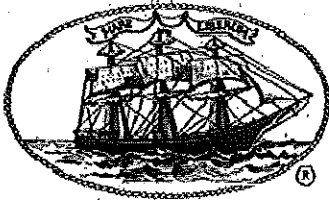


BID FORMS

Your response should only include an original and one (1) copy (unless otherwise indicated in the specifications) of all documents after this page.

Do not use 3-ring binders!



City of New London

Department of Finance-Purchasing Agent
 13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

Bid Proposal Form Page 1 of 2

Bid No.: 2015-05	Bid Opening Date: 8/19/2014	Bid Opening Time: 2:00 P.M.	Bid Surety: 10%	Date Issued: 8/1/2014
----------------------------	---------------------------------------	---------------------------------------	---------------------------	---------------------------------

Project:

Solar Photovoltaic System – Winthrop Elementary Magnet School

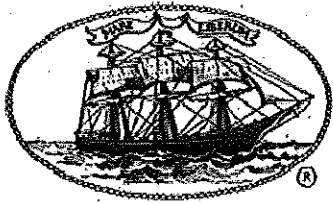
REQUEST FOR PROPOSALS: Pursuant to the provisions of Section 2-69 of the Code of Ordinances of the City of New London, sealed proposals will be received by the Purchasing Agent for the City of New London, at the address above for furnishing the commodities and/or services herein listed.

IMPORTANT: Both pages of this form must be completed, signed and returned by the proposer as part of the proposal package.

NOTE: Proposer means Individual/Sole Proprietor, Partnership or Corporation name.

Section 1 of 3 – Proposer Information

Complete Company Name (Trade Name, Doing Business As)					SSN or FEIN	
Company Address		Street	City	State	Zip Code	
Contact Name (Typed or Printed)			Telephone Number (Include Toll-Free Numbers)		FAX Number	
Written Signature of Person Authorized to Sign Proposals on Behalf of the Above Named Company ← SIGN HERE						Date Executed
Type or Print Name of Authorized Person				Title of Authorized Person		
Company's E-Mail Address				Company's Web Site		
Is Your Business a: <input type="checkbox"/> Proprietorship (Individual), <input type="checkbox"/> Partnership or <input type="checkbox"/> Corporation? (Type of Corporation -)						
Is Your Business Currently a State of Connecticut Certified Small Business? <input type="checkbox"/> Yes (Attach Certificate Copy to Bid) <input type="checkbox"/> No						
If your business is a Partnership , you must attach the names and titles of all partners to this bid when returned.						
If your business is a Corporation , in which State are you incorporated?						
Is your business reportable to the IRS? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, a 1099W2 will be mailed to you at year end.						
Remittance Information: In this box indicate the Remittance Address of your business if different from above.						



City of New London

Department of Finance-Purchasing Agent
13 Masonic Street • New London, CT 06320 • Phone (860) 447-5215 • Fax (860) 447-5297

Bid Proposal Form Page 2 of 2

Section 2 of 3 Important Information for Proposers

AFFIRMATION OF PROPOSER: The undersigned proposer affirms and declares:

1. That this proposal is executed and signed by said bidder with full knowledge and acceptance of the provisions of the Standard Proposal and Contract Terms and Conditions of current issue and in effect on the date of bid issue. These Standard Proposal and Contract Terms and Conditions are made a part of the contract.
2. That should any part of this proposal be accepted in writing by the City of New London within thirty (30) days from the date of proposal opening unless and earlier for acceptance is specified by the proposer the proposal schedule, said proposer will furnish and deliver the commodities and/or services for which this proposal is made, in the quantities and at the prices proposed, and in compliance with the provisions of the STANDARD PROPOSAL AND CONTRACT TERMS AND CONDITIONS, COMMODITY SPECIFICATIONS, PROPOSAL SCHEDULE AND SPECIAL PROPOSAL AND CONTRACT TERMS AND CONDITIONS. Should award of any part of this proposal be delayed beyond the period of thirty (30) days or an earlier date specified by the proposer in the proposal schedule, such award shall be conditioned on the proposer's acceptance.
3. Acceptance of the conditions set forth herein, agreement in strict accordance therewith, and will furnish and deliver the commodities and/or services to the City of New London at the prices bid therein.
4. Should the Purchasing Agent determine that the proposer has not completed Section 1 – Proposer Debarment and/or Suspension included as part of this document, then such determination may be just cause for disqualification from the evaluation of this proposal.

Section 3 of 3 – Proposer Debarment and/or Suspension

Has the bidder, any company officials, or any subcontractor to the bidder, any of its company officials received any notices of debarment and/or suspension from contracting with the State of Connecticut, the federal government, any other state within the United States, any of its territories or any governmental entity?

Yes No

If the above signed bidder, any company official or any subcontractor to the bidder **has** received notice of debarment and/or suspension from contracting with the State of Connecticut, the federal government or any governmental entity, said notices must be attached to this document when submitting this bid.

Number of notices attached _____

NON COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____)
County of _____) ss.

_____, being first duly sworn,
deposes and say that:

- (1) He is _____ of _____ herein referred to as the "Bidder" that has submitted the attached bid;
- (2) He is fully informed respecting the preparation and content of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham Bid;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of New London, CT or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties of interest, including this affiant.
- (6) That no officer or employee or person whose salary is payable in whole or in part from the City of New London is directly or indirectly interested in this Bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.

Signed _____

Title _____

Subscribed and sworn before me this

_____ day of _____ 20____

(Notary Public)

My Commission expires _____

NON COLLUSION AFFIDAVIT OF SUBCONTRACTOR

State of _____)
) ss.
County of _____)

_____, being first duly sworn,
deposes and says that:

- (1) He is _____ of _____ herein referred to as the "Subcontractor";
- (2) He is fully informed respecting the preparation and content of the Subcontractor's Proposal submitted by the Subcontractor to _____, the Contractor for certain work in connection with the _____ Contract pertaining to the Project in New London, Connecticut;
- (3) Such Subcontractor's Proposal is genuine and is not a collusive or sham Bid;
- (4) Neither the said Subcontractors nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in said Subcontractor's Proposal or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of New London, CT or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Subcontractor's Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties of interest, including this affiant.
- (6) That no officer or employee or person whose salary is payable in whole or in part from the City of New London is directly or indirectly interested in this Bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.

Signed _____

Title _____

Subscribed and sworn before me this

_____ day of _____ 20____

(Notary Public)

My Commission expires _____

AFFIRMATIVE ACTION POLICY STATEMENT
(must be submitted on your firm's letterhead)

It has always been the policy and will continue to be the strong commitment of _____ and all contractors and subcontractors who do business with this City to provide equal opportunities in employment to all qualified persons solely on the basis of job-related skills, ability and merit. _____ will continue to take Affirmative Action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, national origin, ancestry, mental disorder (present or past history thereof), age, physical disability (but not limited to blindness), marital status, mental retardation, and criminal record. Such action includes, but is not limited to, employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation and selection for training including apprenticeship. _____, and its subcontractors will continue to make good faith efforts to comply with all federal and state laws and policies which speak to equal employment opportunity.

The principles of Affirmative Action are addressed in the 13th, 14th, and 15th Amendments of the United States Constitution, Civil Rights Act of 1866, 1870, 1871, Equal Pay Act of 1963, Title VI and VII of - the 1964 United States Civil Rights Act, Presidential Executive Orders 11246, amended by 11375, (nondiscrimination under federal contracts), Act I, Sections 1 and 20 of the Connecticut Constitution, Governor Grasso's Executive Order Number 11, Governor O'Neill's Executive Order Number 9, the Connecticut Fair Employment Practices Law (Sec. 46a-60-69) of the Connecticut General Statutes, Connecticut Code of Fair Practices (46a-70-81), Deprivation of Civil Rights (46a-58(a)(d)), Public Accommodations Law (46a-63-64), Discrimination against Criminal Offenders (46a-80), definition of Blind (46a-51(1)), definition of Physically Disabled (46a-51(15)), definition of Mentally Retarded (46a-51(13)), cooperation with the Commission on Human Rights and Opportunities (46 - 77), Sexual Harassment (46a-60(a)-8), Connecticut Credit Discrimination Law (36-436 through 439), Title I of the State and Local Fiscal Assistance Act of 1972.

This Affirmative Action Policy Statement re-affirms my personal commitment to the principles of Equal Employment Opportunity.

DATE

Signature of Authorized Signer

CERTIFICATION OF BIDDER REGARDING
EQUAL EMPLOYMENT OPPORTUNITY

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246 Part II, Section 203(b), (30 FR 12319, 12935). The implementing rules and regulations provide that any bidder or prospective contractor, or any of its proposed subcontractors, shall state whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicated that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven (7) calendar days after bid opening. No contract shall be awarded unless such report is submitted.

CERTIFICATION BY BIDDER

Bidder's Name _____

Address and Zip Code _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause.

Yes () No () If answer is yes, identify the most recent contract.

2. Compliance reports were required to be filed in connection with such contract or subcontract

Yes () No () If answer is yes, identify the most recent contract.

3. Bidder has filed all compliance reports due under applicable instructions, including SF. 100.

Yes () No () Not Required ()

4. If answer to Item 3 is "No" please explain in detail on reverse side of this Certification.

Certification - The information above is true and complete to the best of my knowledge and belief. A willfully false statement is punishable by law (U.S. Code, Title 18, Section 1001).

Name and Title of Signer (Please Type)

Signature

Date

CERTIFICATION OF NON-SEGREGATED FACILITIES

This Bidder certifies that he does not maintain or provide his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The Bidder certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any locations, under his control, where segregated facilities are maintained. The Bidder agrees that a breach of his certification will be a violation of the Equal Opportunity clause and any Contract resulting from acceptance of this Bid. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, color, religion or national origin, because of habit, local custom or otherwise. The Bidder agrees that (except where he has obtained identical certification from proposed Subcontractors for specific time periods) he will obtain identical certifications from proposed Subcontractors prior to the award of Subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have already submitted identical certifications for the specific time periods):

"Notice to prospective subcontractors of requirements for non-segregated facilities. A certification of non-segregated facilities must be submitted prior to the award of a subcontract exceeding the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e. quarterly, semi-annually, or annually).

Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. Paragraph 1001.

Date: _____

By: _____

Official Address: _____

Title: _____

Bid Form "A"
Proposal Form

WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320

STATE PROJECT NO. 095-0084 MAG/EA

Bid Package No. 2014-20

Bid Submitted by:

Company Name

Street Address

City, State & Zip Code

Contact

()-()
Telephone No.

()-()
Fax No.

The undersigned, having familiarized themselves with the existing conditions of the project area affecting the cost of the work, and with the Contract Documents (which includes Invitation to Bid, Bid Form, Bid Bond, Instructions to Bidders, Non-Collusion Affidavit, Addenda, General Conditions, Project Conditions, Technical Specifications, Drawings as listed in the Schedule of Drawings, and form of Surety Bond) hereby proposes to furnish all machinery, tools, appurtenances, equipment, and services, including utility and transportation services required to construct and complete the work, all in accordance with the above listed Documents, and submits herewith in conformity with the project manual and subsequent addenda, the following bid:

The total amount of the Bid as computed by the undersigned Bidder is (in words):

_____ Dollars and Cents

(and figures) \$ _____

The Owner/Owner's Representative reserves the right to make the award on the basis of the above Base Bid.

In submitting this Bid, the Bidder understands that the Owner/Owner's Representative reserves the right to reject any and all bids, or to waive any informality in submitted bid documents. The Bidder also understands that the Owner/Owner's Representative reserves the right to accept any, all, or none of the Alternates, which may be listed above, and may accept Alternates in any order at Owner/Owner's Representative sole discretion subject to a thorough review of the stated value and approval of such value by the Owner. The Bidder agrees to perform the work of each accepted Alternate for the sum quoted above for each, and to include such accepted Alternates in the Contract for Construction.

If written notice of the acceptance of this Bid and any or all of the Alternates is mailed, telegraphed, or otherwise delivered to the undersigned within ninety (90) days after the opening of the Bid, or at any time thereafter before the Bid is withdrawn, the undersigned prescribed form, and to furnish the required bonds within ten (10) days after the Contract is presented to them for signature.

Bid Bond:

The undersigned herewith submits security equal to ten percent (10%) of the Base Bid, the sum of: _____ dollars and no cents

\$ _____

This security shall be the sole and exclusive property of the Owner/Owner's Representative as liquidated damages to the City, if the undersigned fails to execute a Contract in conformity with the accompanying forms, after due date notification therefore in the Contract Documents.

Bidders shall furnish with their bids (in triplicate) the following:

1. Bid Forms A through G (Document 008100)
2. Bid Bond and Form of Surety (Document 003000)
3. Statement of Bidders Qualifications (Document 003100)
4. Department of Administrative Services (DAS) "Contractor Prequalification Certificate and Update Statement (Document 003100)
5. Department of Consumer Protection Major Contractors License

Addenda:

The Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Date received	Signature

Bidder's Official Name and Address:

Company Name

Street Address

City, State & Zip Code

Contact Name:

Signature

Title

Date

WINTHROP ELEMENTARY MAGNET SCHOOL
NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA

Bid Form "B"

Labor Rates

**WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320**

STATE PROJECT NO. 095-0084 MAG/EA

Labor Rates

The following Labor Rates shall apply when Changes in your Scope Work are requested by the Owner/Owner's Representative per the General Conditions of the Contract for Construction, here Unit Prices are not applicable and a Lump Sum Cost proposal cannot be agreed upon. The labor rate shall only include those categories as listed below plus the allowable percentage for overhead and Profit (10%). Trade-related equipment, hand tools and power tools, normally supplied with the labor, shall not be included in the Labor Rate. The 10% Overhead and Profit is defined as all other incidental costs, Main Office Expenses, Main Field Office Staffing, Project Management, Supervision, Insurances, Travel Expenses, etc.

WINTHROP ELEMENTARY MAGNET SCHOOL
 NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA

Item	Laborer	Electrician	Site Engineer	Other
(\$/Hr.)				
Base Rate	\$	\$	\$	\$
Benefits	\$	\$	\$	\$
FICA	\$	\$	\$	\$
State Unemployment	\$	\$	\$	\$
Federal Unemployment	\$	\$	\$	\$
General Liability	\$	\$	\$	\$
Workers Compensation	\$	\$	\$	\$
SUBTOTAL	\$	\$	\$	\$
10% OH & Profit	\$	\$	\$	\$
TOTAL	\$	\$	\$	\$

WINTHROP ELEMENTARY MAGNET SCHOOL
NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA

Bid Form "C"

Alternates

**WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320**

STATE PROJECT NO. 095-0084 MAG/EA

All Bidders shall include within his or her Bid any additional costs associated with the Alternates as listed below and in the Specifications. Should an Alternate not apply to your Scope of Work, indicate so on the Bid Form provided.

NOT APPLICABLE

WINTHROP ELEMENTARY MAGNET SCHOOL
NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA

Bid Form "D"

Allowances

**WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320**

STATE PROJECT NO. 095-0084 MAG/EA

All Bidders shall include within the bid price the applicable Bid Allowances listed below. Should an Allowance not apply to your Scope of Work, indicate so on the Bid Form provided. Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision, overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

NONE

Bid Form "E"

Proposed Subcontractor Listing

**WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320**

STATE PROJECT NO. 095-0084 MAG/EA

This form shall be filled out by each bidder in accordance with amended Paragraph 5.2.1 through 5.2.4 of AIA Document A201 General Conditions 1997 Edition and as required by article 21 of the Instructions to Bidders. Attach additional sheets if necessary.

Subcontractor Name	Address	Trade	SBEIMBEIWBE
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____
11.	_____	_____	_____
12.	_____	_____	_____

WINTHROP ELEMENTARY MAGNET SCHOOL
NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA

Bid Form "F"

Unit Prices

**WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320**

STATE PROJECT NO. 095-0084 MAG/EA

The Contractor shall include within his or her Bid the Unit Prices as listed in the Specifications. Should a Unit Price not apply to your Scope of Work, indicate so on the Bid Form provided. Unit prices shall include all necessary labor, material, equipment, cost for delivery; installation; machinery; insurance; applicable taxes; overhead; and profit.

Unit prices values as listed shall apply to both additions and deletions.

Any and all adjustments to the Contract shall be made via Change Order. No adjustments for Overhead; Profit; Supervision and the like will be allowed.

NOT APPLICABLE

Bid Form "G"

Bidder's Solar Photovoltaic System Qualification Submission Form

**WINTHROP ELEMENTARY MAGNET SCHOOL
74 GROVE STREET
NEW LONDON, CONNECTICUT 06320**

STATE PROJECT NO. 095-0084 MAG/EA

Prospective bidders **must** complete all sections of the Bidder Qualification Form to be in compliance with all bid requirements.

SECTION 1. INSTALLER QUALIFICATIONS

ALL SECTIONS MUST BE COMPLETED IN ORDER TO BE CONSIDERED A VALID BID.

1A. CONTRACTOR PREQUALIFICATION

Bidder **must** be a licensed Prequalified Contractor with the Connecticut Department of Administrative Services.

Provide evidence (a copy of the current certificate) that Bidder is a Prequalified Contractor with the Connecticut Department of Administrative Services Contractor Prequalification Program **AND** evidence of Certification for Solar Electric Work.

Bidder **must** hold a valid Major Contractors license with the Connecticut Department of Consumer Protection.

Provide evidence (a copy of the current certificate) that Bidder is a licensed Major Contractor with the Connecticut Department of Consumer Protection.

Submit as Attachment A to the Bidder Submission Form.

1B. EVIDENCE OF PRIOR EXPERIENCE WITH COMMERCIAL SOLAR PROJECTS

Bidder must provide evidence of prior experience in constructing solar PV projects funded by the State of Connecticut School Construction Program.

Provide a minimum of four (4) solar PV projects completed under the State of Connecticut School Construction Program within the previous five (5) years.

Project #1:

Name & Address of Project: _____

Size of PV System (KW): _____

Interconnected Utility (CL&P or UI): _____

Project #2:

Name & Address of Project: _____

Size of PV System (KW): _____

Interconnected Utility (CL&P or UI): _____

Project #3:

Name & Address of Project: _____

Size of PV System (KW): _____

Interconnected Utility (CL&P or UI): _____

Project #4:

Name & Address of Project: _____

Size of PV System (KW): _____

Interconnected Utility (CL&P or UI): _____

1C. EVIDENCE OF E-1 OR PV-1 CONNECTICUT LICENSE

Provide evidence of CT Unlimited Electrical Contractor (E-1) or Limited PV Contractor (PV-1) license issued by the Connecticut Department of Consumer Protection.

Submit as Attachment B to the Bidder Submission Form.

1D. EVIDENCE OF NABCEP CERTIFICATION

Provide evidence of certification from the North American Board of Certified Energy Practitioners (NABCEP) Certified PV Professional.

Submit as Attachment C to the Bidder Submission Form.

1E. EVIDENCE OF PRIOR EXPERIENCE WITH CT ZERO EMISSIONS RENEWABLE ENERGY CREDIT (ZREC) PROGRAM

The Capitol Region Education Council ("CREC") requires the Bidder to submit a ZREC application for the proposed solar photovoltaic system with Connecticut Light & Power Company. In addition, the Bidder is required to meet all ZREC metering, CT PURA regulatory filings, and ISO-New England GIS registration requirements as part of the project.

Provide a minimum of three (3) solar PV projects that have approved ZREC wholesale contracts with Bidder and Connecticut Light & Power Company.

Project #1:

WINTHROP ELEMENTARY MAGNET SCHOOL
NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA

Name & Address of Project: _____

Size of PV System (KW): _____

Maximum Annual Quantity of ZRECs: _____ (MWhs)

Project #2:

Name & Address of Project: _____

Size of PV System (KW): _____

Maximum Annual Quantity of ZRECs: _____ (MWhs)

Project #3:

Name & Address of Project: _____

Size of PV System (KW): _____

Maximum Annual Quantity of ZRECs: _____ (MWhs)

CONTRACT FORMS

CONTRACT FOR SERVICES

THIS AGREEMENT made and entered into this [] day of [], 201[], by and between (legal name, address, city & state), hereinafter called "**Contractor**" and the City of New London, 181 State Street, New London, CT 06320, hereinafter called "**City.**"

WHEREAS, the City desires to enter into a contract for the (state work being performed) and the Contractor represents itself as competent and qualified to accomplish the specific requirements of this contract to the satisfaction of the City, therefore this contract is entered into under the following terms and conditions:

1. The Contractor agrees to perform the services described below or in attachments if applicable. Only those attachments specifically referenced in this Contract for Services shall apply. The terms and conditions as contained in this Contract for Services shall take precedence over any conflicting terms as may be attached hereto.
2. **Term of the Contract:** The start date for this Contract shall be [], 201[] and the completion date of this Contract shall be [], 201[]
3. **Contract Price:** The City shall pay the Contractor for the performance of the Contract in current funds, for the total quantities of work performed for the price of (written amount) (\$dollar amount).

Based upon Applications for Payment submitted by the Contractor, the City shall make progress payments on account of the Contract Sum to the Contractor. The period covered by each Application for Payment shall be one calendar month ending on the last day of the month. The City shall make payment to the Contractor within 30 days after the City receives the Application for Payment. With each Application for Payment, the Contractor shall submit the most recent schedule of values, which allocates the Contract Price among the various portions of the Work. The Applications for Payments shall indicate the percentage of completion of each portion of the Work. Such Applications may include requests for payment on account of changes in the Work, but not yet included in Change Orders. Partial payment shall be due Contractor in the amount of 95.0% of the work in place.

Final payment, constituting the entire unpaid balance of the Contract Price, including Change Orders, shall be made by the City to the Contractor no later than 30 days after the Contractor has fully performed the Contract and has provided to the Owner a final Application for Payment.

4. **Contract Documents:** The Contract Documents consist of this Agreement, the Standard Bid and Contract Terms and Conditions, the Instructions to Bidders, the Contractor's bid as accepted by the City, the General and Special Conditions of the Work, the Technical Specifications, the drawings and all Addenda attached hereto.

The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of this Agreement and the provisions of any of the other Contract Documents, the provisions of the Agreement shall prevail.

Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the edition of the standard specification, manual, code or laws or regulations identified in the reference. In the event a particular edition is not identified, the reference shall mean the latest edition in effect at the time of receipt of the bid. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the City, the Contractor or any of their consultants, agents or employees from those set forth in the Contract Documents.

5. **Obligations And Liability Of The Contractor:** The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the Work in the manner and within the time hereinafter specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the City, and at the prices herein agreed upon therefor.

All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the Work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation,

whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.

The Contractor shall coordinate his operations with those of any other contractors who may be employed on other work of the City, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precaution as may be necessary to protect life and property.

The Contractor shall indemnify and save harmless the City and its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due to or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, the City or any of their respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the City, its officers, agents, servants, or employees, against any such damages occasioned solely by acts or omissions of the owner other than supervisory acts or omissions of the City in the Work.

The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by any right of the City to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the City to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes unless information regarding such condition(s) was known and not disclosed by the City prior to Contractor commencing its work.

The Contractor shall conduct his operations so as not to damage existing structures or work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as new the damaged portions at his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.

The Contractor shall be as fully responsible to the City for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.

Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor of any such other contractor, the Contractor shall have no claim against the City therefor, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.

If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage.

The Contractor agrees to and does hereby indemnify and save harmless the City from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay and from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, arising out of, relating to or resulting from such claims.

The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him in connection with the Work or his operations under this Agreement and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work.

6. Supervision Of Work: The Contractor shall be solely responsible for supervision of the Work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the City, its officers, agents or employees in every possible way.

At all times, the Contractor shall have as his agent on the Work a competent superintendent capable of reading and thoroughly understanding the Drawings and Specifications, with full authority to execute the directions of the Engineer without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools, supplies and other items as may be required. Such superintendent shall not be removed from the Work without the prior written consent of the City. If, in the opinion of the City, the superintendent or any successor proves incompetent, the Contractor shall replace him with another person approved by the City; such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the Work.

Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such work, such directions or instructions may be given by the City to and shall be received and obeyed by the foreman or any other person in charge of the particular work involved.

7. Insurance: The Contractor shall procure and maintain insurance of the types specified below, and to the limits for this insurance specified in the Standard Bid and Contract Terms and Conditions and the City of New London Code of Ordinances, Article IV., Section 2-71. All insurance shall be obtained from companies satisfactory to the City.

Insurance shall be in such forms as will protect the Contractor from all claims and liability for damages for bodily and personal injury, including accidental death, and for property damage, which may arise from operations under the Contract, whether such operations be by himself, his subcontractors, or by anyone directly or indirectly employed or engaged by him.

The following types of insurance shall be provided before starting and until final completion and acceptance of the Work and expiration of the guarantee period provided for in the Agreement.

- a. Workmen's Compensation and Employer's Liability Insurance.
- b. Bodily Injury Insurance for operations and completed operations and Contractor's Protective Bodily Injury Insurance.
- c. Property Damage Insurance for operations and completed operations and Contractor's Protective Property Damage Insurance, each including coverage for injury to or destruction of wires or pipes and similar property and appurtenant apparatus and the collapse of or structural injury to any building or structure except those on which work under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting under the Contract, and no blasting shall be performed until such insurance has been secured.
- d. Bodily Injury Insurance covering the operation of all motor vehicles owned by the Contractor.
- e. Personal Injury Insurance to cover claims for personal injury and including claims brought by employees.
- f. Property Damage Insurance covering the operation of all motor vehicles owned by the Contractor.
- g. Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, while such vehicles are being operated in connection with the prosecution of the Work.
- h. Contractual Liability Insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and Liability of Contractor" of this Agreement.
- i. Owner's Protective Liability and Property Damage Insurance to protect the City and any Engineer against claims for Property damage and for bodily injuries, including accidental death, caused by the operations of the Contractor

or his subcontractors on the Work. The policy shall indicate the City and any Engineer as the named insured. A copy of the policy shall be furnished to the City and a Certificate of Insurance shall be furnished to any Engineer.

Any of the above coverages written on a claims made form have an Extended Reporting Period of three years from the termination of the contract.

All policies shall be so written that the owner will be notified in writing of cancellation or restrictive amendment at least 30 days prior to the effective date of such cancellation or amendment.

Certificates from the Contractor's insurance carriers stating the coverages provided, the limits of liability, and expiration dates shall be filed in triplicate with the Engineer before operations are begun. Such certificates shall be on the form furnished by the Engineer.

Renewal certificates must be furnished by the Contractor prior to the expiration date of any of the initial insurances.

No insurance required or furnished hereunder shall in any way relieve the Contractor of or diminish any of his responsibilities, obligations and liabilities under the Contract.

8. Contract: This Agreement, which includes all the Contract Document elements listed in paragraph 1 above, forms the Contract between the parties identified in the heading of this document. In the event that any provision of the Contract conflicts with any other provision of this Contract, the decision of the City will be final.

9. Funding and Fiscal Year Appropriations: Appropriations for expenditures by the City and authorization to spend for a particular purpose are ordinarily made on a fiscal year basis. The fiscal year of the City is the twelve (12) month period ending June 30 of each year. The obligations of the City under this Contract for the present or any subsequent fiscal year following the fiscal year in which this Contract is executed are subject to the appropriation of funds sufficient to discharge the City's obligation, which accrues in this or any subsequent fiscal year. In the absence of such appropriation or authorization, this Contract shall be terminated immediately upon the Contractor's receipt of notice to said effect without liability for damages, penalties or other charges arising from early termination. Expenditures for Contracted services that will extend beyond a single fiscal year shall not exceed in any fiscal year the amount appropriated and authorized for said fiscal year. The Contractor's yearly costs, as contained herein, may not exceed the amount appropriated for said year.

10. Termination: The Contract may be terminated without cause by either party by giving written notice to the other at least thirty (30) calendar days prior to the effective date of termination stated in the notice. If Contractor fails to fulfill his obligations, the City may terminate this Contract by giving written notice to the Contractor at least seven (7) calendar days before the effective date of termination stated in the notice. The notice shall state the circumstances of the alleged breach and may state a period during which the alleged breach may be cured, which cure shall be subject to approval by the City.

11. Obligations in Event of Termination:

A. Upon termination, all finished or unfinished documents, data, studies, and reports prepared by the Contractor pursuant to this Contract, shall become the property of the City.

B. The City shall promptly pay the Contractor for all services performed to the effective date of termination, subject to indemnification provisions of Paragraph 5 hereof and subject to offset of sums due the Contractor against sums owed by the Contractor to the City.

12. Record keeping, Audit, and Inspection of Records: The Contractor shall maintain books, records and other compilations of data pertaining to the requirements of the Contract to the extent and in such detail as shall properly substantiate claims for payment under the Contract. All such records shall be kept for a period of six (6) years or for such longer period as is specified herein. All retention periods start on the first day after final payment under this Contract. If any litigation, claim, negotiation, audit or other action involving the records is commenced prior to the expiration of the applicable retention period, all records shall be retained until completion of the action and resolution of all issues resulting therefrom, or until the end of the applicable retention period, whichever is later. The Federal grantor agency, the State Auditor, the City, or any of their duly authorized representatives or designees shall have the right at reasonable times and upon reasonable notice, to examine and copy, at reasonable expense, the books, records, and other compilations of data

of the Contractor which pertain to the provisions and requirements of this Contract. Such access shall include on-site audits, review, and copying of records.

13. Publicity, Publication, Reproduction and Use of Contract Products or Materials: Unless provided otherwise by law or the City, title and possession of all data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for with City funds shall vest with the City at the termination of the Contract. The Contractor shall at all times obtain the prior written approval of the City before it, any of its officers, agents, employees or subcontractors, either during or after termination of the Contract, makes any statement bearing on the work performed or data collected under this Contract to the press or issues any material for publication through any medium of communication. If the Contractor, or any of its subcontractors, publishes a work dealing with any aspect of performance under the Contract, or of the results and accomplishments attained in such performance, the City shall have a royalty-free non-exclusive and irrevocable license to reproduce, publish or otherwise use and to authorize others to use the publication. The Contractor shall use reasonable means to inform the public that the City provides financial support for its operations and services by explicitly stating on publicity material, stationery, posters and other written materials, and on its premises the following: "This program is supported in part (in full) by the City of New London."

14. Assignment by Contractor and Subcontracting: The Contractor shall not assign or in any way transfer any interest in this Contract without the prior written consent of the City, nor shall he subcontract any services without the prior written approval of the City.

15. Connecticut Law: It is agreed that this contract shall be governed by, construed, and enforced in accordance with the internal laws of the State of Connecticut.

16. Venue: In the event of litigation, the parties do agree to be contractually bound to submit themselves to the personal jurisdiction of the state courts of Connecticut. The venue for any court proceeding shall be in the Superior Court for the Judicial District for New London at New London, Connecticut.

17. Waiver of Jury Trial: CONTRACTOR HEREBY EXPRESSLY WAIVES ANY AND ALL RIGHTS IT MAY HAVE TO TRIAL BY JURY OF ANY CLAIM, DEMAND, ACTION OR CAUSE OF ACTION (1) ARISING UNDER THIS AGREEMENT OR ANY OTHER INSTRUMENT, DOCUMENT OR AGREEMENT EXECUTED OR DELIVERED IN CONNECTION HEREWITH, OR (2) IN ANY WAY CONNECTED WITH OR RELATED OR INCIDENTAL TO THE DEALINGS OF THE PARTIES HERETO OR ANY OF THEM WITH RESPECT TO THIS AGREEMENT OR ANY OTHER INSTRUMENT, DOCUMENT OR AGREEMENT EXECUTED OR DELIVERED IN CONNECTION HEREWITH, OR THE TRANSACTIONS RELATED HERETO OR THERETO, IN EACH CASE WHETHER NOW EXISTING OR HEREAFTER ARISING, AND WHETHER SOUNDING IN CONTRACT OR TORT OR OTHERWISE; AND CONTRACTOR HEREBY AGREES AND CONSENTS THAT ANY SUCH CLAIM, DEMAND, ACTION OR CAUSE OF ACTION SHALL BE DECIDED BY COURT TRIAL WITHOUT A JURY, AND THE CITY MAY FILE AN ORIGINAL COUNTERPART OR A COPY OF THIS SECTION WITH ANY COURT AS WRITTEN EVIDENCE OF CONTRACTOR'S CONSENT TO THE WAIVER OF ITS RIGHT TO TRIAL BY JURY.

18. Nondiscrimination and affirmative action provisions, nondiscrimination provisions regarding sexual orientation, Executive Order Number Three and guidelines and rules, Executive Order Number Seventeen, Executive Order Number Sixteen and sexual harassment policy:

For the purposes of this article, the word "contractor" is substituted for and has the same meaning and effect as if it read "Contractor's name." Section A of this article is inserted in connection with subsection (a) of Section 4a-60 of the General Statutes of Connecticut, as revised. Section B of this article is inserted in connection with subsection (a) of Section 4a-60a of the General Statutes of Connecticut, as revised.

A. (a) For the purposes of this section, "minority business enterprise" means any small contractor or supplier of materials fifty-one percent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of Conn. Gen. Stat. Section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements.

For the purposes of this section, "Commission" means the Commission on Human Rights and Opportunities.

For the purposes of this section, "public works contract" means any agreement between any individual, firm, or corporation and the State or any political subdivision of the State other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the State, including, but not limited to, matching expenditures, grants, loans, insurance, or guarantees.

(b) (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut. The contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved; (2) the contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the contractor agrees to comply with each provision of this section and Conn. Gen. Stat. Sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to Conn. Gen. Stat. Sections 46a-56, 46a-68e, and 46a-68f; (5) the contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records, and accounts concerning the employment practices and procedures of the contractor as they relate to the provisions of this section and Conn. Gen. Stat. Section 46a-56. If the contract is a public works contract, the contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project.

(c) Determination of the contractor's good faith efforts shall include, but shall not be limited to, the following factors: The contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The contractor shall include the provisions of subsection (b) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor, or manufacturer unless exempted by regulations or orders of the Commission. The contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Conn. Gen. Stat. Section 46a-56; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The contractor agrees to comply with the regulations referred to in this section as they exist on the date of this contract and as they may be adopted or amended from time to time during the term of this contract and any amendments thereto.

B. (a) (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to

employees and applicants for employment; (3) the contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to Section 46a-56 of the Connecticut General Statutes; (4) the contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records, and accounts concerning the employment practices and procedures of the contractor that relate to the provisions of this section and Section 46a-56 of the Connecticut General Statutes.

(b) The contractor shall include the provisions of subsection (a) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor, or manufacturer unless exempted by regulations or orders of the Commission. The contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Section 46a-56 of the Connecticut General Statutes; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(c) The contractor agrees to comply with the regulations referred to in this section as they exist on the date of this contract and as they may be adopted or amended from time to time during the term of this contract and any amendments thereto.

C. This contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill promulgated June 16, 1971, and, as such, this contract may be cancelled, terminated, or suspended by the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Three, or any State or federal law concerning nondiscrimination, notwithstanding that the State Labor Commissioner is not a party to this contract. The parties to this contract, as part of the consideration hereof, agree that said Executive Order No. Three is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the State Labor Commissioner shall have continuing jurisdiction in respect to contract performance in regard to nondiscrimination, until the contract is completed or terminated prior to completion.

The contractor agrees, as part consideration hereof, that this contract is subject to the Guidelines and Rules issued by the State Labor Commissioner to implement Executive Order No. Three, and that he will not discriminate in his employment practices or policies, will file all reports as required, and will fully cooperate with the State of Connecticut and the State Labor Commissioner.

D. This contract is subject to the provisions of Executive Order No. Seventeen of Governor Thomas J. Meskill promulgated February 15, 1973, and, as such, this contract may be cancelled, terminated, or suspended by the contracting agency or the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Seventeen, notwithstanding that the State Labor Commissioner may not be a party to this contract. The parties to this contract, as part of the consideration hereof, agree that Executive Order No. Seventeen is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the contracting agency and the State Labor Commissioner shall have joint and several continuing jurisdiction in respect to contract performance in regard to listing all employment openings with the Connecticut State Employment Service.

E. This contract is subject to the provisions of Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, and, as such, the contract may be canceled, terminated, or suspended by the State for violation of or noncompliance with said Executive Order No. Sixteen. Executive Order No. Sixteen is attached hereto and made a part hereof. The parties agree to comply with such executive order. In addition, the contractor agrees to include a copy of Executive Order No. Sixteen, and the requirement to comply with said executive order, in all contracts with its contractors, subcontractors, consultants, sub-consultants, and vendors.

F. This contract is subject to the provisions of the City of New London Sexual Harassment Policy ("Policy") and, as such, the contract may be canceled, terminated, or suspended by the City in the event that the contractor, its employees, contractors, subcontractors, consultants, sub-consultants, or vendors engages in behavior prohibited by the provisions of the Policy (a copy of the Policy is attached hereto). The contractor agrees to include a copy of the Policy, and the requirement to prevent behavior as defined in such Policy, in all contracts with its contractors, subcontractors, consultants, sub-consultants, and vendors.

19. Force Majeure: Neither party shall be liable to the other or be deemed to be in breach of this Contract for any failure or delay in rendering performance arising out of causes beyond its reasonable control and without its fault or negligence. Such causes may include, but are not limited to, acts of God or of a public enemy, fires, floods, epidemics,

quarantine restrictions, strikes, freight embargoes, or unusually severe weather. Dates or times of performance shall be extended to the extent of delays excused by this section, provided that the party whose performance is affected notifies the other promptly of the existence and nature of such delay.

20. Compliance with Laws and Indemnification of the City of New London: The Contractor shall comply with all applicable laws, rules, regulations, ordinances, orders or requirements of the State of Connecticut and any governmental authority relating to the delivery of the services specified in this Contract. The City may require the Contractor to pay fines, penalties, and damages that may arise out of or may be imposed because of, the Contractor's breach or failure to comply with the provisions of this Contract. Unless otherwise provided by law the Contractor shall indemnify and hold harmless the City, its agents, officers and employees against any and all liability, loss, damages, penalties, costs or expenses for personal injury or damage to real or tangible personal property which the City may sustain, incur or be required to pay resulting from, arising out of, or in connection with the services performed or delivered under this Contract by reason of acts, inactions, omissions, negligence, reckless or intentional misconduct of the Contractor, its agent(s), officers, employees or subcontractors; provided that the Contractor is notified of any claim within a reasonable time after the City becomes aware of it, and the Contractor is afforded an opportunity to participate in the defense of such claim. In such event, no negotiated settlement agreement shall be binding on the Contractor without the Contractor's concurrence.

21. Waivers And Severability: All conditions, covenants, duties and obligations contained in this Contract can be waived only by written agreement. Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any way limit the legal or equitable remedies available to that party. A waiver or breach of any term, condition, or covenant by a party shall not constitute a waiver or breach of any other term, condition or covenant. If any court of competent jurisdiction declares a provision of this Agreement invalid, illegal, or otherwise unenforceable, the remaining provisions of the Agreement shall remain in full force and effect.

22. Amendments: No amendment to this Contract shall be effective unless it is signed by authorized representatives of both parties and complies with all other regulations and requirements of law.

23. Entire Agreement: The parties understand and agree that this Contract and attachments (if any), which includes all Contract Documents, supersede all other verbal and written agreements and negotiations by the parties relating to the services under this Contract.

24. Notice: Unless otherwise specified in an attachment hereto, any notice hereunder shall be in writing addressed to the persons and addresses indicated in the caption of this Contract on page 1.

IN WITNESS WHEREOF, the parties hereto have caused this AGREEMENT to be executed in two (2) original copies on the day and year first above written.

OWNER:

CONTRACTOR:

Daryl Justin Finizio
Its Mayor

John C. McConville, President
Its Duly Authorized Agent

Approved as to form:

Jeffrey T. Londregan, Esq., Director of Law

Date Signed _____

**How to obtain or continue a warranty
when a Firestone roofing system is used as a PV platform:**

FOR EXISTING FIRESTONE-WARRANTED ROOFING SYSTEMS:

- 1. Submit the Firestone PV Roof Alteration Form with all required documentation.**
- 2. Receive Notice from Firestone Roofing Solutions Department regarding required enhancements.**
- 3. Schedule a Pre-PV Roof Audit (\$750.00)**
 - Contact your Quality Building Services (QBS) Technical Representative to schedule this audit.
 - Submit payment to Firestone.
- 4. Schedule a Post-PV Roof Audit (\$750.00)**
 - Contact your QBS Technical Representative to schedule this audit.
 - Submit payment to Firestone.

FOR NEW CONSTRUCTION OR REROOF:

- 1. Contact the Firestone Roofing Solutions Department at least 60 days prior to bid submittal.**
- 2. Submit Pre-Installation Notice (PIN) Online.**
 - In the "Conditions Requiring Special Consideration" section on your PIN, please note that the PV system will be installed on the roofing system.
- 3. Submit Approved Roof Drawing (ARD) and Request for Inspection (RFI) online.**
- 4. Your Pre-PV Roof Audit is FREE.**
 - Your QBS Technical Representative will be notified when your Request for Inspection (RFI) is submitted via the PIN Entry System.
- 5. Schedule a Post-PV Roof Audit (\$750.00).**
 - Contact your QBS Technical Representative to schedule this audit. This audit is FREE if the Firestone EnviroReady Warranty is purchased, or if the PV product is purchased through Firestone.

Please contact the Firestone Roofing Solutions Department, 1-800-428-4511, or your Firestone Sales Representatives, with any questions regarding Firestone roofing systems.

Regards,

Matt Barmore

Matt Barmore
Manager, Roofing Solutions Department
Quality Assurance Division



PV Roof Alteration Form

Building Name: _____ FBPCO # _____

Warranty # _____ Expiration Date: _____

Contractor Name: _____ Contractor License # _____

PV Manufacturer: _____ PV Install Start Date: _____

INSTRUCTIONS:

- 1. Submittal:** Submit this form and all documentation required below at least 60 days prior to start of the PV system installation.
- 2. Review & Response:** The Firestone Roofing Solutions Department will review your submittal and respond to you regarding any required enhancements to the roofing system. Failure to perform the required enhancements you receive from Firestone could void the Firestone Warranty.
- 3. Roof Audits:** Firestone requires two (2) roof audits: a pre-PV roof audit and a post-PV roof audit, by a Quality Building Services (QBS) Technical Representative for each installation. The charge for each Roof Audit is \$750.00. You must attach a check made payable to Firestone Building Products Company, LLC, to this document for the total amount of all roof audits. It is the Contractor's responsibility to contact Quality Building Services at 1-800-428-5411 to request the pre-PV and post-PV roof audits. All roof audit fees are waived if the building owner purchases PV through Firestone Energy Solutions.
- 4. Roofing Contractor:** Every effort should be made to contact the Firestone Red Shield-licensed contractor who performed the original installation.

AGREEMENT & SUBMITTAL:

I understand that failure to follow the requirements I receive from Firestone may void the Firestone Warranty. I certify that each of the following items is attached to this document, and that all information submitted is accurate:

- Shop Drawing showing proposed PV layout and complete Roof Plan;** drawing must also show the placement of all membrane seams or fasteners and plates/batten if the roofing membrane is mechanically-attached
- PV manufacturer's complete details and installation information**
- Signed Overburden Waiver (available online);** not required if PV is purchased through Firestone Energy Solutions
- Proposed protection/slip sheet material;** type, location, and application
- Appropriate Firestone details to be used for flashing, penetrations, additional membrane attachment and protection (all current Firestone details and specifications must be followed)**
- Check in the amount of \$_____ for the required pre-PV and post-PV roof audits.**

Name: _____

Signature: _____ Date: _____
As authorized agent for the Firestone-licensed contractor

SUBMIT THIS FORM, ALL ATTACHMENTS, AND A CHECK FOR TOTAL AMOUNT OF ROOF AUDITS, TO:

Firestone Building Products Company, LLC
Roofing Solutions Department
250 W. 96th St., Indianapolis, IN 46260

03/01/2010

Firestone
BUILDING PRODUCTS
OVERBURDEN WAIVER

Owner: _____ FBPCO # _____

Roofing Contractor: _____ License No. _____

Contractor's Signature: _____ Date: _____

Description of Overburden: _____

Overburden is defined here as any above-membrane material, temporary or permanent, which requires removal prior to investigation or repair of a suspected roof leak. Stone or pavers used as ballast in a Firestone Ballasted Roofing System Assembly do not constitute an overburden. This document must be signed and submitted prior to issuance of a Firestone Warranty to the Owner.

1. I agree to remove and replace any overburden, at my expense, in order to provide access to the roofing system for the investigation or repair of a suspected roof leak.

2. Should damage occur to the roofing system during the installation, removal, or replacement of the overburden, I agree to pay the repair costs necessary to restore the roofing system into warrantable condition, as determined by Firestone.

3. I understand that the Firestone Warranty does not include removal, replacement, or repair of the overburden material, and that Firestone is not responsible or liable for the appearance or performance of any new overburden materials which are installed following the investigation or repair of a suspected roof leak.

Signed: _____

Printed Name: _____
As authorized agent for owner

Title: _____ Date: _____

Submit to:
Firestone Building Products Company, LLC
Roofing Solutions Department
250 W. 96th Street
Indianapolis, IN 46260

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING & ALUMINUM RACKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural Steel.
 - 2. Structural Aluminum.
- B. Related Sections (if applicable):
 - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
 - 3. Section 017419 "Construction and Demolition Waste Management"
 - 4. Section 018113 "VOC Limits for adhesives, Sealants, Paints and Coatings"

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 HIGH PERFORMANCE BUILDINGS GENERAL REQUIREMENTS:

- A. Implement practices and procedures to meet the project's environmental goals, which include complying with Connecticut Standard Guidelines Compliance Manual for High Performance Buildings, August 2009 with additional mandatory building project requirements for schools. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated High Performance Building criteria.
- B. Comply with Connecticut Standard Guidelines Compliance Manual for High Performance Buildings, August 2009 with additional mandatory building project requirements for schools.

1.5 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Use ASD or LRFD; data are given at service-load level.
- B. Moment Connections: Type FR, fully restrained.

- C. Construction: Combined system of moment frame and shear walls.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 5. For structural-steel connections indicated to comply with design loads, include structural analysis data.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, fabricator and testing agency.
- B. Welding certificates (if applicable).
- C. Paint Compatibility Certificates (if applicable): From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Shear stud connectors.
 3. Shop primers.
 4. Nonshrink grout.
- F. Source quality-control reports.

1.8 HIGH PERFORMANCE BUILDING SUBMITTAL REQUIREMENTS:

The contractor or subcontractor shall submit the following High Performance Building certification items:

- A. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
- a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
- B. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
- C. Product Cut Sheets for all materials that meet the High Performance Building Requirements this Section.
- D. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of

the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.9 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- F. Preinstallation Conference: Conduct conference at Project site.
- G. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.
- H. Quality Assurance for Hot-Dip Galvanizing and Factory-Applied Metal Coatings:
 - 1. Galvanizing shall be performed by a company with a minimum of five years experience in the successful application of hot-dip galvanizing utilizing the dry kettle process.
 - 2. Submit two 3 inch by 6 inch samples of factory-applied coatings and colors proposed for use for approval prior to coating application.
 - 3. Engage the services of a galvanizer who has demonstrated a minimum of five (5) years experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coatings within the same facility as outlined herein. The Architect has the right to inspect and approve or reject the galvanizer/galvanizing facility.
 - 4. Handle and install materials with factory-applied coatings as recommended by galvanizer and coating manufacturer to prevent damage to coatings prior to and after installation.
 - 5. Touch-up factory-applied metal coatings as recommended by galvanizer and coating manufacturer.
 - 6. Coatings not matching approved submittals shall be removed and replaced at no additional expense to the Owner.
 - 7. Certificate of compliance that the galvanizer has certified weighers on premises with a certification from the local municipality, and a certified scale or municipal scale has been utilized by the galvanizer.

8. Fabricator shall provide a notarized statement from the galvanizer, along with a description of the material processed, indicating that all work has been done in conformance with this specification prior to receiving payment.
9. Certificate of Compliance for Shop Drawing Review by Galvanizer: Submit galvanizer's certification that shop drawings for metal fabrications to receive metal coatings have been reviewed and that fabrications are acceptable to galvanizer for proper application of galvanizing and metal coatings. All drawings should be stamped by the galvanizer to indicate approval of design for galvanizing.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.11 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: $F_y = 46\text{ksi}$ structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 STRUCTURAL - ALUMINUM MATERIALS

- A. Aluminum Extruded Solar Rails: High Grade 6061 Aluminum Alloy
- B. Aluminum rails interfacing with steel structural components shall be separated by stainless steel washers for proper isolation of metals.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Configuration: As indicated.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 5. Finish: Plain.
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Plain.
- H. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Washers: ASTM A 36/A 36M carbon steel.
 - 3. Finish: Plain.
- I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

2.4 PRIMER

- A. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- B. Galvanizing Repair Paint: ASTM A 780.

2.5 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.
- H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.
 - 3. Galvanize all exterior exposed structural steel.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Ultrasonic Inspection: ASTM E 164.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel and aluminum accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.

- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Ultrasonic Inspection: ASTM E 164.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 05 12 00

SECTION 26 31 00 – SOLAR PHOTOVOLTAIC SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes complete photovoltaic system:
 - A. Solar Photovoltaic Modules (Collectors)
 - B. Mounting Structures
 - C. Electrical equipment
 - D. Grid-interactive Inverters
 - E. AC Combiner Panels and Disconnects
 - F. Web-based System Monitoring
 - G. Revenue Grade Meter
 - H. Labeling

1.3 REFERENCES

- A. North American Board of Certified Energy Practitioners (NABCEP)
- B. National Fire Protection Association
 - A. NFPA 70 – National Electrical Code
- C. Underwriters Laboratories Inc. (UL):
 - A. UL 1703 – Flat Plate Photovoltaic Modules and Panels
 - B. UL 1741 – Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
 - C. UL 67 – Panelboards
 - D. UL 50 – Enclosures for Electrical Equipment
 - E. UL 489 – Circuit Breakers
 - F. UL 6 – Standard for Electrical Rigid Metal Conduit
 - G. UL 796 – Steel Electrical Metallic Tubing
 - H. UL 360 – Liquid-Tight Flexible Metal Conduit
 - I. UL 651 - Schedule 40,80,Type EB and A Rigid PVC Conduit and Fittings
 - J. UL 514 – Conduit, Tubing, and Cable Fittings
 - K. UL 468 – Wire Connectors
 - L. UL 1561 – Dry Type General Purpose and Power Transformers
- D. Institute of Electrical and Electronics Engineers (IEEE)
 - A. IEEE 929 – Inverter Interconnection Standard

- B. IEEE 1547 – Standard for Interconnecting Distributed Resources to Electric Power Systems
- C. IEEE C57.12.91 – Test Code for Dry-Type Distribution and Power Transformers

- E. International Electrotechnical Commission (IEC)
 - A. IEC 61215 Crystalline Silicon Terrestrial Photovoltaic Modules

- F. Northeast Utilities (NU)
 - A. Exhibit B - Generator Interconnection Technical Requirements

- G. American Society for Testing and Materials (ASTM)
 - A. ASTM C-719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement
 - B. ASTM C-836 Standard specification for High Solids Content, Cold Liquid Applied Elastomeric Waterproofing Membrane for use with Separate Wearing Course
 - C. ASTM D-2939 Standard Test Methods for Emulsified Bitumens Used as Protective Coatings
 - D. ASTM E-96 Standard Test Method for Water Vapor Transmission of Materials
 - E. ASTM A-615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - F. ASTM C-150 Standard Specification for Portland Cement
 - G. ASTM C-260 Standard Specification for Air Entraining Admixtures to concrete
 - H. ASTM C-33 and C-330 Standard Specification for Concrete Aggregates and Lightweight aggregates
 - I. ASTM C-94 Standard Specification for Ready Mixed Concrete

- H. National Electrical Manufacturers Association (NEMA)
 - A. NEMA TP-1 – Guide for Determining Energy Efficiency for Distribution Transformers
NEMA TP-2 - Standard Test Method for Measuring the Energy Consumption of Distribution Transformers

1.4 DESIGN REQUIREMENTS

- A. The photovoltaic system as shown in the contract documents is intended to set a minimum level of system capacity of 84,000 Watts DC (at Standard Test Conditions) and define the specific location and construction of the photovoltaic arrays. Acceptable design deviations will be considered, but will require the PV contractor to provide revised documentation, electrical and structural engineering calculations, and signed and sealed certifications for permitting, utility interface and grant applications.

- B. The photovoltaic array structures are designed to the following design loading criteria:
 - A. Maximum Wind Speed: 120 MPH
 - B. Design Snow Load: 30 PSF
 - C. Wind Exposure Classification: Exposure C
 - D. Photovoltaic Modules shall have a 5400Pa wind and snow load rating from the front of the module and 2400Pa from the rear (underside) of the module

1.5 SUBMITTALS

- A. Product Data: Provide product data for each component of the complete photovoltaic system, including:
 - A. Photovoltaic modules
 - B. Inverters
 - C. Proprietary cabling systems
 - D. PV module grounding system
 - E. PV module fastening system
 - F. AC disconnect
 - G. Conduit and associated fittings
 - H. Electrical conductors
 - I. Junction boxes and enclosures
 - J. Panelboards and transformers
 - K. Web monitoring system
 - L. Structural Steel components

- B. PV Module support data shall include mounting rails, fasteners, clamps and drawings indicating project specific layouts and methods of attachment. Include engineering calculations, fastener information and signed and sealed structural design plans for the PV array mounting structure and foundation.

- C. Shop Drawings: For PV module structures and PV module mounting.
 - A. Include plans, elevations, sections, and mounting details.
 - B. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - C. Detail fabrication and assembly.
 - D. Include diagrams for power, communications, and grounding wiring at array

- D. Shop Drawings: For Electrical Equipment
 - A. Provide a detailed PV module layout map with each module numbered using a project specific identification system, and a corresponding table showing how the corresponding inverters for each PV module will connect to the electrical equipment.
 - B. Provide a detailed floor plan for the photovoltaic electrical equipment room and outdoor concrete equipment pad showing locations of all panel boards, transformers, disconnects, phase monitors, contactors, and monitoring equipment.

- E. System Design Data: Provide system data including DC capacity at STC and PTC, AC Capacity, number of modules, panel layout and ground area utilized, panel tilt, azimuth, system operating voltage and current.

- F. System Calculations: Provide calculation detailing:
 - A. Projected monthly production, Annual Production, and Life Cycle Production.
 - B. Wire sizing calculations for all conductors to point of interconnection.

- G. Warranties: Provide manufacturers' warranty certificates for PV modules and inverters.
 - A. Photovoltaic modules shall have a ten (10) year warranty for materials and workmanship and a twenty-five (25) year limited power warranty.
 - B. Inverters shall have a minimum twenty-five (25) year warranty.

1.6 INSTALLER QUALIFICATIONS

- A. Installing contractor must be prequalified contractor with CT Department of Administrative Services Construction Contractor Prequalification program and must be certified under CTDAS Contractor Classification List for Solar Electric work.
- B. Installing contractor must document a minimum of four (4) solar PV projects completed under the State of Connecticut school construction program within the previous five (5) years. The contractor must also demonstrate that it was the applicant of record for initiating and completing the approved Utility Interconnection for each project.
- C. Installing contractor must provide documentation demonstrating it has a CT Unlimited Electrical Contractor (E-1) or Limited PV Contractor (PV-1) issued by the CT Department of Consumer Protection.
- D. Installing contractor shall have a North American Board of Certified Energy Practitioners (NABCEP) Certified PV Professional on staff and responsible for overseeing of the installation. NABCEP Entry Level certifications or other NABCEP certifications will not be accepted.
- E. Installing contractor must demonstrate expertise and participation in the Connecticut Zero Emissions Renewable Energy Credit (ZREC) Program by documenting a minimum of three (3) approved wholesale power contracts with Connecticut Light and Power Company.

1.7 QUALITY ASSURANCE

- A. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.8 RELATED WORK

- A. 05 12 00 Structural Steel Framing & Aluminum Racking

PART 2 - PRODUCTS

2.1 PHOTOVOLTAIC MODULES

- A. Manufacturers
 - A. Solarworld
 - B. Suniva
 - C. SunPower
 - D. PhonoSolar
 - E. Hyundai
 - F. Axitec

- B. Product Description: Modules shall be mono-crystalline or poly-crystalline with the following characteristics or comparable:
 - A. STC Watts: 250
 - B. PTC Watts: 220
 - C. Efficiency: 15.0%
 - D. Output tolerance: -0%/+3%
 - E. Rated voltage a maximum performance: 29.98V
 - F. Rated current at maximum performance: 8.34A
 - G. Open Circuit Voltage: 37.5V
 - H. Short Circuit Current: 8.84A
 - I. Outside Dimensions: 65" x 39" x 1.57"
 - J. Weight: 41 lbs

- C. Module connection shall be MC4 compatible with #12 AWG or #10 AWG PV-Wire cables and Protection Class IP67 rated J-Box.

- D. Frame shall be anodized aluminum alloy.

- E. Module shall have minimum 5400Pa wind and snow load rating from the front of the module and 2400Pa from the rear of the module.

- F. Modules shall have tempered glass and be hail tested per IEC 61215.

2.2 GRID INTERACTIVE MICRO-INVERTERS

- A. Manufacturers
 - A. Basis of Design: Enphase Energy M215 or acceptable equivalent.

- B. Product Description: Grid interactive micro-inverters shall be outdoor rated individual units installed one per PV module underneath each corresponding module and possessing the following operating characteristics:
 - A. Rated AC output: 215W
 - B. Rated AC current at 208VAC: 1.0A
 - C. Power factor: >.95
 - D. 3 phase, 208V, 60HZ output
 - E. Designed with NEMA 6 rating for installations in full sun, driving rain and drifting snow.
 - F. Peak efficiency: 96.3%

- G. Operating temperature range: -40°
- C. Inverters shall be equipped with the following protection:
 - A. Over/Under Voltage
 - B. Over/Under Frequency
 - C. Over Current
 - D. DC Ground Fault (GFDI)
- D. Communication Capability: Power Line communication to proprietary monitoring system.

2.3 CABLING SYSTEM AND WIRE MANAGEMENT

- A. Manufacturers
 - A. Enphase Energy Engage Portrait Cabling.
- B. Product description: Proprietary cabling system designed to interface with proprietary AC output connectors from micro inverters shall be used. Cabling system is designed for outside use and shall be fastened along aluminum module mounting rails using a portrait configuration with AC connector receptacles located at a convenient location underneath each inverter to facilitate an unstrained connection of the inverter AC cable and connector leads.
- C. Wire management: cabling system shall be fastened to aluminum module mounting rails using a nonmetallic UV resistant mounting system. UV resistant cable ties of sufficient strength are acceptable.
- D. Fittings for transition to rain-tight junction boxes: Shall be Sunlight resistant, non-metallic gasketed compression fittings.
 - A. Manufacturers: Heyco Solar Masthead or approved equivalent

2.4 SURGE PROTECTION

- A. Manufacturers:
 - A. Delta Lightning Arrestors
- B. Provide AC lightning arrestor for each AC combiner panelboard (LA603).
 - A. Design: Silicone Oxide Varistor.
 - B. Maximum current: 100,000A.
 - C. Maximum energy: 3,000 joules per line.
 - D. Maximum number of surges: Unlimited.
 - E. Response time in one milliamp test: 5 nanoseconds.
 - F. Leads: (4) 36" #12 AWG copper.

2.5 PV MODULE FASTENING – STANDING SEAM METAL ROOF

- A. Manufacturers:
 - A. Basis of Design: S-5 or acceptable equivalent.

- B. Product Description: Roof accessory attachment system to provide attachment to standing seam metal roofs without penetrations through roof seams or panels.
- C. Components: Standard S-5-E clamp(s) manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.

Set screws manufactured from 300 series stainless steel, 18-8 alloy, 3/8 inch diameter, with round nose point, two per clamp.

Attachment bolts manufactured from 300 series stainless steel, 18-8 alloy, 10mm diameter, with flat washers.
- D. Examination: Prior to beginning installation, verify that the panel seaming is complete and installation will not impede roof drainage.
- E. Preparation: Clean seam areas to receive clamps; remove loose or foreign matter that could interfere with installation and proper fastening performance.
- F. Installation: Install clamps in accordance with Manufacturer's instructions. Place clamp in neat, straight rows, evenly spaced in accordance with structural design criteria. Place both set screws on same side of clamp. Tighten screws to manufacturer's recommended torque rating. Randomly test screw torque using calibrated torque wrench.

2.6 ARRAY CONSTRUCTION

- A. Refer to Division 05 12 00 Structural Steel Framing & Aluminum Racking.
- B. PV Module Mounting: modules shall be mounted to the aluminum mounting rails in the designed format shown in the contract drawings and shall utilize the following components.
 - A. Module clamps must be manufactured from an aluminum extrusion and be engineered to meet or exceed all pull-out loads imposed by the PV modules. Engineering documentation shall be provided approving the components for the use intended.
 - B. Listed grounding clips shall be integrated with the module clamping system to ensure proper grounding.
 - C. Module clamps must be fastened to aluminum mounting rails using stainless hardware approved by the manufacturer or custom designed and approved with signed and sealed document from a licensed/registered structural engineer.

2.7 WEB BASED MONITORING SYSTEM

- A. Manufacturer: Enphase Energy
- B. Description: Provide 1 (one) Envoy Communications Gateway web boxes which will establish direct communication with the micro inverters, collecting data and uploading to the host (Enphase) via internet connection for display using the "Enlighten" system monitoring portal.

- C. System shall include all necessary data cabling for the Ethernet connection of the Envoy unit to the local area network of the main building. A fiber optic network link or acceptable wireless option such as Ubiquiti Nanostation will be required to connect the remote Envoy Communication Gateways.
- D. Contractor shall connect system to the building network switch/router for internet access. Installation shall be coordinated with the IT administrator.
- E. Contractor shall configure and set up monitoring portal on behalf of the owner, as well as provide a link for the public viewing portal to the IT administrator for display on the owners' website.
- F. Network line amplifiers shall be installed as necessary to facilitate proper operation of the system over long distance cable runs.

2.8 REVENUE METER

- A. Manufacturers and Models:
 - A. As provided by Connecticut Light and Power based on specific project design.
 - B. Provide a self contained meter enclosure acceptable to Connecticut Light and Power Company.
 - C. Photovoltaic system shall include installation of a revenue grade meter in compliance with the Connecticut Light and Power Company (CL&P) *Standard Contract for the Purchase and Sale of Connecticut Class 1 Renewable Energy Credits for Low and Zero Emission Projects*.
 - D. Installing contractor is responsible for all costs associated with acquiring the revenue meter assigned by CL&P as outlined in *Metering Procedures for P.A 11-80 Renewable Energy Credits ("MPREC")*.
 - E. Installing contractor is responsible for proper application of REC resource into the NEPOOL GIS including, but not limited to, any and all application costs.

2.9 PANELBOARDS AND CIRCUIT BREAKERS

- A. Manufacturers
 - A. Schneider Square D
 - B. General Electric
 - C. Eaton Cutler Hammer
 - D. Siemens
- B. General
 - A. Furnish and install approved panelboards of types and configurations indicated and specified herein
 - B. Panelboards shall comply with the following industry standards:
 - a. UL Standards

- 1) Panelboards – UL67
 - 2) Cabinet & Boxes – UL 50
 - 3) Circuit Breakers – UL489
 - b. National Electrical Code, Article 408
 - c. NEMA Standard – PB 1
- C. Panels identified for use as service entrance equipment shall be so labeled and equipped.
- C. Bus Bars and Connections
- A. Main bus bars and branch connectors shall be tin-plated copper or aluminum, sized in accordance with UL standards to limit the temperature rise on any current carrying part.
 - B. Circuit breaker panelboards shall utilize bolt-on breaker connections.
 - C. Provide full capacity insulated neutral bus in each panelboard. Neutral bussing shall have a suitable lug for each outgoing circuit requiring a neutral connection.
 - D. Circuit breakers shall be full-size type and 3-pole breakers shall be a single molded case.
 - E. Provide feeder, sub-feed, and feed through lugs as shown on drawings.
- D. Panelboard circuit configurations and voltage, ampere, and short circuit ratings shall be in accordance with the schedules on the drawings.

2.10 RACEWAYS

- A. Provide raceways of the types and sizes indicated and specified, or as required to comply with NEC Articles 342 through 366 and job conditions where not so indicated or specified.
- B. Metallic Conduit and Fittings
 - A. Rigid steel conduit or intermediate metal conduit shall be hot-dip or electro-galvanized, conforming to ANSI C80.1, UL 6 and NEC Article 344. Fittings and couplings shall be threaded. Set screw type products are not acceptable. Four outdoor conduit termination locations, provide raintight conduit hubs with insulated throat and bonding screw equal to OZ Gedney Type CMH-T. Die cast fittings are not acceptable
 - B. Electrical metallic tubing (EMT) shall be galvanized steel, conforming to ANSI C80.3, UL 797, and NEC Article 358. Provide with galvanized steel compression type fittings, couplings, and connectors for sizes less than 1-1/2 inch. Provide with galvanized steel double set screw type fittings, couplings, and connectors for sizes 1-1/2 inch and larger. Die-cast fittings are not acceptable.
 - C. Liquidtight flexible metal conduit shall have an interlocked flexible galvanized steel core with a permanently bonded polyvinylchloride (PVC) jacket, conforming to UL 360 and NEC Article 352. Die-cast fittings are not acceptable.
- C. Non-Metallic Conduit and Fittings

- A. Schedule 40 and Schedule 80 rigid non-metallic conduit shall be polyvinyl chloride (PVC), rated 90 degrees C., conforming to NEMA TC-2, UL 651, and NEC Article 352. Provide with matching fittings conforming to NEMA TC-3 and UL 514.
- B. Expansion fittings for PVC conduit shall be as follows:
 - a. PVC conduit in concrete or wet locations: O.Z. Gedney Type EX or approved equal.

2.11 UNDERGROUND LINE IDENTIFICATION MARKER TAPE (IF APPLICABLE)

- A. Underground line identification marker tape shall consist of a reinforced protective plastic jacket bonded to an electronically detectable.
- B. Tape shall be resistant to acids and alkalis commonly found in soil.
- C. Tape shall be minimum 6" wide and 5 mil thick.
- D. Tape shall be installed 12" below finished grade, directly above the buried raceway.
- E. The following stock imprinting shall be provided:
 - A. "CAUTION ELECTRIC LINE BURIED BELOW!"
- F. Manufacturers:
 - A. Reef Industries, Inc., Terra Tape Sentry Line Detectable
 - B. Scotch 400 Series Detectable
 - C. Brady B-721 Detectable Identoline

2.12 ELECTRICAL BOXES

- A. Provide outlet, junction and pull boxes, complete with associated fittings and accessories, as indicated and specified, as required by NEC Article 314, to suit job conditions, and compatible with the associated wiring methods and devices.
- B. Exterior or Wet Area Outlet Boxes, Pull, and Junction Boxes
 - A. Provide NEMA FB1, Type FS or FD, corrosion-resistant cast aluminum or steel rain tight boxes with threaded conduit entrance fittings, or NEMA 3R or 4 Steel boxes with Myers Scru-Tite hubs or approved equal as indicated on drawings
 - B. Covers shall be gasketed PVC, with spring-loaded weathertight-while-in-use covers as appropriate for the application.
- C. In-ground Cast Boxes
 - A. Provide vehicular traffic bearing cast polymer resin concrete or non-traffic bearing cast fiberglass or concrete resin underground junction and pull boxes with closed bottoms for flush mounting as shown on drawings.

- B. Cover shall be non-skid with neoprene gasket and stainless steel cover screws. Cover legend: ELECTRIC, TELEPHONE, CATV and as shown on drawings.

2.13 TERMINATIONS

- A. Terminations, splices and taps under 600 volts:
 - A. Copper conductors No. 10 AWG and smaller: Provide copper compression type or twist-on spring loaded connectors and nylon insulated covering.
 - B. Copper conductors No. 8 AWG or larger: Provide hydraulic copper compression type using manufacturer's recommended tooling, Burndy or approved equal, or mechanical bolted pressure type, Greaves USA Series insulated multi-conductor splice connectors or approved equal
 - C. Cable lugs and connectors: Provide compression type of tin-plated copper. Provide to match cable, pre-filled with antioxidant compound, UL486B listed, with marking indicating size and type. Where oversized feeders are installed to reduce voltage drop and the equipment terminations are not sufficient to accept the larger feeders, provide the proper equipment terminations or provide Burndy Type YE-series or approved equivalent compression adapters.

2.14 DISCONNECT SWITCHES

- A. Manufacturers:
 - A. Schneider Square D
 - B. General Electric
 - C. Eaton Cutler Hammer
 - D. Siemens
- B. Product Description: AC Disconnect(s) shall be heavy gauge steel, 600V, NEMA 3R, Lockable, visible break blades/terminals per utility interconnection requirements.
- C. Neutral Provisions: full sized neutral termination kit shall be provided by the manufacturer of the disconnect switch specifically for that purpose.
- D. Grounding Provisions: equipment grounding terminal kit shall be provided by the manufacturer of the disconnect switch specifically for that purpose.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference with owner, architect, construction manager and PV system installer two (2) weeks prior to job start.
- B. Review requirements of contract documents and submittals and review overall system design and construction as shown on shop drawings and contract drawings.

- C. Review details of project coordination, including preliminary schedule, staging and delivery of project materials and key personnel involved.

3.2 ROOF MANUFACTURER – ROOF PROTECTION MATS

- A. Contractor to submit application to roof manufacturer for installation of solar photovoltaic system to adhere to roof warranties.
- B. Contractor to provide all necessary drawings, specifications, designs, loads, and other information required by the roof manufacturer for purposes of maintaining existing roof warranties.
- C. In no circumstance will the Contractor begin construction until written approval(s) have been received by the roof manufacturer approving the solar photovoltaic design.
- D. Coordinate all necessary site visits and meeting with roof manufacturer and/or manufacturer's representative.
- E. Contractor to coordinate installation of roof protection mats prior to installation of solar photovoltaic structural racking system.

3.3 UTILITY INTERCONNECTION AND PERMITS

- A. Connecticut Light and Power Interconnection Application for Fast Track and Study Process Interconnection Request: Provide all documentation required to initiate grid interconnection.
 - A. Submit interconnection application along with interconnection fee, required drawings, Generator (the owner) signatures, Generator's liability insurance document, and applicable technical documentation prior to starting the project.
 - B. Coordinate scheduling and submit additional requirements to ensure project is energized in a timely manner without causing extensive waiting periods after installation is completed.
 - C. Submit Generator signed Interconnection Agreements (from Connecticut Light and Power), witness test procedure and witness test fee at the appropriate times.
 - D. Schedule and conduct witness test for final Approval to Energize.
- B. Permitting: Identify and apply for necessary electrical and building permits needed for municipal approval of the complete photovoltaic system. Include all necessary permit fees.

3.4 DELIVERY, STORAGE, PROTECTION AND HANDLING

- A. All equipment and materials, including each individual PV module and micro inverter, All electrical panelboard, junction boxes, connectors and fittings, raceway components, fasteners, and conductors, shall be inspected for physical defects and damage prior to installation.

- B. PV modules and micro inverters shall be delivered to site in original unopened manufacturers packaging.
- C. Store all materials to permit easy access and identification. Allocate material storage area that will not interfere with array construction, or other construction activities taking place at the same time.
- D. Store all materials, including structural steel and conduit off the ground, and all equipment not designed to be installed outside shall be protected from the weather by a waterproof steel container or other suitable protective enclosure.
- E. Handle all PV modules with clean gloves to avoid fouling anti-glare coatings and depositing oils or other contaminants on the glass or frames.

3.5 INSTALLATION

A. Raceways

- A. Install conduit in accordance with the NECA "Standard of Installation"
- B. Coordinate conduit runs inside building with other trades as needed to provide proper clearances and avoid location conflicts.
- C. Raceways and cables shall be neatly arranged on hangers and supports, with fittings designed for the purpose, and shall be installed parallel and perpendicular to the walls, ceilings, and array structures in a neat and workmanlike manner.
- D. Conduit ends shall be reamed smooth.
- E. Change from non-metallic conduit to metallic conduit to rigid steel or intermediate metal conduit before rising above the floor or emerging from grade.
- F. Direct buried conduit and conduit below concrete slabs: Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively used. Backfill using fine material no less than 6 inches above the top of the conduit placed in 6-inch lifts and thoroughly tamped.
- G. Provide a suitable pull-string in each empty conduit longer than 10 feet.
- H. Use suitable caps to protect empty conduit against entry of dirt and moisture.

B. Array Structures

- A. Refer to Division 05 12 00 Structural Steel Framing & Aluminum Racking.

C. Modules and Inverters

- A. Install Enphase Engage micro inverter cable harness system to module mounting rails fastened at regular intervals. Use Enphase cable termination devices at all cable ends.
 - B. Install micro inverters on aluminum module mounting rails at proper intervals to correspond with module lead locations and AC inverter output cable receptacles. Create a layout map showing exact location of all inverters and apply the provided serial number identification label to its corresponding place on the map, or use the Enphase ArrayGun device, to facilitate easy mapping and fault location after monitoring portal has been configured.
 - C. Verify all module clamps and fasteners have been installed and sufficiently tightened to recommended torque values on every PV module in each row prior to beginning installation of next row to prevent access problems and the need to remove and re-install modules
 - D. Do not stand or lean on any portion of PV modules during installation. Do not allow objects to fall on modules.
- D. System Grounding
- A. Install proper UL listed grounding clips between inverter housing and aluminum module mounting rail.
 - B. Install all necessary UL listed grounding clips on module mounting rails prior to installing modules.
 - C. Install supplementary grounding electrode system as shown on contract drawings and adhere to all NEC Article 250 and 690 grounding requirements.
 - D. Install #8 AWG DC grounding electrode conductors as required by NEC Article 250, NEC Article 690 and micro inverter manufacturer.
 - E. DC grounding electrode conductor, DC equipment ground and AC equipment ground for each 20A branch source circuit shall be bonded together in the respective weatherproof junction box for that circuit using an insulated UL listed compression splice terminal.
- E. Panelboards, Disconnect Switches and Distribution Equipment
- A. Install all electrical components per NEC requirements, manufacturers' requirements and with components listed for weatherproof use where exposed.
 - B. Install electrical distribution equipment and transformers in electrical equipment housing structure observing pre-designed room layout shown in shop drawing submittals.
 - C. Drawings show schematic locations for panelboards with the contractor responsible for final field installation to Code standards and working clearances.
 - D. Unless otherwise indicated, mount panelboards with top of enclosure 6'-6" above finished floor. Mount securely, per manufacturer's instructions, with top and sides level and plumb.

- E. Surface mounted panelboards shall be mounted on 7/8" galvanized steel channel secured to wall.
- F. Provide detailed as-built circuit information for each panelboard, including location description of all inverters grouped into each source circuit. Circuit description shall conform to NEC Paragraph 408.4 which states "identification shall include sufficient detail to allow each circuit to be distinguished from all others".
- G. Clearly label the exterior of each panelboard with I.D. number from drawings, system voltage, and ampere rating of each panel on engraved nameplates.

3.6 LABELING AND IDENTIFICATION

- A. All labeling and identification shall be in accordance with the National Electrical Code, Article 690 and additional requirements outlined in this section and shall be:
 - A. Durable vinyl adhesive labels or mounted plaques with sufficiently large and legible machine printed wording
 - B. Printing shall consist of white lettering on a red background.
 - C. Constructed of UV resistant materials.
- B. All incoming source (branch) circuits shall be labeled with vinyl cloth adhesive labels identifying the array letter and circuit number designation.
- C. A permanent plaque shall be placed at the main building and fire department key box location stating the following:
 - A. "WARNING: DUAL POWER SOURCES. OTHER SOURCE IS PHOTOVOLTAIC SYSTEM"
 - B. The plaque shall also list the locations of:
 - a. The Main Service Disconnect
 - b. The main Photovoltaic System AC Utility Disconnect
- D. Place a label or plaque at the main point of interconnection and all disconnects associated with the photovoltaic system that read as follows:
 - A. AC SOLAR DISCONNECT or
 - B. PHOTOVOLTAIC SYSTEM AC UTILITY DISCONNECT
- E. Place labels reading "CAUTION: SOLAR CIRCUIT", no smaller than 1"x8", on all visible conduit associated with the AC output of the photovoltaic system up to the main building point of interconnection. Apply at intervals not exceeding 10 feet.
- F. Place a label on each AC combiner panel in photovoltaic equipment room with the following wording:

“WARNING: PHOTOVOLTAIC SYSTEM AC OUTPUT CIRCUITS. DO NOT ADD ANY ADDITIONAL LOADS TO THIS PANEL”

3.7 FIELD QUALITY CONTROL

- A. Provide all terminations and connections of electrical wiring fully tightened, torque to manufactures' specifications, provide strain relief when appropriate.
- B. Fasten all cables and leads running along and through the PV arrays at regular intervals and in a neat and organized fashion.
- C. Conduct regular quality control inspections during the installation and a complete inspection by installing contractor's representative prior to completion to verify that all clamps, fasteners, connections have been properly included and tightened.
- D. Visually inspect entire installation for signs of damage to PV modules, micro inverter cables, clamps, fasteners and structural components.

3.8 COMMISSIONING AND TESTING

- A. Prior to making feeder and branch circuit connections, perform installing contractor mega-ohm meter insulation resistance testing of all feeders and conductors from the main building point of interconnection up to the AC combiner panels containing the inverter AC output circuits. Provide documentation and recorded values of testing to be included in owner documentation.
- B. Energize system up to AC combiner panels and systematically energize AC inverter output circuits per manufacturer's recommended startup procedure until all inverters are energized.
- C. Use Enphase Enlighten inverter monitoring website to initiate monitoring account and set up complete monitoring portal including array layouts. Use the portal to discover all inverters using their respective serial numbers, and cross reference all individual inverter locations on monitoring site map with the serial number installation map.
- D. Verify that Envoy devices were able to locate and identify all inverters in system.
- E. Provide a commissioning and testing report. Conduct testing on a cloudless clear day and include the following data:
 - A. Date and time of commissioning and testing
 - B. Six (6) solar irradiance measurements taken at six different locations in installation
 - C. Ambient temperature outside and directly underneath PV modules
 - D. Voltage and Current readings at AC combiner panel feeders to calculate system output
 - E. Instantaneous output reading at Revenue meter
 - F. Total system production reported on Enlighten monitoring portal
 - G. Estimated total system production taking into account solar irradiance, line losses, inverter efficiency, and ambient temperature coefficients.
- F. Conduct a preliminary test using a clamp-on current meter and voltage test to verify that all inverters stop conducting upon opening of the main AC utility disconnect.

- G. De-energize system and wait to conduct scheduled Witness Test per Connecticut Light and Power Company requirements

3.9 OPERATING AND MAINTENANCE MANUALS

- A. Include three (3) sets of operation and maintenance manuals. The installing contractor shall prepare manuals in an indexed format with all materials fitting into a heavy duty 3-ring vinyl covered binder with pocket folders for folded sheets. Proper identification labels shall be included on the front and spine.
- B. Manual shall include the following
 - A. As built drawings showing the final placement of all equipment including AC load centers, transformers, disconnects, conduits, monitoring equipment, communication lines and grounding components.
 - B. As built versions of all shop drawings.
 - C. Complete as built one-line riser diagram of complete system.
 - D. Manufacturers printed installation and operating manuals for PV modules, inverters, inverter cables, monitoring devices, connectors and end caps, transformers and any other equipment related to the system.
 - E. Maintenance procedures for routine preventative maintenance and troubleshooting.
 - F. Emergency shutdown instructions.
 - G. Systematic normal situation shut-down and re-energizing procedure.
 - H. Contact information for technical assistance and parts ordering.
 - I. Copies of all warranties.
 - J. Approved shop drawings for array structures, mounting and electrical equipment layout.

3.10 TRAINING

- A. Provide a summary and training to building staff for operation, maintenance and emergency procedures. Allow 4 hours for training. Coordinate and schedule training with owner and notify owner a minimum of 7 working days prior to training.
- B. Provide a summary and training of monitoring system operations to building IT administrator. Provide login credentials for monitoring portal. Allow 2 hours for summary/training

END OF SECTION 26 31 00

WINTHROP ELEMENTARY SCHOOL
NEW LONDON, CT

STATE PROJECT NO. 095-0084 MAG/EA