TOWN OF GLASTONBURY

INVITATION TO BID

BID #	ITEM	DATE & TIME REQUIRED
GL-2015-18	Transfer Station Electrical Service Upgrade	December 23, 2014 @ 11:00 a.m.

The Town of Glastonbury is seeking bids to upgrade the electrical service for the Glastonbury Transfer Station located at 2340 New London Turnpike, Glastonbury, CT 06033

Bid Forms may be obtained from the Town's website at www.glastonbury-ct.gov or at the Office of the Purchasing Agent, Town Hall, 2155 Main Street, Glastonbury, Connecticut 06033, (second level).

A mandatory pre-bid meeting and site walk through will be held at the 2340 New London Turnpike, Glastonbury, CT 06033 on December 15, 2014 at 1:00 p.m.

Sealed bids must be accompanied with Bid Security. Bid Security shall be issued payable to the "Town of Glastonbury" in the form of a certified check or Bid Bond in an amount not less than 10% of the total amount of the base bid. The Bid Bond must be issued by a surety company licensed in the State of Connecticut. Cashier's checks will not be accepted.

The Town reserves the right to waive informalities or reject any part of, or the entire bid, when said action is deemed to be in the best interest of the Town. All Sealed Bids must be submitted to the Office of the Purchasing Agent no later than the time and date indicated. All bids will be publicly opened and read.

The Town of Glastonbury is an Affirmative Action/Equal Opportunity Employer. Minority / Women / Disadvantaged Business Enterprises are encouraged to bid.

Mary F. Visone
Purchasing Agent

1. Sealed bids **(one original and one copy)** on the attached Bid Forms will be received at the Office of the Purchasing Agent, Town Hall, 2155 Main Street, Glastonbury, Connecticut, 06033 (second level). At the designated time of opening, they will be publicly opened, read, recorded and placed on file.

2. Whenever it is deemed to be in the best interest of the Town, the Town Manager, Purchasing Agent or designated representative shall waive informalities in any and all bids. The right is reserved to reject any bid, or any part of any bid, when such action is deemed to be in the best interest of the Town of Glastonbury.

3. Bidders shall submit a Bid on a lump sum basis for the Base Bid. The basis of award will be based upon the sum of the Base Bid.

4. Bids will be carefully evaluated as to conformance with stated specifications.

5. The envelope enclosing your bid should be clearly marked by bid number, time of bid opening, and date, bidder's company name and address.

6. Specifications must be submitted complete in every detail and, when requested, samples shall be provided. If a bid involves any exception from stated specifications, they must be clearly noted as exceptions, underlined, and attached to the bid.

7. The Bid Documents contain the provisions required for the requested item. Information obtained from an officer, agent, or employee of the Town or any other person shall not affect the risks or obligations assumed by the Bidder or relieve him/her from fulfilling any of the conditions of the bid.

8. Each Bidder is held responsible for the examination and/or to have acquainted themselves with any conditions at the job site which would affect their work before submitting a bid. Failure to meet these criteria shall not relieve the Bidder of the responsibility of completing the bid without extra cost to the Town of Glastonbury.

9. Any bid may be withdrawn prior to the above-scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and the date specified shall not be considered. No Bidder may withdraw a bid within sixty (60) days after the actual date of the opening thereof. Should there be reasons why a bid cannot be awarded within the specified period, the time may be extended by mutual agreement between the Town and the Bidder.

10. Each bid must be accompanied by a bid bond payable to the Town for ten percent (10%) of the total amount of the bid. The bid bond of the successful Bidder will be retained until the payment bond and performance bond have been executed and approved, after which it will be returned. A certified check may be used in lieu of a bid bond. The Town of Glastonbury will not be liable for the accrual of any interest on any certified check submitted. Cashier's checks will not be accepted.

11. A 100% Performance and Payment bond is required of the successful bidder. This bond shall cover all aspects of the specification and shall be delivered to the Purchasing Agent prior to the issuance of a purchase order. The Performance and Payment Bond will be returned upon the delivery and acceptance of the bid items.

12. The Bidder agrees and warrants that in the submission of this sealed Bid, they will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religion, national origin, sex, or physical disability including, but not limited to blindness, unless it is shown by such Bidder that such disability prevents performance of that which must be done to successfully fulfill the terms of this sealed Bid or in any manner which is prohibited by the laws of the United States or the State of Connecticut: and further agrees to provide the Human Relations Commission with such information requested by the Commission concerning the employment practices and procedures of the Bidder. An Affirmative Action Statement will be required by the successful Bidder.

13. Bidder agrees to comply with all of the latest Federal and State Safety Standards and Regulations and certifies that all work required in this bid will conform to and comply with said standards and regulations. Bidder further agrees to indemnify and hold harmless the Town for all damages assessed against the Town as a result of Bidder's failure to comply with said standards and/or regulations.

14. All correspondence regarding any purchase made by the Town of Glastonbury shall reference the Town purchase order number. Each shipping container shall clearly indicate both purchase order number and item number.

15. Bidder is required to review the Town of Glastonbury Code of Ethics adopted July 8, 2003 and effective August 1, 2003. Bidder shall acknowledge that they have reviewed the document in the area provided on the bid/proposal response page (BP). The selected Bidder will also be required to complete and sign an Acknowledgement Form prior to award. The Code of Ethics and the Consultant Acknowledgement Form can be accessed at the Town of Glastonbury website at www.glastonbury-ct.gov. Upon entering the website click **Bids & RFPs** which will bring you to the links for the **Code of Ethics** and the **Consultant Acknowledgement Form**. If the Bidder does not have access to the internet, a copy of these documents can be obtained through the Purchasing Department at the address listed within this bid/proposal.

16. Any bidder, in order to be considered, shall be engaged primarily in the business of construction with for minimum of five (5) years, prior experience with electrical service upgrades and have a valid contractor's license in the State of Connecticut.

17. Non-Resident Contractors:
Upon award the Town is required to report names of nonresident (out of state) Contractors to the State of Connecticut, Department of Revenue Services (DRS) to ensure that Employment Taxes and other applicable taxes are being paid by Contractors. **A single surety bond for 5% of the entire contract price is required to be filed with DRS by any unverified nonresident prime or general contractor (if awarded) where the contract price for the project is $250,000 or more.** The contractor will be required to promptly furnish to the Town a copy of the **Form AU-968 - Certificate of Compliance** issued by the State of Connecticut, DRS. See State of Connecticut **Notice SN 2012 (2).**

18. Bidder shall include on a sheet(s) attached to its proposal a complete disclosure of all past and pending mediation, arbitration and litigation cases that the bidder or its principals (regardless of their place of employment) have been involved in for the most recent five years. Please include a statement of the issues in dispute and their resolution. Acceptability of Bidder based upon this disclosure shall lie solely with the Town.

19. Bidder or its principals, regardless of their place of employment, shall not have been convicted of, nor entered any plea of guilty, or nolo contendere, or otherwise have been found civilly liable or criminally responsible for any criminal offense or civil action. Bidder shall not be in violation of any State or local ethics standards or other offenses arising out of the submission of bids or proposals, or performance of work on public works projects or contracts.

20. Municipal construction projects are exempt from Federal Excise Taxes, as well as, State of Connecticut Sales, Use and Service Taxes and should not be include in the Bidder's proposal.

21. After award of Contract, Owner will require the Contractor's Schedule of Values, which shall be submitted at the preconstruction meeting. The Schedule of Values must accurately reflect job costs and include a complete breakdown of material and labor costs.

22. Each Bidder shall submit a list of similar projects completed within the last three years. In order to be eligible for consideration, the Bidder must have successfully completed a minimum of five (5) similar projects within the last three (3) years. Please provide project name and contact information for project coordinator (name, title, address, phone number). Please also provide contract value.

23. Technical questions regarding this bid shall be made in writing and directed to David Sacchitella, Buildings Superintendent, dave.sacchitella@glastonbury-ct.gov. For administrative questions regarding this Bid, please contact Mary F. Visone, Purchasing Agent, at (860) 652-7588 or email the Purchasing Department at purchasing@glastonbury-ct.gov . All questions, answers, and/or addenda, as applicable will be posted on the Town's website at www.glastonbury-ct.gov. (Upon entering the website click on Bids & RFP's). The request must be received at least three (3) business days prior to the advertised response deadline**. It is the respondent's responsibility to check the website for addenda prior to submission of any bid/proposal.**

IMPORTANT:

- **Failure to comply with general rules may result in disqualification of the Bidder.**
- **Municipal projects are exempt from Federal Excise Taxes, as well as, State of Connecticut Sales, Use and Service Taxes and should not be include in the Bidder's proposal.**

01.00 WORKMANSHIP, MATERIALS AND EMPLOYEES

01.01 Wherever in this contract the word "Engineer" is used, it shall be understood as referring to the Building Superintendent of the Town of Glastonbury acting personally or through any assistants duly authorized.

01.02 The entire work described herein shall be completed in accordance with the plans and specifications to the full intent and meaning of the same. Unless otherwise specified, all materials incorporated in the permanent work shall be new, and both workmanship and material shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

01.03 The wording "furnish", "install", "construct", "furnish and install", or any similar terms, unless specifically noted to the contrary, shall include all labor, materials, water, tools, equipment, light, power, transportation, and any other services required for the completion of the work.

01.04 The Contractor shall at all times enforce strict discipline and good order among his employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned to him.

02.00 SUPERINTENDENT

02.01 The Contractor shall keep on the work during its progress, in the absence of the Contractor, a competent Superintendent. The Superintendent shall be acceptable to the Engineer and shall fully represent the Contractor. All directions given to the Superintendent shall be binding as if given to the Contractor.

03.00 PRECONSTRUCTION MEETING

03.01 A Preconstruction Meeting will be held with the Engineer, Contractor, and any other interested parties prior to commencing any work. The Engineer shall arrange the meeting based on a mutually convenient time.

04.00 PERMITS

04.01 All permits, licenses, and fees required for the performance of the Contract work shall be secured and paid for by the Contractor. The local building permit fees will be waived.

05.00 PROPERTY ACCESS

05.01 The Contractor shall take all proper precautions to protect from injury or unnecessary interference, and provide proper means of access to abutting property where the existing access is cut off by the Contractor.

05.02 The Contractor shall take all proper precautions to protect persons from injury or unnecessary inconvenience and leave an unobstructed way along the public and private places for travelers, vehicles, and access to hydrants.

05.03 The Contractor shall make arrangements with the adjacent property owners for such trespass as he may reasonably anticipate in the performance of the work. All such arrangements shall be reported, in writing, to the Engineer.

06.00 PROTECTION OF THE PUBLIC AND OF WORK AND PROPERTY

06.01 The Contractor shall continuously maintain adequate protection of all work from damage, and shall take all reasonable precautions to protect the Town from injury or loss arising in connection with the Contract.

06.02 The Contractor shall adequately protect adjacent private and public property as provided by law and the Contract Documents.

06.03 The Contractor shall make good any damage, injury, or loss of work and to the property of the Town resulting from lack of reasonable protective precautions.

06.04 The Town Hall building involved will be occupied during the work Monday-Friday 7 a.m. to 5:30 p.m. and for selected evenings. The Contractor may be required to adjust his work schedule should the work have an adverse impact on operations. There will be no modification of the bid price should a schedule adjustment be required.

07.00 EXISTING IMPROVEMENTS

07.01 The Contractor shall conduct his work so as to minimize damage to existing improvements designated to remain. Except where specifically stated otherwise in the specifications, drawings, or as directed by the Engineer, it will be the responsibility of the Contractor to restore to their original condition, as near as practical, all improvements on public or private property. This shall include:

a. Property within and adjacent to the work area such as shrubs, walks, driveways, fences, etc.

b. Utility mains, ducts, poles, and services. The Contractor is hereby notified that utilities, if/where shown on the plans, are at approximate locations. These locations are subject to possible errors in the source of information and errors in transcription. The Contractor shall make certain of the exact location of all mains, ducts, poles, and services prior to excavation.

08.00 SEPARATE CONTRACTS

08.01 The Engineer reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his work with theirs. Wherever work being done by the Town of Glastonbury forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer to secure the completion of the various portions of the work.

09.00 INSPECTION OF WORK

09.01 The Town shall provide sufficient personnel for the inspection of the work.

09.02 The Engineer shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and for inspection.

09.03 If the specifications or the Engineer's instructions require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection and, if the inspection is by another authority other than the Engineer, of the date fixed for such inspection. Inspections by the Engineer shall be made promptly. If any work should be covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination and properly restored at the Contractor's expense.

09.04 Re-inspection of any work may be ordered by the Engineer. If such work is found to be in accordance with the Contract Documents, the Town shall pay the cost of re-inspection and replacement. If such work is not in accordance with the Contract Documents, the Contractor shall pay such cost.

10.00 RIGHT TO INCREASE OR DECREASE WORK

10.01 The Town shall have the right to increase or decrease the amount of work herein specified as may be required.

11.00 RIGHT OF ENGINEER TO STOP WORK FOR WEATHER CONDITIONS

11.01 Should the work, in the opinion of the Engineer, be in danger by reason of inclemency of weather, or could not be finished in time to prevent such danger, the Contractor shall cease operations upon order of the Engineer, and shall not resume them until ordered to do so by the Engineer when the weather conditions are favorable. The Contractor shall, upon such orders, discontinue work, remove all materials or appliances for or in use upon the work, and place the premises in proper condition for use by the public during the time the work is suspended as herein provided, without cost to the Town.

12.00 CONTRACTOR TO BE RESPONSIBLE FOR IMPERFECT WORK OR MATERIALS

12.01 Any faithful work or imperfect material that may be discovered before the acceptance and the payment of the work shall be corrected upon the order of the Engineer. The acceptance and payment of the work does not in any manner relieve the Contractor of his obligation to construct work in the proper manner and the use of materials herein specified.

13.00 TOWN MAY NOTIFY CONTRACTOR IF WORK IS NOT CARRIED ON SATISFACTORILY

13.01 If, in the opinion of the Engineer, the Contractor is not proceeding with the work at a sufficient rate of progress so as to finish in the time specified, or has abandoned said work, or is not complying with the terms and stipulations or the Contract and specifications, the Engineer may serve notice on the Contractor to adopt such methods as will ensure the completion of the work in the time specified.

13.02 If, within five days after the Engineer has notified the Contractor that his work is not being carried on satisfactorily as before mentioned, the Engineer shall have the right to annul the

Contract and manage the work under the direction of the Engineer, or re-let, for the very best interest of the Town as a new contract, the work under said new Contract shall be considered the responsibility of the defaulting Contractor.

13.03 Additional costs incurred over and above the original Contract shall be borne by the Performance Bond.

14.00 DEDUCTIONS FOR UNCORRECTED WORK

14.01 If the Engineer deems it inexpedient to correct work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made there for.

14.02 The Contractor shall promptly remove from the premises all materials condemned by the Engineer as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the Town, and shall bear the expense of making good all work by other contractors destroyed or damaged by such removal or replacement.

14.03 If the Contractor does not remove such condemned work and materials as promptly as possible after written notice, the Engineer may remove them and store the materials at the expense of the Contractor.

15.00 CLEANING UP

15.01 The Contractor must remove all debris of every description as the work progresses and leave the surroundings in a neat and orderly condition to the satisfaction of the Engineer.

15.02 Upon completion, and before acceptance and final payment, the Contractor shall remove from the site all equipment, forms, surplus material, rubbish and miscellaneous debris and leave the site in a neat and presentable condition.

16.00 ROYALTIES AND PATENTS

16.01 The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Town of Glastonbury harmless from loss on account hereof, except that the Town of Glastonbury shall be responsible for all such loss when a particular manufacturer, product, or process is specified by the Town of Glastonbury.

17.00 ERRORS OR CONFLICT IN DRAWINGS AND SPECIFICATIONS

17.01 The Contractor shall immediately notify the Owner/Engineer should he find any errors or conflicts in the contract documents. The Owner/Engineer shall render his interpretation or instruction in writing on the items as soon as possible.

17.02 Any work undertaken by the Contractor containing possible errors or conflicts will be done at his own risk unless he has received prior written approval from the Owner/Engineer.

17.03 The Contractor shall be responsible for estimating and supplying all quantities, and where clarification or additional information is required, a request in writing to the Owner/Engineer shall be made. No extra charge or compensation will be allowed the Contractor unless there is a change in scope or dimension of the project resulting in need for extra material, equipment and/or labor. Said differences are to be handled under Article 18.

18.00 EXTRA WORK AND EXTRA COST

18.01 The Owner, without invalidating the contract documents, may order extra work or make changes by altering, adding to or deducting from the work, the contract price being adjusted accordingly. All such work shall be executed under the conditions of the original contract except that any claim of extension of time caused thereby shall be adjusted at the time of ordering the change.

18.02 No extra work or change shall be performed unless in pursuance of a written order from the Owner/Engineer, with the agreed price prior to the commencement of the work, and no claim for an addition to the contract price shall be valid unless so ordered.

18.03 The value of any such work or change shall be determined, in one or more of the following ways:

a) By estimate and acceptance on a lump sum.
b) By unit prices named in the contract or subsequently agreed upon.
c) By cost and percentage or by cost and a final fee.

19.00 SUBSTITUTIONS

19.01 The Contractor shall use materials as specified unless material list is of an open nature. Material other than specified will be permitted only after written application, including four (4) copies of specifications, is made by the Contractor and written approval received from the Engineer or Owner.

The material installed in the job site shall be new and of the quality specified.

The manufacturer's recommendation shall be followed for the installation of all equipment.

20.00 PRODUCT SUBMITTALS

20.01 Prior to ordering materials, the Contractor shall submit submittals as specified in the detailed specification sections. Three (3) copies of the submittals shall be forwarded to the Engineer for review and approval.

20.02 Submittals shall indicate specification Section for each product. Submittals not containing all the required information shall be returned to the contractor for re-submittal.

21.00 OWNER'S ACCEPTANCE

21.01 Within seven (7) days of the Contractor's notification that the installation is substantially complete, the Owner's authorized representative shall inspect the installation. The Owner, with the Contractor, shall take necessary steps to inspect the installation. Upon completion of the inspection, the Owner or the Owner's authorized representative may either accept the work

outright or prepare a "Punch List" that upon completion by the Contractor and acceptance by the Owner will signify final acceptance provided that all other applicable terms and provisions of the Contract have been completed to the Owner's satisfaction.

22.00 RESPONSIBILITY FOR MAINTENANCE

22.01 It will be the Contractor's responsibility to maintain the work as specified in the detailed specifications during the warranty period.

23.00 SERVICE BY THE CONTRACTOR

23.01 The Contractor shall maintain the work as specified during the warranty period.

24.00 WARRANTY

24.01 The guarantee shall be as specified in the respective sections of the specification.

24.02 The Contractor shall be responsible for the repair and/or replacement of all defective work and materials. All repair work shall be completed in a timely fashion.

24.04 Should the Contractor not respond promptly, the Owner may take any action he deems necessary to repair the defect and prevent further damage to his property, including the hiring of another contractor, or the repairing of such a defect with material supplied by the Contractor. In this event, the Contractor shall be liable for expenses incurred and property damages suffered by the Owner.

01.00 NOTICE TO CONTRACTOR

01.01 Intent of Contract: The intent of the Contract is to prescribe a complete work or improvement which the Contractor undertakes to do, in full compliance with the specifications, plans, special provisions, proposal and Contract. The Contractor shall perform all work in close conformity with the plans or as modified by written orders, including the furnishing of all materials, supplies, transportation, labor, and all other things necessary to the satisfactory prosecution and completion of the project.

The scope of the work shall include all labor, materials and equipment needed to provide and install, and equip new electrical service and associated equipment and materials, complete and ready for use, as described in the plans and specifications for Transfer Station Electrical Service Upgrade at 2340 New London Turnpike in Glastonbury, CT.

02.00 COMMUNICATIONS

02.01 All notices, demands, requests, instructions, approvals, proposals, and claims must be in writing.

02.02 Any notice to, or demand upon, the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Agreement (or at such other office as the Contractor may, from time to time, designate) in a sealed, postage-prepaid envelope or delivered with charges prepaid to any overnight mail carrier in each case addressed to such office.

02.03 All papers required to be delivered to the Town shall, unless otherwise specified in writing to the Contractor, be delivered to the Building Superintendent, 2143 Main Street, Glastonbury, CT 06033, and any notice to, or demand upon, the Town shall be delivered at the above address in a sealed, postage-prepaid envelope or delivered with charges prepaid to any overnight mail carrier, in each case addressed to such office or to such other representatives of the Town, or to such other address as the Town may subsequently specify in writing to the Contractor for such purpose.

02.04 Any such notice shall be deemed to have been given as of the time of actual delivery or, in case of mailing, when the same should have been received in due course of post or, in the case of telegrams, at the time of actual receipt, as the case may be.

03.00 WORK BY OTHERS

03.01 Private utilities, contractors, developers or other parties may be expected to be working within the Contract area during this Contract. It shall be the responsibility of the contractor to coordinate his work with the work being done by others in order that the construction shall proceed in an efficient and logical manner. The Contractor shall have no claim or claims whatever against the Town, the Engineer, or other parties due to delays or other reasons caused by the work by others or his failure to coordinate such work.

04.00 CONTRACTOR'S WORK AND STORAGE AREA

04.01 The Contractor shall contact the Town to determine if any specific locations will be designated, or gain its approval prior to using any area for storage of equipment, materials and trailers during the period of this Contract. The Contractor shall confine his work/storage area to the limits as designated or approved and shall be responsible for the security of the work/storage area. Upon

completion of the Contract, the Contractor shall remove all equipment and materials, except as otherwise specified, and restore the site to its original condition as approved by the Engineer and at no cost to the Town.

05.00 DISPOSAL AREA

05.01 The Tryon Street Bulky Waste Facility will be available to the Contractor, at no charge, for disposal of materials that are accepted at that facility. No materials containing lead-based paint of any level shall be dumped at the Tryon Street facility. The Contractor is required to obtain a disposal area for all other unsuitable or surplus materials at no cost to the Town.

06.00 DUST CONTROL

06.01 During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities so as to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use water or calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed, without additional compensation.

07.00 PROTECTION OF EXISTING UTILITIES

07.01 Before starting any excavation, the Contractor shall submit to the Engineer plans or details showing the proposed method the Contractor will use to support and protect all existing utilities during construction. The furnishing of such plans and details shall not serve to relieve the Contractor of any responsibility for the proper conduct of the work.

07.02 There will be no extra payment for submitting plans or details for supporting and protecting all existing utilities during construction.

08.00 TIME FOR COMPLETION/NOTICE TO PROCEED

08.01 Within ten (10) calendar days after the date of the Notice of Award, the Contractor must provide the appropriate insurance certificates to the Town Purchasing Agent and shall be issued a Notice to Proceed and a Purchase Order prior to initiating any work on the project.

08.02 Work shall commence within thirty (30) days of the date of the Notice to Proceed/Purchase Order.

08.03 After the work has begun, it will continue in an orderly fashion and shall be fully completed within 45 consecutive calendar days from the date of commencement. The Engineer reserves the right to extend the contract an additional thirty (30) days by mutual written agreement.

08.04 Weather permitting, it is the intention of the Town to have all work required under this Contract completed no later than June 1, 2015. In no case, however, shall the work be completed any later than June 15, 2015.

08.05 Because the facilities may remain open during the installation period, the Contractor shall make every reasonable effort to complete the installation as expeditiously as possible.

09.00 MEASUREMENT AND PAYMENT

09.01 All direct, indirect, or incidental costs of work and/or services required by these specifications shall be included in the Lump Sum price.

09.02 Monthly progress payments will be made, based on the approved Schedule of Values, for work that has progressed in accordance with the contract documents, subject to a deduction of five percent (5%) of the amount of the application for payment to be retained by the Owner until completion of the entire contract in an acceptable manner and two and one half percent (2.5%) until the applicable one year warranty period has expired and all required inspections have been completed and results have been submitted and approved by the Engineer.

10.00 COMPLIANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS

10.01 This award of bid is subject to the conformance of the Contractor to all Federal, State, and Local laws, statutes, regulations, ordinances or other requirements that are applicable to the type of work contained in these specifications.

INSURANCE

The Bidder shall, at its own expense and cost, obtain and keep in force during the entire duration of the Project or Work the following insurance coverage covering the Bidder and all of its agents, employees and sub-contractors and other providers of services and shall name the **Town of Glastonbury and its employees and agents as an Additional Insured** on a primary and non-contributory basis to the Bidders Commercial General Liability and Automobile Liability policies. All policies shall contain a waiver of subrogation. **These requirements shall be clearly stated in the remarks section on the Bidder's Certificate of Insurance.** Insurance shall be written with insurance carriers approved in the State of Connecticut and with a minimum Best's Rating of A-VIII. In addition, all carriers are subject to approval by the Town. Minimum Limits and requirements are stated below:

1) Worker's Compensation Insurance:
- Statutory Coverage
- Employer's Liability
- $500,000 each accident/$500,000 disease-policy limit/$500,000 disease each employee
- A Waiver of Subrogation shall be provided

2) Commercial General Liability:
- Including Premises & Operations, Products and Completed Operations, Personal and Advertising Injury, Contractual Liability and Independent Contractors.
- Limits of Liability for Bodily Injury and Property Damage
  Each Occurrence $1,000,000
  Aggregate $2,000,000 (The Aggregate Limit shall apply separately to each job.)
- A Waiver of Subrogation shall be provided

3) Automobile Insurance:
- Including all owned, hired, borrowed and non-owned vehicles
- Limit of Liability for Bodily Injury and Property Damage:
  Per Accident $1,000,000
- A Waiver of Subrogation shall be provided

The Bidder shall direct its Insurer to provide a Certificate of Insurance to the Town before any work is performed. The Contractor shall be responsible to notify the Town 30 days in advance with written notice of cancellation or non-renewal. The Certificate shall evidence all required coverage including the Additional Insured on the General Liability and Auto Liability policies. The Bidder shall provide the Town copies of any such insurance policies upon request.

INDEMNIFICATION

To the fullest extent permitted by law, the Bidder shall indemnify and hold harmless the Town and its consultants, agents, and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, attorneys and other professionals and court and arbitration costs) to the extent arising out of or resulting from the performance of the Bidder's work, provided that such claim, damage, loss or expense is caused in whole or in part by any negligent act or omission by the Bidder, or breach of its obligations herein or by any person or organization directly or indirectly employed or engaged by the Bidder to perform or furnish either of the services, or anyone for whose acts the Bidder may be liable.

Proposal of _____

(hereinafter called "Bidder"), organized and existing under the laws of the State of _____

_____, doing business as _____

_____.

To the Town of Glastonbury (hereinafter called "Town").

In compliance with your Invitation to Bid, the Bidder hereby proposes to furnish and/or services as per Bid Number GL-2015-18 in strict accordance with the Bid Documents, within the time set forth therein, and at the prices stated below.

By submission of this bid, the Bidder certifies, and in the case of a joint bid each party thereto certifies as to their own organization that this bid has been arrived at independently without consultation, communication, or agreement as to any matter relating to this bid with any other Bidder or with any competitor.

The Bidder acknowledges receipt of the following Addenda:

Addendum #1 _____ (Initial & Date)

Addendum #2 _____ (Initial & Date)

Addendum #3 _____ (Initial & Date)

It is the responsibility of the bidder to check the Town's website for any Addenda before submitting the bid.

BASE BID Furnish and install Transfer Station Electrical Service Upgrades as specified in the Plans and Specifications for Bid GL-2015-18.

BASE BID AMOUNT

$ _____
NUMERIC AMOUNT

$ _____
WRITTEN TOTAL BASE BID AMOUNT

CODE OF ETHICS

I/We have reviewed a copy of the Town of Glastonbury's Code of Ethics and agree to submit a Consultant Acknowledgement Form if I/We are selected. Yes_____ No_____ *

***Bidder is advised that effective August 1, 2003, the Town of Glastonbury cannot consider any bid or proposal where the Bidder has not agreed to the above statement.**

Respectfully submitted:

Type or Print Name of Individual	**Doing Business as (Trade Name)**
Signature of Individual	**Street Address**
Title	**City, State, Zip Code**
Date	**Telephone Number/Fax Number**
E-Mail Address	**SS# or TIN#**

(Seal – If bid is by a Corporation)

Attest

Other Items Required with Submission of Bid Proposal

The following bid checklist describes items required for inclusion with the above-referenced bid proposal package. It is provided for the convenience of the bidders and, therefore, should not be assumed to be a complete list.

_____ Bid Bond (10% of total bid amount).

_____ List of five (5) similar projects completed within last three (3) years.

_____ Acknowledgement of Addendums in Bid Proposal (as applicable).

_____ Acknowledgement of Code of Ethics in Bid Proposal.

_____ Sealed bids, one original and one copy.

_____ Disclosure of past and pending mediation, arbitration and litigation cases that the Bidder or its principals have been involved in for the most recent five years (if applicable).

_____ Copy of Bidder's Contractor's License (State of Connecticut).

It is the responsibility of the bidder to clearly mark the outside of the bid envelope with the Bid Number, Date and Time of Bid Opening, Bidder's Company Name and Address. It is also THE RESPONSIBILITY OF THE BIDDER TO CHECK THE TOWN'S WEBSITE BEFORE SUBMITTING BID FOR ADDENDA POSTED PRIOR TO BID OPENING.

Name of Bidder: _____

DRAWING NUMBER	DRAWING NAME
E-1	Electrical Site Plan, Details and Schedules

SECTION 16000 - GENERAL ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and Division 1, General Requirements, are a part of this Section and shall be binding on the Contractor and /or Subcontractor who performs this work. Note also all addenda.

B. The requirements in Section 16000 shall govern the work under all Sections of Division 16.

1.2 SCOPE OF WORK

A. Scope of work consists of installation of materials to be furnished under these Specifications and without limiting generality thereof consists of furnishing labor, materials, equipment, hoisting, plant, transportation, rigging, staging, appurtenances, and services necessary and/or incidental to properly complete all electrical work as shown on drawings, as described in the Specifications or as reasonably inferred from either as being required in opinion of the Architect and Engineer.

B. The work shall include, but is not limited to:

1. Temporary power (see Division 1).
2. Demolition.
3. Secondary electric service conduits and conductors.
4. Free Standing Disconnect Enclosure
5. Enclosed Main Disconnect Switch
6. Meter Socket
7. Generator Connection Cabinet
8. Double Throw Safety Switch
9. Panelboards.
10. Mini Power Center
11. Transformer
12. Feeder distribution system.
13. Safety Switches
14. Switches, receptacles and other similar wiring devices.
15. Lighting fixtures and lamps.
16. Branch circuit wiring

1.3 SITE CONDITIONS

A. Prior to submitting bid, visit the site and identify existing conditions and difficulties that will affect work called for by the Contract Documents. No compensation will be granted for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observers. Include in the bid amount all demolition work required.

B. The Contractor shall verify and obtain all necessary dimensions at the site.

1.4 DEFINITIONS

A. Furnish: The word "furnish" is used to mean "supply and deliver the referenced item to the project site, ready for unloading, unpacking, assembly, and installation".

B. Install: The word "install" is used to describe operations at the project site involving the referenced item including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".

C. Normally Occupied: The words "normally occupied" are used to mean "all rooms within a building except for crawlspaces, underground tunnels, attic spaces, mechanical rooms, telephone rooms, data distribution rooms, and electrical rooms".

D. Or Approved Equal: The words "or approved equal" are used to mean "any product which in the opinion of the Engineer is essentially equal in quality, size, arrangement, appearance, construction, and performance to that product specified or shown on the drawings".

E. Provide: The word "provide" means "to furnish and install the referenced item, complete and ready for the intended use".

F. Remove: The word "remove" means "to disconnect from its present position, remove from the project site, and to dispose of in a legal manner".

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of the Contract Documents.

B. Codes and Regulations:

1. In addition to complying with the specified requirements, comply with all Federal, State and Local Codes wherever applicable including the following:
   2005 Connecticut State Building Code Supplement with the 2009 Amendment, 2003 International Building Code, 2005 Connecticut Fire Safety Code with the 2009 Amendment, 2003 International Fire Code, 2011 National Electrical Code, ICC/ANSI A117.1-2003 Accessible and Usable Buildings and Facilities, and ADA.
2. Comply with the requirements of the Local Authority Having Jurisdiction.
3. Materials and equipment shall be UL listed where standard has been established.
4. Perform tests required by specifications, Engineer's instructions, laws, ordinances or public authorities, approvals, and give Owner timely notice. Notify the Owner of dates for inspection by other authorities.
5. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern.
6. Reference made to codes and standards shall be interpreted as minimum requirements. Provide and perform work in excess of codes and standards as indicated by drawings or specifications.

C. Prior to bidding, the Contractor shall give written notice to the Engineer of any materials, equipment, or apparatus believed in the opinion of said Contractor, to be inadequate or unsuitable for the installation, or in violation of laws, ordinances, rules, or regulations of authorities having jurisdiction. The Contractor shall also give written notice to the Engineer of any items, materials, equipment, or work believed in the opinion of said Contractor, to be omitted from the Contract Documents. In the absence of such written notice, it is mutually agreed that Contractor has included the cost of all required items in his bid and that he will be responsible for approved satisfactory functioning of systems without further compensation.

1.6 SUBMITTALS

A. Product data: after the Contractor has received the Owner's Notice to Proceed, submit six hard cover 3-ring binders containing one copy each of the following:

1. Materials list of all items proposed to be provided.
2. Manufacturers' specifications, catalog cuts, performance curves, electrical characteristics, wiring diagrams, equipment dimensions and weights, and other data for each item proposed to be provided as needed to prove compliance with the specified requirements.
3. Shop Drawings and other data as required indicating method of installing and attaching equipment.

B. Place a permanent label or title block on each submittal binder for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Include the following information on the label for processing and recording action taken:

a. Project name, location, and address
b. Date
c. Name and address of Architect
d. Name and address of Engineer
e. Name and address of Contractor
f. Name and address of Sub-Contractor
g. Name and address of supplier(s)
h. Name of manufacturer(s)
i. Number and title of appropriate Specification section.

C. Data sheets and catalog cuts, etc. contained in submittal binders shall be clearly marked in ink indicating specific service or application for which material or equipment is to be used. Data of a general nature and not clearly defining the service or application for which the proposed item is to be used will not be accepted.

D. Submit for review complete diagrams of systems prepared by equipment manufacturer showing connections and equipment. Standard wiring diagrams shall be modified where necessary to specific system.

E. Prior to forwarding submittals and shop drawings for review by the Architect and Engineer, the Contractor shall thoroughly check each submittal, reject those not conforming to the

specifications, and indicate by his signature that the submittals in his opinion meet the contract requirements.

F. Intent of Shop Drawings and product data review is to check for capacity, rating and certain construction features, ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction, and for coordination of work between trades.

G. Submittal review shall not diminish responsibility under this contract for dimensional coordination, quantities, installation, piping, supports, access, service and errors, nor for deviations from requirements of contract documents. Noting errors while overlooking others will not excuse proceeding in error. Requirements of contract documents are not limited, waived, nor superseded by shop drawing review.

H. Equipment alternates, substitutions, and deviations:

1. Wherever more than one manufacturer (2 or more) is mentioned in the specifications or on the drawings, any of those named shall be considered equally acceptable to that on upon which design was based, and providing all aspects of the specification are met insofar as quality, construction, performance, space requirements, noise levels and special accessories or materials, any of those named may be included in Contractor's bid.
2. Wherever more than one manufacturer (2 or more) is mentioned in the specifications or on the drawings, approval on brands other than those mentioned shall not be granted.
3. Wherever a single manufacturer is used in the specifications or on the drawings and is followed by the words "or approved equal" the Contractor must use the item named or use a product which in the opinion of the Engineer is essentially equal in quality, size, arrangement, appearance, construction, and performance to that product specified or shown on the drawings.
4. “Or approved equal” equipment, as proposed to be provided by the contractor, must be essentially equal in quality, size, construction, and performance to that item specified or shown on the drawings.
5. Submittals for “or approved equal” equipment shall list all deviations and differences from the base specified equipment. Failure to submit this list will result in rejection of the submittal. Any deviations and differences not listed but discovered after installation shall be rectified as directed by the Engineer at the Contractor’s cost.
6. Furnish samples of “or approved equal” equipment proposed to be provided when so requested by the Architect or Engineer.
7. Wherever a single manufacturer is used in the specifications or on the drawings, no other manufacturer is mentioned, and the words “or approved equal” are not used, the Contractor must use the item named without exception.
8. Where no specific make or material, apparatus or appliance is mentioned in the Contract Documents, any first class product made by a reputable manufacturer may be used, providing it conforms to the requirements of these specifications and meets the approval of the Engineer.
9. Where the Contractor proposes to use an item of equipment which differs from that upon which design was based, which requires any redesign of the structure, partitions, foundations, piping, wiring or of any other part of Mechanical, Electrical or Architectural

Layout, all such redesign, new drawings or detailing required shall be prepared by Contractor at his own expense for approval of the Architect and Engineer.

10. Where approved substitutions or deviations require a different quantity, size or arrangement of structural supports, wiring, conduit, piping, ductwork, and equipment from that upon which design was based, all additional items required by the systems shall, with the approval of the Architect and Engineer, be furnished by Contractor at no additional cost to Owner.

I. Allow sufficient time so that the delivery and installation of equipment will not be delayed as a result of the time required to review, process and transmit submittals, including resubmittals. Failure by the Contractor to transmit submittals to the Architect and Engineer in ample time for review and processing shall not entitle him to an extension of the Contract Time and no claim for an extension of time by reason of such default will be allowed.

J. Submittals, shop drawings, and samples will be reviewed with reasonable promptness and will be returned indicating appropriate action as follows:

1. "No Exceptions Taken" means that fabrication, manufacture, or construction may proceed providing submittal complies with contract documents.
2. "Amend as Noted" means that fabrication, manufacture, or construction may proceed, providing the submittal complies with Engineer's notations and contract documents.
3. "Resubmit" means that submittal, or equipment proposed to be provided, does not comply fully with the contract documents and that fabrication, manufacture, or construction shall not proceed. Resubmit in accordance with the Engineer's notations and contract documents.
4. "Rejected" means that submittal does not comply with contract documents, or that equipment proposed to be provided does not comply with the specified requirements or is not equal or better in quality and performance than that item specified. Fabrication, manufacture, or construction shall not proceed. Resubmit in accordance with the contract documents and specified requirements.

K. If material or equipment is installed prior to review, or without review, it shall be removed and replaced at no extra charge to the Owner if, in the opinion of the Architect and Engineer, the material or equipment is not in compliance with the Contract Documents.

1.7 RECORD DRAWINGS

A. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings at the job site. Protect record drawings from deterioration and loss in a secure location. Provide access to record drawings for the Architect's and Engineer's reference during normal working hours.

B. As work progresses mark the record drawings to show the actual installation where the installation varies from the work as originally shown, whether resulting from Addenda, Change Order, approved submittals, or changes made due to field conditions. Mark whichever drawing is most appropriate for showing conditions fully and accurately. Where shop drawings are used, record a cross reference at the corresponding location on the Contract Drawings. Give particular attention to items concealed within the structure or buried below grade.

1. Mark record sets with colored erasable pencils: using separate colors to distinguish between different systems.
2. Include dimensioned locations of conduit runs buried below floor slabs and buried beyond the building footprint.
3. Note related change order numbers where applicable.

C. At the completion of work prepare a new set of black line white-print Record Drawings, of work as actually installed, incorporating addenda, changes made due to approved submittals, change order work, field changes, and added data, all as shown on the marked-up record drawings maintained at the site. Date the set and clearly mark it as "Record Drawings".

D. Furnish two sets of the Record Drawings to the Architect and Engineer for review and transmission to the Owner.

1.8 OPERATING AND MAINTENANCE MANUALS

A. Upon completion of the work of this Contract, deliver to the Architect and Engineer four (4) copies of an Operation and Maintenance (O & M) Manual. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl covered binders, with pocket folders for folded sheet information. Include a separate section for each system or sub-system. Sections shall be separated by heavy plastic dividers with tabs that identify the material in each section. Place a permanent label or title block on each binder for identification.

1. Include the following information on the label:

   a. O & M Manual for _____ (Project name)
   b. Date
   c. Name and address of Architect
   d. Name and address of Engineer
   e. Name and address of Contractor
   f. Name and address of Sub-Contractor

B. Provide the following in each manual:

1. Table of Contents
2. Listing of all service agents with addresses and telephone numbers
3. Description of systems operation
4. Emergency instructions for equipment and/or systems where appropriate
5. Wiring diagrams and piping diagrams specific to systems installed.
6. Manufacturers' operating and maintenance instructions for each piece of equipment installed
7. Inspection procedures
8. Spare parts list
9. Copies of all panelboard circuit indexes.
10. Copies of measurements taken where specified elsewhere in the Contract Documents
11. Copies of all warranties and guarantees.
12. Copies of submittals and shop drawings.

1.9 GUARANTEE AND WARANTIES

A. Obtain in Owner's name written equipment and material warranties offered in manufacturer's published product data without exclusion or limitation.

B. Guarantee work of this Contract in writing for not less than one year from date of Substantial Completion. Repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Owner's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within contract price.

C. Replace material or equipment that requires excessive service during guarantee period, as defined and as directed by the Architect and Engineer.

D. Submit guarantee to the Owner before final payment.

1.10 LAWS, ORDINANCES, PERMITS, AND FEES

A. Give all necessary notices, obtain all permits and pay all taxes, fees and other costs in connection with the work; file all necessary plans, prepare all documents and obtain all necessary approvals of all Regulation Authorities; obtain all required Certificates of Occupancy and/or Inspections required for the work and deliver same to the Owner before requests for acceptance and final payment for the work.

B. Include in the work, without extra cost to the Owner, all labor, materials, services, apparatus, drawings (in addition to Contract Documents and Drawings) required to comply with all applicable laws, ordinances, rules and regulations.

1.11 CORRELATION OF DRAWINGS AND SPECIFICATIONS

A. In general, the Specifications will describe the "quality" of the work and the drawings the "extent" of the work.

The drawings and specifications are cooperative and supplementary; however, and each item of the work is not necessarily mentioned in both the drawings and specifications. All work necessary to complete the project, so described, is to be included in this contract.

B. In case of disagreement between drawings and specifications, or within either document itself, the better quality or greater quantity of work shall be estimated and the matter drawn to the Architect's and Engineer's attention for decision and/or adjustment. Any work done by any Contractor without consulting the Architect and Engineer, when the same requires a decision and/or adjustment, shall be done at the Contractor's risk.

C. Drawings are diagrammatic and indicate general arrangement of systems and work included in Contract. Information and components shown on diagrams but not on plans, and vice versa, shall apply or shall be provided as though expressly required on both. It is not intended that every fitting or component be specified or shown on drawings; however, Contract Documents require provision of all components and materials necessary for a complete and operational installation, whether or not indicated or specified.

D. Do not scale drawings. Scale indicated on drawings is for establishing reference points only. Actual field conditions shall govern all dimensions. The Contractor shall verify all dimensions at the project site.

E. In all cases where the Contract Documents refer to equipment or apparatus in singular number, it is intended that such reference include as many such items that are required to complete the work.

1.12 ELECTRICAL VOLTAGES

A. The electrical service to the site is 277/480V, 3 phase, 3 wire.

B. All equipment shall be suitable for this electrical supply. It is the responsibility of the Contractor to study the electrical drawings to determine the supply for any particular piece of equipment.

C. If equipment requires other electrical characteristics (voltage and phase) than that supplied and shown on the electrical drawings, transformers and wiring shall be provided with that equipment at no extra cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

A. Provide only materials that are new and of type and quality specified. Where Underwriters' Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.

B. Provide accessories, materials and equipment necessary to make installation complete in every detail, and to conform to manufacturers' latest installation instructions, under this Contract whether or not specifically shown on drawings or specified herein.

C. All component parts of each item of equipment shall bear the manufacturers' nameplate, giving name of manufacturer, description, size, type, serial or model number, electrical characteristics, etc. in order to facilitate maintenance or replacement. Contractors or Distributors nameplates shall not be fixed to items of equipment and are not an acceptable alternate to the manufacturer's nameplate data.

D. No materials or equipment used shall be discontinued or about to be discontinued items.

E. The Architect and Engineer shall have the right to reject any part of the work in case the material or workmanship is not of satisfactory quality. Any work or material deemed unacceptable by the Architect and Engineer shall be removed and replaced with acceptable work and material as defined by the Architect and Engineer, and at no additional expense to the Owner.

2.2 PROTECTION:

A. Work performed by the Contractor shall include protecting the work and materials of all other Contractors from damage by work or workmen, and shall include making good any and all damage thus caused.

B. The Contractor shall be responsible for work and equipment until finally inspected, tested and accepted. Protect work against theft, weather, injury or damage, and carefully store material and equipment received on site which is not immediately installed. Close open conduit ends with Carlon conduit plugs or end caps during construction to exclude dust, dirt, moisture, plaster, mortar, or general construction debris. Note - duct tape is not an acceptable means of protecting open conduit and pipe ends.

C. If so specified, work may include receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting any motor starters and/or control equipment having mechanical/electrical service connections which may be furnished by Owner or furnished by others.

D. Work shall include exercising special care in handling and protecting equipment and fixtures. Any equipment and fixtures which are missing, lost, stolen, or damaged by reason of the Contractor's failure to provide adequate protection shall be replaced by that Contractor at no additional cost to the Owner.

2.3 TEMPORARY FACILITIES

A. Provide temporary power and lighting as specified under Division 1, and as required for the performance of the work of this Contract.

B. Provide new materials and equipment; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. All materials shall be suitable for the service intended.

C. Maintain temporary services and facilities in a neat and clean manner. Operate in a safe and efficient manner. Do not allow hazardous, dangerous, or unsanitary conditions to develop or persist on site.

D. Do not overload temporary facilities, or permit them to interfere with progress of the work.

E. Scaffolding and other temporary construction shall be rigidly built in accordance with Local, State, and Federal regulations.

F. Remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete and/or restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that can not be repaired to the satisfaction of the Owner.

G. Do not allow temporary wiring to become enclosed within the building structure. All temporary wiring and conduit shall be removed from the building.

2.4 SCAFFOLDING, RIGGING, HOISTING

A. Work shall include all scaffolding, rigging, hoisting and services necessary for delivery and erection of equipment into or onto the site and/or building. Remove all scaffolding, rigging, and hoisting equipment from the site when no longer needed.

2.5 EXCAVATION AND BACKFILLING

A. Excavation and backfilling for all electrical work inside and outside of the building shall be performed in accordance with Division 2 of these Specifications.

2.6 CUTTING AND PATCHING

A. Cutting and patching for all electrical work shall be performed in accordance with Division 1 of these Specifications.

2.7 SLEEVES AND OPENINGS

A. The Electrical Contractor shall provide all necessary sleeves and openings as required to permit the installation of the electrical systems.

2.8 PAINTING

A. All painting of electrical work shall be performed in accordance with Division 9 of these Specifications, unless otherwise specified.

2.10 BASES AND SUPPORTS

A. Provide all necessary supports, rails, framing, bases, and piers required for the installation of equipment provided under this contract.

B. Unless otherwise shown, all equipment shall be securely attached to the building structure in an acceptable manner. Attachments shall be of a strong and durable nature; any attachments that are insufficient in the opinion of the Architect or Engineer shall be replaced as directed at no additional cost to the Owner.

2.11 SEISMIC RESTRAINTS

A. Provide seismic restraints for all electrical system components in accordance with the Connecticut State Building Code. Refer to typical details on mechanical drawings for additional information.

2.12 SLEEVES, INSERTS AND ANCHOR BOLTS

A. The Contractor shall provide and shall be held responsible for the location and position of all sleeves, inserts, and anchor bolts required by his work. Failure to do so, which requires cutting and patching of finished work, shall be done at no additional cost to the Owner.

2.13 FIRE STOPPING

A. All sleeves shall be packed with damming material and sealed. Sealant shall allow for movement without cracking and shall be 3M brand Fire Barrier Caulk CP25WB or approved equal.

B. Provide fire stopping at all fire or smoke rated wall or fire rated floor penetrations in order to maintain its original integrity. The materials and methods must be tested and listed or approved by Underwriters Laboratories, Factory Mutual or some other recognized authority. The fire stopping performance must be evaluated in accordance with ASTM-E814 test method. The Contractor shall use 3M Family of Products including, but not limited to the following:

1. CP25WB caulk fire barrier compound.
2. CS-195 fire resistive composite panel for large openings.
3. FS-195 wrap/strip to fire stop plastic pipe.
4. PSS-7900 systems for circular, rectangular, and square openings.

The above 3M products and systems shall be submitted for review by the Engineer and properly applied in the field in accordance with the Manufacturer's recommended procedures.

2.14 LUBRICATION

A. All equipment installed under this contract having moving parts shall and requiring lubrication shall be properly lubricated according to the manufacturer’s instructions prior to operation and testing. Any such equipment discovered to have been operated prior to lubrication by the Contractor shall be subject to rejection and replacement at no additional cost to the Owner.

2.16 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect and Engineer.

B. Provide miscellaneous hardware and support accessories, including channels, support rods, nuts, bolts, screws, and other such items, with galvanized or cadmium plated finish, or other approved rust inhibiting coatings.

PART 3 - EXECUTION

3.1 GENERAL

A. Unless specifically noted or shown otherwise, install all equipment and material specified herein or shown on drawings whether or not specifically itemized herein.

3.2 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Contract will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.3 PREPARATION

A. Coordinate:

1. Coordinate as necessary with other trades to assure proper and adequate provisions in the work of those trades for interface with the work of this Contract. Each Contractor shall furnish all information necessary to permit work of other trades to be installed in a satisfactory manner.
2. Coordinate delivery of equipment to project prior to installation. Any equipment stored for an extended period of time prior to installation may be subject to rejection by the Owner or Engineer.
3. Coordinate the installation of items with the schedule for work of other trades to prevent unnecessary delays in the total work.
4. Where electrical equipment is shown in conflict with locations of structural members or other equipment, provide required supports, offsets, bends, or tees as required to clear the encroachment.
5. No conduit, cable(s), boxes, etc., shall be installed until the entire run has been checked for clearances and the work has been coordinated between all the trades. Each tradesman shall be responsible for taking his own field measurements and maintaining proper clearance from the Owner's equipment and the work of other trades, and for coordinating his work with that of other Contractors. Furnish all necessary information, dimensions, templates, etc. in order that a properly coordinated job will result.
6. Prior to roughing, the contractor shall obtain exact electrical equipment, fixture, and device locations from the Architect and Owner. Equipment, fixture, and device locations shown on the drawings are to be used for general reference only. Roughing of equipment, fixtures, and devices shall not proceed until the exact locations, heights, and orientations of same have been agreed upon with the Architect and Owner.
7. If due to lack of coordination and foresight by the Contractor, equipment must be relocated or extra work performed, all costs shall be the responsibility of the Contractor and may not be passed through to the Owner.

B. Unload equipment and materials delivered to the site. Pay cost for rigging, hoisting, lowering and moving electrical equipment on site, in building, or on roof. During construction provide protection against moisture, dust accumulation, and physical damage of equipment, Provide temporary heaters within units as required to evaporate excessive moisture and provide ventilation as required.

C. Certain present building clearances are available for handling equipment. All equipment shall be delivered knocked down as required to clear space limitations on site and within the building.

D. Unless noted otherwise the Contractor shall set all equipment level, plumb, and secure prior to making connections to other equipment or systems.

E. Data indicated on the drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels and other conditions will be governed by actual construction and the drawings and specifications should be used only for guidance in such regard.

F. Verify all measurements at the building. No extra compensation will be allowed because of differences between work shown on the drawings and actual measurements at the site of construction.

G. The drawings are diagrammatic, but are required to be followed as closely as actual construction and work of other trades will permit. Where deviations are required to conform to actual construction and the work of other trades, make such deviations without additional cost to the Owner.

3.4 ACCESSIBILITY

A. Locate all equipment which must be serviced, operated or maintained, in fully accessible positions including but not limited to: controllers, motor starters, disconnect switches, transformers, panelboards, switchgear, etc. Provide access panels as required for equipment access.

B. Failure by the Contractor to locate equipment and arrange the installation to allow for adequate access and clearance for maintenance and servicing shall result in rejection of the installation and the disassembly, relocation and re-assembly of the installation shall be done by the Contractor at no additional cost to the Owner.

3.5 CLEANING AND PROTECTING PIPING, CONDUITS AND EQUIPMENT

A. Thoroughly clean all piping, conduit, and equipment of all foreign substances inside and out before installation.

B. Plug open pipe and conduit ends during construction with Carlon conduit plugs or end caps to exclude dust, moisture, plaster or mortar etc. Note - using duct tape to cover conduit and pipe ends is not an acceptable means of excluding construction debris and may result in rejection of the installation with remedial action to be taken by the Contractor at no additional cost.

C. If any part of a conduit system should be blocked by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary in order to locate and remove the obstruction(s). Any work damaged in the course of removing obstructions shall be repaired or replaced at no additional cost to the Owner.

3.6 PROJECT COMPLETION

A. Upon completion of the work, remove all waste, rubbish and other materials left as a result of operations and leave the premises in clean condition.

B. Thoroughly clean all exposed portions of the mechanical and electrical installations, removing all traces of soil, labels, grease, oil and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.

C. Vacuum all exteriors of equipment and interiors of equipment having accessible interior compartments to remove all dust, dirt, cable clippings, construction debris, etc.

D. Equipment with damage to painted finish shall be repaired to satisfaction of the Owner.

E. Upon completion of all work and of all tests, the Contractor shall furnish the necessary skilled labor and helpers for operating the system and equipment for a period of one (1) day or eight (8) hours, or as otherwise specified. During this period, instruct the Owner or his representative fully in the operation, adjustment and maintenance of all equipment furnished. Give at least forty-eight (48) hours notice to the Owner in advance of this period.

F. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the record drawings and the operations and maintenance manual required to be submitted under these Specifications.

3.7 INSTRUCTION PERIOD

A. Prepare written instruction frames for the proper maintenance and operation of any special equipment furnished and installed under this Contract.

B. The contractor shall arrange for on-site instruction of the Owner's representatives by manufacturers of all major items of equipment. The instruction periods shall be consecutive and shall be held after the installations are complete, tested and balanced and the approved documentation is available. The contractor shall be responsible for attendance of the manufacturer's technical representatives and shall coordinate program timing with the Owner.

C. In addition to normal operation, the Owner's representatives shall be instructed on routine maintenance and trouble-shooting.

END OF SECTION 16000

SECTION 16060 - BASIC ELECTRICAL MATERIALS & METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Bidding Requirements, Contract Forms and Conditions of the Contract, including General Conditions of the Contract for Construction, and Division 1 - General Requirements, apply to the work specified in this Section.

B. The requirements in Section 16000 shall govern the work under all Sections of Division 16.

C. This Section includes requirements that are binding on other Sections of Division 16.

1.2 SCOPE

A. Scope of work consists of installation of materials to be furnished under this Section, and without limiting generality thereof consists of furnishing labor, materials, equipment, hoisting, plant, transportation, rigging, staging, appurtenances, and services necessary and/or incidental to properly complete all electrical work as shown on the drawings, as described in these specifications or as reasonably inferred from either as being required in opinion of the Owner.

B. Work Included: Provide complete electrical services where shown on the drawings, as specified herein and as needed for a complete and proper installation including but not necessarily limited to:

1. General
2. Conduits & Raceways
3. Equipment Labeling
4. Wire and Cables
5. Devices, Switches and Receptacles
6. Outlet Boxes, Junction Boxes, Pull Boxes
7. Cabinets
8. Disconnect Switches
9. Supporting Devices
10. Fuses
11. Grounding
12. Backboards.

1.3 QUALITY ASSURANCE

A. Refer to Section 16000.

1.4 SUBMITTALS

A. Shop Drawings: Submit for all items listed in Paragraph 1.2.B.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide only materials that are new and of type and quality specified, or approved equal. Where Underwriters' Laboratories, Inc. has established standards for such materials, provide only materials bearing the UL label.

B. Provide materials and equipment necessary to make installation complete in every detail, and to conform to manufacturers' latest installation instructions, under this contract whether or not specifically shown on drawings or specified herein.

2.2 TEMPORARY FACILITIES

A. Refer to the requirements of Division 1 regarding temporary facilities.

B. Scaffolding and other temporary construction shall be rigidly built in accordance with Local and State requirements. Remove from premises upon completion of work.

C. Provide temporary construction required for electrical work as directed by the Architect.

2.3 RACEWAYS

A. Rigid Steel Conduit:

1. Shall be manufactured from high strength strip steel, shall be hot dipped galvanized with threads galvanized after cutting, and shall be chromated to form an additional protective layer. Rigid steel conduits shall be UL listed, shall meet the requirements of ANSI C80.1, and shall be as manufactured by Allied Tube and Conduit, or approved equal.
2. Shall be used in outdoor locations where conduit is exposed to physical damage, sunlight or weather.
3. Shall be used for underground work.
4. Shall be used for horizontal and vertical underground sweeps, horizontal and vertical sweeps below concrete slabs, and for penetrations through concrete slabs.
5. Fittings, couplings and connectors shall be threaded and galvanized or cadmium plated.

B. Rigid PVC Conduit:

1. Shall be heavy wall schedule 40 PVC for underground work and extra heavy wall schedule 80 PVC for underground work below vehicular traffic areas. Joints and fittings shall be solvent welded all to ASTM standards for underground installation and in accordance with the National Electric Code.
2. May be used in lieu of rigid steel conduit for underground work except as noted in paragraph 2.3, A, 4 above.
3. The minimum size for running below slabs shall be 1" for both feeders and branch circuits.
4. Joints shall be made watertight.
5. Shall not be embedded in concrete slabs.
6. Shall not be used above ground.

7. Shall not be used for horizontal and vertical underground sweeps, horizontal and vertical sweeps below concrete slabs, or for penetrations through concrete slabs.
8. Furnish PVC conduit in Carlon, Cantex, or approved equal.
9. Flexible PVC conduit (ENT) shall not be used.

C. Intermediate Steel Conduit:

1. Shall be manufactured from high strength flat steel that is cold-formed and electrically welded into a uniform tube, shall be hot dipped galvanized with threads galvanized after cutting, and shall be chromated to form an additional protective layer. Intermediate steel conduit shall be UL listed, shall meet the requirements of ANSI C80.6, and shall be as manufactured by Allied Tube and Conduit, or approved equal.
2. Shall be used in interior locations where conduit is exposed to physical damage, or corrosive or wet environments.
3. Fittings, couplings and connectors shall be threaded and galvanized or cadmium plated.

D. Electrical Metallic Tubing:

1. Shall be manufactured from high grade mild strip steel, shall be hot dipped galvanized, and shall be chromated and lacquered to form additional protective layer. EMT conduit shall conform to UL 797 and ANSI C80.3 and shall be as manufactured by Allied Tube and Conduit, or approved equal.
2. Fittings, connectors and couplings shall be gland compression type.
3. Shall be used for all wiring except for the secondary electrical service and wiring below grade. Provide insulated throat grounding bushings for all feeder conduit connections to switchboards, panelboards, disconnect switches, transformers, and pull boxes.
4. Shall not be embedded in concrete slabs.

E. Flexible Steel Conduit:

1. Shall be full wall steel flexible conduit, shall be manufactured from high grade strip steel and shall be hot dipped in a molten zinc bath. The steel strip shall be formed into interlocking convolutions that are continuously joined, metal to metal, assuring continuous grounding contact. Flexible steel conduit shall be UL listed and shall be as manufactured by AFC Cable Systems, or approved equal.
2. Fittings, connectors and couplings shall be zinc plated malleable iron, insulated type.
3. May be used in short lengths where EMT cannot be installed due to interferences and obstacles.

F. Liquidtight Flexible Steel Conduit:

1. Shall be similar to flexible steel conduit, but with pressure-extruded moisture and oil-proof outer jacket of gray polyvinyl chloride plastic. Liquidtight flexible steel conduit shall be UL listed (UL 360) and shall be as manufactured by AFC Cable Systems, or approved equal.
2. Fittings, couplings and connectors shall be zinc plated malleable iron, insulated type.
3. Provide where located outdoors or in damp or wet areas for final connections to motor driven equipment or where subject to vibration.

G. Surface Steel Wireway:

1. Wireways shall be code gauge galvanized steel, manufactured standard sections and fittings, with hinged and/or screwed covers, indoors NEMA Type 1/Outdoors NEMA Type 3R, and shall be as manufactured by Hoffman, or approved equal. Wireways shall be sized to code conductor fill requirements and shall be provided as required for job conditions.

2.4 METHODS AND MATERIALS FOR LABELING EQUIPMENT

A. Main Disconnect Switch, Panelboards, Loadcenters, Transformers, Safety Switches:

1. Non-metallic engraved nameplates shall be used to identify device. Nameplates shall be secured to equipment with two screws or rivets.
2. Letters to be white on black background.
3. Nameplate letters to be 1/4" high.
4. Identification nomenclature shall be in accordance with plans. All name nomenclature shall be submitted for approval.
5. Nameplates for panelboards shall include panel designation and voltage.

B. Identify all fused disconnect switches with installed fuse size, i.e: Maximum fuse size = xxx amps. Identification shall be of the same method as specified in paragraph 2.4.A, except white letters on red background.

C. Identify all junction boxes and pull boxes installed above ceilings and in unfinished spaces with branch circuit or feeder designations. Identification shall be done with black felt tip permanent marker in a neat and readily legible manner.

2.5 SAFETY SWITCHES

A. All safety disconnect switches shall be furnished in heavy duty quick-make, quick-break, interlocking fusible or non-fusible, type as indicated on the drawings. Manufacturer shall be the same as provided for switchgear and panelboards.

B. Provide enclosures clearly marked for maximum voltage, current and horsepower rating, and:

1. Indoors: NEMA Type 1.
2. Outdoors or Damp or Wet Locations: NEMA Type 3R.
3. Hosedown and Splashing Water Locations: NEMA Type 4.

C. Furnish and install disconnect switches at each motor location except where combination switches and starters are furnished with equipment by others but are mounted by this contractor.

D. Furnish and install weatherproof disconnect switch at each exterior located fan or motor location.

E. Disconnect switches shall be of "lock-out" design to prevent opening of switch when in "ON" position.

2.6 CONDUCTORS

A. All conductors shall be copper, rated 600 volts, 90 deg. C., wet or dry locations, type XHHW-2, color coded.

B. Grounding electrode conductors and bonding conductors shall be soft drawn copper, ASTM B3 solid bare copper for sizes smaller than #8AWG, ASTM B8 stranded bare copper for sizes #8AWG and larger.

C. Light fixture connections to be copper, Type SF-1, 200 deg. C.

D. Minimum gauge conductors for power and lighting shall be #12 AWG. Increase to #10 AWG for runs exceeding 75'-0", and #8AWG for runs exceeding 150'-0".

E. Wire Size #8 AWG and larger shall be stranded. Wire of size smaller than #8 AWG shall be solid.

2.7 OUTLET, JUNCTION AND PULL BOXES

A. Provide outlet boxes as required for a complete installation including, but not limited to the following: switches, receptacles, lighting fixtures, etc.

B. Outlet boxes shall be code gauge galvanized steel and shall be of shapes and sizes to suit their respective locations and installations, and shall be provided with covers to suite their function and installation.

C. The minimum box size for all outlet boxes shall be nominal 4” square x 2 1/8” deep (2-gang). Provide larger size outlet boxes, or gangable type boxes where required for the installation.

D. For lighting outlets, provide standard 4” octagon units with 4” round flat covers. Provide 3/8” malleable iron fixture studs and box hangers where required.

E. For exposed work in normally unoccupied (unfinished) areas, provide surface boxes with galvanized or cadmium plated steel covers with rounded corners. Provide cast boxes for work exposed to wet locations and where called for on the drawings.

F. For above ground pull boxes, provide galvanized code-gauge sheet steel units with screwed on covers, of size and shape required to accommodate wires without crowding, and to suit the location. Provide pull boxes as specified herein, as required for job conditions, and as follows:

1. Indoors: NEMA Type 1.
2. Outdoors or Damp or Wet Locations: NEMA Type 3R.
3. Hosedown and Splashing Water Locations: NEMA Type 4.

G. For in-ground pull boxes, provide Quazite boxes as manufactured by Hubbell or approved equal. Pull boxes shall be constructed of Polymer concrete consisting of sand and aggregate bound together with a Polymer resin and reinforced by a heavy weave fiberglass. Pull box covers shall have a skid resistant finish and shall be secured with stainless steel bolts. Provide in-ground pull boxes of size and shape required to accommodate the service and suit the location.

2.8 WIRING DEVICES

A. All devices shall be furnished in Hubbell or approved equal in Cooper, Pass & Seymour, or Leviton. Devices specified herein are based on Hubbell unless otherwise noted. Receptacle and switch colors shall be as directed by the Architect.

B. Lighting Switches:

1. Toggle Type: Institutional Heavy Duty specification grade, flush mounting, quiet operation AC type with abuse resistant colored nylon toggle operator, heat resistant composition plastic housing, silver cadmium oxide contacts and copper alloy spring contact arm. Rated at 120-277 VAC, capable of full capacity on tungsten or fluorescent lamp load. Designed for side or back wiring with up to No. 10 wire, and with #8 brass terminal screws.

	20 AMP	30 AMP
Single Pole	#HBL1221	#HBL3031
Two Pole	#HBL1222	#HBL3032
Three way	#HBL1223	#HBL3033
Four way	#HBL1224	-

C. Receptacles:

1. Single and duplex convenience receptacles shall be extra heavy duty weather resistant, 2 pole, 3 wire grounding, NEMA 5-20R, rated 20AMP at 125 Volts AC. Receptacles shall have a one-piece all brass wrap around mounting strap with integral ground contacts and ground tension retaining clips, tandem bypass contact, heat resistant thermoplastic rynite base, and high impact nylon face. Receptacles shall be back and side wired, shall have a back wired green ground terminal, automatic ground clip, and threaded brass square head center rivet assembly.

Single Receptacle #HBL5361
Duplex Receptacle #HBL5362WR

2. Ground Fault Duplex convenience receptacles shall be heavy duty specification grade, 2 pole, 3 wire grounding, NEMA 5-20R, rated 20AMP at 125 volts AC. Receptacles shall have a solid brass wrap around mounting strap with pre-tensioned ground contacts, tandem modified bypass contacts, all glass circuit board with conformal coating for superior moisture immunity, 7 noise filtering capacitors, heat resistant thermoplastic base and high impact nylon face. Receptacles shall be side wired and shall have a green ground terminal.

Duplex GFCI Receptacle #GFR5362SG

D. Weatherproof enclosures:

1. Weatherproof enclosures for outdoor GFCI receptacles shall be cast aluminum, single gang vertical Hubbell #WP26M or single gang horizontal Hubbell #WP26MH. Enclosures shall include gasket and mounting screws, shall have ¼" diameter padlock holes, and shall have large cord openings for use with cover closed.

2.9 FUSES

A. Provide current limited, non-renewable fuses, Bussman, Littelfuse, or Gould, UL class J up to 600 Amp and Class L over 600 Amp.

B. Fuses shall be rated 600V or less A.C., UL listed, and have minimum interrupting rating of 200,000 rms amperes with peak let-through current and maximum clearing values within prescribed UL limits. Fuses for motor feeders or motor circuits shall be Class RK-5 of voltage classification rated for motor with minimum interrupting capacity of 200,000 rms amperes and with minimum time delay of ten seconds at 500%.

C. Provide one complete set of three spare fuses for each size and type used.

2.10 GROUND RODS

A. Ground rods shall be hardened steel with a minimum 10 mil thick electrolytic copper covering (copper-clad) and shall conform to UL 467. Ground rods shall be ¾" dia. x 10' long. Provide ground rods in Blackburn manufacture or approved equal.

2.11 EXOTHERMIC WELDS

A. All grounding/bonding connections to ground rods shall be made with exothermic welds. Provide in Cadweld or approved equal.

2.12 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the contractor subject to the approval of the engineer.

B. Provide miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws, and other such items, with galvanized or cadmium plated finish, or other approved rust inhibiting coatings.

PART 3 - EXECUTION

3.1 GENERAL

A. Unless specifically noted or shown otherwise, install all equipment and material specified herein or shown on drawings whether or not specifically itemized herein. PART 3 covers particular installation methods and requirements peculiar to certain items and classes of materials and equipment.

B. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until satisfactory conditions are corrected.

C. The electrical drawings are diagrammatic, but are required to be followed as closely as actual construction and work of other trades will permit. Where deviations are required to conform with

actual construction and the work of the other trades, make such deviations without additional cost to the Owner.

D. Data indicated on the drawings and in these specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels and other conditions will be governed by actual construction and the drawings and specifications should be used only for guidance in such regard.

E. Verify all measurements at the building. No extra compensation will be allowed because of differences between work shown on the drawings and actual measurements at the site of construction.

F. Do not scale drawings. Scale indicated on drawings is for establishing reference points only. Actual field conditions shall govern all dimensions.

G. Coordinate:

1. Coordinate as necessary with other trades to assure proper and adequate provisions in the work of those trades for interface with the work of this Section.
2. Coordinate delivery of electrical equipment to project prior to installation. Equipment stored for an extended period of time prior to installation may be subject to rejection by Architect.
3. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total work.
4. Where electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide required supports and wiring to clear the encroachment.
5. Prior to roughing, the contractor shall obtain exact fixture and device locations from the Architect. Outlet and fixture locations shown on the drawings are to be used for general reference only. Roughing of fixtures and outlets shall not proceed until exact locations, heights, and orientations of fixtures and outlets have been agreed upon with the Architect and Owner.
6. Arrange installation to provide access to equipment for easy maintenance and repair.

3.2 INSTALLATION OF RACEWAYS AND FITTINGS

A. Install wire and cable in approved raceways or cable assemblies as specified and as approved by authorities having jurisdiction.

B. Run conduit plumb and true to present a neat appearance.

1. Make bends with standard conduit elbows or conduit bent to not less than the same radius.
2. Make bends free from dents and flattening.

C. Provide code sized conduit unless a larger size is shown on the drawings or specified herein. Minimum conduit size shall be ¾" diameter.

D. Securely and rigidly support conduit throughout the work with approved clips, straps, staples, and hangers all in conformance with code seismic requirements.

1. Do not use mechanics wire for supporting conduit or cable.
2. Do not support conduits from mechanical or electrical equipment.
3. Steel supports and racks shall be galvanized steel channel and fittings, unistrut or approved equal.
4. Provide clamps and support rods as required.
5. Steel support rods or support bolts for conduits shall be 1/8 inch diameter for each inch or fraction thereof of diameter of conduit size, but no rod or bolt shall be less than ¼" in diameter.
6. Horizontal and vertical conduit supports shall not be more than 10' apart or more than 1' from any fitting.

E. Provide double locknuts on all conduits terminating in sheet metal enclosures. Provide insulated throat grounding bushings on all feeder conduits.

F. Where conduit is installed underground or is exposed to weather or wet areas make all joints watertight.

G. Provide offsets prior to entrance into outlet boxes and other electrical equipment for proper adjustment to finished building surfaces. Exercise care when roughing-in conduits which turn up or down to surface mounted panelboards or cabinets, so that conduit extensions to cabinet will be fitted close to wall. Where possible, provide back entry into surface mounted boxes or equipment items.

H. Install rigid galvanized steel conduit with ends cut square without sharp edges, threaded, and I.D. reamed to remove any burrs. Field made bends shall be of equivalent radius as factory made bends. Exposed threads shall be kept to a minimum.

I. Feeder and branch circuit conduits shall not be run below concrete slabs or in concrete slabs unless specifically indicated so on the drawings, or unless there is no other way to feed the outlet, device, or equipment.

1. Where conduits are run underground below concrete slabs they shall be kept a minimum of 12" below bottom of slab. Provide rigid steel conduit for horizontal and vertical sweeps below concrete floor slabs and for penetrations through concrete floor slabs.
2. Where conduits turn out of concrete slab in open areas, provide threaded couplings flush with floor line for extending exposed conduit to equipment, outlet, fitting or box.

J. Carefully clean and dry all conduit before installation of conductors. Do not pull wires into conduit system until the entire run is completed. Provide Carlon conduit plugs and end caps to exclude debris, dust, moisture, etc. during construction.

K. Lubricants or cleaning agents which might have deleterious effect on conductor coverings shall not be used for drawing conductors into raceways.

L. Provide minimum 1/4 inch diameter twisted nylon fish cord in all empty raceways. Provide tag on each end indicating location of other end. Fish cord shall have minimum of 200 pounds tensile strength.

M. All wiring shall be installed in electrical metallic tubing unless otherwise specified herein or called for on the drawings.

1. Where conduit is installed underground (buried), provide PVC conduit.
2. Provide PVC conduit for the secondary electrical service.

3.3 CONDUCTOR INSTALLATION

A. General:

1. The interior of all conduits shall be cleared of burrs, moisture, dirt and obstructions before wires are pulled.
2. Lubricant for pulling wires shall be inert to cable and conduit, shall not in any way restrict ease of pulling through conduit with passage of time, and shall be special lubricant designed specifically for cable pulling and shall be chemically compatible with cable.

B. Color Coding:

1. Consistent phase identification of all conductors shall be maintained as follows:

	120/240V	277/480V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral Wire	White	Natural Grey

Provide colored plastic tape of specified color code identification for large size conductors available only in black. Wrap tape three complete turns around conductor, at ends and at connections and splices. Provide same color coding for switch legs as corresponding phase conductor.

C. Minimum Conductor Sizes:

1. The minimum branch circuit conductor size shall be #12AWG. Provide #10AWG conductors for branch circuits where the conductor run exceeds 75 feet, and #8AWG conductors where the conductor run exceeds 150 feet.

D. Provide the number of conductors required for a given branch circuit, or as required for circuitry, whether indicated on the drawings or not.

E. Neutral Conductors:

1. All branch circuits shall be installed with a separate neutral conductor. Shared neutrals for groups of branch circuits shall not be permitted.

F. Provide each circuit with a dedicated ground wire back to its respective panel ground bar. Size all ground wires in accordance with NEC requirements. Use #12 minimum size.

G. Identify conductors passing through pull boxes, junction boxes, and wireways to indicate circuit designation. Identify pull boxes and junction boxes as specified herein.

H. Phase conductors shall be connected to phase supply mains in proper rotation to assure balanced condition on panel. Circuit numbers assigned on drawings are for convenience only. Provide typed circuit directories for all panelboards at conclusion of work, representing circuits as actually connected to panelboard. Directories shall note the equipment, devices and rooms served by each branch circuit.

I. Branch circuit wiring and arrangement of home runs have been designed for maximum economy consistent with adequate sizing for voltage drops, circuit ampacities and other considerations.

1. Install the wiring with circuits arranged as shown on the drawings, except as otherwise approved in advance by the Architect and Engineer.
2. Do not make changes and rearrange circuits without prior approval.
3. If more than 3 current carrying conductors are installed in one conduit they shall be derated in accordance with the National Electric Code. Do not install more than three 30 Amp single phase or four 20 Amp single phase circuits in the same conduit.

J. Splices and Connections:

1. Makes splices electrically and mechanically secure with pressure-type connectors.

   a. For wires size #8AWG and smaller, provide solderless, screw-on connectors, "Scotch-Lock" or equal, 600V rating, of size and type to manufacturer's recommendation, with temperature ratings equal to the conductor insulation.
   b. Make splices and terminations to conductors #6AWG and larger with corrosion-resistant, high conductivity, pressure indent, hex screw or bolt clamp connectors, with or without tongues, designed specifically for intended service. Connectors for cables 250 kcmil and larger shall have two clamping elements or compression indents. Terminals for bus connections shall have two bolt holes.
      Split bolt connectors, Burndy or equal, shall be acceptable for all splices of conductors #6AWG and larger.

2. Insulate splices with a minimum of two layers of scotch brand No. 33 vinyl-plastic electrical tape where insulation is required.

3. Tape joints as required with rubber tape 1 ½ times the thickness of the conductor insulation, then cover with the vinyl-plastic electrical tape specified above.

4. Provide high conductivity copper alloy bolt-on lugs with pressure plate and socket set screw or hex head screw to attach wire and cable to disconnect switches, transformers, and other electrical equipment as required.

5. Provide Greaves PT-R series cable reducing adaptor plugs where required for terminating oversize cable to standard size equipment lugs. Conductor strands shall not be cut in order to fit equipment lugs.

6. Provide antioxidant joint compound on all conductor splices and connections.

3.4 OUTLET BOXES

A. Install outlet boxes at uniform heights and straight and true with reference to walls, floors, ceilings and casework.

B. Provide knockout plugs in boxes with unused openings.

C. Secure all outlet boxes with metal straps, rods, or bolts independently of entering conduits or cables.

3.5 PULL BOXES AND JUNCTION BOXES

A. Provide pull boxes and junction boxes where shown on the plans and where required to facilitate proper pulling of wires and cables. Install pull boxes or pull fittings no less than one every 100 ft. of straight horizontal conduit run, or three 90 degree bends, unless otherwise noted.

B. For site work provide pull boxes no less than one every 400 feet of straight run or two 90 degree bends, unless shown or noted differently.

3.6 WIRING DEVICES

A. Install receptacles vertically with grounding posts at top of device, except locate grounding post to left for horizontal mounting.

3.7 GROUNDING SYSTEM

A. Provide a complete grounding system which will thoroughly ground the non-current carrying metal parts of every piece of installed equipment, as described herein and as indicated on the drawings.

B. System shall be mechanically and electrically connected to provide an independent return path to the grounding sources.

C. Each grounding conductor shall have a minimum capacity of 25 percent of the rated capacity of the equipment it grounds, unless otherwise indicated.

D. The minimum size of grounding conductors shall be No. 12 AWG copper. Insulation color of grounding conductors shall be green.

E. Provide insulated throat grounding bushings at all feeder conduit connections to switchboards, panelboards, double throw switches, enclosed circuit breakers, disconnect switches, transformers, wireways, and pull boxes. Connect grounding bushings within each enclosure, backbox, wireway, or pull box by #4AWG bare copper bonding conductor connected to a grounding lug welded to the enclosure, backbox, wireway, or pull box.

F. Provide a separate green ground conductor for each feeder and branch circuit.

G. Provide ground rods as specified herein and as called for on the drawings.

H. Provide exothermic weld ground connections as specified herein and as called for on the drawings.

I. Tests: Entire system shall be thoroughly tested on completion for ground continuity and capacity. Provide not more than 10 ohms resistance between main ground system and equipment frame system neutral and/or derived neutral point.

3.8 SPECIAL REQUIREMENTS

A. Wiring shall be bundle tied where passing through pull boxes, wireways, and panelboards in neat and orderly manner with plastic cable ties. Cable ties shall be Ty-Raps as manufactured by Thomas & Betts, or equal.

B. Turn branch circuits and auxiliary system wiring out of wiring gutters at 90 degrees to circuit breakers and terminal lugs.

C. Provide miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws, and other such items, with galvanized or cadmium plated finish, or other approved rust inhibiting coatings.

D. Unload electrical equipment and materials delivered to site. Pay cost for rigging, hoisting, lowering and moving electrical equipment on site, in building or on roof. During construction provide additional protection against moisture, dust accumulation and physical damage of electrical equipment. Provide temporary heaters within units, as approved to evaporate excessive moisture and provide ventilation as required.

3.9 TESTING AND INSPECTION

A. Provide personnel and equipment, make required tests, and secure required approvals from the Architect and governmental agencies having jurisdiction.

B. When material and/or workmanship are found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.

C. Perform all required adjustments and settings. Verify and correct deficiencies as necessary including voltages, tap settings, trip settings and phasing of equipment from distribution system to point of use.

D. Provide all necessary testing equipment.

E. Test wiring, buswork, and connections for continuity and ground by “megger” test. Minimum insulation resistance between conductors and ground shall be as follows:

1. For circuits of #14 or #12 AWG wire: 1,000,000 ohms.
2. Conductor current carrying capacities from 25 to 50 amperes, inclusive: 250,000 ohms.
3. Conductor current carrying capacities from 51 to 100 amperes, inclusive: 100,000 ohms.

4. Conductor current carrying capacities from 101 to 200 amperes, inclusive: 50,000 ohms.
5. Conductor current carrying capacities from 201 to 400 amperes, inclusive: 25,000 ohms.
6. Conductor current carrying capacities from 401 to 800 amperes, inclusive: 12,000 ohms.
7. Conductor current carrying capacities over 800 amperes: 5,000 ohms.

F. Main ground electrode system shall not exceed 10 ohms unless specified otherwise.

1. Verify ground resistance by ground continuity test between main ground system and equipment frame system neutral and/or derived neutral point.
2. Perform ground continuity test by passing minimum of ten Amps DC between ground reference system and ground point. Calculate resistance by voltage drop method.

G. In the Architect's Presence:

1. Test all parts of the electrical system and prove that all such items provided under this Section function electrically in the required manner.

H. Balance all panels as follows:

1. Turn on all lighting and equipment served by a panel and measure the current in each branch circuit phase and neutral conductor and in each phase and neutral bus-bar.

2. Log all measurements taken and then correct imbalance by substituting branch circuits from phase to phase until optimum balance (within 10%) is achieved. Log all final current measurements and submit for the Engineer's review.
3. Also measure and log voltages between each phase bus-bar and between each phase bus-bar and neutral bus-bar and submit measurements for the Engineer's review.

3.10 PROJECT COMPLETION

A. Upon completion of the work of this Section, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.

B. Vacuum all exteriors and interiors of switchboards, panelboards, safety switches, and equipment racks to remove all dust, dirt, cable clippings, etc.

C. Equipment with damage to painted finish shall be repaired to satisfaction of the Architect.

D. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under these Specifications.

3.11 EQUIPMENT SPECIFIED

A. Contractor shall furnish equipment or systems in manufacturers specified or named herein or on the drawings. No other manufacturers shall be considered.

END OF SECTION 16060

SECTION 16400 – SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements. Apply to the work specified in this Section.

B. The General Requirements in Section 16000 shall also govern the work under this Section.

C. Examine all drawings, data, and coordinate the work of this Section with all related and adjoining work.

1.2 DESCRIPTION OF WORK

A. Includes but is not limited to:

1. Underground secondary service conduits and cables.
2. Grounding.
3. Feeder distribution.
4. Main service disconnect.
5. Panelboards.
6. Encapsulated transformer
7. Generator connection cabinet (GCC).
8. Mini-power center
9. Double throw switch.
10. Free standing disconnect enclosure.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Refer to Section 16000.

B. Northeast Utilities construction and installation standards.

1.4 SUBMITTALS

A. Shop Drawings: Submit for all items listed in paragraph 1.2, Description of Work.

PART 2 - PRODUCTS

2.1 SECONDARY ELECTRICAL SERVICE

A. Secondary electrical service will be 200 amp, 3 phase, 3 wire, 277/480 volts.

B. Furnish and install secondary underground service consisting of 3 x #3/0 XHHW-2 in 3" conduit.

C. Secondary service conduits shall be rigid galvanized steel or rigid schedule 40 PVC; conductors to be copper stranded conductor Type XHHW-2, 600 volts.

2.2 GROUNDING

A. Provide #4 AWG copper service ground cable in conduit to grounding rod system.

B. Refer to Section 16060 for equipment, conduit, and panelboard grounding.

2.3 ENCLOSED MAIN DISCONNECT SWITCH (200A.).

1. 200A rated, 2 pole circuit breaker in NEMA 3R enclosure as manufactured by Cutler-Hammer.

2.4 PANELBOARDS

A. Distribution panels shall be furnished in Cutler-Hammer or equal in General Electric or Square D. Specific types for various applications listed in panel schedule.

B. Panelboards shall be equipped with the following features:

1. Bolt-on circuit breakers.
2. Symmetrical interiors.
3. Surface or flush trim as called for in schedule, door-in-door type.
4. Flush key catch lock.
5. Painted finish, ANSI-61 gray.
6. Metal frame/plastic cover index card holder.
7. Separate equipment ground bus.
8. Fast latch trim and jacking screw adjustment.
9. Split neutral.
10. Connection accessible from front.
11. Screw type mechanical lugs.
12. Density rated 1000A/sq. in. copper busses.
13. AL/CU ground bus.
14. Black face/white core engraved nameplate fixed to panel with two screws or rivets.

D. Load centers shall be as scheduled on the drawings. Proposed equals in General Electric or Square D will be considered only if all aspects of the specification are met.

E. Indexing and Identification: After installations are complete, provide and mount under sturdy transparent shield in the directory frame of each panel door a neat, accurate and carefully typed directory properly identifying the lighting, receptacles, outlets and equipment which each branch circuit breaker controls.

F. All circuit breakers feeding mechanical equipment shall be 'HCAR' rated.

G. All circuit breakers shall be fully rated. Series rated breakers shall not be permitted.

2.5 CIRCUIT BREAKERS

A. All circuit breakers in distribution panels shall be bolt-on type. Circuit breakers in load centers shall be plug-on type.

B. Circuit breakers shall be fully rated. Series ratings are not acceptable.

C. Circuit breakers serving motorized equipment shall be ‘HACR’ rated.

D. 20 Amp, 1-Pole circuit breakers shall be listed by the Manufacturer for use with #12AWG through #8AWG conductor sizes.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDUITS

A. Contractor, before proceeding with installation of underground conduits, shall ensure that all trenching and excavation is free of rock.

B. Conduits shall be run in a neat and orderly manner, plumb and true.

3.2 PANELBOARDS

A. Mount panel 4'-0" to panel center but with maximum height of 6'-0" to handle of topmost switching device.

B. Provide double locknuts and insulated throat grounding bushings on each conduit entering panel. Run No. 4 stranded bare copper ground wire through each grounding lug and connect to panel box grounding lug.

END OF SECTION 16400

TRANSFER STATION ELECTRICAL SERVICE UPGRADES

2340 NEW LONDON TPKE
GLASTONBURY, CT 06033

ISSUED DATE: DECEMBER 12, 2014

BID #GL-2015-18

M/E/P ENGINEER
BEMIS ASSOCIATES LLC
185 MAIN STREET
FARMINGTON, CONNECTICUT 06032
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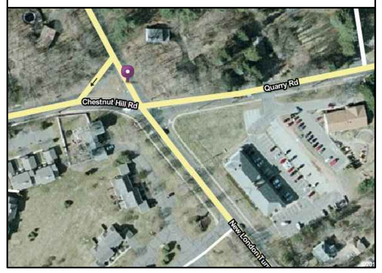
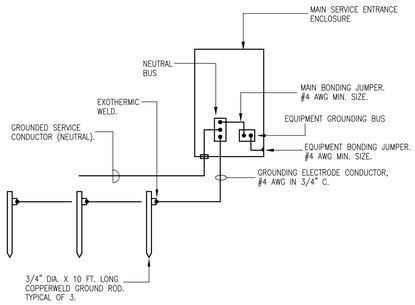
VICINITY MAP

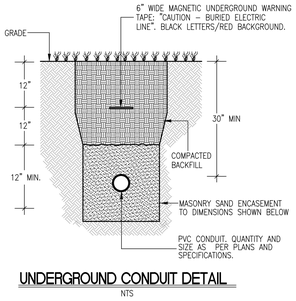


LIST OF DRAWINGS



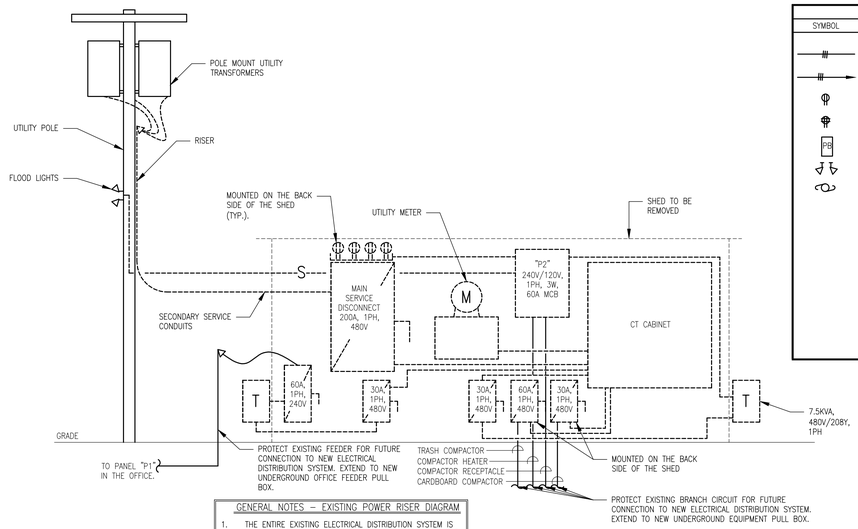
GROUNDING ELECTRODE SYSTEM SCHEMATIC

NTS



UNDERGROUND CONDUIT DETAIL

NTS



GENERAL NOTES – EXISTING POWER RISER DIAGRAM

1. THE ENTIRE EXISTING ELECTRICAL DISTRIBUTION SYSTEM IS TO BE REMOVED AS INDICATED BY THE DASHED EQUIPMENT AND FEEDERS. SEE POWER RISER DIAGRAM BELOW FOR NEW ELECTRICAL SYSTEM DISTRIBUTION AND ADDITIONAL NOTES.

EXISTING POWER RISER DIAGRAM

N.T.S.

DRAWING LEGEND

SYMBOL	DESCRIPTION
#/	BRANCH CIRCUIT WIRING. CROSS LINES INDICATE NUMBER OF CONDUCTORS.
#/	BRANCH CIRCUIT WIRING HOMERUN. CROSS LINES INDICATE NUMBER OF CONDUCTORS.
	DUPLEX RECEPTACLE, 18" AFF UNLESS NOTED DIFFERENTLY.
	QUADRUPLEX RECEPTACLE, 18" AFF UNLESS NOTED DIFFERENTLY.
PB	PULL BOX
	FLOOD LIGHTS
	UTILITY POLE

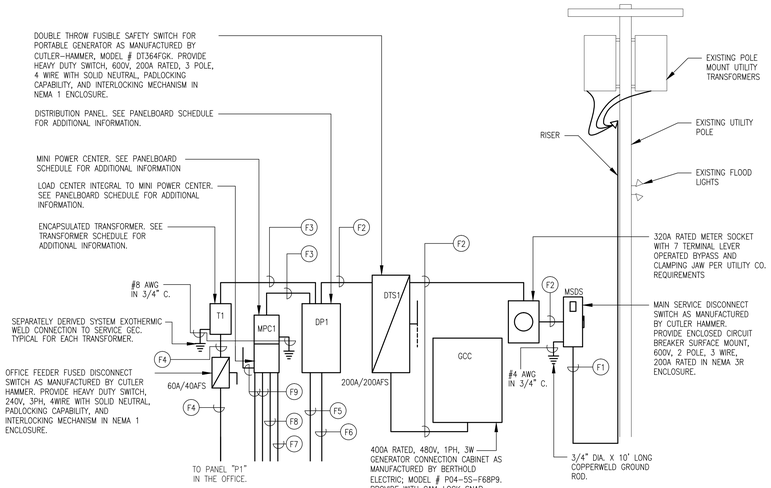
ABBREVIATION	DESCRIPTION
A	AMPS.
AFF	ABOVE FINISHED FLOOR.
C	CONDUIT.
CKT.	CIRCUIT.
C/B	CIRCUIT BREAKER.
ER	EXISTING TO REMAIN.
GEC	GROUNDING ELECTRODE CONDUCTOR.
GFCI	INDICATES RECEPTACLE WITH INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER.
GND	GROUND.
NTS	NOT TO SCALE.
P	POLE.
SWBD	SWITCHBOARD.
V	VOLTS.

GENERAL SPECIFICATION NOTES – POWER

1. THE CONTRACTOR SHALL VERIFY AND OBTAIN ALL NECESSARY DIMENSIONS AT THE BUILDING.
2. FINISHED WORK: THE INTENT OF THE SPECIFICATIONS AND DRAWINGS IS TO CALL FOR FINISHED WORK, COMPLETED, TESTED AND READY FOR OPERATION.
3. GOOD PRACTICE: IT IS NOT INTENDED THAT THE DRAWINGS SHOW EVERY CONDUIT, JUNCTION BOX, FITTING OR MINOR DETAIL AND IT IS UNDERSTOOD THAT WHILE THE DRAWINGS MUST BE FOLLOWED AS CLOSELY AS CIRCUMSTANCES WILL PERMIT, THE SYSTEMS SHALL BE INSTALLED ACCORDING TO THE INTENT AND MEANING OF THE CONTRACT DOCUMENTS AND IN ACCORDANCE WITH GOOD PRACTICE.
4. ANY APPARATUS, APPLIANCE, MATERIAL OR WORK NOT SHOWN ON DRAWINGS BUT MENTIONED IN SPECIFICATIONS OR VICE VERSA, OR ANY INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE WORK COMPLETE AND PERFECT IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SPECIFIED, SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
5. CODES AND STANDARDS – COMPLY WITH ALL FEDERAL, STATE AND LOCAL CODES AND STANDARDS WHEREVER APPLICABLE INCLUDING THE FOLLOWING: 2009 AMENDMENT TO THE 2005 CONNECTICUT STATE BUILDING CODE SUPPLEMENT, 2003 INTERNATIONAL BUILDING CODE, 2005 CONNECTICUT FIRE SAFETY CODE, 2003 INTERNATIONAL FIRE CODE, 2011 NATIONAL ELECTRICAL CODE, ICC/ANSI A117.1-2003 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES, ADA, NFPA, ILLUMINATING ENGINEERING SOCIETY LIGHTING HANDBOOK, UNDERWRITERS LABORATORIES, FACTORY MUTUAL INSURANCE COMPANY, NEMA STANDARDS.
6. NOTE THAT THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF THE ELECTRICAL EQUIPMENT AND SYSTEMS, WITHOUT SHOWING EVERY DETAIL AND FITTING.
7. ALL CABLES AND CONDUITS PASSING THROUGH FLOORS, WALLS OR PARTITIONS SHALL BE PROVIDED WITH EMT CONDUIT SLEEVES SIZED TO GIVE A MINIMUM OF 1/2" CLEARANCE BETWEEN SLEEVE AND THE OUTSIDE DIAMETER OF THE CABLE OR CONDUIT.
8. ALL SLEEVES AND/OR CORE BORED HOLES AROUND CONDUIT AND CABLE SHALL BE PACKED WITH DAMMING MATERIAL AND SEALED. SEALANT SHALL ALLOW FOR MOVEMENT WITHOUT CRACKING AND SHALL BE 3M BRAND FIRE BARRIER CAULK CP25 OR APPROVED EQUAL.
9. PROVIDE FIRE STOPPING AT ALL FIRE AND/OR SMOKE RATED WALL OR FLOOR PENETRATIONS IN ORDER TO MAINTAIN ITS ORIGINAL INTEGRITY.
10. ALL POWER CONDUCTORS SHALL BE COPPER, RATED 600 VOLTS, 90 DEG. C., COLOR CODED, TYPE XHHW-2.
11. MINIMUM SIZE CONDUCTORS FOR POWER AND LIGHTING SHALL BE #12 AWG. PROVIDE MINIMUM #10 AWG SIZE FOR RUNS EXCEEDING 75' IN CONDUCTOR LENGTH, AND #8 AWG SIZE FOR RUNS EXCEEDING 150' IN CONDUCTOR LENGTH. PROVIDE LARGER SIZE CONDUCTORS AS SCHEDULED OR AS NOTED ON THE DRAWINGS.
12. THE NUMBER OF WIRES ON A CONDUIT/CABLE RUN IS INDICATED ON THE DRAWINGS BY CROSS LINES ON THE CONDUIT/CABLE RUNS. PROVIDE CODE-SIZED CONDUIT FOR THE NUMBER AND SIZE OF WIRES UNLESS A LARGER SIZE IS SHOWN ON THE DRAWINGS. MINIMUM CONDUIT SIZE SHALL BE 3/4".
13. CONDUITS SHALL BE SCHEDULE 40 PVC FOR ELECTRICAL SERVICE AND WHERE RUN BELOW GRADE. AND EMT WHERE RUN INSIDE THE SERVICE ENCLOSURE AND WHERE EXPOSED ABOVE GRADE. EMT CONNECTORS AND COUPLINGS SHALL BE GLAND COMPRESSION TYPE.
14. OUTLET BOXES SHALL BE CODE GAUGE GALVANIZED STEEL AND SHALL BE OF SHAPES AND SIZES TO SUIT THEIR RESPECTIVE LOCATIONS AND INSTALLATIONS, AND SHALL BE PROVIDED WITH COVERS TO SUITE THEIR FUNCTION AND INSTALLATION.
15. OUTLET BOXES SHALL BE EQUIPPED WITH FIXTURE STUD OR STRAPS WHERE REQUIRED. MINIMUM BOX SIZE FOR FIXTURE, WALL OR SWITCH OUTLETS SHALL BE NOMINAL 4" X 4" X 2-1/8" (I.E. 2 GANG SIZE).
16. SET BOXES AND COVERS SQUARE AND PLUMB.
17. ALL DEVICES SHALL BE FURNISHED IN HUBBELL OR APPROVED EQUAL IN COOPER, PASS & SEYMOUR, OR LEVITON. DEVICES SPECIFIED HEREIN ARE BASED ON HUBBELL UNLESS OTHERWISE NOTED. RECEPTACLE AND SWITCH COLORS SHALL BE AS DIRECTED BY THE ARCHITECT.

    LIGHTING SWITCHES SHALL BE TOGGLE TYPE, EXTRA HEAVY DUTY INDUSTRIAL GRADE, 20 AMP, 120-277V AC, #HBL1201I FOR SINGLE POLE.

    RECEPTACLES SHALL BE HEAVY DUTY SPECIFICATION GRADE, 2 POLE, 3 WIRE GROUNDING, NEMA 5-20R, RATED 20 AMPS AT 125 VOLTS AC, #HBL5361 FOR SINGLE RECEPTACLES, #HBL5362 FOR DUPLEX RECEPTACLES, TWO (2) #HBL5362 FOR QUADRUPLEX RECEPTACLES, AND #GFR5362SGI FOR DUPLEX GFCI RECEPTACLES.
18. BRANCH CIRCUIT WIRING AND ARRANGEMENT OF HOME RUNS HAS BEEN DESIGNED FOR MAXIMUM ECONOMY CONSISTENT WITH ADEQUATE SIZING FOR VOLTAGE DROPS, CIRCUIT AMPACITIES, AND OTHER CONSIDERATIONS. INSTALL THE WIRING WITH CIRCUITS ARRANGED AS SHOWN ON THE DRAWINGS, EXCEPT AS APPROVED IN ADVANCE BY THE ARCHITECT AND ENGINEER. DO NOT MAKE CHANGES WITHOUT PRIOR APPROVAL.
19. PROVIDE A SEPARATE NEUTRAL CONDUCTOR FOR EACH 120V SINGLE PHASE CIRCUIT. DO NOT USE A COMMON NEUTRAL FOR GROUPS OF CIRCUITS. PROVIDE A SEPARATE GROUND WIRE FOR EACH CIRCUIT BACK TO THE RESPECTIVE PANEL GROUND. IF MORE THAN 3 CURRENT CARRYING CONDUCTORS ARE INSTALLED IN ONE CONDUIT THEY SHALL BE DE-RATED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE. DO NOT INSTALL MORE THAN THREE 30 AMP SINGLE PHASE OR FOUR 20 AMP SINGLE PHASE CIRCUITS IN THE SAME CONDUIT. DO NOT MIX LIGHTING AND POWER CIRCUITS IN THE SAME CONDUIT.



POWER RISER DIAGRAM

N.T.S.

FEEDER/BRANCH CIRCUIT SCHEDULE – COPPER CONDUCTORS

SYMBOL	FEEDER C/B	FEEDER AMPACITY	FEEDER SIZE	REMARKS
F1	–	200A	3 X #3/0 XHHW-2 IN 3" C.	–
F2	200A	200A	3 X #3/0 XHHW-2 AND 1 X #6 XHHW-2 GND. IN 3" C.	–
F3	40A	40A	2 X #8 XHHW-2 AND 1 X #10 XHHW-2 GND. IN 3/4" C.	–
F4	40A	40A	3 X #8 XHHW-2 AND 1 X #10 XHHW-2 GND. IN 3/4" C.	–
F5	30A	40A	2 X #8 XHHW-2 AND 1 X #10 XHHW-2 GND. IN 3/4" C.	CARDBOARD COMPACTOR BRANCH CIRCUIT.
F6	60A	70A	2 X #4 XHHW-2 AND 1 X #10 XHHW-2 GND. IN 1" C.	TRASH COMPACTOR BRANCH CIRCUIT.
F7	(3) 20A	20A	6 X #12 XHHW-2 AND 3 X #12 XHHW-2 GND. IN 1" C.	2-20A, 1P DEDICATED CKTs. FOR GFCI RECEPTACLES AND 1-20A, 1P DEDICATED CKT. FOR FLOOD LIGHTS.
F8	(2) 20A	20A	4 X #12 XHHW-2 AND 2 X #12 XHHW-2 GND. IN 1" C.	2-20A, 1P DEDICATED CKTs. FOR GFCI RECEPTACLES.
F9	20A	20A	2 X #12 XHHW-2 AND 1 X #12 XHHW-2 GND. IN 3/4" C.	2-20A, 1P DEDICATED CKTs. FOR GFCI RECEPTACLES.

TRANSFORMER SCHEDULE

DESIGNATION	CUTLER-HAMMER TRANSFORMERS MODEL #	PRIMARY-SECONDARY VOLTAGE	WINDINGS	KVA	TAPS	TEMP. RISE	SOUND LEVEL	REMARKS
T1	S48D11S07N	480V – 120/240V	COPPER	7.5	4 @ +5%	115°C	40dB	

PANEL DP1 – CUTLER-HAMMER TYPE PRL3a, SURFACE, 277/480V, 1 PHASE, 3 WIRE, 250A MAIN LUGS, MIN. 22K A.I.C. RATING, (FULLY RATED)

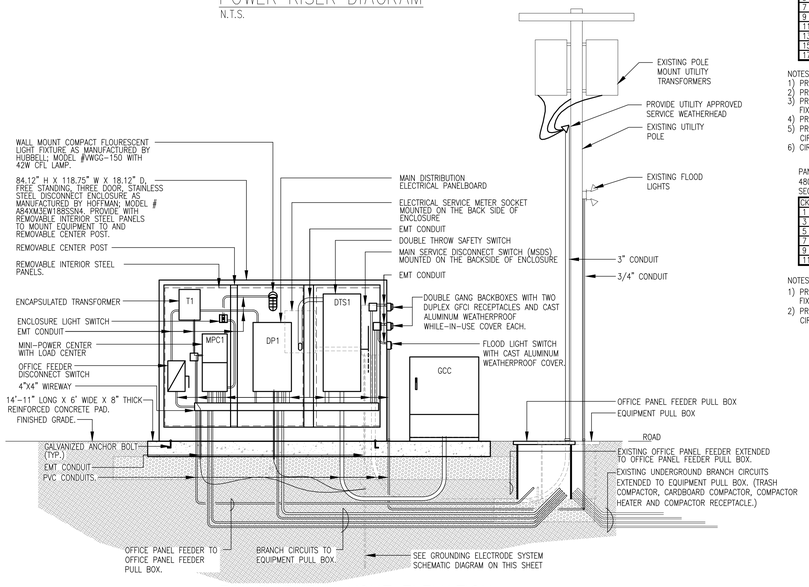
CKT	TRIP	POLE	REMARKS	CKT	TRIP	POLE	REMARKS
1	30	2	P1 (VIA. TX.)	2	30	2	LC1 (VIA. TX.)
3	–	–	–	4	–	–	–
5	30	2	CARDBOARD COMPACT.	6	60	2	TRASH COMPACT.
7	–	–	–	8	–	–	–
9	20	1	SPARE	10	20	1	SPARE
11	20	1	SPARE	12	20	1	SPARE
13	20	1	SPARE	14	20	1	SPARE
15	20	1	SPARE	16	20	1	SPARE
17	20	1	SPARE	18	20	1	SPARE

NOTES:
1) PROVIDE WITH COPPER BUS BARS AND AL/CU GROUND BAR.
2) PROVIDE WITH DOOR-IN-DOOR TRIM.
3) PROVIDE WITH BLACK FACE, WHITE CORE ENGRAVED NAMEPLATE FIXED TO PANEL WITH TWO SCREWS OR RIVETS.
4) PROVIDE WITH PLASTIC COVER CIRCUIT DIRECTORY FRAME.
5) PROVIDE WITH TYPE WRITTEN CIRCUIT DIRECTORY REPRESENTING CIRCUITS AS ACTUALLY CONNECTED TO PANEL.
6) CIRCUIT BREAKERS SHALL BE BOLT-ON TYPE.

PANEL MPC1 – CUTLER-HAMMER, 7.5 KVA MINI POWER CENTER; PRIMARY VOLTAGE: 480V 1PH, SECONDARY VOLTAGE: 120/240V, 1PH; PRIMARY MAIN C/B: 30A, SECONDARY MAIN C/B: 30A.

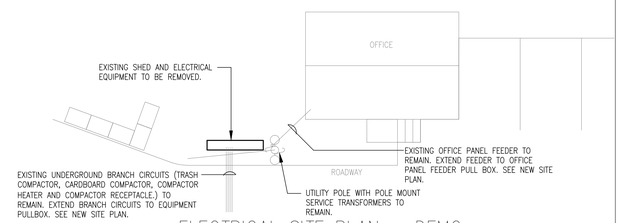
CKT	TRIP	POLE	REMARKS	CKT	TRIP	POLE	REMARKS
1	20	1	RECEPTACLE	2	20	1	RECEPTACLE
3	20	1	RECEPTACLE	4	20	1	RECEPTACLE
5	20	1	LIGHTING	6	20	1	BLOCK HEATER COMPACT.
7	20	1	RECEPT. BY COMPACT.	8	20	1	FLOOD LIGHT.
9	20	1	SPARE	10	20	1	SPARE
11	20	1	SPARE	12	20	1	SPARE

NOTES:
1) PROVIDE WITH BLACK FACE, WHITE CORE ENGRAVED NAMEPLATE FIXED TO PANEL WITH TWO SCREWS OR RIVETS.
2) PROVIDE WITH TYPE WRITTEN CIRCUIT DIRECTORY REPRESENTING CIRCUITS AS ACTUALLY CONNECTED TO PANEL.



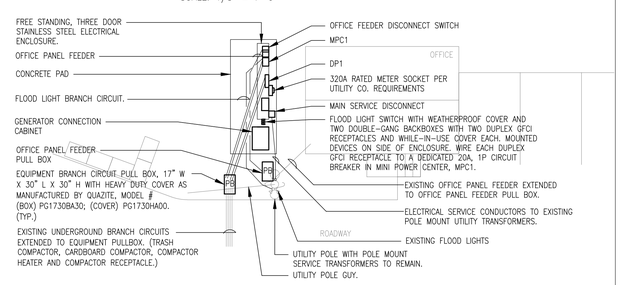
EQUIPMENT LAYOUT ELEVATION

N.T.S.



ELECTRICAL SITE PLAN – DEMO

SCALE: 1/8" = 1'-0"



ELECTRICAL SITE PLAN – NEW

SCALE: 1/8" = 1'-0"

REVISIONS

TRANSFER STATION ELECTRICAL SERVICE UPGRADES

GLASTONBURY, CONNECTICUT

GL-2015-18

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TITLE

ELECTRICAL SITE PLAN, DETAILS, AND SCHEDULES

DATE 12/12/2014

DWG. NO.

E-1