are met or exceeded. The Stage 1 archaeological property inspection exhibited archaeological potential. A Stage 2 archaeological field inspection has been undertaken and found artefacts of low heritage cultural value. A cultural heritage self assessment was conducted and indicated that there was potential for heritage resources at the project location. A cultural heritage impact assessment has been completed. The solar array development was determined to have no negative impact on the property. Neither the surface water nor groundwater is impacted by the development. There is no requirement to change the Land Use for the Project. Post-decommissioning, the land can revert back to its agricultural usage.

The solar facility relies on sunshine to produce electricity and therefore operates only during daylight hours. It will operate year-round. A schedule of inspection, maintenance and repair has been set out. No security measures are proposed.

An outline for an Emergency Response Plan (ERP) along with an Emergency Communications Plan has been noted. Key contact information for early responders (police, ambulance and fire) will be identified in addition to coordination requirements with the local municipality or other designated agency. An ERP will be prepared and formalized with the local authorities.

Regular contact with stakeholders apprising them of the Project status and a public consultation protocol for all future phases has been identified. This includes mail outs as required, notices in local newspapers, and public information meetings.

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1. Introduction

As part of an application for a Renewable Energy Approval (REA) from the Ontario Ministry of Environment (MOE), any renewal energy projects are required to submit a Design and Operations Report (DOR). The DOR is prepared in accordance with the March 1, 2010 draft of Technical Bulletin Two: Chapter 6, Guidance for preparing the Design and Operations Report as part of an application under O.Reg.359/09 Renewable Energy Approval (REA) under Part V.0.1 of the Ontario Environmental Protection Act as amended by O.Reg. 521/10 and O.Reg. 231/11. This report describes the project activities to be undertaken during the permanent facility construction and their operation, and discusses the potential for environmental effects within 300 metres of the project location. This DOR is to be consistent with information presented in the Project Description Report, and will address and describe the following in relation to the proposed solar power project:

- Detailed Site Plan
- Facility Design Plan
- Facility Operational Plan
- Environmental Effects Mitigation and Monitoring Plan
- Emergency Response Plan and Emergency Communications Plan (from construction to and including decommissioning)

A Project Description Report for the Ground Mount Solar PV Power Project – L.P #6 was prepared on November 16th, 2011, and was available for viewing at the proponent's website (www.futuresolardevelopments.com). An application has been made for the site L.P#5 and a file opened under the OPA FIT Program (FIT-FV 2CJ1A).

2. General Information

2.1 Project Name, Applicant and Location

The proposed solar power project is named Ground Mount Solar PV Power Project – LP #6 (the Project). It is being initiated by Canadian Solar Developers Ltd., based in Barrie, Ontario. **Exp** Services Inc is completing all REA-related reports and will be representing Canadian Solar Developers Ltd during the application and approval process.

The Project is located in the Municipality of Strathroy-Caradoc, and is approximately 25 km west of the City of London. The project address is L.P #6 8338 Scotchmere Drive, Strathroy-Caradoc, Ontario, N7G 3H3. The Project area and local road maps are illustrated in Figures 1 and 2.

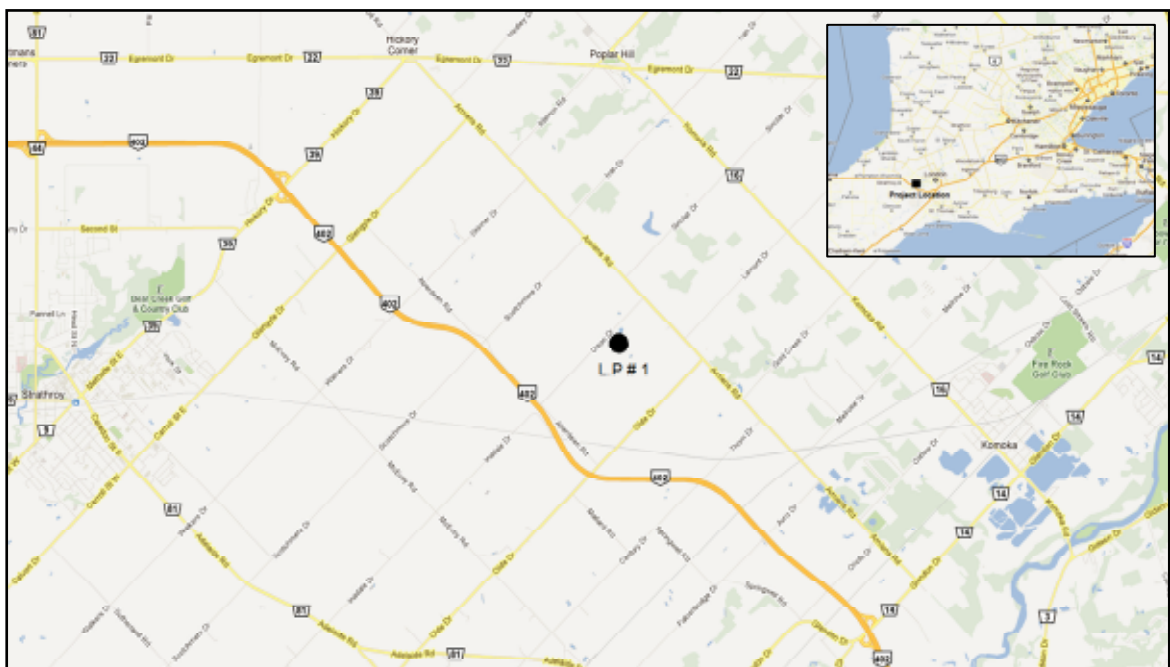
The closest arterial road is Highway No. 402. To drive to the site, take the Hickory Drive exit (Road #39) west 4 km to Strathroy to Caradoc Street South / Adelaide Road (Road #81); travel south 4 km to Scotchmere Drive; go east 2 km on Scotchmere Drive to the farm entrance on the north side.

The solar array is located in a cultivated field and is situated 90 metres to the west of the farmyard. Access can be gained to the site through the farmyard. To the west of the solar array site is a watercourse which is related to the Komoka / South Strathroy Creek Provincially Significant Wetland. The land is gently sloping in a south- southwesterly direction.

Figure 1: Aerial Photo of the Project Location



Figure 2: Project Location Road Map



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The project website and electronic copies of this Design and Operations Report (DOR) and supporting documents are available at: www.futuresolardevelopments.com/projects.

2.2 Energy Source, Nameplate Capacity and Class of Facility

The project will consist of a ground mounted, solar panel array used to convert solar energy into electricity using photovoltaic panels (PV). The maximum name plate capacity will be 100kW. The facility is classified as a Class 3 solar facility. The electricity generated will be connected to the electrical distribution system of Hydro One Networks Inc.

2.3 Other Approvals and Consultation

The project has received the Feed-In-Tariff (FIT) approval. A contract between Canadian Solar and the Ontario Power Authority (OPA) for the sale of electricity generated by this renewable facility under the FIT program has been received. Permits are being obtained as necessary from the Municipality of Strathroy-Caradoc for temporary and permanent works and any service installation within their road right-of-way. The draft Design and Operations Report is being made available for public review and comment to the requirements of O.Reg. 359/09 prior to final REA submission to the Ontario Ministry of Environment (MOE).

Other consultation that has been or will be undertaken as the project progresses is as follows:

- Complete First Nation and Aboriginal consultation.
- Meet with Ontario Ministry of Natural Resources (MNR) to discuss the natural heritage features and confirm requirements, review results and then obtain a letter confirming their agreement with methodology and results (underway).
- Complete consultation with the Municipality of Strathroy-Caradoc, and any service boards in accordance with the consultation form provided by MOE (pending).
- Determine which natural heritage features are within the setbacks identified in Ontario Regulation 359/09 and complete site investigations, if required (underway).
- Complete a public consultation process including the first and second public information session in the area of the project (pending).

2.3.1 Stakeholder and Public Communications – Design Phase

Public consultation and stakeholder engagement activities will continue through all phases of the Project. The contact list identified during the first public information meeting for the Project Description Report will be updated. The stakeholders including regulatory agencies,

landowners, Aboriginal communities and other interested parties will be notified of upcoming meetings through newspaper advertisements and direct letters where required. In addition, reports and other key documents will be made available on the proponent's website (www.futuresolardevelopments.com). The following communications / consultation is being presently planned:

- Publish second newspaper notice announcing the second public meeting;
- Hold second public meeting
- Post final copies of REA application (including study reports) on the proponent's website
- Provide notice of application to MOE and posting this on the EBR;
- Assimilate and respond to communications received from the agencies and public throughout the MOE technical review;
- Formalize the completion of the MOE review and the related Notice to Proceed by placing a notice on the proponent website;
- Identify construction dates on the proponent website; and
- Maintain communications with public through periodic updates of work progress on the proponent website and direct communications as required.

Communications received during the REA process and prior to submission to the MOE will be formally documented (typically electronically) and made part of the submission package for the REA regarding project consultation. Communications received after the MOE submission and prior to application approval will similarly be documented and provided as an addendum. Responses will be formalized and provided in a timely manner.

2.3.2 **Public Communications – Construction, Operation and Decommission Phases**

Public and stakeholder consultation will continue during the construction, operation and decommission phases. The stakeholder contact will likely be to apprise the parties of the status of the work and emergency issues.

The public may have specific concerns and/or incidents that require a response. A formal approach will be taken to document and address these communications including:

- Noting name and address of party and other relevant contact information;
- Documenting time and date of contact;
- Identifying nature of issue and whether a formal response is required;
- Responding directly to the party related to the issue or concern and documenting; and
- Following-up further as deemed necessary.

2.4 **Supporting Documentation**

Supporting documentation of the draft Design and Operations Report includes:

- Project Description Report;
- Construction Plan Report;

- Decommissioning Plan Report;
- Acoustic Assessment Report (Noise);
- Natural Heritage Assessment Record Review Report;
- Natural Heritage Site Investigation Report;
- Water Assessment Records Review Report;
- Water Assessment Site Investigation Report;
- Cultural Heritage Impact Assessment; and
- Archaeological Assessment Reports (Stages 1 and 2).

2.5 Land Ownership

Canadian Solar Developers Ltd. has entered into a long term lease agreement with the landowner.

3. Facility Site Plan

The facility is located at 8338 Scotchmere Drive in the Municipality of Strathroy-Caradoc, Ontario, east of Adelaide Road and north of Scotchmere Drive. The solar equipment is to be located to the west of the existing property buildings (see Site Plan, Appendix 1).

3.1 Buildings and Structures

There are no new buildings associated with the facility. There is an existing power supply to the farmyard. The service from the solar array to the powerline on Scotchmere Drive will be kept separate, but be mounted to the same overhead powerline. Electrical structures will be situated in a small area south of the array panels and consist of inverters, a weatherproof enclosure with station service disconnect switch, splitter and revenue meter, and a pad-mounted transformer.

3.2 Roads and Access

The farmyard entrance off Scotchmere Drive and gravel laneway extending to the back of the yard will be used for the site access for all construction equipment. It is a short distance (25 metres) from the yard to the east limit of the solar array. This access will be combined with that for L.P #5. The existing yard can be used as a staging area. No heavy equipment is envisioned for the solar array assembly. As the site is located in an active farm field, there are no trees or shrubs in the work area. Topsoil will be stripped at the access to and in the area of the electrical system (combiners, inverters, station service disconnect switch and splitter, and transformer). A small dozer can remove the topsoil and stockpile it in a ridge along the northerly limit of the site. The stockpile will be placed as not to restrict surface drainage. A gravel base approximately 0.25 metre thick will be placed for the access road (5 metres wide) and at the area for the electrical equipment.

3.3 Groundwater and Surface Water

The site is situated to the south-west of the farmyard. The predominant drainage pattern is to the south towards the watercourse which is situated approximately 225 metres to the south. A borehole was placed at the development site as part of the geotechnical investigation. No

monitoring well was installed. Wet soil conditions were identified at a 2.4 metre depth in a zone of sand. Saturated lenses were also encountered at a depth of 1.0 metre. The Preliminary Geotechnical Investigation report concluded that there would be no major groundwater problems for construction. Infiltration at excavations can be dealt with through pumping.

The footprint of the array and associated works is 0.35 ha. The array sheds precipitation to the ground below. The existing topography is not being changed as no grading of the site is planned. A review of existing residential wells in the area was not undertaken. No impact is envisaged to the water balance of infiltration and runoff. Due to the estimated minimal impact on the water balance, a hydrogeotechnical study does not need to be undertaken.

The Natural Heritage report noted that there was a Provincially Significant Wetland (PSW) beyond the development setback of the array field. The development of the site is not anticipated to impact this wetland complex.

3.4 Stormwater Facilities

The access to the site is at an existing entrance on Scotchmere Drive and through a developed farmyard. No constructed works to address surface drainage (ditches and culverts) are required. Precipitation falling on the solar panels is not impacted environmentally. This runoff does not need to be collected for treatment at a stormwater facility. The site is being vegetated with a low maintenance ground cover including any topsoil stockpile. The access to the array will be gravelled and developed with a cross-fall. Site erosion will not be an issue.

3.5 Archaeology, Cultural Heritage, Natural Heritage and Water Bodies

A Stage 1 archaeological assessment study has been undertaken by a licensed archaeologist and was conducted in accordance with the Ontario Heritage Act and using the Ministry of Tourism and Sport's Draft Standards and Guidelines for Consultant Archaeologists (2011). The reports are being submitted to the Ministry of Tourism, Culture and Sports. The Stage 1 archaeological property inspection exhibited archaeological potential. A Stage 2 archaeological inspection consisting of a combination of pedestrian survey of all ploughable lands and test pits in areas where ploughing is not feasible has been undertaken. The artefacts found were determined to have low cultural heritage value and no further work was recommended. This recommendation is subject to MTCS approval.

A cultural heritage self-assessment was completed for this site, which included correspondence with the local municipality and online heritage-related searches. The self-assessment indicated that, because the site contains a structure more than 40 years old, there is potential for heritage resources at the project location. A cultural heritage impact assessment has been undertaken.. Appendix 3 presents the completed self-assessment form, correspondence with the municipality, and results of online searches. The proposed solar array development was determined to not have any negative impact on the farmhouse, bank barn or any of the cultural heritage attributes associated with the subject property.

The Natural Heritage report, from a review of OMNR Records, noted that the Komoko / South Provincially Significant Wetland (PSW) was greater than 130 metres beyond the subject property. Woodlands are situated further away to the north and northwest. A waterbody is situated to the south-east beyond the development setback of 120 metres. There are no areas categorised as ANSIs. A site investigation was undertaken to verify the delineation of the PSW boundary and other natural features. The layout for the array field is outside the 120 metre

setback requirement of all natural features. The development of the site is not anticipated to impact the PSW.

3.6 Land Use and Land Use Plans

The surrounding land use to the south, north and west is designated as General Agriculture (A1). A zoning map has been included in Appendix 1. Given the existing Project site land use, and the land use in the surrounding area, the Project is considered to be in a rural environment. The solar facility is situated in an actively farmed field.

3.7 Transformer

The present farm operation is supplied from the HONI F1 feeder service to Mt. Brydges DDS. A new pad mounted three phase transformer will take the 600V electrical power from the inverters and step it up to 8.32kV. The power will then be fed through an underground cable eastward along the site access to the overhead powerline at the farmyard from the F1 feeder service at Scotchmere Drive.

3.8 Noise Receptors

An Acoustic Assessment Report has been prepared for L.P #6. The noise assessment conducted was based on MOE guidance documentation (“Basic Comprehensive Certificates of Approval (Air) – User Guide”, MOE, 2004). The study focused on the potential environmental noise producers, being the transformer and the inverter. The critical noise receptors (points of reception – POR) within 1 km of the site were identified as permanent residences. As the area is zoned agriculture, new development and hence future PORs within the environmental zone were not considered. In addition to Project L.P #6, a similar project (L.P #5) by Canadian Solar Developers is proposed immediately to the west of this Project. As these projects have the potential to impact on coincident points of reception the potential noise impact of both projects operating simultaneously has been assessed within the Acoustic Assessment report.

The operating load and hence ambient noise production of the transformer and inverter is at its greatest during daylight hours when the solar panels are receiving maximum sunlight. For the noise evaluation, it was assumed that full power production was being produced continuously (24 hours). As the calculated worst predictable case noise impacts are significantly lower than the applicable MOE exclusionary limits of 45 / 40 / 40 dBA for daytime / evening / nighttime periods respectively, it was concluded that the proposed facility would be in compliance with MOE noise criteria.

4. Facility Design Plan

The components of the solar array facility will be operated and maintained for the life of the project. Manufacturer technical component data sheets are provided in Appendix 2 for the main electrical items of the facility.

As noted in Section 3, Site Plan, the site access makes use of an existing farm entrance off Scotchmere Drive. The site does not require any special grading other than for a small length of access road. No drainage or stormwater management facilities are required. Although the operation of the solar facility will produce some environmental noise, it has been determined that the noise level will not impact residents (PORs) identified within the study area. No noise barriers or other containment will be required. The solar facility will not generate air emissions

or sewage, or discharge any air contaminants. Fencing around the electrical inverter and other works will be discussed with the landowner.

4.1 Facility Components

The solar facility will consist of ground mounted solar panels, transformer, and direct buried cable to the feeder line at Scotchmere Drive (see Site Plan, Appendix 1). Table 1 below summarizes the facility components and their operational details.

Table 1: Facility Specifications and Details

Specification	Details
Generator connection	Three Phase
Connection point type and name	Feeder, F1
Connection point location	Latitude: 42.943 Longitude: -81.568
Connection voltage level	8.32 kV
Name of transformer station near feeder	Mt Brydges
Nearest roads	Scotchmere Drive
Distribution lines, poles, support structures	Underground Connection to Feeder at Scotchmere Drive
Solar Array	Panel Type – Canadian Solar CS6P-230 Frame & Mounting – UNIRAC ISYS Ground System with concrete block pedestals
Transformer	600V/8.32kV three phase 100kVA Cooper Power Systems
Other electrical conversion, metering and protection equipment	100kW, 600V 3 phase Satcom Inverter; NEMA 3 weatherproof enclosure with station service, disconnect switch, splitter; revenue meter; HV Interrupter & Isolation Switch

4.1.1 Solar Modules / Array and Mounting System

The solar electric generating facility consists of 507 modules of photovoltaic (PV) panels in strings of 13 modules installed on a fixed racking structure. Solar panels typically produce between 200 and 300 watts of direct current (DC) electricity. It is anticipated that the supplier of the panels will be Canadian Solar and the panel model will be CSP-230 which produces 230 watts (Appendix 2). These panels may come to the site partially pre-assembled.

The panels will be mounted on a rigid racking frame of strings in 5 and 6 rows (to create an array) with the rows facing due south to maximize the sun exposure. The frame is set off the ground approximately 0.3 to 0.5 metres using concrete blocks. This ensures there is no interference of sunlight reaching the solar panel by the vegetation. These blocks secure the array to the ground to address wind loads. Each racking frame is separated by a distance of 3 metres to aid in assembly and maintenance. A typical manufacturer / supplier of frame and

mounting equipment is UNIRAC and their ISYS Ground System (Appendix 2). The design of the frame will be based on the final layout of the panel arrays and foundation support and anchorage. The mounting frame will be designed and produced under the direction of the contractor. The contractor will assemble the frame on site.

The foundation supports are based on a ground mount system and will consist of concrete blocks approximately 0.5 metres in diameter and 0.3 metres high with a steel plate mounted to threaded rods cast into the concrete. The plate will be able to be adjusted to provide a level and/or inclined plane as necessary for the frame installation. These blocks will be produced by a concrete manufacturer under the direction of the contractor. There will be approximately 30 supports per assembled unit (13 panels per row / 5 to 6 rows). It is envisaged that the supports will be placed on the grassed surface as the bearing pressure of the concrete block is minimal. The geotechnical report notes that the topsoil should be stripped to the subsoil. Should the design of the foundation supports result in a significantly larger block, the requirements of the geotechnical report will be followed. Similarly, should the contractor prefer an alternate system such as a screw mount anchor, the soil conditions noted and the design parameters set out in the Preliminary Geotechnical Investigation report will be followed.

4.1.2 Inverters, Transformers and Electrical Collection System

Direct current (DC) electricity generated from each panel is transmitted through interconnecting panel wiring in each string to combiner boxes. The five Satcom Smart Combiners or equivalent (Appendix 2) will be situated at the south limit of the solar array field. This inverter converts the DC current to three phase alternating current (AC).

The electricity is then fed to a weatherproof enclosure (NEMA 3R) housing the station service disconnect switch, splitter and revenue meter. This steel box will be mounted on a concrete pad resting on a gravel base near the Inverter. The power from the splitter will be fed to the 600V to 8.32kV single phase 100kVA transformer (Cooper Power Systems or equivalent) and then to the pad-mounted high voltage (HV) interrupter and isolation switch. The underground cable to the farmyard will be trenched. This cable will be fed to the overhead farm service from the F1 feeder at Scotchmere Drive.

4.1.3 Temporary Construction Activities

Arrangements will be made with the farmer to take off any crop prior to construction and plough and till the field in preparation for seeding of the ground cover (see Section 4.3 Landscape Plan). There will be no stripping of topsoil or grading of sub-soils in the area of the solar array.

All landmarks, access roads, transmission cables and construction area boundaries will be identified and marked using surveying equipment and tied to UTM coordinates. Locates for underground utilities will be requested. Buried infrastructure, such as gas lines and electrical and communication cables within the farmyard will also be located and marked. The work area will be laid out with tall wood stakes set at the corners.

Site preparation will include system component layout, creating access points for installing foundation supports, frames and panels, identifying and preparing the route for the electrical installations and any other features required for construction of the facility. The aboveground electrical components will be installed at the east limit of the solar array. The electrical service connection will be buried within the farm field along the site access and markers placed to identify the cable location. All materials will be trucked to site on flat bed trailers.

The entrance off Scotchmere Drive and gravel laneway extending to the rear of the farmyard will be used for the site access for all construction equipment. Some tree pruning of the hedgerows may be required for a modified overhead service. It is a short distance (25m) from the yard to the limit of the array. The site access, which also will serve Site L.P #5, will be constructed with a gravel base including at the east end of the array field where the electrical components are situated. The existing farmyard can be used as a temporary staging area. No heavy equipment is envisaged for the solar array assembly. For construction, service and decommissioning, a working area of 5 metres to 10 metres will be taken around the perimeter of the array field. This area will be kept grassed. For operation and maintenance, vehicles can use the constructed access.

Once construction has been completed, all construction equipment and vehicles will be removed from the site. Debris and waste will be collected and disposed of at an approved location. Where possible, materials such as gravel will be diverted from landfill and be recycled. Topsoil that has been stockpiled will be stabilized by seeding with a native grass. Any gravel surface will be bladed with a cross fall to not impede surface drainage. Disturbed areas will be seeded by broadcasting as necessary.

4.2 Water Assessment

Section 3.3 described the groundwater and surface water at the Project site and stated that there would be no impact to the water balance of infiltration and runoff. No scheduled cleaning of the solar panel is undertaken nor are there any site water supply and waste facilities planned. The surface drainage / topography of the site is generally not changed. Runoff (sheet flow) is not impeded. The solar panels direct precipitation to the ground surface. The environmental 'water' footprint of the solar array field is related to the foundation supports. It is estimated that these supports equate to approximately 2% of the surface area of the array field. The impact on infiltration would not be measurable. Further, the proposed vegetation will capture runoff to a greater degree and enhance infiltration. The access to the array field is gravel which is generally placed to the same depth as the topsoil. The gravel is semi-pervious and could be considered to have the same permeability as the topsoil. The materials identified for the design and the construction methodology will not have a demand on the local water resources, and will not impact the groundwater.

4.3 Landscape Plan

The existing site is an actively farmed field. There is no permanent vegetation (trees) in the area that will be impacted by the temporary and permanent works. A detailed landscaping plan is not considered necessary. The ground at the site will be tilled and be mechanically seeded with a low maintenance short native grass prior to construction and the seed allowed to germinate. Construction activities will take place on this hardy vegetation.

5. Facility Operational Plan

The solar panels are unattended electricity producing units. They operate year round (365 days a year), given adequate sun exposure. Therefore, operational hours depend on the length of day, which varies throughout the year.

5.1 Equipment Operation and Maintenance

The site will require periodic inspection possibly monthly by a trained technician. This will be undertaken in daylight hours. The system will have remote monitoring capability to indicate loss of performance (power production). Periodic maintenance will likely take place quarterly. This will require repairs to or replacement of electrical components, confirming electrical connections are sound, and replacing photovoltaic panels as necessary. The transformer will be checked for leaks and repaired immediately. Adjustments to the elevation of the support frame may need to be made as a result of soil movement (settlement). Cleaning of the panel is generally not required. The system self monitors and identifies any issues with the solar panels as a result of lost electrical production. There will be no cutting of the vegetation although higher vegetation such as weeds will be removed. Any erosion points will be addressed by placing topsoil and seed. Should the potential for more severe erosion be present, bio-filter socks (organic media in a bio-degradable filter tube) with seed can be installed at areas of concentrated flow.

The system is self-contained. There will be no hazardous materials stored on site. Pull sheets of the various electrical components will be stored on site at the meter location along with a data log record of inspection and maintenance. The local utility and other governing bodies will be apprised of the status of the site.

5.2 Post - Installation Activities

All decommissioning and restoration activities will adhere to provincial, federal and municipal requirements and permits. The decommissioning and restoration process will comprise the following:

- Removal of ground structures including all gravel;
- Removal of below ground structures;
- Replacement of topsoil to bring the site back to pre-construction condition.

Materials will be salvaged and recycled to the greatest extent possible.

6. Environmental Effects Monitoring Plan (EEMP)

The Ministry of Environment has released a draft Technical Bulletin for Preparing the Design and Operations Report which sets out the requirement that the environmental effects monitoring plan show how the negative environmental effects will be mitigated and monitored to comply with O. Reg. 359/09.

The Technical Bulletin notes that:

- A summary of all potential negative environmental effects caused by the project as given in the description of negative environmental effects in the Project Description Report be provided.
- For each potential negative effect, performance objectives are to be stated where possible such that in achieving the objective the negative environmental effect will be mitigated.
- A description of all mitigation strategies planned to achieve performance objectives be identified.

- If there is an on-going risk of potential negative environmental effects, a description be included as to how the project will be monitored to ensure that mitigation strategies are meeting performance objectives.
- Contingency measures are to be provided should monitoring reveal that negative effects are continuing to occur.

The EEMP is to:

- Provide instruction regarding measures to protect the environment and minimize the potential negative environmental effects;
- Document environmental concerns along with protection / mitigation measures and strategies;
- Identify monitoring activities; and
- Be kept current and be updated through all phases of the work.

Given the nature of solar power generation, few if any effects are expected during the operations period. The associated Project reports for the L.P #6 solar array facility have documented and studied the potential environmental effects of construction activities and system operations within their respective geographical area. The construction of the proposed Project could impact the environment relating to: topography, soils, surface water, groundwater, aquatic habitats/biota, vegetation, terrestrial wildlife and air quality. In addition to this, certain social environments and cultural features could be affected, and are not limited to: local traffic, municipal roadways, public safety, sound levels, land use, archaeological resources and cultural heritage resources.

The potential negative environmental effects for each component are further summarized in Table 2, along with performance objectives, mitigation strategies, residual and long term effects that may occur, and a monitoring plan for each environmental component.

Table 2: Environmental and Social Effects Summary

Component		Potential Negative Effect	Performance Objectives	Mitigation Strategy/ Measures	Residual Effects	Monitoring Plan/ Contingency Measures
Natural Environment	Topography	During construction, grading and minor alteration to topography could occur	Minimize change to site topography	Disturbed areas will be re-graded to match surrounding topography as closely as possible	Minor long term topographical changes may occur as a result of construction	No monitoring plan required / No contingency measures required.
	Soils	Soil compaction, erosion, loss of quality as a result of accidental spills during construction	Minimize soil disturbance; no long-term increase in erosion beyond existing conditions; no long-term environmental effects due to toxic spills	Use construction best management practices & mitigation measures.	No residual effects if proper mitigation is implemented.	Daily equipment inspection during construction; Report spills to MOE Spills Action Centre; containment; Monthly site inspection of site conditions / Undertake repairs immediately
	Surface Water	As a result of construction, water turbidity could increase, along with contamination from spills	No long-term increase in runoff turbidity; no long-term environmental effect due to toxic spills	The solar array will be minimum 120m from any surface water. Sediment filtration measures will be used during construction. Soil erosion will be repaired.	No residual effects if proper mitigation is implemented.	Check condition of vegetation monthly during growing season; look for soil erosion / Undertake repairs immediately.
	Groundwater	May be contaminated by accidental spills during construction.	No long-term environmental effect due to toxic spills; minimize infiltration loss	Spill prevention and response measures will be implemented through the life of the Project.	No residual effects if proper mitigation is implemented.	Daily equipment inspection during construction / Reporting spills to MOE Spills Action Centre; containment.
	Aquatic Habitat/Biota	Potential negative effects due to construction and site alteration	No long-term environmental effect due to construction and site alteration	The solar panel will be at least 120m from any aquatic feature or habitat	No residual effects if proper mitigation is implemented.	Check condition of vegetation monthly during growing season; look for soil erosion / Undertake repairs immediately.
	Vegetation	While the project area is already cleared, some vegetation clearing could occur.	Minimize impact to existing vegetation during construction; site restoration to be compatible with existing land usage and vegetation	Clearing will be kept at a minimum and not extend beyond the construction perimeter. Replanting native species after construction.	No residual effects if proper mitigation is implemented.	Check condition of vegetation monthly during growing season; look for soil erosion / Undertake repairs immediately.

Component		Potential Negative Effect	Performance Objectives	Mitigation Strategy/ Measures	Residual Effects	Monitoring Plan/ Contingency Measures
	Terrestrial Wildlife	Loss of wildlife and wildlife habitat could occur during construction.	No long-term environmental effect due to construction and site alteration	Wildlife habitat clearing will be kept at a minimum. Best management practices with respect to work during breeding seasons will be implemented.	Some disturbance of wildlife will occur during construction and operation.	Check for nesting activities during maintenance; avoid disturbance / No contingency plan required.
	Air Quality	Construction vehicles will cause reductions in air quality. Dust and emissions will increase during construction.	No long-term environmental effect due to construction and site alteration	The use of standard construction best management practices and mitigation measures will be implemented to reduce dust.	No residual effects if proper construction standards are followed.	No monitoring plan required / Discuss operational mitigation strategies during construction meetings.
Social Environment	Local Traffic	May increase due to construction vehicles. Temporary distributions in traffic routes and delays will occur during construction.	Elimination of risk to public	Effects will be minimized by designating and preparing transportation routes and facilitating traffic flows when necessary.	No residual effects if proper mitigation is implemented.	No monitoring plan required / Respond to any complaints and modify construction traffic where possible.
	Municipal Roadways	Damage to roads near the construction site could occur.	Elimination of risk to public	Any damage will be remediated to the satisfaction of the municipality.	No residual effects if proper mitigation is implemented.	Monitor haul roads daily / Notify municipality immediately.
	Public Safety	Construction will pose risk to the community and workforce.	Elimination of risk to public	Proper provincial and federal safety procedures will be adhered to during all phases of the project.	No residual effects if proper mitigation is implemented.	No monitoring plan required / Record any accidents and notify MOL.
	Waste Management and Disposal Sites	Construction will generate construction waste, hazardous waste and sanitary waste.	Maximize recycling potential of construction materials; hazardous and sanitary waste to be dealt with under existing regulations	Proper storage and disposal of wastes will be implemented.	No residual effects if proper management of waste is implemented.	No long-term monitoring plan required / Discuss waste management strategies during construction meetings and implement.

Component		Potential Negative Effect	Performance Objectives	Mitigation Strategy/ Measures	Residual Effects	Monitoring Plan/ Contingency Measures
	Visual Landscape	Installation of panels will be a permanent fixture and result in a change to the local landscape.	Elimination / reduction in visual disturbance	Aesthetic visual barriers may be considered if necessary.	Visual landscape will change for the duration of the Project.	No monitoring plan required / Repair erosion areas quickly.
	Sound Levels	During construction, disturbance to neighbouring residents will occur. Transformers and inverters may result due to increased ambient sound levels.	Minimize noise emissions at nearby noise receptors to provincial guidelines; minimize environmental impact	A noise study will be conducted to ensure noise levels are within provincial standards.	No residual effects.	No monitoring plan required / Respond to noise complaints quickly.
	Land Use	Land use designation will change for the duration of the Project.	Maintain present land use to the greatest extent possible	The land use designation will remain unchanged.	A reduction in agricultural land for the duration of the Project.	No monitoring plan required / At decommissioning return site to original usage.
	Archaeological Resources	During construction, archaeological finds may be discovered.	Undertake assessment to regulatory requirements; mitigate impact to greatest extent possible	An Archaeological Assessment will be completed to determine potential resources and mitigation requirements.	Construction will cease in the event archaeological evidence is found and the Ministry of Culture will be notified immediately.	No monitoring plan post-construction required / During construction be aware of potential artefacts; Notify regulatory agency and stop work.
	Cultural Heritage Resources	Construction could negatively affect cultural heritage landscapes.	Undertake assessment to regulatory requirements; mitigate impact to greatest extent possible	As required by the Ministry of Tourism and Culture, potential heritage resources will be determined and assessed.	Low potential for impacts on heritage resources on property. No residual effects if proper mitigation is implemented.	No monitoring plan post-construction required / At decommissioning return site to original usage.

7. Emergency Response Plan and Emergency Communication Plan

The operation of a solar facility is generally passive and consists of monitoring of the site and undertaking maintenance repairs occasionally. Emergency events are generally unlikely and are typically associated with construction activities during installation and decommissioning. The proponent will develop an emergency response plan and a communications plan to cover the entire life of the project including during the construction, operation and decommissioning phases. These plans will be provided to the local authorities and implemented prior to construction commencement. Plans will be kept current during the various phases and any updates will be circulated.

7.1 Emergency Response Plan (ERP)

The proponent will prepare an Emergency Response Plan (ERP) to the requirements of the local authorities including the Municipality of Strathroy-Caradoc, Middlesex County and St. Clair Region Conservation Authority if requested. The Municipality of Strathroy-Caradoc has prepared an Emergency Response Plan in October 2008 (By-law No. 92-07). The Chief Administrative Office located at 52 Frank Street Strathroy N7G 2R4 (519-245-1105 X225) administers this plan.

The proponent will request a meeting with the Fire Services management (23 Zimmerman Street Strathroy ON N7G 2G8) and the Strathroy-Caradoc CAO prior to construction to discuss the details of the various phases of the work including any potential emergency scenarios that might arise. A draft Project ERP document will be prepared and circulated to the various authorities for review and comment. A final version of the Project ERP will be posted on the Project website and copies provided to MOE and other agencies as requested. The ERP will include:

- Communication procedures including the identification of a primary and secondary crisis manager to serve as the company spokesperson in the event of an emergency;
- Listing of site personnel designated and trained in first aid/ CPR including the contractor safety officer;
- Emergency and evacuation procedures for each type of emergency (fire personal injury, spill);
- Emergency phone numbers; and
- Name and direction to nearest hospital or medical aid facility.

The contractor will be provided a copy of this document with instructions to keep a copy on site at all times during the construction work, and to advise their safety officer and staff of the procedures and contact information.

7.2 Emergency Communications Plan (ECP)

As part of the Emergency Response Plan (ERP), an Emergency Communications Plan (ECP) will be included identifying contact information for relevant responders, regulators, landowners and other stakeholders. The communications protocol between the proponent and the Municipality's ERP coordinator for emergency scenarios at the Project will be set out. Emergency issues could include personal injury, fire and environmental spill. The contact information will be clearly posted at the construction site and with other key parties. In the event of an emergency at the Project site, contact ((typically phone) will be made with key parties according to the communications protocol.

During the construction and decommissioning phases, the Contractor's Health and Safety officer or designate will take the lead and be the contact with the outside agencies. During the operation phase, the proponent or their designate will take this role. These trained staff will consider:

- The nature of the emergency;
- Potential risk of human injury;
- Potential risk to the environment;
- Potential risk to property; and
- Need for additional resources to respond to the incident.

This knowledgeable staff can identify potential action plans and assist with other communications / notifications to the public, stakeholders and first responders (fire department, medical - ambulance and police). Where the incident involves an environmental spill, the Ministry of Environment Spills Action Centre will be notified immediately (1-800-268-6060).

8. Conclusions

The Design and Operations Report (DOR) has been prepared as part of an application for a Class 3 Solar Facility under O.Reg.359/09 Renewable Energy Approval (REA) under Part V.0.1 of the Ontario Environmental Protection Act as amended by O.Reg. 521/10 and O.Reg. 231/11.

A site plan has been prepared showing the layout of the solar array field, the associated electrical components, topographical features and other amenities within the study area.

The environmental impacts during the construction, operation and decommissioning phases have been determined to be able to be mitigated and/or manageable.

There are no provincial parks, ANSIs or water bodies within 120 metres of the proposed solar array field. The Provincially Significant Wetland is outside the prescribed limit. The Project will not impact this feature.

The acoustical assessment determined that all MOE requirements are met or exceeded.

The Phase 1 archaeological assessment indicated the site exhibited archaeological potential. A Stage 2 field study determined that the artefacts had low heritage cultural value and no further investigations are required.

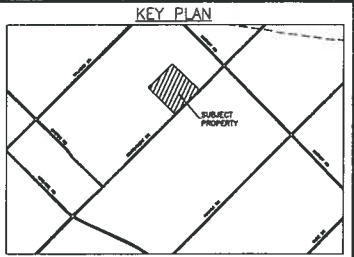
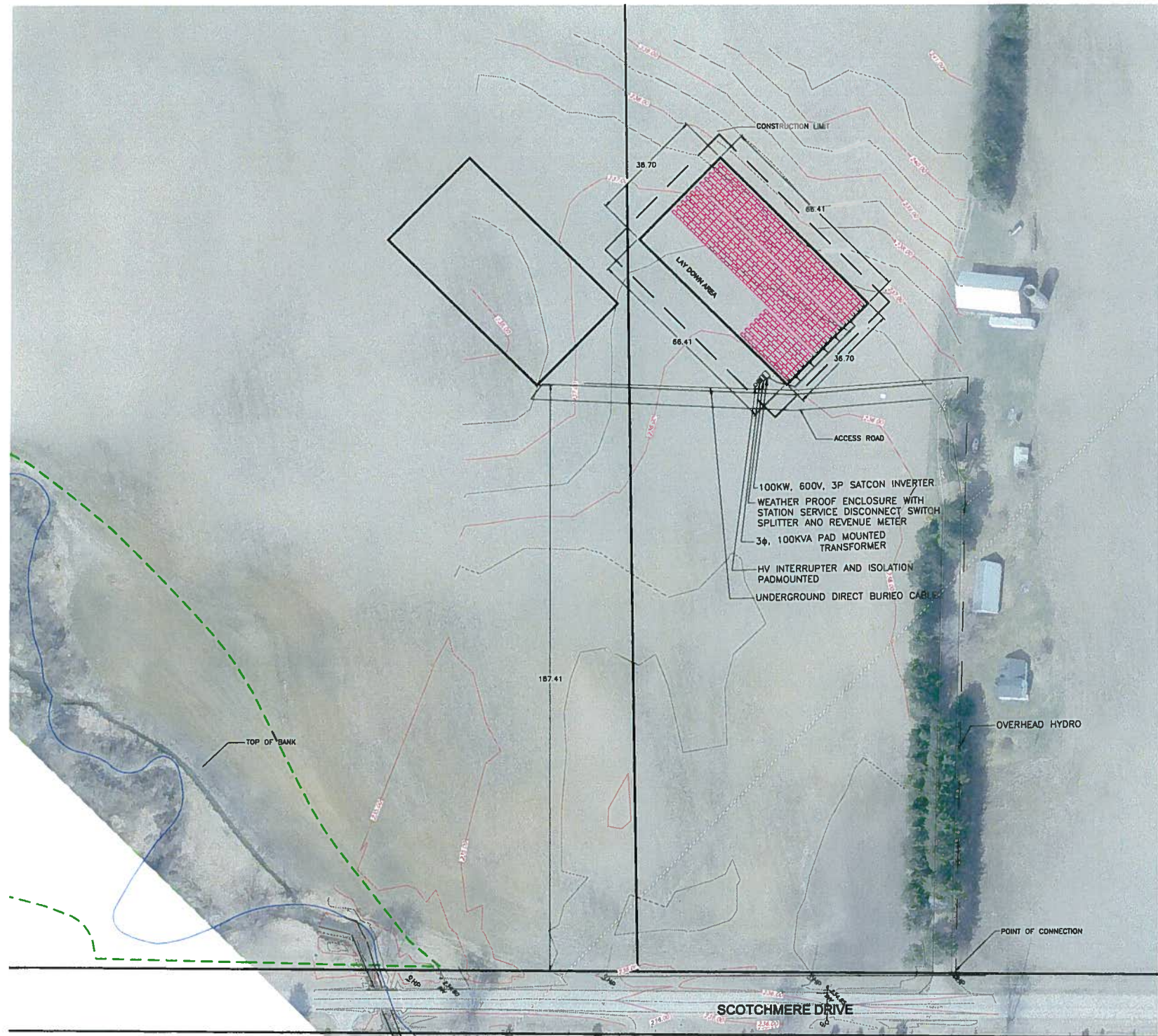
The cultural heritage impact assessment determined the proposed solar array development would not have any negative impact on the farmhouse, bank barn or any of the cultural heritage attributes associated with the subject property.

Neither the surface water nor groundwater is impacted by the development.

There is no requirement to change the Land Use for the Project. Post-decommissioning, the land can revert back to its agricultural usage.

An outline for an Emergency Response Plan (ERP) along with an Emergency Communications Plan has been noted. An ERP needs to be prepared and formalized with the local authorities.

Appendix 1 – Project Site Plan & Land Use Zoning



LEGEND

⊗ POINT OF CONNECTION

— PROPERTY LIMIT

h HAMMERSCHLAG + JOFFE INC.
69 Leslie Road Toronto,
Ontario Canada M5B 2T8
T: (416) 444-8283
F: (416) 444-1483
E: hamp@hamp.com

STATISTICS: SOLAR ARRAY

NUMBER OF MODULES: 507
NUMBER OF MODULES PER STRING: 13
NUMBER OF STRINGS: 39
PANEL TYPE: CANADIAN SOLAR CS6P-230
FEEDER NAME: F1
CONNECTION VOLTAGE: 4.8KV

CONTRACT IDENTIFICATION # F-001362-SPV-130-505
FIT REFERENCE # FIT-FV2CJ1A

NOTES
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NO.	REVISION DESCRIPTION	DATE	BY	APPRO	NO.	REVISION DESCRIPTION	DATE	BY	APPRO
					1	ISSUED FOR DOR REPORT	10/08/12	TB	MHN

SCALE

HORZ 1:750
VERT 1:50

0 5m 10m 20m

DESIGNED BY

REVIEWED BY

FUTURE SOLAR DEVELOPMENTS INC.

3400 PHARMACY AVE, SCARBOROUGH, ON

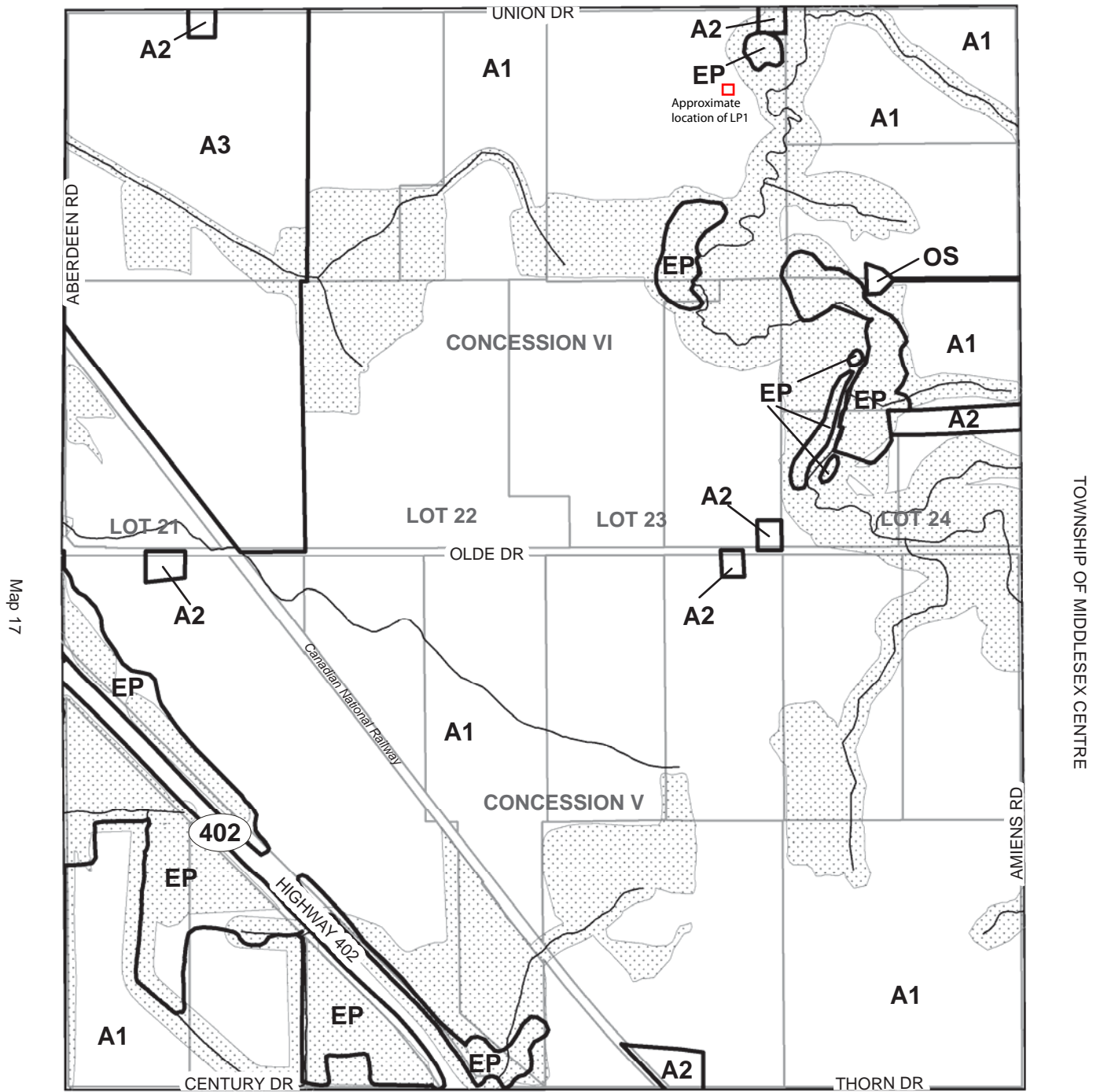
exp. exp. Services Inc.
c/o HAMMERSCHLAG + JOFFE INC.
69 LESLIE ROAD
TORONTO, ON M5B 2T8
CANADA
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• BUILDINGS • WATER & ENVIRONMENT • ENERGY •
• INFRASTRUCTURE • SUSTAINABILITY •

DESIGNER	K.H.
DESIGN	K.H.
CHECKED	G.B.
DATE	K.H.
PROJECT NAME	G.B.
APPROVED	G.B.

PROJECT	FUTURE SOLAR	PROJ. NO.	WSL-2250
SUBJECT	SCOTCHMERE OR, STRATHROY, ON	DATE	FBS
TITLE	SITE PLAN	DATE	OCT 7, 2011
	LP6	DESIGNED BY	SP 3

Map 12

Approximate location of LP7




Map 24



MUNICIPALITY OF STRATHROY-CARADOC BY-LAW No. 43-08

LEGEND

 Natural Environment Overlay

1:15,000

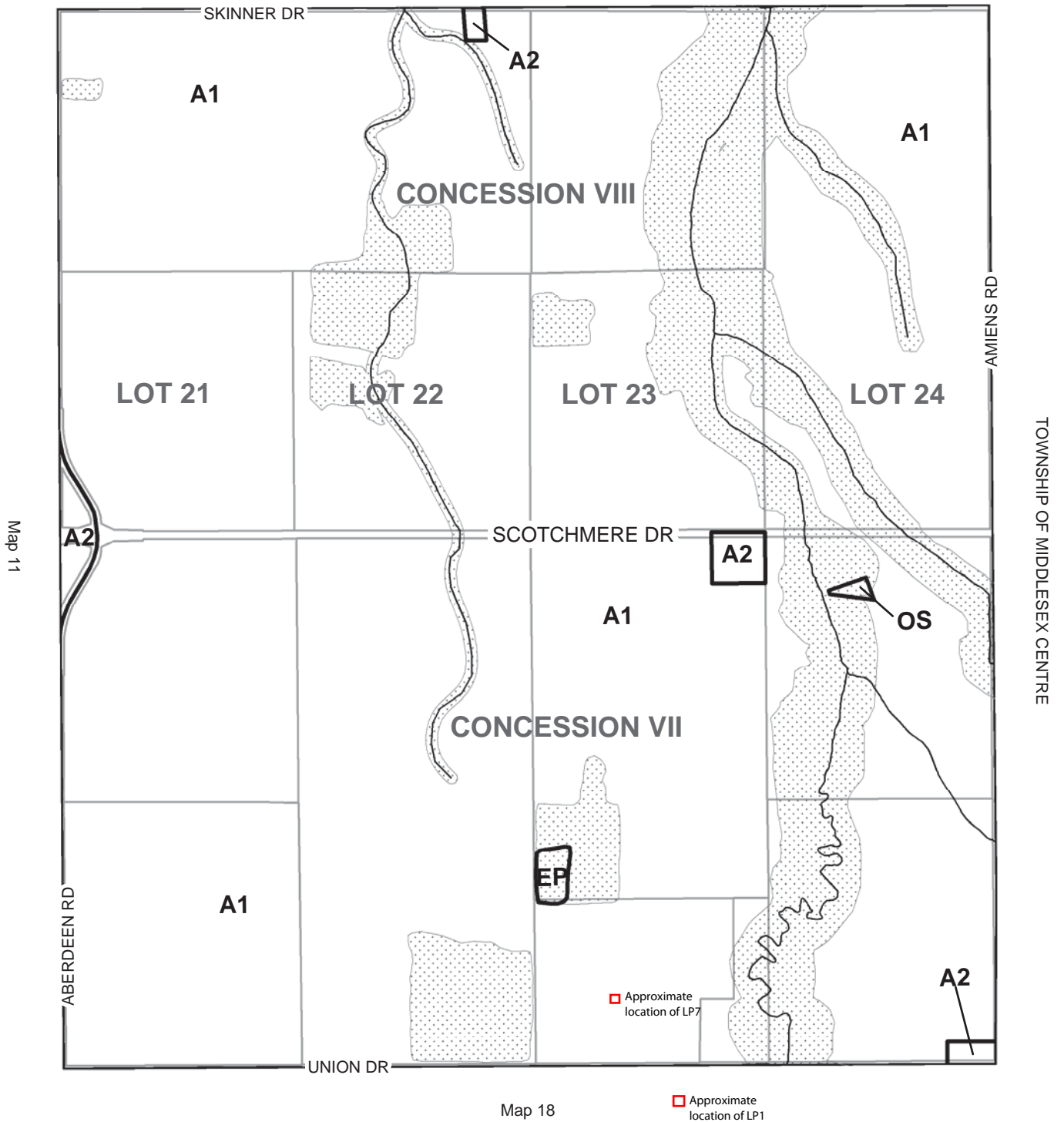
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Metres



SCHEDULE 'A'
MAP #18

Map 6




Map 18

Approximate location of LP1



MUNICIPALITY OF STRATHROY-CARADOC BY-LAW No. 43-08

LEGEND

 Natural Environment Overlay

1:15,000

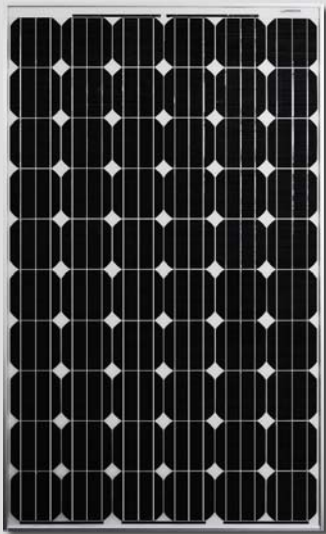
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Metres



SCHEDULE 'A'
MAP #12

Appendix 2 – Manufacturer Technical Components



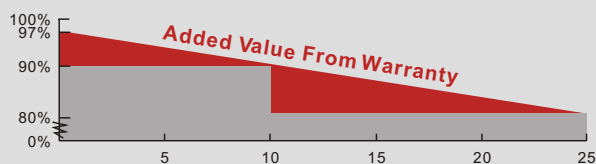
CS6P

235/240/245/250/255M

CS6P is a robust solar module with 60 solar cells. These modules can be used for on-grid solar applications. Our meticulous design and production techniques ensure a high-yield, long-term performance for every module produced. Our rigorous quality control and in-house testing facilities guarantee Canadian Solar's modules meet the highest quality standards possible.

Key Features

- High module efficiency up to 15.85%
- Positive power tolerance: 0 ~ +5W
- Robust frame to up to 5400 Pa load
- Anti-reflective with self-cleaning surface
- Outstanding performance at low irradiance
- High energy yield at Low NOCT
- **Backed By Our New 10/25 Linear Power Warranty Plus our added 25 year insurance coverage**



- 10 year product warranty on materials and workmanship
- 25 year linear power output warranty

Best Quality

- 235 quality control points in module production
- EL screening to eliminate product defects
- Current binning to improve system performance
- Accredited Salt mist/Ammonia resistant

Best Warranty Insurance

- 25 years worldwide coverage
- 100% warranty term coverage
- Providing third party bankruptcy rights
- Non-cancellable
- Immediate coverage
- Insured by 3 world top insurance companies

Comprehensive Certificates

- IEC 61215, IEC 61730, IEC61701 ED2, UL1703, KEMCO, CEC Listed, CE, JET and MCS
- ISO9001: 2008: Quality Management System
- ISO/TS16949:2009: The automotive quality management system
- ISO14001:2004: Standards for Environmental management system
- QC080000 HSPM: The Certification for Hazardous Substances Regulations
- OHSAS 18001:2007 International standards for occupational health and safety
- Reach Compliance



www.canadiansolar.com

CS6P-235/240/245/250/255M

Electrical Data

STC	CS6P-235M	CS6P-240M	CS6P-245M	CS6P-250M	CS6P-255M
Nominal Maximum Power (Pmax)	235W	240W	245W	250W	255W
Optimum Operating Voltage (Vmp)	30.1V	30.2V	30.3V	30.4V	30.5V
Optimum Operating Current (Imp)	7.82A	7.95A	8.09A	8.22A	8.35A
Open Circuit Voltage (Voc)	37.2V	37.3V	37.4V	37.5V	37.7V
Short Circuit Current (Isc)	8.34A	8.46A	8.61A	8.74A	8.74A
Module Efficiency	14.61%	14.92%	15.23%	15.54%	15.85%
Operating Temperature	-40°C~+85°C				
Maximum System Voltage	1000V (IEC) /600V (UL)				
Maximum Series Fuse Rating	15A				
Application Classification	Class A				
Power Tolerance	0 ~ +5W				

Under Standard Test Conditions (STC) of irradiance of 1000W/m², spectrum AM 1.5 and cell temperature of 25°C

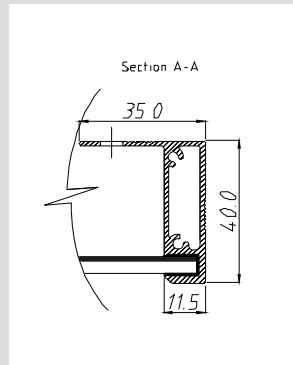
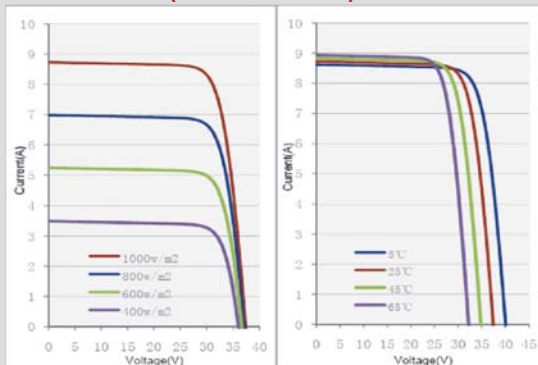
NOCT	CS6P-235M	CS6P-240M	CS6P-245M	CS6P-250M	CS6P-255M
Nominal Maximum Power (Pmax)	170W	173W	177W	180W	184W
Optimum Operating Voltage (Vmp)	27.5V	27.5V	27.6V	27.7V	27.8V
Optimum Operating Current (Imp)	6.18A	6.29A	6.40A	6.51A	6.62A
Open Circuit Voltage (Voc)	34.1V	34.2V	34.3V	34.4V	34.6V
Short Circuit Current (Isc)	6.75A	6.85A	6.97A	7.08A	7.18A

Under Normal Operating Cell Temperature, Irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s

Mechanical Data

Cell Type	Mono-crystalline 156 x 156mm, 2 or 3 Busbars
Cell Arrangement	60 (6 x 10)
Dimensions	1638 x 982 x 40mm (64.5 x 38.7 x 1.57in)
Weight	19kg (41.9 lbs)
Front Cover	3.2mm Tempered glass
Frame Material	Anodized aluminium alloy
J-BOX	IP65, 3 diodes
Cable	4mm ² (IEC)/12AWG(UL), 1000mm
Connectors	MC4 or MC4 Comparable
Standard Packaging (Modules per Pallet)	24pcs
Module Pieces per container (40 ft. Container)	672pcs (40'HQ)

I-V Curves (CS6P-250M)



*Specifications included in this datasheet are subject to change without prior notice.

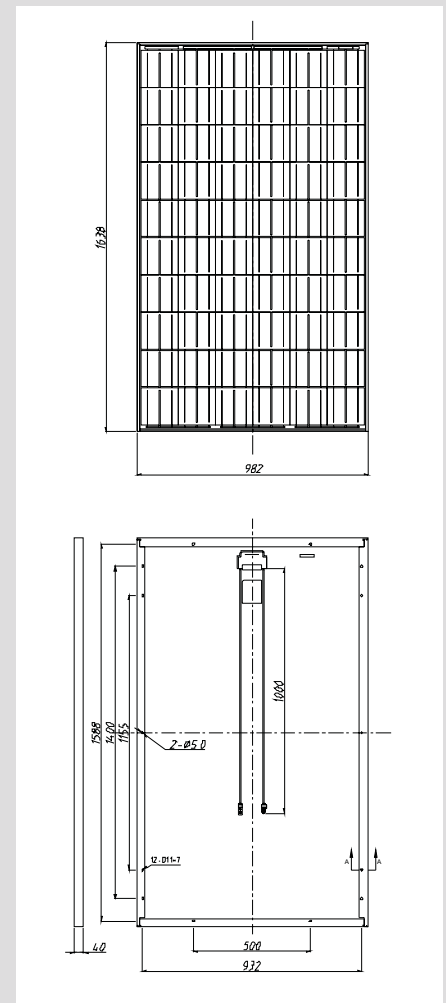
Temperature Characteristics

Temperature Coefficient	Pmax	-0.45%/°C
	Voc	-0.35 %/°C
	Isc	0.060 %/°C
Normal Operating Cell Temperature		45±2°C

Performance at Low Irradiance

Industry leading performance at low irradiation environment, +95.5% module efficiency from an irradiance of 1000w/m² to 200w/m² (AM 1.5, 25 °C)

Engineering Drawings



About Canadian Solar

Canadian Solar Inc. is one of the world's largest solar companies. As a leading vertically-integrated manufacturer of ingots, wafers, cells, solar modules and solar systems, Canadian Solar delivers solar power products of uncompromising quality to worldwide customers. Canadian Solar's world class team of professionals works closely with our customers to provide them with solutions for all their solar needs.

Canadian Solar was founded in Canada in 2001 and was successfully listed on NASDAQ Exchange (symbol: CSIQ) in November 2006. Canadian Solar has module manufacturing capacity of 2.05GW and cell manufacturing capacity of 1.3GW.

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Functional Specification for Three-Phase Pad-Mounted Distribution Transformers 45 – 10,000 kVA

1.0 Scope

- 1.1. This specification covers the electrical and mechanical characteristics of 45-10,000 kVA Three-Phase Step-Down Pad-Mounted Distribution Transformers. KVA ratings for transformers with secondary voltages not exceeding 700V are 45-3,750 kVA, while kVA ratings for transformers with secondary voltages greater than 700V are 1,000-10,000 kVA. Product is per Cooper Power System's catalog section 210-12.

2.0 Applicable Standards

- 2.1. All characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of the following ANSI/IEEE, NEMA, and Department of Energy standards.

C57.12.00 – IEEE Standard for Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

C57.12.28 – Pad-Mounted Equipment - Enclosure Integrity.

C57.12.34 – IEEE Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers (2500 kVA and Smaller) - High Voltage: 34500GrdY/19920 Volts and Below; Low-Voltage: 480 Volt 2500 kVA and Smaller (*issued in March 2005 - combines C57.12.22 and C57.12.26*).

C57.12.90 – IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short-Circuit Testing of Distribution and Power Transformers.

C57.12.91 – Guide for Loading Mineral-Oil-Immersed Transformers.

NEMA TR 1-1993 (R2000) – Transformers, Regulators and Reactors, Table 0-2 Audible Sound Levels for Liquid-Immersed Power Transformers.

NEMA 260-1996 (2004) – Safety Labels for Pad-Mounted Switchgear and Transformers Sited in Public Areas.

10 CFR Part 431 – Department of Energy – Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule.

3.0 Ratings

- 3.1. The transformer shall be designed in accordance with this specification and the kVA rating shall be:

45, 75, 112.5, 150, 225, 300, 500, 750, 1000, 1500, 2000, 2500, 3000, 3750, 5000, 7500, 10,000 (range may also be specified).

- 3.2. The primary voltage, configuration, and the basic lightning impulse insulation level (BIL) shall be _____, {make a selection from Table 1} Dual voltages are also available.

- 3.3. The secondary voltage, configuration, and the basic insulation level (BIL) of the secondary voltage shall be _____, {make a selection from Table 1}

Table 1
Ratings for Three-Phase Transformers
(Single Ratio)

Primary Voltage	BIL (kV)		Secondary Voltage	BIL (kV)
2400 Delta	60		208Y/120	All 30 kV
4160 Delta	60		480Y/277	
4800 Delta	60		575Y/332	
7200 Delta	75		600Y/347	
12000 Delta	95		690Y/398	
12470 Delta	95		240 Delta	
13200 Delta	95		480 Delta	
13800 Delta	95		240 Delta with 120 Mid-Tap	
14400 Delta	95		480 Delta with 240 Mid-Tap	
16430 Delta	125			
34500 Delta	150			
43800 Delta	250			
4160GrdY/2400	60		See left column for voltages over 700 V	
8320GrdY/4800	75			
12470GrdY/7200	95			
13200GrdY/7620	95			
13800GrdY/7970	95			
22860GrdY/13200	125			
23900GrdY/13800	125			
24940GrdY/14400	125			
34500GrdY/19920	150			
43800GrdY/25300	250			

- For complete connector rating, see ANSI/IEEE 386.
- Transformers are suitable for connectors with phase-to-ground or phase-to-ground/phase-to-phase high-voltage ratings as listed.
- Arrester coordination may require higher BIL on multiple connections than indicated to achieve a minimum protection level of 20%.

- 3.4. The transformer may be furnished with full capacity high-voltage taps. The tap changer shall be clearly labeled to reflect that the transformer must be de-energized before operating the tap changer as required in Section 4.3 of ANSI C57.12.34. The tap changer shall be operable on the higher voltage only for transformers with dual voltage primaries. The unit shall have one of the following tap configurations:

No Taps

Two – 2 ½% taps above and below rated voltage (split taps)

Four – 2 ½% taps below rated voltage (four below)

NEMA taps (14400, 13800, 13200, 12470, 12540)

Non-standard tap configuration

The applicable tap configuration shall be specified on the inquiry.

- 3.5. The average winding temperature rise above ambient temperature, when tested at the transformer rating, shall not exceed 65°C **OR** shall not exceed 55°C **OR** at the base transformer rating, shall not exceed 55°C, and when tested at 112% of the base rating, shall not exceed 65°C.
- 3.6. The percent impedance voltage, as measured on the rated voltage connection, shall be per Table 2. For target impedances, the tolerance on the impedance shall be +/- 7.5% of nominal value for impedance values greater than 2.5%. The tolerance on the impedance shall be +/- 10.0% for impedance values less than or equal to 2.5%.

Table 2
Percent Impedance Voltage

KVA Rating (Low voltage < 700 V)	Impedance
75	1.10 - 5.75
112.5-300	1.40 - 5.75
500	1.70 - 5.75
750-3750	5.75 nominal

KVA Rating	Low voltage > 700 V (all nominal values)		
	≤150 kV BIL	200 kV BIL	250 kV BIL
1000 - 5000	5.75	7.00	7.50
7500 - 10000	6.50	7.00	7.50

4.0 Construction

- 4.1. The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum, the windings will be energized to heat the coils and drive out moisture, and the transformer will be filled with preheated filtered degassed insulating fluid. The core shall be manufactured from burr-free, grain-oriented silicon steel and shall be precisely stacked to eliminate gaps in the corner joints. The coil shall be insulated with B-stage, epoxy coated, diamond pattern, insulating paper, which shall be thermally cured under pressure to ensure proper bonding of conductor and paper. Coils shall be either aluminum or copper (eliminate a metal if one is required over the other).
- 4.2. The dielectric coolant shall be listed less-flammable fluid meeting the requirements of National Electrical Code Section 450-23 and the requirements of the National Electrical Safety Code (IEEE C2-2002), Section 15. The dielectric coolant shall be non-toxic*, non-bioaccumulating and be readily and completely biodegradable per EPA OPPTS 835.3100. The base fluid shall be 100% derived from edible seed oils and food grade performance enhancing additives. The fluid shall not require genetically altered seeds for its base oil. The fluid shall result in zero mortality when tested on trout fry *. The fluid shall be certified to comply with the US EPA Environmental Technology Verification (ETV) requirements, and tested for compatibility with transformer components. The fluid shall be Factory Mutual Approved, UL Classified Dielectric Medium (UL-EOUV) and UL Classified Transformer Fluid (UL-EOVK), Envirotemp® FR3 fluid.
*(Per OECD G.L. 203)

4.3. Tank and Cabinet Enclosure

- 4.3.1. The high-voltage and low-voltage compartments, separated by a metal barrier, shall be located side-by-side on one side of the transformer tank. When viewed from the front, the low-voltage compartment shall be on the right. Each compartment shall have a door that is constructed so as to provide access to the high-voltage compartment only after the door to the low-voltage compartment has been opened. There shall be one or more additional fastening devices that must be removed before the high-voltage door can be opened. Where the low-voltage compartment door is of a flat panel design, the compartment door shall have three-point latching with a handle provided for a locking device. Hinge pins and associated barrels shall be constructed of corrosion-resistant material, passivated AISI Type 304 or the equivalent.
- 4.3.2. A recessed, captive, penta-head or hex-head bolt that meets the dimensions per ANSI C57.12.28 shall secure all access doors.
- 4.3.3. The compartment depth shall be in accordance with C57.12.34, unless additional depth is specified.
- 4.3.4. The tank base must be designed to allow skidding or rolling in any direction. Lifting provisions shall consist of four lifting lugs welded to the tank.

- 4.3.5. The tank shall be constructed to withstand 7 psi without permanent deformation, and 15 psi without rupture. The tank shall include a 15 psig pressure relief valve with a flow rate of minimum 35 SCFM.
- 4.3.6. The exterior of the unit shall be painted Munsell 7GY3.29/1.5 green (STD), ANSI 70 gray, or ANSI 61 gray in color. If a special paint color is specified, a federal spec number or paint chip must be provided at the time of order. The cabinet interior and front plate shall be painted gray for ease of viewing the inside compartment.
- 4.3.7. The tank shall be complete with an anodized aluminum laser engraved nameplate. This nameplate shall meet Nameplate B per ANSI C57.12.00.

4.4. High Voltage Bushings and Terminals

- 4.4.1. High voltage bushings will be installed in the high voltage termination compartment located on the front left of the transformer and requiring access via the low voltage termination compartment on the front right.

4.4.2. Bushing Style

- [] **15/25 KV DEADFRONT, CURRENTS BELOW 200 AMPS:** The high voltage bushings shall be 15/25 kV 200A bushing wells with bushing well inserts installed. The bushings shall be externally removable and be supplied with a removable stud (Re: Cooper Power Systems catalog sections 800-32, 500-12, and 500-26).
- [] **35 KV DEADFRONT, CURRENTS BELOW 200 AMPS:** The high voltage bushing shall be a one-piece, 150 kV, 200-amp large interface load-break bushing (Re: Cooper Power Systems catalog section 800-39).
- [] **15/25/35 KV DEADFRONT, CURRENTS ABOVE 200 AMPS:** The high voltage bushing shall be a 600A dead-break primary one-piece bushing externally removable, 3Ø rated, integral design. An optional 900 A bushing is available upon request (Re: Cooper Power Systems catalog sections 800-45 and 800-47).
- [] **36 KV TO 46 kV (250 KV BIL) DEADFRONT APPLICATIONS:** The high voltage bushing shall be a CONNEX Plug-in Cable Termination System, size 3S. The male and female portions of the bushing shall be supplied with the transformer. Available in radial feed only (Re: see www.pfisterer.com).
- [] **15/25/35 KV LIVEFRONT, 200 KV BIL MAX:** The high voltage bushing shall be a porcelain bushing with a two, four, or six-hole spade or an eyebolt connector.

4.4.3. Bushing Configuration

- [] **15/25 KV RADIAL FEED DEADFRONT:** The transformer shall be provided with three (3) high voltage bushings in accordance with Figure 1 dimensions (Figure 4a dimensions may be specified when a larger termination compartment for greater working space is desired) from ANSI C57.12.34 for radial feed configurations. The bushing heights shall be in accordance with Figure 3 dimensions (Figure 6 dimensions may be specified for greater bushing height) of ANSI C57.12.34.
- [] **15/25 KV LOOP FEED DEADFRONT:** The transformer shall be provided with six (6) high voltage bushings in accordance Figure 2 dimensions (Figure 5a dimensions may be specified when a larger termination compartment for greater working space is desired) of ANSI C57.12.34 for loop feed configurations. The bushing heights shall be in accordance with Figure 3 minimum dimensions (Figure 6 dimensions may be specified for greater bushing height) of ANSI C57.12.34.
- [] **35 KV RADIAL FEED DEADFRONT:** The transformer shall be provided with three (3) high voltage bushings in accordance with Figure 4b dimensions of ANSI C57.12.34 for radial feed configurations. The bushing heights shall be in accordance with Figure 6 dimensions of ANSI C57.12.34.
- [] **35 KV LOOP FEED DEADFRONT:** The transformer shall be provided with six (6) high voltage bushings in accordance with Figure 5c dimensions of ANSI C57.12.34 for loop feed configurations. The bushing heights shall be in accordance with Figure 6 dimensions of ANSI C57.12.34.
- [] **46 KV / 250 KV BIL DEADFRONT:** The transformer shall be provided with 3 bushings mounted 45° down from the horizontal, 60" from the ground, and 12" apart from each other.
- [] **15/25/35 KV LIVEFRONT, 150 KV BIL MAX:** The transformer shall be provided with three (3) bushings in accordance with Figure 9 of ANSI C57.12.34 for radial feed configurations. The bushing heights shall be in accordance with Figure 10 of ANSI C57.12.34.
- [] **200 KV BIL LIVEFRONT:** The transformer shall be provided with 3 bushings with phase-to-phase and phase-to-ground clearances adequate for 200 kV BIL.

4.5. Low Voltage Bushings and Terminals

4.5.1. Bushing Style

- 4.5.1.1. Voltages less than 700 Volts: The transformer shall be provided with tin-plated spade-type bushings for vertical takeoff. The spacing of the connection holes shall be 1.75" on center, per ANSI C57.12.34 figure 13a. The quantity of connection holes shall be 4, 6, 8, 12, 16, or 20 holes.
- 4.5.1.2. Transformers 300 kVA and below, and 500 kVA with 480Y/277 secondary will have two piece low voltage bushings with studs and screw on spades. Transformers 500 kVA with 208Y/120 secondary and all transformers above 500 kVA will have one-piece bushings.

Table 3
Standard / Maximum Bushing Hole Quantities

KVA	208Y/120	480Y/277 and higher
45-300	4 standard, 16 maximum	4 standard, 16 maximum
500	6 standard, 12 maximum	4 standard, 16 maximum
750-1500	12 standard, 20 maximum	6 standard, 12 maximum
2000-3750	N/A	12 standard, 20 maximum

(Re: Cooper Power Systems catalog sections 800-14, 800-16, and 800-21)

- 4.5.1.3. Bushing supports shall be provided for transformers requiring 10 or more connection holes. Bushing supports shall be affixed to the cabinet sidewalls; tank-mounted supports mountings are not acceptable.

4.5.2. Bushing Configuration

The transformer shall be provided with bushings in a staggered arrangement in accordance with Figure 11a dimensions (Figure 12a dimensions may be specified when a larger termination compartment for greater working space is desired) of ANSI C57.12.34.

- 4.5.3. Voltages greater than 700 Volts: Refer to section 3.1 for the bushing type. Secondary arrangements shall be live-front or dead-front. Dead-front application with a required neutral shall have a porcelain X0 bushing. Dead-front application may be loop feed when specified. Provide additional front barrier for high voltage live front secondary, creating an additional barrier after the low voltage door has been opened.

4.6. Switching

[] **Primary Switching:** The primary switching scheme provided with the transformer shall be one (*only available option for radial feed*), two, or three on-off under-oil load-break switch(s), or one four-position V or T-blade load-break sectionalizing switch. Refer to Appendix 1 for the schematics of these switching options (Re: Cooper Power Systems catalog sections 800-64 and 800-65).

[] **Make-before-break option for four-position, sectionalizing switch:** This switch option provides improved system reliability by eliminating momentary interruptions during switching operations.

4.7. Overcurrent Protection

[] **BAY-O-NET WITH BACK-UP CURRENT LIMITING FUSES:** (available up to 130 amps of full-load transformer current, up to 34.5 kV grounded wye, or 23 kV delta). The high-voltage overcurrent protection scheme provided with the transformer shall be an externally removable loadbreak expulsion Bay-O-Net fuse assembly with a flapper valve to minimize oil spillage. The bayonet fuses shall be in series with ELSP under-oil partial-range current-limiting back-up fuses with an interrupting rating of 50,000 A. (Re: Cooper Power Systems catalog sections 240-40, 240-45, 240-46, 240-47, 240-48, 240-49, and 240-50)

For voltages 23000Y or Delta and above (which must also take into account any higher tap settings), bayonet fuses are not available.

[] **Cartridge fusing, >23kV:** Under-oil cartridge fusing shall be utilized (available up to 208 amps of full-load transformer current, up to 34.5kV delta). The high-voltage overcurrent protection scheme provided with the transformer shall be under-oil cartridge fusing. Cartridge fuses shall be in series with ELSP under-oil partial-range current-limiting back-up fuses with an interrupting rating of 50,000 A.

[] **Optional Accessory:** An interlock shall be required between the load-break switch scheme specified and the bayonet fuses, such that the fuses may not be removed unless the transformer has been de-energized via the load-break switch scheme.

[] **MAGNEX® INTERRUPTER:** (available up to 42 amps of full-load transformer current, up to 35 KV grounded wye, or 17.1 KV delta), The high-voltage overcurrent protection scheme provided with the transformer shall be a three-phase trip Magnex® Interrupter. This externally resettable device may also be used as an on-off switch. The three-phase Magnex® Interrupter shall be in series with ELSP under-oil partial-range current-limiting back-up fuses with an interrupting rating of 50,000 A (Re: Cooper Power Systems catalog sections 240-33 and 240-50).

- [] **INTEGRAL VACCUUM, FAULT INTERRUPTER (VFI):** (available from 13 amps up to 900 amps of full-load transformer current, up to 34.5 kV, grounded wye or delta, maximum 150 KV BIL) The high-voltage or low-voltage overcurrent protection scheme provided with the transformer shall be an integral Vacuum Fault Interrupter (VFI). The VFI shall have a maximum interrupting rating of 12,000A RMS symmetrical (optional 16,000 A RMS symmetrical available at 15 KV) with resettable fault protection up through 35kV. The VFI shall also include a Tri-Phase electronic breaker control with over 100 minimum trip settings and 5 selectable time current curves. The minimum trip setting shall be XX amps, and curve profile shall be the EF, KF, TF, F, or H (Re: see Cooper Power Systems bulletins 97055 and 02039 and catalog section S285-75-1 for the electronic control).
- [] **Optional ELSP Accessory:** VFI shall be in series with ELSP under-oil partial-range current-limiting back-up fuses with an interrupting rating of 50,000 A.
- [] **Optional VFI Accessories:** SCADA board; Ground fault detection; Motor operator assembly; Visible break window.

4.8. Overvoltage Protection

4.8.1. The overvoltage protection scheme provided with the transformer shall protect the high-voltage or low voltage winding.

- [] **DEAD-FRONT BUSHINGS:** (maximum 150 kV BIL, for voltages up to 18 kV delta and 35 kV grounded wye). Externally mounted, Distribution Class M.O.V.E. Dead-front elbow arresters shall be supplied. (Re: Cooper Power Systems catalog section 235-55 and 235-65) M.O.V.E. arresters are for installation on 200 A rated dead-front bushing interfaces only. *If transformer bushings are rated 600 A or 900 A, BT-TAP elbow connectors, T-OP II elbow connectors, or 600 A bushing adapters, each with a load-reducing tap plug for arrester connection, are required* (Re: Cooper Power Systems catalog sections 235-42, 235-45, 235-52, 235-70, 235-71, 235-75, 235-99).
- [] **LIVEFRONT BUSHINGS:** (up to 200 KV BIL). Intermediate Class and Distribution Class (Heavy Duty, Medium Duty, Riser Pole Duty) arresters shall be supplied beneath the high-voltage bushings (Re: Cooper Power Systems catalog sections 235-42, 235-45, 235-52, 235-70, 235-71, 235-75).
- [] **UNDER OIL:** (for voltages up to 27 kV delta and 35 KV grounded wye). Internally mounted, Distribution Class MOV under-oil surge arresters shall be supplied (Re: Cooper Power Systems Catalog Section 235-95).
- [] **Optional Accessory:** Three (3) disconnect switches shall be included to disconnect the under-oil arresters from ground for transformer testing (Re: Cooper Power Systems catalog section 800-51).

5.0 Labeling

- 5.1. A temporary bar code label shall be attached to the exterior of the transformer in accordance with ANSI C57.12.34.

6.0 Finish Performance Requirements

- 6.1. The tank coating shall meet all requirements in ANSI C57.12.28 including:
 - Salt Spray
 - Crosshatch adhesion
 - Humidity
 - Impact
 - Oil resistance
 - Ultraviolet accelerated weathering
 - Abrasion resistance – taber abraser
- 6.2. The enclosure integrity of the tank and cabinet shall meet the requirements for tamper resistance set forth in ANSI C57.12.28 including but not limited to the pry test, pull test, and wire probe test.

7.0 Production Testing

- 7.1. All units shall be tested for the following:
 - No-Load (85°C or 20°C) losses at rated current
 - Total (85°C) losses at rated current
 - Percent Impedance (85°C) at rated current
 - Excitation current (100% voltage) test
 - Winding resistance measurement tests
 - Ratio tests using all tap settings
 - Polarity and phase relation tests
 - Induced potential tests
 - Full wave and reduced wave impulse test
- 7.2. Minimally, transformers shall conform to efficiency levels for liquid immersed distribution transformers, as specified in Table I.1 of the Department of Energy ruling. “10 CFR Part 431 Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule; October 12, 2007.” Manufacturer shall comply with the intent of all regulations set forth in noted ruling. This efficiency standard does not apply to step-up transformers.
- 7.3. In addition, the manufacturer shall provide certification upon request for all design and other tests listed in C57.12.00, including verification that the design has passed short circuit criteria per ANSI C57.12.00 and C57.12.90.

- 7.4. In the event of proposal bid evaluated with guaranteed losses due to a loss evaluation (see section 10.0), manufacturer shall conform to guaranteed average losses as specified in ANSI C57.12.00. The no-load losses of a transformer shall not exceed the specified no-load losses by more than 10%, and the total losses of a transformer shall not exceed the specified total losses by more than 6%.

8.0 Approved Manufacturers

- 8.1. Cooper Power Systems—Waukesha WI

9.0 Accessories

- 9.1. The following accessories and options shall be provided:

- ☐ Bolted main tank cover (1000 kVA & below)
- ☐ Welded main tank cover with bolted handhole (1500 kVA & above)
- ☐ 1.0" upper fill plug
- ☐ 1.0" drain plug in LV compartment (500 kVA & below)
- ☐ 1.0" drain valve w/ sampling device in LV compartment (750 kVA & above)
- ☐ Automatic pressure relief valve
- ☐ Metal drip shield (when bayonets specified)
- ☐ 20" deep cabinet (2500 kVA & below)
- ☐ 24" deep cabinet (3000 kVA & above)
- ☐ Ground provisions per C57.12.34 section 9.11.
- ☐ Meet NEMA TR-1 sound levels
- ☐ Liquid level gauge
- ☐ Dial-type thermometer gauge
- ☐ Pressure vacuum gauge
- ☐ 1.0" drain valve w/ sampling device in (LV or HV) compartment (500 kVA & below)
- ☐ Upper fill valve
- ☐ Pressure vacuum bleeder
- ☐ 24" deep cabinet
- ☐ 30" deep cabinet
- ☐ 36" deep cabinet
- ☐ 40" deep cabinet
- ☐ Spare bayonet fuse links
- ☐ Fault indicator provisions
- ☐ Ground connectors
- ☐ Mr. Ouch warning & danger signs
- ☐ Danger high voltage warning signs
- ☐ Miscellaneous stenciling
- ☐ Non-PCB decal
- ☐ Touch-up paint
- ☐ Interphase barriers (for live front primary units only)
- ☐ Seismic zone 3 and 4 tank anchoring
- ☐ Complete 304L stainless steel tank and cabinet
- ☐ 304L stainless steel tank base and cabinet sides & sill (partial)
- ☐ Liquid level gauge with auxiliary contacts

- [] Dial-type thermometer gauge with auxiliary contacts
- [] Pressure vacuum gauge with auxiliary contacts
- [] Current or potential transformers
- [] Rapid rise relay with seal-in panel
- [] Winding temperature indicator
- [] Watt-hour meter package – includes GE kV2c Encompass™ Electronic Meter. Factory supplied wiring shall be internal to the cabinet, not in conduit. Communication connection shall be the OPTOCOM port.
- [] Harmonic resistant K-factor design, K=4, 9, 13, or 20
- [] Forced air ONAF (mineral oil) or KNAF (Envirotemp FR3) rating. Forced air rating requires documentation from Cooper Power Systems' customer that they are aware this transformer is no longer tamper resistant and is no longer in compliance with ANSI standards.
- [] Future forced air rating
- [] FM Global (FM) Approved transformer (to comply with NEC 450-23 listing restrictions for installations on, near, or inside of buildings)
- [] Combination UL Listed & Classified transformer (to comply with NEC 450-23 listing restrictions for installations on, near, or inside of buildings) per UL XPLH
- [] UL Listed transformer (certifying compliance with ANSI standards only) per UL XPLH

10.0 Optional Transformer Evaluation

- [] No unit evaluation, but include quote losses as reference only on bid.
- [] Unit loss evaluation, guaranteed average losses. Criteria to properly evaluate quoted losses:
 - Core loss evaluation (A-factor) ____ \$/watt
 - Winding loss evaluation (B-factor) ____ \$/watt(Cooper may be contacted for sample loss evaluation method)

11.0 Shipping

- 11.1. Transformers, 1000 kVA and below, shall be palletized. Transformers, 1500 kVA and larger, shall be loaded and unloaded with overhead cranes, so a pallet is not to be provided for these transformers.

12.0 Data With Proposal

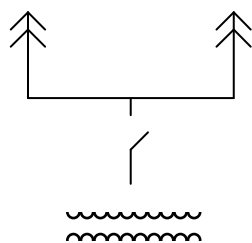
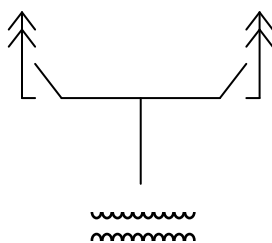
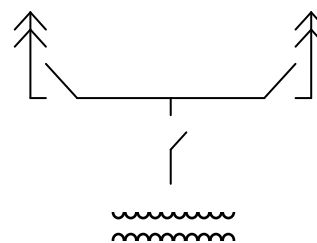
12.1. The following data shall be submitted with the proposal:

- Core losses (when requested per Sections 7.4 and 10.0).
- Winding losses (when requested per Sections 7.4 and 10.0).
- Percent Impedance
- Typical bid drawing
- Approval drawing – drawings shall show final dimensions and features. When requested, approval drawings shall be provided per quoted leadtime.
- Record Drawing – drawings shall show final dimensions and features. When requested, record drawings shall be provided.

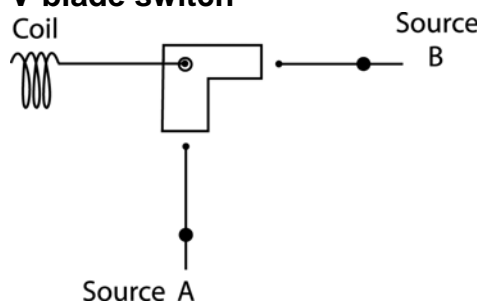
13.0 Service

13.1. The manufacturer of the transformer shall have regional service centers located within 2 hours flight time of all contiguous 48 states. Service personnel shall be factory trained in commissioning and routine service of quoted transformers.

APPENDIX 1: Switching Options and Schematics

1 On/Off Switch**2 On/Off Switches****3 On/Off Switches**

(Re: Cooper Power Systems catalog section 800-65)

4-position sectionalizing switches:**V-blade switch**

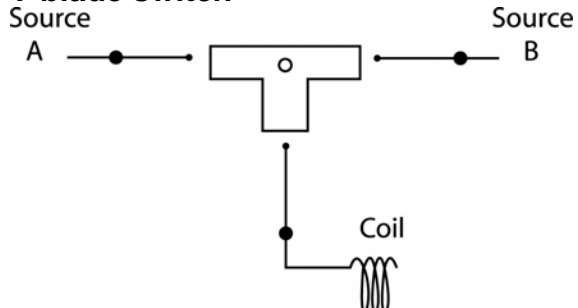
Description of positions:

Feed from A & B

Feed from A only

Feed from B only

Open — the loop is **open** and the transformer is de-energized

T-blade switch

Description of positions:

Feed from A & B

Feed from A only

Feed from B only

Open — the loop is **closed** and the transformer is de-energized

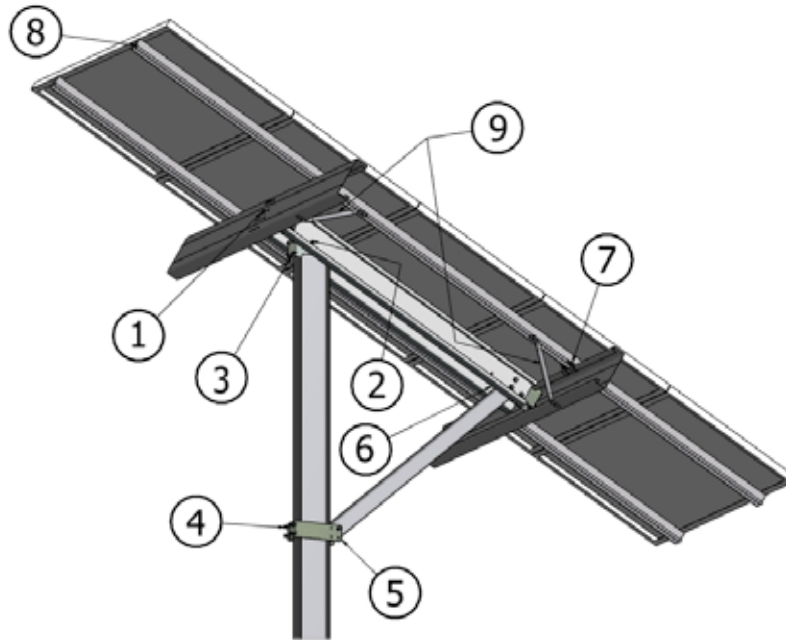
(Re: Cooper Power Systems catalog section 800-64)

ISYS Ground 2.0 Technical Datasheet

Pub 111206-1td • Rev. 1.1 • December 2011

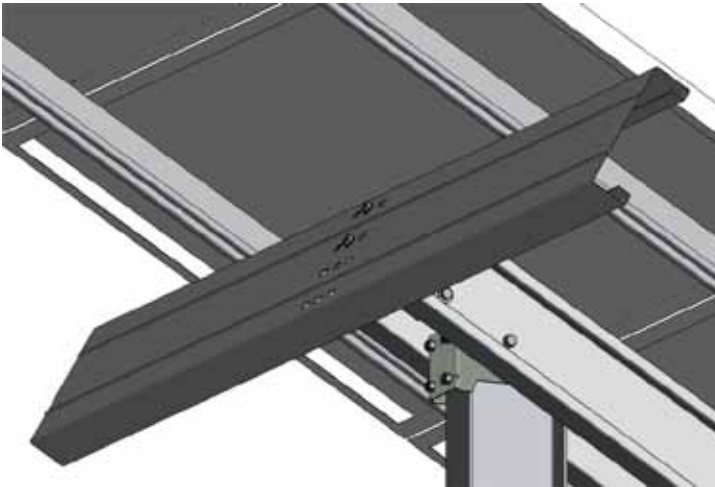
ISYS Ground Connections	1
East West Beam to Top-Chord Assembly	2
Top-Chord Assembly to Top U-Clamp	2
Top U-Clamp to Vertical Column	3
Bottom U-Clamp to Vertical Column	3
Diagonal Brace to Bottom U-Clamp at Column	4
Diagonal Brace to Top-Chord Assembly	4
East West Beam to North South Rail	5
North South Rail to Framed Module	5
Lateral Brace to East West Beam and North South Rail	6

ISYS Ground Connections

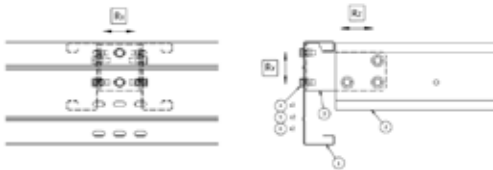


CONNECTION	DESCRIPTION
1	East West Beam to Top-Chord Assembly
2	Top-Chord Assembly to Top U-Clamp
3	Top U-Clamp to Vertical Column
4	Bottom U-Clamp to Vertical Column
5	Diagonal Brace to Bottom U-Clamp
6	Diagonal Brace to Top Chord Assembly
7	East West Beam to North South Rail
8	North South Rail to Module
9	Lateral Brace to East West Beam and North South Rail

East West Beam to Top-Chord Assembly



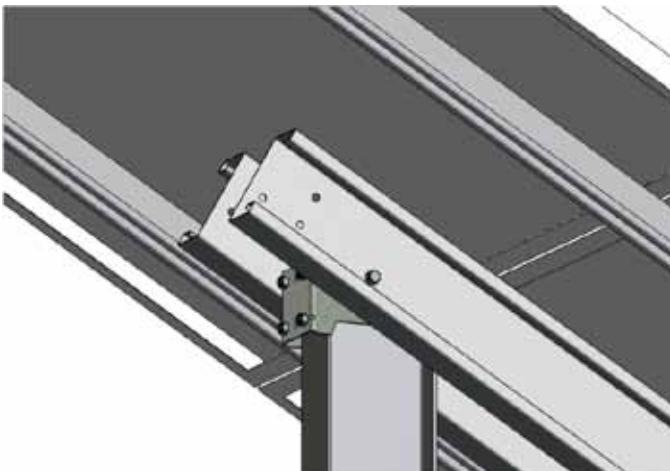
	DESCRIPTION	MATERIAL
1	EAST WEST C-CHANNEL	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14GA
2	TOP CHORD CHANNELS	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14GA
3	8.5" U-CLAMP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 0.1875" THK.
4	1/2 " BOLT	SAE J429-GRADE 5
5	1/2 FLAT WASHER	ANSI, B, N
6	1/2 " FLANGE NUT	SAE J995-GRADE 5



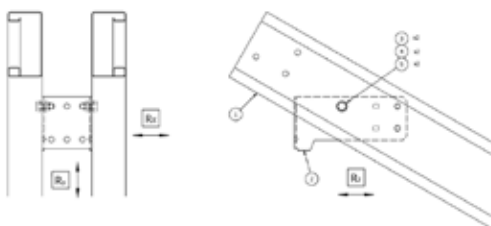
APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R_x	5374 (23,904)	1930 (8585)	2960 (13,166)	2765 (12,299)
R_y	9660 (42,970)	4830 (21,484)	6762 (30078)	4830 (21,484)
R_z	9660 (42,970)	4830 (21,484)	6762 (30078)	4830 (21,484)

Note: Load values based on two (2) bolts at single East West Beam to Top-Chord connection

Top-Chord Assembly to Top U-Clamp



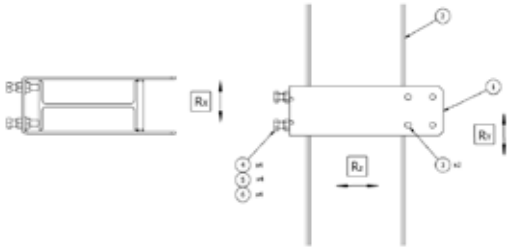
	DESCRIPTION	MATERIAL
1	TOP CHORD CHANNELS	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14GA
2	10.5" U-CLAMP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 0.1875" THK.
3	1/2 " BOLT	SAE J429-GRADE 5
4	1/2 FLAT WASHER	ANSI, B, N
5	1/2 " FLANGE NUT	SAE J995-GRADE 5



APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R_x	12,600 (56,047)	5040 (22,419)	7560 (33,628)	6,300 (28,023)
R_y	12,600 (56,047)	5040 (22,419)	7560 (33,628)	6,300 (28,023)
R_z	12,600 (56,047)	5040 (22,419)	7560 (33,628)	6,300 (28,023)

Top U-Clamp to Vertical Column

	DESCRIPTION	MATERIAL
1	10.5" U-CLAMP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 0.1875" THK.
2	VERTICAL COLUMN	A572 GRADE 50
3	U-CLAMP PIN	AISI 1018 STEEL
4	1/2 " X 2 1/2 HEX SOC, SET SCREW, CONE POINT	ALLOY STEEL, ASTM F912-04, ASME 18.3
5	1/2 " FLANGE NUT	SAE J995-GRADE 5
6	1/2 " HEX NUT	SAE J995-GRADE 5

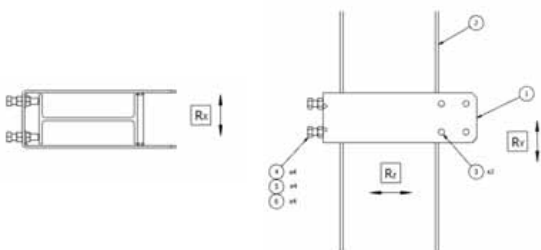


APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs (N)
R _x	8,365 (37,209)	3452 (15,355)	5,293 (23,544)	4182(18,023)
R _y	8,365 (37,209)	3452 (15,355)	5,293 (23,544)	4182(18,023)
R _z	8,365 (37,209)	3452 (15,355)	5,293 (23,544)	4182(18,023)

Bottom U-Clamp to Vertical Column



	DESCRIPTION	MATERIAL
1	12.5" U-CLAMP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 0.1875" THK.
2	VERTICAL COLUMN	A572 GRADE 50
3	U-CLAMP PIN	AISI 1018 STEEL
4	1/2 " X 2 1/4 HEX BOLT	SAE J429-GRADE 5
5	1/2 " FLANGE NUT	SAE J995-GRADE 5
6	1/2 " HEX NUT	SAE J995-GRADE 5

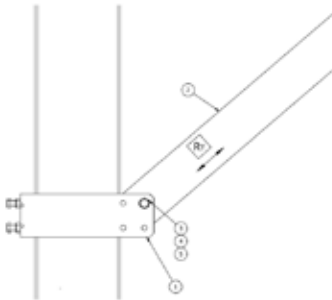


APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs (N)
R _y	8,365 (37,209)	3452 (15,355)	5,293 (23,544)	4182(18,023)

Diagonal Brace to Bottom U-Clamp at Column

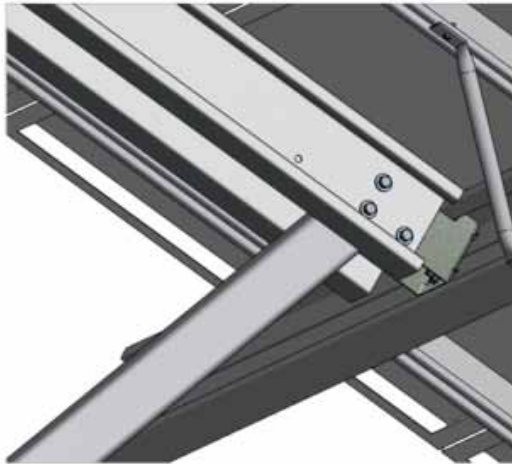


	DESCRIPTION	MATERIAL
1	12.5" U-CLAMP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 0.1875" THK.
2	DIAGONAL BRACE	4x4 SQUARE TUBE, A572 GRADE 50/ ROLL-FORMED CHANNEL, ASTM A653 GRADE 50
3	1/2 "BOLT	SAE J429-GRADE 5
4	1/2 " FLAT WASHER	ANSI, B, N
5	1/2 " HEX NUT	SAE J995-GRADE 5
6	1/2 " HEX NUT	SAE J995-GRADE 5

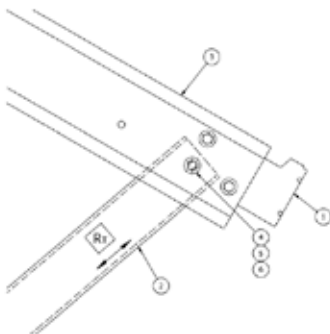


APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R _T	21,168 (94,159)	8,820 (39,233)	13,750 (61,163)	8820 (94,159)

Diagonal Brace to Top-Chord Assembly

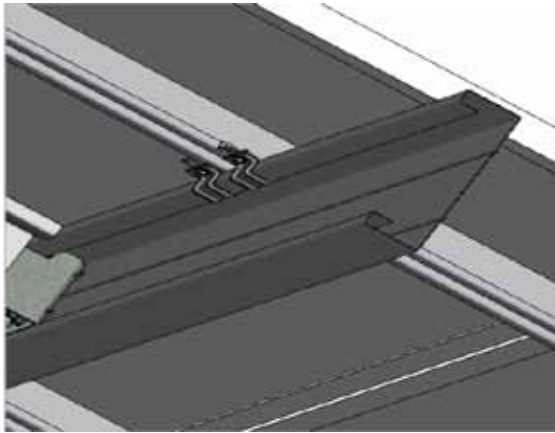


	DESCRIPTION	MATERIAL
1	8.5" U-CLAMP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 0.1875" THK.
2	DIAGONAL BRACE	4x4 SQUARE TUBE, A572 GRADE 50/ ROLL-FORMED CHANNEL, ASTM A653 GRADE 50
3	1/2 "BOLT	SAE J429-GRADE 5
4	Top Chord Channels	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14 GA
5	1/2 " FLAT WASHER	ANSI, B, N
6	1/2 " HEX NUT	SAE J995-GRADE 5

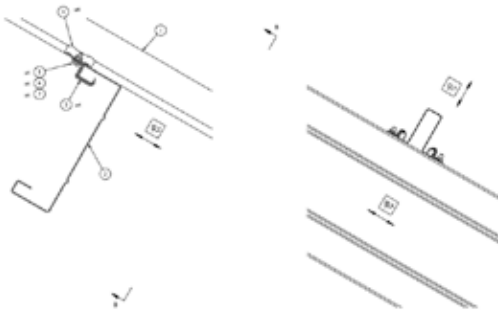


APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R _T	21,168 (94,159)	8,820 (39,233)	13,750 (61,163)	8820 (94,159)

East West Beam to North South Rail



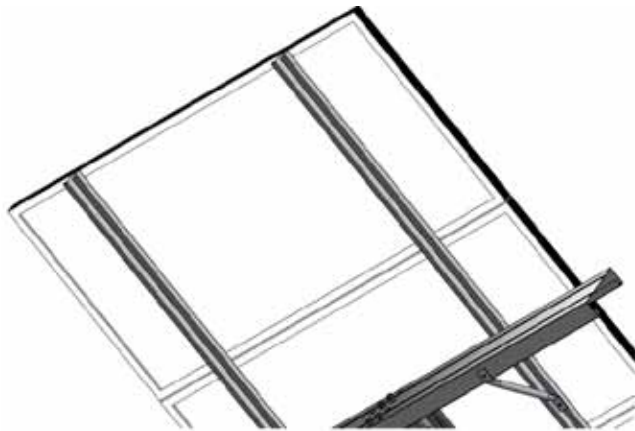
	DESCRIPTION	MATERIAL
1	NORTH SOUTH RAIL	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 18 GA
2	EAST WEST BEAM	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14 GA
3	LARGE BEAM CLIP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14 GA
4	SMALL BEAM CLIP	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, 14 GA
5	1/4 " BOLT	SAE J429-GRADE 5
6	1/4 " FLANGE NUT	SAE J995-GRADE 5
7	1/4 " FLAT WASHER	SAE J995-GRADE 5



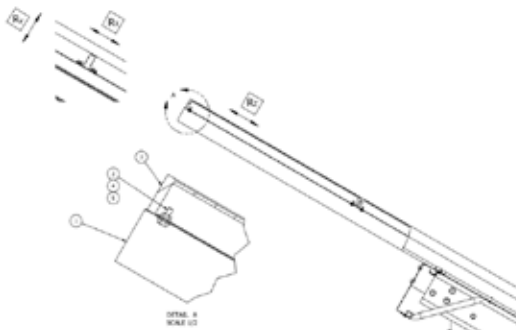
APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R _x	549 (2,442)	205 (911)	321 (1,427)	258(1,147)
R _y	1,559 (6,934)	629 (2,798)	986 (4,386)	795(3,536)
R _z	2323 (10,333)	937 (4,167)	1469 (6,534)	1,195 (5,315)

Note: Load values based on two (2) clamps at single East West Beam to North South Rail connection

North South Rail to Framed Module



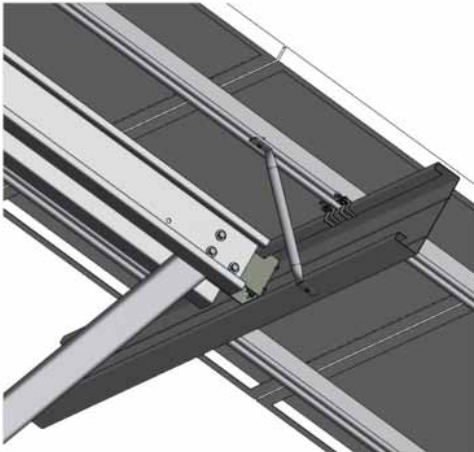
	DESCRIPTION	MATERIAL
1	NORTH SOUTH RAIL	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, MIN G90 GALV, 18 GA
2	MODULE FRAME	ALUMINUM (PER MODULE MFG. SPEC.)
3	1/4 " BOLT	SAE J429-GRADE 5
4	1/4 " FLANGE NUT	SAE J995-GRADE 5
5	1/4 " FLAT WASHER	SAE J995-GRADE 5



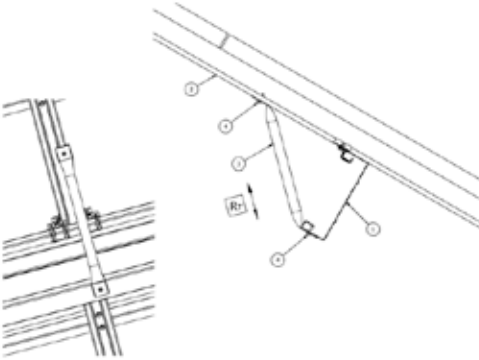
APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R _x	1,687 (7,504)	843 (3,750)	1,180 (5,248)	860(3,825)
R _y	1,687 (7,504)	843 (3,750)	1,180 (5,248)	860(3,825)
R _z	634 (2,820)	269 (1,196)	381 (1,695)	300 (1,334)

Note: Load values based on one (1) bolt.

Lateral Brace to East West Beam and North South Rail



	DESCRIPTION	MATERIAL
1	EAST WEST BEAM	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, MIN G90 GALV, 14 GA
2	NORTH SOUTH RAIL	ASTM A653 GRADE 50, MIN TENSILE 60 KSI, MIN G90 GALV, 18 GA
3	LATERAL BRACE	1" GALVANIZED ELECTRICAL METALLIC TUBING, YIELD 30 KSI, ULTIMATE TENSILE 75 KSI
4	1/4-14 X 1" HEX TEK SCREW SELF-DRILLING	SAE J78, 1/4 -14 X 1", #3 POINT



APPLIED LOAD DIRECTION	NOMINAL LOAD lbs (N)	ALLOWABLE LOAD, ASD, (Ω) lbs (N)	DESIGN LOAD, LRFD, (Φ) lbs (N)	DESIGN LOAD, LSD, (Φ) lbs(N)
R_T	1500 (6,672)	500 (2,224)	750 (3,336)	600 (2,668)

General Specifications

Outdoor models

PVI-5000-OUTD-AU / PVI-5000-OUTD-S-AU

PVI-6000-OUTD-AU / PVI-6000-OUTD-S-AU

AURORA BENEFITS

- Dual input section to process two strings with independent MPPT (6000W max models)
- High speed MPPT for real time power tracking and improved energy harvesting
- Transformerless operation for highest efficiency: up to 97% (96,5% Euro)
- Reverse polarity protection minimizes chance of damage due to mis-wiring
- High overload capability: works up to 6000W under most ambient conditions
- True Sine Wave Output
- Anti-islanding Protection
- LCD Display on the front to monitor the main parameters
- Standard DC Multi-Contact terminals, screw terminals option available



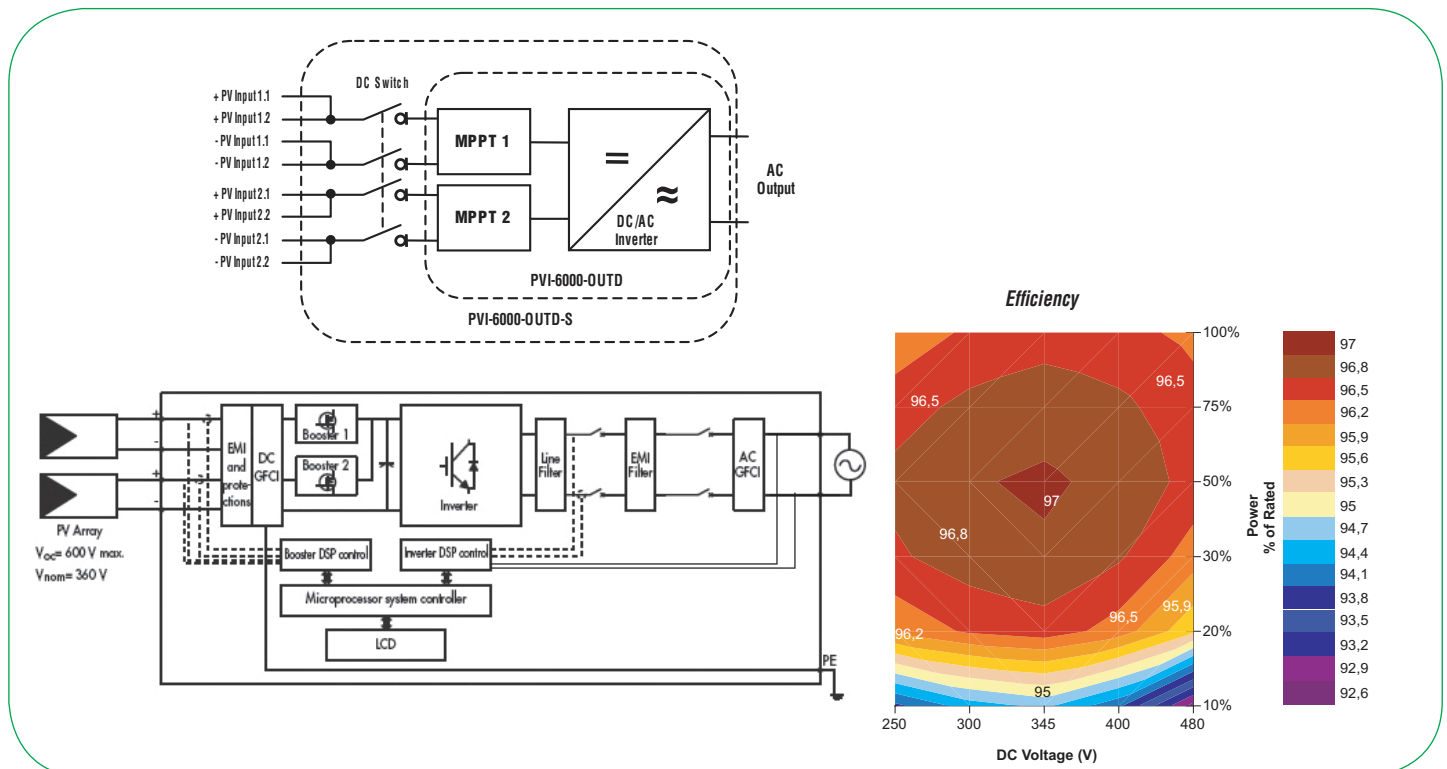
SMART CONTROLS

Aurora controls are DSP (Digital Signal Processor) based with sophisticated control and self-diagnostic algorithms. A LCD display shows the main operational parameters. Three LED's indicate the operating status.

STANDARDS AND CODES

Aurora inverters comply with standards set for grid-tied operation, safety and electromagnetic compatibility including: AS/NZS 60950:2003 A1-3, AS/NZS 3100:2002, AS4777.2 and AS4777.3, VDE0126, CEI 11-20 IV ed, DK5940, IEC 61683, IEC 61727, EN50081, EN50082, EN61000, CE certification, El Real Decreto RD1663/2000 de España.

Block Diagram and typical efficiency



CHARACTERISTICS	PVI-5000-OUTD	PVI-6000-OUTD
INPUT PARAMETERS		
Nominal DC Power [kW]	4,8	6,2
Max. Recommended DC Power [kW]	5,75	6,9
Operating Input Voltage Range [V]	0,7xVstart - 580 (360 nominal)	
Full Power MPPT input voltage range (symmetrical load) [V]	140-530	180-530
Full asymmetrical load input voltage range [V]	220-530 (@ 4kW) / 90-530 (@ 0,8kW)	220-530 (@ 4kW) / 120-530 (@ 2,2kW)
Absolute Max. Input Voltage [V]	600	
Activation voltage "Vstart" [V]	200 nominal (adjustable within the range 120Vdc-350Vdc, independently/each input)	
No of independent MPPT trackers	2	
Max. Input Power, each MPPT [kW]	4	
No. of DC Inputs	4 (2 each MPPT)	
Max. DC Current, each MPPT [A]	18 (22 shortcircuit)	
DC Connection	8 x MultiContact Ø 4mm (4 male - positive input + 4 female - negative input)	
	Mating cable connector included	
	Conductor cross section: 4-6mmq/AWG12-10 - Cable Ø w/insulator: 3-6mm	
INPUT PROTECTION		
Reverse polarity protection	Yes	
Fuse rating, each input (-FS suffix versions only)	NA	NA
DC side varistors	4 (2 for each MPPT), thermally protected	
PV array Insulation Control	according to VDE0126-1-1	
DC Switch (-S/-FS suffix versions only)	Integrated (Rating: 600Vdc / 25Adc)	
OUTPUT PARAMETERS		
Nominal AC Power (up to 50°C, kW)	4,6	6
Max. AC Power [kW]	5	6
AC Grid Connection	single phase 230Vac 50Hz + PE	
Nominal AC Voltage [V]	230	
Maximum AC Voltage Range [V]	180-264	
Nominal AC Frequency [Hz]	50	
Max. AC Line Current [A]	25	30
AC Connection	Cage-clamp terminal block	
	Conductor Cross Section: Solid: 0,5-16mmq / Stranded: 0,5-10mmq / AWG20-6	
	Cable Gland: M32 - Cable Ø: 13-21mm	
Line Power Factor	1	
AC Current Distortion [THD%]	<3,5% at rated power with sine wave voltage	
OUTPUT PROTECTION		
AC side varistors	2, plus gas arrester to ground	
Ground fault protection (AC + DC leakage current)	according to VDE0126-1-1	
CONVERSION EFFICIENCY		
Max. Efficiency	97%	
Euro Efficiency	96,40%	
ENVIRONMENTAL PARAMETERS		
Cooling	Natural cooling	
Ambient Temp. Range [°C]	-25 / +60 (output power derating above 50°C)	
Operating Altitude [m]	2000	
Acoustical Noise [dBA]	<50 @1mt	
Environmental IP Rating	IP65	
Relative Humidity	0-100% condensing	
MECHANICAL		
Dimensions [H x W x D]	740 x 325 x 208	
Weight [kg]	26	
OTHER		
Stand-By Consumption [W]	8	
Feed In Power Threshold [W]	10	
Night Time consumption [W]	0,3	
Isolation	No isolation, Transformer-less	
Display	YES (Alphanumeric 2 lines)	
Communication	RS485 (cage-clamp connector - Conductor cross section: 0,08-1,5mmq/AWG28-16); Usb (service only) Optional "Aurora Easy Control" remote monitoring system	
AVAILABLE PRODUCT VARIANTS		
Standard - no options	PVI-5000-OUTD	PVI-6000-OUTD
With DC switch	PVI-5000-OUTD-S	PVI-6000-OUTD-S

MODEL SUMMARY

MODEL NUMBER	POWER
PVI-5000-OUTD	5000W
PVI-5000-OUTD-S	5000W with DC Switch
PVI-6000-OUTD	6000W
PVI-6000-OUTD-S	6000W with DC Switch

Appendix 3 – Cultural Heritage Self Assessment



Ministry of Tourism,
Culture and Sport
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

REA Checklist: Consideration of Potential for Heritage Resources

Applies to: Applicants for a renewable energy approval (REA) under the *Environmental Protection Act* who opt to consider the potential for heritage resources under subsection 23(2) of O. Reg. 359/09.

Screening Question

Is the project location situated on a parcel of land that:	Yes	No
1. Abuts any protected property as described in Column 1 of the Table in section 19?*	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Is included on the Ministry of Tourism, Culture and Sport's list of provincial heritage properties?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Is listed on a register or inventory of heritage properties maintained by the municipality?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Is the subject of a municipality, provincial or federal plaque?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Is on or abutting a National Historic Site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Is on or abutting a known burial site and/or cemetery?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Contains structures over forty years old? (Residential structures, farm buildings and outbuildings, industrial, commercial, institutional buildings and/or engineering works, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Is there Aboriginal or local knowledge or accessible documentation suggesting that the project location is situated on a parcel of land that:	Yes	No
8. Contains or is part of a cultural heritage landscape? (Aboriginal trail, park, relationship to a Canadian Heritage River, designed garden, historic road or rail corridor, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Has special association with a community, person or historical event? (Aboriginal sacred site, traditional-use areas, battlefield, birthplace of an individual of importance to the community, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If **YES** to one or more of the above questions, there is potential for heritage resources at the project location.

If **uncertain** about the answer to one or more of the above questions, a heritage assessment is advised as additional research is required to determine whether there is potential for heritage resources in the project location.

If **NO** to all of the above questions, there is low potential for heritage resources at the project location. A summary of the information supporting the consideration of potential for heritage resources must be included in the design and operations report.

LP 5
Empty field next to 8338 Scotchmere Dr.

*If the project is located on a protected property, written authorization must be obtained from the appropriate body and submitted to MOE as part of complete REA application under section 19 of O. Reg. 359/09.



The Corporation of the Municipality of Strathroy-Caradoc
52 Frank Street, Strathroy, ON N7G 2R4
Phone: 519-245-1070 • Fax: 519-245-6353
www.strathroy-caradoc.ca

August 15, 2012

Mr. Jean-Louis Gaudet
Exp.
1595 Clark Boulevard
Brampton, ON L6T 4V1

**Re: Your Project No. V00002250-00
Request for Information – Renewable Energy Approval – Canadian Solar
Developers (LP 1, 5 and 6, 7)**

Dear Mr. Gaudet

Further to your email inquiry regarding the above-noted matter, staff have reviewed the subject property files and have the following information to offer:

9307 Union Drive

Relating to Section 19(1) of O. Reg. 359/09:

Has the property or abutting property been municipally designated as a heritage or protected property and/or is listed on the municipal heritage register or provincial register/list? **No**

Has a notice of intention to designate has been issued for the property or abutting property? **No**

Is the property or abutting property subject to a municipal easement agreement? **No**

Is the property or abutting property located within a designated Heritage Conservation District?
No

Relating to Appendix D of the new MTC guidance document (*Protected Properties, Archaeological and Heritage Resources – An Information Bulletin for Applicants Addressing the Cultural Heritage Component of Projects Subject to Ontario Regulation 359/09 Renewable Energy Approvals*):

Is a municipal, provincial or federal plaque on or related to the property? **No**

Is there is a known burial site and/or cemetery on the property or abutting the property? **No**

Is the property is within a Canadian Heritage River watershed? **No**

Is the property or an abutting property is associated with a known architect, planner or builder?
No

Is the property or an abutting property is associated with a historic road or railroad? **Union Drive is an original township concession (VII Concession) surveyed in 1822**

Does the property or an abutting property contain a park or planned/designated recreational or community space? **No**

Is there documentation to indicate built heritage or cultural heritage landscape potential? **Our records indicate that the dwelling located on the property was constructed circa 1870**

Is the property or an abutting property is associated with a person or event of historic interest?
No

8338 Scotchmere Drive

Relating to Section 19(1) of O. Reg. 359/09:

Has the property or abutting property been municipally designated as a heritage or protected property and/or is listed on the municipal heritage register or provincial register/list? **No**

Has a notice of intention to designate has been issued for the property or abutting property? **No**

Is the property or abutting property subject to a municipal easement agreement? **No**

Is the property or abutting property located within a designated Heritage Conservation District?
No

Relating to Appendix D of the new MTC guidance document (*Protected Properties, Archaeological and Heritage Resources – An Information Bulletin for Applicants Addressing the Cultural Heritage Component of Projects Subject to Ontario Regulation 359/09 Renewable Energy Approvals*):

Is a municipal, provincial or federal plaque on or related to the property? **No**

Is there is a known burial site and/or cemetery on the property or abutting the property? **No**

Is the property is within a Canadian Heritage River watershed? **No**

Is the property or an abutting property is associated with a known architect, planner or builder?
No

Is the property or an abutting property is associated with a historic road or railroad?
Scotchmere Drive is an original township concession (VIII Concession) surveyed in 1822

Does the property or an abutting property contain a park or planned/designated recreational or community space? **No**

Is there documentation to indicate built heritage or cultural heritage landscape potential? **Our records indicate that the dwelling located on the property was constructed circa 1890**

Is the property or an abutting property is associated with a person or event of historic interest?
No

9274 Union Drive

Relating to Section 19(1) of O. Reg. 359/09:

Has the property or abutting property been municipally designated as a heritage or protected property and/or is listed on the municipal heritage register or provincial register/list? **No**

Has a notice of intention to designate has been issued for the property or abutting property? **No**

Is the property or abutting property subject to a municipal easement agreement? **No**

Is the property or abutting property located within a designated Heritage Conservation District?
No

Relating to Appendix D of the new MTC guidance document (*Protected Properties, Archaeological and Heritage Resources – An Information Bulletin for Applicants Addressing the Cultural Heritage Component of Projects Subject to Ontario Regulation 359/09 Renewable Energy Approvals*):

Is a municipal, provincial or federal plaque on or related to the property? **No**

Is there is a known burial site and/or cemetery on the property or abutting the property? **No**

Is the property is within a Canadian Heritage River watershed? **No**

Is the property or an abutting property is associated with a known architect, planner or builder?
No

Is the property or an abutting property is associated with a historic road or railroad? **Union Drive is an original township concession (VII Concession) surveyed in 1822**

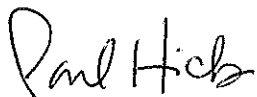
Does the property or an abutting property contain a park or planned/designated recreational or community space? **No**

Is there documentation to indicate built heritage or cultural heritage landscape potential? **Our records indicate that the dwelling located on the property was constructed circa 1975**

Is the property or an abutting property is associated with a person or event of historic interest?
No

I trust the above will be satisfactory for your purposes. Should you require additional information or clarification on what had been provided, please do not hesitate to contact me by telephone at: 519-245-1105 (ext 250) or by email at: phicks@strathroy-caradoc.ca.

Sincerely

A handwritten signature in black ink that reads "Paul Hicks". The signature is written in a cursive, flowing style.

Paul Hicks
Planner

Search Results of Ontario Heritage Trust Website (result - no Ontario Heritage Trust sites on project site)

Ontario Heritage Trust - Visit our easement properties - Windows Internet Explorer provided by exp

http://www.heritagetrust.on.ca/Conservation/Conservation-easements/Visit-our-easement-properties.aspx

File Edit View Favorites Tools Help

★ Favorites ★ Suggested Sites trow Web Slice Gallery Online Conversion Dictionary.com Bing Maps WDO Google

Ontario Heritage Trust - Visit our easement ...

FAQ
Links

[Frontenac County Courthouse](#) (Kingston)
• [Macpherson House](#) (Greater Napanee)
• [Mississippi Valley Textile Museum](#) (Mississippi Mills)
• [St. George's Cathedral](#) (Kingston)

Greater Toronto Area

- [Benares](#) (Mississauga)
- [Gooderham Building](#) (Toronto)
- [Peel County Courthouse and Jail](#) (Brampton)
- [St. Anne's Anglican Church](#) (Toronto)
- [Sharon Temple](#) (Town of East Gwillimbury)

Niagara Falls and Region

- [Neutral Indian Burial Ground](#) (Grimsby)
- [Niagara District Court House](#) (Niagara-on-the-Lake)
- [Redmond Heights](#) (Niagara Falls)
- [Welland County Courthouse](#) (Welland)

Northern Ontario


- [Kenora Post Office](#) (Kenora)
- [North Bay CPR Station](#) (North Bay)
- [Ontario Northland Railway Station](#) (Cobalt)
- [Precious Blood Cathedral](#) (Sault Ste. Marie)
- [Tourist Pagoda](#) (Thunder Bay)

Ottawa


- [Aberdeen Pavilion](#) (Ottawa)
- [Church of St. Alban the Martyr](#) (Ottawa)
- [Fleet Street Pumping Station](#) (Ottawa)
- [Pinhey Estate](#) (Ottawa)
- [St. Brigid's Church](#) (Ottawa)

Southwestern Ontario

- [Assumption Church](#) (Windsor)
- [Dundurn Castle](#) (Hamilton)
- [Middlesex County Courthouse](#) (London)
- [Ruthven Estate](#) (Cayuga)
- [Stratford City Hall](#) (Stratford)



See what's in our collections
Explore the collection at Fulford Place
» [Learn more...](#)



Heritage Matters
Explore the Trust's signature magazine online!
» [Issues at a glance...](#)

Internet 130%

Online Plaque search results on Ontario Heritage Trust website. <http://www.heritagetrust.on.ca/Resources-and-Learning/Online-Plaque-Guide/Online-Plaque-search-results.aspx?searchtext=>

(result – no historic plaques on project site)

The screenshot shows the Ontario Heritage Trust website. At the top, there is a navigation bar with links for 'About us', 'Contact us', 'Feedback', and 'Français'. Below this is a search bar with a magnifying glass icon. The main navigation menu includes 'Home', 'Conservation', 'Programs', 'Resources and Learning', and 'Support us'. The 'Resources and Learning' section is active, displaying 'Online Plaque search results'. On the left, there are links for 'Online Plaque Guide' and 'Online Plaque Guide'. The main content area shows 4 results returned in order of relevance. The first result is 'General Sir Arthur William Currie 1875-1933', followed by 'Founding of Strathroy, The', 'Honourable Edward Blake 1833-1912, The', and 'St. Mary's Church'. Each result includes a brief description and a link to the full entry. On the right, there is a photo of a man and a woman standing next to a plaque, with the text 'Apply today!' and a link to 'Application...'. Below this is a section for 'Discover the featured Plaque of the Month' with a link to 'Explore the Online Plaque Guide...'. At the bottom, there is a section for 'More from the Ontario Heritage Trust' with several small images.

Ontario HERITAGE TRUST
An agency of the Government of Ontario

Advanced search | Sitemap

Home Conservation Programs Resources and Learning Support us

AAA PRINT EMAIL SHARE

Online Plaque search results

4 results have been returned in the order of relevance.

[General Sir Arthur William Currie 1875-1933](#)

A native of **Strathroy**, William Currie was one of Canada's most distinguished military figures. He saw action throughout the First World War and in 1917 was appointed commander-in-chief of the Canadian Corps in Europe.

[Founding of Strathroy, The](#)

The sawmill and grist-mill that John Buchanan built on the Sydenham River in 1836 formed the basis of a settlement named after Buchanan's birthplace in Ireland. Construction of a rail line through **Strathroy** 20 years later ensured the community's continued development.

[Honourable Edward Blake 1833-1912, The](#)

A distinguished lawyer and brilliant orator, Blake, who was born near **Strathroy**, served briefly as prime minister of Ontario in 1871-72. He later held several cabinet posts in the federal government and was leader of the Liberal party for eight years.

[St. Mary's Church](#)

In the 1830s, many veterans of British military and naval service commuted their pensions to purchase land in Adelaide Township. Largely members of the Church of England, they soon erected St. Mary's, now the oldest remaining church in Middlesex County.

Apply today!

Apply to the Provincial Plaque Program ...
deadline September 15. (Photo: Rick Chard)

» [Application...](#)

Discover the featured Plaque of the Month

Each month, a featured plaque highlights an historical event, person or heritage theme.

» [Explore the Online Plaque Guide...](#)

More from the Ontario Heritage Trust

Search results on Parks Canada website. http://www.pc.gc.ca/apps/dfhd/default_eng.aspx

(result – no historic sites or other designations on project site)

http://www.pc.gc.ca/apps/dfhd/results-resultats_eng.aspx?p=1&m=10&ct100%24Main%24PageSearch1%24btKeyword=&desCheck=NHS&desCheck=EVENT&desCheck=PERSON&desCheck=...

DFHD - Search Results

Parks Canada
www.pc.gc.ca

Français Home Contact Us Help Search canada.gc.ca

Home > [Directory of Federal Heritage Designations](#) > [Search the Register](#) > Search Results

Directory of Federal Heritage Designations Found 0 Results Results Per Page: 10 25 50 100

Search Directory
About the Directory
Directory Statistics
Recent Designations
National Historic Sites of Canada - administered by Parks Canada
Historic Sites and Monuments Board of Canada
Federal Heritage Buildings Review Office
Historic Railway Stations Protection Act
Heritage Lighthouses Program
Xplorers
Glossary
Contact the Registrar

Previous Next

Date Modified : 2012-03-15 [Top of Page](#) [Important Notices](#)

Done Internet 130%

Location of LP's #1, 5, 6 and 7 in watershed

http://maps.camaps.ca/SilverlightViewer1_4/Viewer.html?ViewerConfig=http://maps.camaps.ca/Geocortex/Essentials/REST/sites/scrca/viewers/SCRCA_SL/virtualdirectory/Config/Viewer.xml

(result – project site not in historic river watershed)

