

Invitation for Bids
Stand-By Electrical Generator
Town Hall
Moultonborough, NH
November 11, 2010



Joel R. Mudgett, Chairman
Board of Selectmen

Table of Contents

Advertisement..... 3

Scope of Work or Specifications and Conditions..... 4

Bid Forms..... 6

Exhibit A



PLEASE POST

TOWN OF MOULTONBOROUGH

Invitation for Bids

Sealed bids for the provision of one propane fired stand-by electrical generator will be accepted until 2:00 p.m. on December 2, 2010 in the Offices of the SelectBoard, 6 Holland Street, PO Box 139, Moultonborough, NH 03254 at which time they will be opened and publicly read aloud.

A detailed package with information on the equipment to be delivered, the conditions thereof, and bid forms, is available at www.moultonboroughnh.gov (click on Paid, Volunteer and Contract Openings) or said offices during normal business hours. An optional pre-bid conference and site inspection will be held at 10 a.m. on November 19, 2010 at 6 Holland Street, Moultonborough, NH 03254

Your bid envelope must be marked with the project, item or service being sought, and the date the bids are due. If you send your bid by mail you should put it into a separate sealed envelope, marked as required, inside the mailing envelope to safeguard against it being opened in error. Any questions with respect to this invitation must be received, in writing by mail (above address), fax (603.476.5835) or email (cterenzini@moultonboroughnh.gov), by Carter Terenzini, Town Administrator, no later than 12 Noon on November 24, 2010.

The town reserves the right to reject any and all bids, and waive any minor or non-material informalities, if deemed to be in its best interests.

Joel R. Mudgett, Chairman/s/
Board of Selectmen

Posted: Town Bulletin Boards (7)
SAU

Advertised: Laconia Citizen 11/11/10
Meredith News & Carroll County Independent 11/18/10

Mailed: Vendors List

Web: Town; Craigslist; winnipesaukee.com; NHLGC

Scope of Work or Specifications and Conditions

1.) General Description of the Project, Materials and Quantities

The Town is soliciting proposals for the furnishing and installation of a propane fired stand-by electrical generator together with associated site work, piping for the propane supply, and associated electrical wiring within the mechanical room.

Your bid price is all inclusive of the equipment, freight to our location, installation, and training as specified herein. Progress payments will be made.

2.) Specifications & Certification

See Exhibit A for the specific scope of work all of which must be completed in accordance with local applicable codes, manufacturer's instructions and in a work-manlike manner.

3.) Delivery Location and Timing

All equipment is to be shipped to the Town Hall at 6 Holland Street within seventy five (75) days of the placement of the order. Installation and training is to be completed within one hundred and twenty (120) days of the order.

4.) Term of Contract

The contract will be end on June 30, 2011 unless sooner completed, terminated for cause, or extended by agreement of the two parties.

5.) General Conditions

a.) Upon the execution of the contract you must produce a certificate of insurance, naming the town, its officers, employees and assigns, as Certificate Holder and Additionally Named Insured, for the following types and levels of coverage:

- Workers Compensation	Statutory
- Automobile and Equipment	\$1 Million/\$2 Million
- Property Damage	\$1 Million/\$2 Million
- General Liability	\$1 Million/\$2 Million

If you use a sub-contractor for any portion of the work you must obtain from them, and provide to us a similar certificate in similar amounts. You may not use a subcontractor without our approval.

b.) Payments will be made within thirty (30) days of the submission of a bill showing conformance with all work requirements. Any progress payments made on each item will have a 15% retainage until all work is completed and fully certified by the permitting authorities and

end user as represented by the Public Works Director/Highway Agent. You may substitute a 100% performance bond covering all labor and materials for the 15% retainage if you desire. In this instance the retainage shall be reduced to 5%.

c.) The term “days” shall mean calendar days.

6.) Site Inspection, Questions and Supplements

a.) No site inspection is required. An optional pre-bid conference and site inspection will be held at 10 a.m. on November 19, 2010 at 6 Holland Street, Moultonborough, NH 03254.

b.) Any questions with respect to this invitation must be received, in writing by mail at 6 Holland Street, PO Box 139, Moultonborough, NH 03254 (above address), by fax (603.476.5835) or by email (cterenzini@moultonboroughnh.gov), by Carter Terenzini, Town Administrator, no later than 12 Noon on November 24, 2010.

c.) The answers, and any other changes or supplements to this document, will be posted on the Town web site as an Addendum no later than 4:00 p.m. on November 29, 2010. It is the bidder’s responsibility to check and verify any such changes in order to account for them in their bid.

d) You must submit a statement of qualifications showing at least three similar installations within the past five years as follows:

- a.) Location Address
- b.) Client Name (i.e. Town of..., SAU #..., etc)
- c.) Contact Name
- d.) Telephone Number
- e.) Dollar Value
- f.) Date of Installation
- g.) Size of generator and Description of Work

6.) Bid Due Date and Methods of Delivery

Bids will be accepted until 2:00 p.m. on December 2, 2010 in the Offices of the SelectBoard, 6 Holland Street, PO Box 139, Moultonborough, NH 03254 at which time they will be opened and publicly read aloud.

Your bid envelope must be marked with the name of the project, item or service being sought by the Town, and the date the bids are due. If you send your bid by mail you should put it into a separate sealed envelope, marked as required, inside the mailing envelope to safeguard against it being opened in error. If mailed, each bid should be in a separate sealed envelope, similarly marked to protect against the actual bid being opened in error.

**Town of Moultonborough
Stand-By Electrical Generator**

Bid Form

(Please Print or Type)

Name of Bidder: _____

Address: _____

Contact Person: _____
Telephone _____ Fax _____

_____ Email

ATTENTION:

Mr. Joel R. Mudgett, Chairman
Board of Selectmen
PO Box 139
Moultonborough, NH 03254

Dear Mr. Mudgett:

Having examined the documentation provided with the subject Invitation for Bids the undersigned proposes to furnish all materials as requested in accordance with the subject documents.

The undersigned acknowledges Addenda # _____
(If none, write none).

If I am notified my proposal is accepted within forty five (45) days of the bids having been opened, I will execute a contract for the work within fourteen (14) days thereafter.

1.) I propose to provide the total work required for the lump sum total price of:

In Words: _____

In Numbers: \$ _____

My Breakdown of the total lump sum contract value is per item as follows:

1.) Permits, Disconnection and Layout: \$ _____

In words: _____

2.) Install Concrete: \$ _____

In words: _____

3.) Install Propane Piping: \$ _____

In words: _____

4.) Furnish and Install Generator & Associated Work: \$ _____

In words: _____

5.) Transfer Switch, Sub-Panel & Cut Over circuits \$ _____

In words: _____

2.) ADD Alternate #1:

Further I propose to perform a full preventative maintenance service, in accordance with the manufacturer's specifications, at the one year anniversary of the date of acceptance of the initial installation for the price of

In Words: _____

In Numbers: \$ _____

3.) ADD Alternate #2:

Further I propose to furnish and install a generator rated higher than 40Kw for the price of

In Words: _____

In Numbers: \$ _____

Attachments Required:

- Statement of Qualifications (See Section 6d)

- Clerk's Certificate showing your authority to bind your business to a contract if signing other than as a sole proprietor.
- Design Calculation and Submittal requirements on the Base Bid Standby Generator (See Section 16620 Subsection 1.03)
- Design Calculation and Submittal requirements on the Add Alternate Standby Generator (See Section 16620 Subsection 1.03)

I understand that the town reserves the right to reject any and all bids, and waive any minor or non-material informalities, if deemed to be in its best interests. I understand that the Town may hold my bid for forty five (45) days prior to awarding a contract.

I certify, under the penalties of perjury, that (1) I have had an opportunity to view the full bid package and am aware it was my responsibility to perform my own due diligence appropriate to submitting this proposal, (2) I am fully authorized to submit this bid, (3) I have not engaged in discussions, negotiations, or collusion with any person to determine what my bid will be and (4) that I, to the best of my knowledge and belief, have paid all taxes, fees, assessments, betterments or other municipal charges that I owe to the Town of Moultonborough or have a payment agreement in place or have filed an appeal over the same.

Signature of Bidder

Corporate
Seal

Title of Bidder

Signed this _____ day of _____, _____.

Exhibit A - Scope of Work

1.) Earthwork	Section 02200
2.) Paving, Sidewalks and Curbing	Section 02525
3.) Cast-in-Place Concrete	Section 03300
4.) Electrical Work	Section 16402
5.) Standby Generator System	Section 16620
6.) Site Plans & Electrical Room	E-1
7.) Details	E-2

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes excavations of normal depth, as required for trenching; backfilling and compaction for new utilities; miscellaneous earth excavation; all geotechnical testing and inspection; the removal, hauling, and stockpiling of suitable excavated material for subsequent use in the work; all re-handling, hauling, and placing of stockpiled materials for use in refilling, filling, backfilling, grading, and such other operations; the removal and satisfactory disposal off the site of unsuitable material; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.

There is no ground profile plan for the new generator concrete foundation. The Contractor shall field determine the elevation of the new foundation such that the top of the foundation shall be six (6) inches above the final grade, and the slope of the final grade shall be away from the new foundation on all sides. If the Contractor requires the services of a surveyor or Civil Engineer to set the final grade for the top of the foundation, the costs of such services shall be included in his bid for the project. Fully coordinate slopes with the Owner and any required Authorities Having Jurisdiction to insure acceptance before construction.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
- B. Backfill Materials: Submit. Submit a grain size analysis and curve performed, in accordance with ASTM D422, for each proposed source of backfill for review by the Contract Administrator. The grain size analysis shall indicate that the backfill material conforms to the gradation requirements specified.
- C. Submit a moisture-density curve indicating the maximum dry density and optimum moisture content, as determined by ASTM D1557, for each proposed source of backfill for review of the Contract Administrator.
- D. Submit daily field reports from the geotechnical testing laboratory documenting all earthwork activity and field testing for each day. The field reports shall include, at a minimum, the following:
 - 1. A description of the day's activities.

2. The results of in-place density testing including in-place dry density, moisture content, percent compaction, elevation of test and a description of the soil.
 3. A sketch indicating the extent of each day's work and the location of testing.
- E. If needed, submit the qualifications of the independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The geotechnical testing laboratory must demonstrate to the Owner's and Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer in the State of New Hampshire.

1.4 EXCAVATION CLASSIFICATIONS

- A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for unauthorized excavation, additional excavation, or rock excavation.
- B. Unauthorized Excavation consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.
1. Backfill and compact unauthorized excavations, as specified for excavations of the same class, unless otherwise directed by the Engineer.
- C. Additional Excavation:
1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions.
 2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material, as directed by the Engineer.
 3. Removal of unsuitable material and its replacement, as directed, will be paid on the basis of contract conditions relative to changes in work, or as provided for under the unit rates for this classification.

1.5 EXCAVATION

- A. The Contractor shall perform all excavations, of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, removal of pipe and subsurface utilities within five (5) feet of each building located within the limit of work, or as shown on the Drawings, and other work, and to permit access to the Engineer for the purpose of observing the work. Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.

- B. All excavations made in open cut will be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth-faced bucket or by hand, if directed by the Engineer.

1.6 TEMPORARY EARTH SUPPORT

- A. The Contractor shall furnish, place, and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations, and to prevent danger to persons, and to prevent injurious caving or erosion or the loss of ground, and to maintain pedestrian and vehicular traffic, as directed and required.
- B. In all sheeting, shoring, and bracing operations, care shall be taken to prevent injury to persons or damage to structures, facilities, utilities, and services. Any injuries to persons shall be the responsibility of the Contractor; and any damage to the work occurring as a result of settlement, water or earth pressure, or other causes due to inadequate bracing, or other construction operations of the Contractor, shall be satisfactorily repaired or made good by the Contractor, at no additional expense to the Owner.
- C. Where sheeting is to be used, it shall be driven ahead of excavation operations to the extent practicable so as to avoid the loss of material from behind the sheeting; where voids occur outside of the sheeting, they shall be filled immediately with selected fill and thoroughly compacted.
- D. The Contractor shall leave in place all sheeting and bracing at the locations and within the limits ordered by the Contract Administrator in writing. The Contractor shall cut off the sheeting at elevations to be determined by the Engineer.
- E. The Contractor shall comply with all federal, state, and local safety regulations, and requirements.

1.7 GROUNDWATER CONTROL

- A. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to cause excessive disturbance of underlying natural ground. The drainage of all water resulting from pumping shall be managed so as not to cause damage to adjacent property. At a minimum, the Contractor shall use hay bales and/or siltation fence to protect adjacent areas from dewatering activities.
- B. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Contract Administrator, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the

Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous where directed by the Engineer to protect the work and/or to maintain satisfactory progress.

- C. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations and drainage operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.
- D. The Contractor shall control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, temporary ditches shall be provided for drainage. Upon completion of the work and when directed, all areas shall be restored by the Contractor in a satisfactory manner and as directed.

1.8 BLASTING

- A. Blasting shall not be permitted.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIALS

- A. Granular Fill: All fill placed within the limits of work, other than crushed stone, shall meet the requirements of Structural Fill. Structural fill shall consist of gravel and sand consisting of hard durable particles, and free from trash, ice and snow, tree stumps, roots and other organic and deleterious or organic matter. Structural fill shall conform to the following gradation requirements.

SIEVE SIZE	PERCENT FINER BY WEIGHT
3-inch	100
1-inch	40-90
No. 4	15-75
No. 40	10-70
No. 200	0-15

- B. Crushed Gravel: Crushed gravel shall consist of durable gravel and shall be free from ice and snow, sand, clay, loam, or other deleterious or organic material. Crushed gravel shall meet specified gradation following requirements and shall meet NHDOT Standard Specifications, Section 304.

SIEVE SIZE	PERCENT FINER BY WEIGHT
3-inch	100
2-inch	95-100
1-inch	55-85

SIEVE SIZE	PERCENT FINER BY WEIGHT
No. 4	27-52
No. 200	0-12

- C. **Crushed Stone:** Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the following requirements.

PERCENT PASSING BY WEIGHT	
SIEVE SIZE	1½-INCH STONE
2-inch	100
1½-inch	95-100
1-inch	35-70
¾-inch	0-25
¼-inch	0-10

- C. **Gravel Subbase:**

- Gravel subbase shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The gravel subbase shall be used in the upper two (2) feet of trench backfill material immediately below pavements. Gravel subbase shall conform to NHDOT Item No. 304.3 and graded as indicated below:

Sieve Size	Percent Passing by Weight
3-inch	100
2-inch	95-100
1-inch	55-85
No. 4	27-55
No. 200*	0-12
* In Sand Portion	

PART 3 - EXECUTION

3.1 FILLING AND BACKFILLING

- A. **Subgrade Preparation:** After the subgrade has been shaped to line, grade, and cross-section, it shall be thoroughly compacted. This operation shall include any required reshaping and wetting to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.

- B. **Backfill Material Selection:** Unless otherwise specified or directed, material used for filling and backfilling shall meet the requirements specified under PRODUCTS (Part 2). In general, the material used for backfilling utility trench excavations shall be material removed from the excavations, provided that the reuse of these materials results in the required trench compaction.

Place backfill to a maximum loose lift thickness of 12 inches. Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 2 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as uniform as possible in lift thickness, moisture content, and effort required to compact soil mass.

- C. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a smooth surface at all times level with adjacent surfaces. Any subsequent settling over backfilled areas shall be repaired by the Contractor immediately, in a manner satisfactory to the Engineer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.
- D. The finished subgrade of the fills and filled excavations upon which topsoil is to be placed, or pavements are to be constructed, shall not be disturbed by traffic of other operations and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.
- E. Uniformly smooth grading of all areas to be graded, as indicated and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor's operations, shall be accomplished. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.

3.2 COMPACTION

A. Compaction Requirements:

- 1. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content, as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

AREA	ASTM DENSITY DEGREE OF COMPACTION
All Fill	95%

B. Moisture Control:

- 1. Fill that is too wet for proper compaction shall be disced, harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.

2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

C. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
2. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

D. Compaction Control:

1. In-place density tests shall be made in accordance with ASTM D1556, D2922, or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor, at no additional expense to the OWNER. In-place density testing shall be made at the Contractor's expense by the geotechnical testing laboratory.
2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer, nor any observation and testing performed by him, shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.
3. In-place density tests shall be performed as a minimum according to the following:
 - a. One (1) test every 50 cubic yards of material placed for foundation and other backfilling.
 - b. One (1) test per lift every fifty (50) feet of trench construction.

E. Placement:

1. All fill shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill should be benched into the existing slope in order to avoid the formation of a shear plane.

END OF SECTION 02200

SECTION 02525

PAVING, SIDEWALKS AND CURBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. The State of New Hampshire Department of Transportation (NHDOT) Standard Specifications for Road and Bridge Construction (hereinafter referred to as NHDOT Standard Specifications).
 - 1. All references to Method of Measurement, Basis of Payment and Payment Items in the NHDOT Standard Specifications are hereby deleted. References made to particular sections or paragraphs in the NHDOT Standard Specifications shall include all related articles mentioned therein.

1.2 SUMMARY

- A. This Section includes furnishing all plant, labor, equipment, appliances and materials, and performing all operations in connection with the furnishing and installing pavement, base course, sidewalks, curb, guardrail, and pavement markings, complete in place, in accordance with the Drawings and Specifications.

1.3 SUBMITTALS

- A. Submit in accordance with Contract Documents.
- B. Submit a statement of qualifications for the paving contractor. The information shall contain the name of the paving contractor, key personnel resumes, equipment lists and list of prior experience.
- C. Submit certificate of compliance that the materials to be used for the work complies with the Specifications.
- D. No paving shall be placed until submittals have been reviewed by the Engineer and Owner.

1.4 QUALITY ASSURANCE

- A. All permits required by the Owner shall be obtained and paid for by the Contractor.

- B. The paving contractor completing the work shall have a minimum of 5 years experience in municipal and state roadway paving operations. The Owner reserves the right to reject paving contractors who, in the judgment of the Owner, lacks the necessary experience or equipment to perform the work as specified, or who displays a lack of ability based on the actual performance of the work completed. Contractor shall replace rejected paving contractors with qualified paving contractors at no additional cost to the Owner.
- D. The pavement shall come from an approved NH DOT plant.
- E. Testing: Employ a certified, independent testing laboratory acceptable to Owner and Engineer to perform field and laboratory material evaluation tests. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 PAVEMENT

- A. Pavement shall meet the requirements of NHDOT Standard Specifications.
- B. Job mix formula for bituminous pavement materials shall be as follows:
 - 1. Temporary pavement material shall be base course gradation Type B as specified in NHDOT Standard Specifications, Section 401, Table 2.
 - 2. Permanent base course pavement material shall be base course gradation Type B as specified in NHDOT Standard Specifications, Section 401, and Table 2.
 - 3. Leveling course material shall be as specified in NHDOT Standard Specifications, Section 411, Table 1.
 - 4. Permanent wearing course pavement material shall be wearing course gradation Type E as specified in NHDOT Standard Specifications, Section 401, Table 2.
 - 5. Bituminous driveway material shall be wearing course gradation as specified in NHDOT Standard Specifications, Section 401, Table 2.
 - 6. Bituminous waterway material shall be wearing course gradation as specified in NHDOT Standard Specifications, Section 401, Table 2.
- C. Reclaimed asphalt pavement shall be as specified in NHDOT Standard Specifications, Section 401, Materials.

2.2 BASE COURSES

- A. Aggregate base course material shall be as specified in Section 02200 – Earthwork.
- B. Reclaimed stabilized base course material shall be as specified in NHDOT Standard Specifications, Section 306, Materials.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Owner reserves the right to delete any paving items of work from the Contract without penalty.
- B. The Contractor shall replace all pavement, markings, curbs, waterways and drives, which have been removed or damaged during construction operations. Pavement replacement shall include satisfactory repair by the Contractor of roadways, curbs, sidewalks, driveways and any other surface disturbed by his operations by the same materials as removed or as specified herein. Care shall be taken to minimize trench widths in paved areas.
- C. The Contractor shall place all bituminous pavement by machine method only unless otherwise permitted by the Owner. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the pavement true to the established line, grade, width and crown. The pavement shall be placed and compacted only at such times as to permit the proper checking by the Owner and Engineer. Paving boxes shall be of proper size to allow paving the excavated trenches.
- D. Hand methods of placing bituminous pavement will be permitted only for particular locations in the work where because of irregularity, inaccessibility or other unavoidable obstacles mechanical spreading and finishing cannot be performed.

3.2 BASE COURSES AND SUBGRADE

- A. After the subgrade has been shaped to line, grade, and cross section, it shall be thoroughly compacted. This operation shall include any required reshaping and wetting to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all low sections, holes, or depressions shall be brought to the required grade with approved material and thoroughly compacted. Refer to Section 02200 – Earthwork for compaction requirements and additional requirements for fine grading.
- B. Base courses shall be constructed to the depths and areas shown on the Drawings.
- C. Aggregate base courses shall be constructed in accordance with NHDOT Standard Specifications, Section 304, Construction Requirements except as herein modified:
 - 1. Gravel and crushed gravel base courses shall be placed in 6-inch lifts and compacted to 95% maximum density unless otherwise directed by the Owner. Refer to Section 02200 – Earthwork for additional compaction requirements.
 - 2. Crushed gravel shall be fine graded with a power grader or other approved equipment. Tolerances shall be within 1/2" or less.
 - 3. No pavement shall be placed until fine grading has been checked by the Owner.
- D. Reclaimed stabilized base courses shall be constructed in accordance with NHDOT Standard Specifications, Section 306, Construction Requirements except as herein modified:

1. Excess reclaimed base course material shall become the property of the Owner unless otherwise directed by the Owner. Contractor shall remove excess material from the work site and haul and stockpile material in a location to be determined by the Owner. Excess material not salvaged by the Owner, as determined by the Owner, shall become the property of the Contractor.
 2. All cobbles, stones and boulders 6-inch in diameter or greater that are exposed under the existing pavement shall be removed from the work area.
 3. No pavement shall be placed until fine grading has been checked by the Owner.
- E. The Contractor shall regrade and re-compact the base course for installation of permanent base and wearing course pavement in areas which are disturbed during construction, and in areas as directed by the Owner.
- F. After the base course has been rolled to the required grade, any broken or irregular edges of the existing pavement shall be saw cut in straight lines leaving a sound vertical face 12-inches back from the edge of the trench or other excavations to accept placement of a 12-inch minimum overlap of bituminous base course pavement on undisturbed material.
- G. The edges of the existing pavement shall receive an application of a cut-back asphalt so that the new pavement material may be properly bonded to the existing.

3.3 BITUMINOUS PAVEMENT

- A. Bituminous base course and wearing course pavement shall be constructed in accordance with NHDOT Standard Specifications, Section 401, Construction Requirements except as herein modified:
1. Pavement shall only be placed when the underlying surface is dry, frost-free and the surface temperature is above 50 degrees F, unless otherwise directed by the Owner.
 2. Pavement shall only be placed during daylight hours.
 3. All existing iron grates, covers and valve boxes within the limits of pavement shall be adjusted by the Contractor prior to placing the wearing course of pavement
 4. All catch basins shall be covered with acceptable cover before paver passes over grate.
 5. Manholes and other castings shall be sprayed with kerosene or other product before the paver passes over casting. The casting shall be clean of asphalt at the completion of the paving.
 6. The Contractor shall do the required handwork around catch basins to provide a downward slope to catch basin grates.
 7. Compaction shall be completed by an 8-ton minimum static steel wheel roller. A smaller roller shall be used to smooth-out edges.
- B. Temporary Pavement
1. Temporary pavement shall be placed in areas where test pits or exploratory excavations occur in

paved areas, where the road is to be reconstructed by others and as directed by the Owner.

2. Contractor shall place temporary pavement the full width of the excavation within the same week of the trench being backfilled unless otherwise directed by the Owner.
3. Temporary pavement shall be repaired as necessary to maintain the surface of the pavement until replaced by the permanent pavement. If points of settlement or holes appear in the temporary pavement, the Contractor shall repair the same within 24 hours of notification by the Owner.
4. After the specified time period for trench settlement has elapsed and when so directed by the Owner, the Contractor shall remove and dispose of the temporary pavement, cut the trench edges and regrade the base course for installation of the permanent pavement.

3.4 CURBS

- A. Replace Existing Curbs (if any): Curbs shall be replaced with the existing curbing if existing curbs have not been damaged, or with new curb sections of the same material, dimensions and alignment for those sections damaged during removal.
- B. New Curbs (if any): Curbs shall be replaced as required and installed as indicated on the Drawings and directed by the Owner.
- C. Granite curbs shall be constructed in accordance with NHDOT Standard Specifications, Section 609. (if any)
- D. Bituminous curbs (if any) shall be constructed in accordance with NHDOT Standard Specifications, Section 609, except as herein modified:
 1. The bituminous curb shall be placed on the permanent base course pavement. The wearing course pavement shall be constructed after placement of the bituminous curbs.
 2. Prior to placing the bituminous curb, the permanent base course pavement shall be cleaned and painted with a tack coat of bituminous material.
 3. Bituminous curbs shall not be placed within 24 hours of last rainfall.
 4. Bituminous curbs shall be placed by extruding curb paver and compacted to 95% maximum density.
- E. Curbs shall conform to the grade of roadway and adjacent curb sections.
- F. Areas behind curbs and sidewalks shall be graded smooth. Areas shall receive loam and seed, gravel or replacement of sidewalks as required.
- G. The Contractor shall be responsible for damage to curbs until final completion.

3.5 INFRA-RED HEATER TRENCH REPAIRS

- A. Infra-Red heater trench repairs shall be performed by an experienced infra-red operator in the following general manner:

- B. Areas to be repaired shall be swept clean to remove all loose and foreign materials.
- C. An approved infra-red heater shall be positioned over the area to be repaired for a period of time required to soften the existing pavement to a depth of two or more inches. Oxidation of the pavement, caused by improper heating techniques, must be avoided. Unsuitable material must be discarded, if this condition occurs.
- D. The softened area shall be scarified and raked to a workable condition.
- E. Any necessary additional bituminous concrete mix must be obtained from a suitable infra-red heated storage unit required to keep asphalt mix at near constant temperature throughout the working day. Under no circumstances shall any asphalt mix to be used that measures a temperature of less than 200 degrees F.
- F. After the paving mixture has been properly admixed and raked to grade, compaction shall be obtained by use of a steel wheeled roller of sufficient weight to establish a uniform density comparable to that of the adjacent surface within the working area. The finished patch shall be level with no depression retaining water on any of its surface.
- G. Edges of the rolled area shall be sealed with suitable asphalt emulsion, and sand spread over the entire area that has been patched.

3.6 FIELD QUALITY CONTROL

- A. Thickness and Surface Tolerances:
 - 1. Bituminous pavement courses shall be tested in-place for compliance with compacted thickness and surface tolerance requirements.
 - 2. Contractor shall repair or remove and replace unacceptable pavement and retest as directed by the Contract Administrator, all at no additional cost to the Owner.
 - 3. Testing, tolerances and replacement shall be as specified in NHDOT Standard Specifications, Section 401.
 - 4. In-place testing shall be completed at Contractor's expense by a testing laboratory experienced and certified to complete the testing required.
- B. Compaction: Refer to Section 02200 - Earth Excavation.
- C. Protection: Protect completed work with barricades or other devices as approved by Owner so that no damage occurs as a result of subsequent construction operations. Repair damages or other irregularities to satisfaction of Owner, at no additional cost to the Owner, before final acceptance by the Owner and Engineer.
- D. Guarantee: During the one-year guarantee period, the Contractor shall maintain the surfacing and shall promptly fill any depressions and holes that may occur so as to keep the surfacing in a safe and satisfactory condition for traffic. Fill material shall be in compliance with these Specifications.

END OF SECTION 02525

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUBMITTALS

- A. Submit the following:
1. Product data for reinforcement, forming accessories, admixtures, patching compounds, joint systems, curing compounds, dry-shake finish materials, and others as requested by Engineer.
 2. Shop drawings for fabricating, bending, and placing concrete reinforcement.
 3. Laboratory test reports or evaluation reports for concrete materials and concrete mix designs.
 4. Written report to Engineer and to the Owner for each proposed concrete mix at least 15 days prior to start of concreting. Do not begin concrete production until mixes have been reviewed by Engineer or Owner.
- B. Quality Assurance: Comply with provisions of ACI 301, "Specifications for Structural Concrete for Buildings," ACI 318, "Building Code Requirements for Reinforced Concrete," and CRSI "Manual of Standard Practice," except where more stringent requirements are indicated.
1. Concrete Testing Service: Engage a testing agency acceptable to Engineer and Owner to perform materials evaluation testing and to design concrete mixes.
 - a. Materials certificates signed by concrete producer and Contractor may be submitted in lieu of materials laboratory testing when acceptable to Owner.

1.02 PRODUCTS

- A. Form Materials: Furnish form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection.
1. Forms for Exposed Concrete Surfaces: Suitable panel-type material to provide continuous, straight, smooth, exposed surfaces.
- B. Reinforcing Materials: As follows:
1. Deformed Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise

indicated.

2. Welded Wire Fabric: ASTM A 185
- C. Concrete Materials: As follows:
1. Portland Cement: ASTM C 150, Type 1
 2. Fly Ash: ASTM C 618, Type F
 3. Aggregates: ASTM C 33, except local aggregates of proven durability may be used.
 4. Water: Potable
- D. Admixtures: Provide admixtures that contain not more than 0.1 percent chloride ions.
1. Air-Entraining Admixture: ASTM C 260
 2. Water-Reducing, Retarding, and Accelerating Chemical Admixtures: ASTM C 494
- E. Related Materials: As follows:
1. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
 2. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or polyethylene-coated burlap, complying with ASTM C 171
 3. Membrane-Forming Curing Compound: ASTM C 309, Type I. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
 4. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- F. Mix Proportions and Design: Proportion mixes complying with mix design procedures specified in ACI 301.
1. Limit use of fly ash to not exceed 25 percent of cement content by weight.
 2. Design mixes to provide normal weight concrete with the following properties:
 - a. 4000-psi, 28-day compressive strength; water-cement ratio, 0.44 maximum (non-air-entrained), 0.35 maximum (air-entrained).

3. Limit maximum water-cement ratio of concrete exposed to freezing and thawing to 0.45. Limit maximum water-cement ratio of concrete exposed to deicing salts, brackish water, or seawater to 0.40.
 4. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - a. Ramps, Slabs, and Sloping Surfaces: Not more than 3 inches.
 - b. Reinforced Foundation Systems: Not less than 1 inch and not more than 3 inches.
 - c. Other Concrete: Not more than 4 inches.
 5. Adjust mix designs when material characteristics, job conditions, weather, test results, or other circumstances warrant. Do not use revised concrete mixes until laboratory test data and strength results have been submitted to and reviewed by the Owner.
- G. Use air-entraining admixture in exterior exposed concrete, providing not less than 4.5 percent nor more than 7 percent entrained air for concrete exposed to freezing and thawing, and from 2 percent to 4 percent for other concrete.
- H. Use water-reducing, accelerating, and retarding admixtures that have been tested and accepted in mix designs in strict compliance with manufacturer's directions.
- I. Job-Site Mixing: Use drum-type batch machine mixer, mixing not less than 1-1/2 minutes for 1 cu. yd. or smaller capacity. Increase mixing time at least 15 seconds for each additional cu. yd.
- J. Ready-Mix Concrete: ASTM C 94.

1.03 EXECUTION

- A. Formwork: Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Select form materials to obtain required finishes.
1. Maintain formwork tolerances and surface irregularities within ACI 347 limits, Class A tolerances for concrete exposed to view and Class C tolerances for other concrete surfaces.
 2. Provide openings in formwork to accommodate work of other trades. Accurately place and securely support items built into forms.
 3. Clean and adjust forms prior to concrete placement. Apply form-release agents

or wet forms as required. Retighten forms during concrete placement, if required, to eliminate mortar leaks.

- B. Reinforcement: Accurately position and support reinforcement, and secure against displacement. Locate and support reinforcement to maintain minimum cover with metal chairs, runners, bolsters, spacers, and hangers as required. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- C. Joints: Locate and install construction, isolation, and control joints as indicated or required. Locate construction joints so they do not impair strength and appearance of structure. Place isolation and control joints in slabs-on-ground to stabilize differential settlement and prevent random cracking.
- D. Installation of Embedded Items: Set and build anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting diagrams, templates, and instructions provided by others for locating and setting.
- E. Concrete Placement: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," for placing concrete in a continuous operation within planned joints or sections. Do not begin concrete placement until other affected work is completed.
 - 1. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping so that concrete is worked around reinforcement and other embedded items and into forms.
 - 2. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing.
 - a. In cold weather comply with ACI 306.
 - b. In hot weather comply with ACI 305.
- F. Finish of Formed Surface: As follows:
 - 1. Smooth-Formed Finish: Provide a smooth finish for concrete surfaces exposed to view and surfaces to be covered with a coating or covering material applied directly to concrete. Repair and patch defective areas, with fins and other projections completely removed and smoothed.
- G. Slab Finishes:
 - 1. Nonslip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

- a. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route.
- H. Curing: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, apply an evaporation-control compound according to manufacturer's instructions after screening and bull floating, but before power floating and troweling.
1. Begin initial curing as soon as free water has disappeared from exposed surfaces.
 2. Continue curing unformed concrete surfaces by water ponding, continuous fog spraying, continuously wetted absorptive cover, or by moisture-retaining cover curing. Cure formed surfaces by moist curing until forms are removed. Keep concrete continuously moist for not less than 72 hours for high- early strength concrete and 7 days for all other concrete.
 3. Apply membrane-forming curing compound to exposed interior slabs and to exterior slabs, walks, and curbs as soon as final finishing operations are complete. Apply uniformly according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Use membrane-curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- I. Field Quality Control: The Contractor shall employ a testing agency to perform tests and to submit test reports. Sampling and testing for quality control during concrete placement shall include the following, as directed by Engineer.
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

- d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 3. When total quantity of a given class of concrete is less than 50 cu. yd., Contract Administrator may waive strength testing if adequate evidence of satisfactory strength is provided.
 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
 6. Test results will be reported in writing to Engineer, Owner, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
 7. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
 8. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Owner or Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION

SECTION 16402
ELECTRICAL WORK

PART 1 – GENERAL

1.1 GENERAL

Include Conditions of the Contract and applicable parts of Division 1.

Examine all other sections of the specifications for requirements, which affect the work of this Section, whether or not such requirements are particularly mentioned herein.

Coordinate the work of this section with the related work of other trades, and cooperate with such trades to assure the steady progress of all work of this Contract.

Where the National Electrical Code appears in this specification, it shall be interrupted to mean the latest edition.

1.2 SCOPE

The work covered by this Section consists of furnishing all labor, materials, equipment, supplies, devices, electrical apparatus, concrete bases, breakers, etc., the installation of the materials and equipment and the performance of all operations necessary for the installation of a stand-by power system and/or modifications to existing facility electrical power services as indicated on the Contract Drawings and/or as described within the Contract Specifications.

This work shall include all costs involved in modifying electrical service and distribution as indicated and any costs involved with any other special controls for the project. Without limiting the work required under this specification section, the following is included:

1. Provide concrete base for new generator.
2. Provide new utility and generator main service breakers, etc.
3. Provide new metering installation.
4. Provide new generator distribution panelboard.
5. Provide all conduit and wire for modified service connection, generator connections and connection of service to the new facility distribution.
6. Install automatic transfer switch (provided under section 16620).
7. All trench excavation for conduit, backfill, pavement repair, loaming and seeding, etc. associated with the installations.
8. Coordinate with the Owner to determine the property line and insure all setbacks from all property lines are in accordance with municipal requirements. Coordinate with the Authority Having Jurisdiction to obtain approval for the clearance between the new stand-by generator and the Owner's existing and/or new fuel storage tanks before initiating construction.
9. Removal of discontinued metering transformer enclosure, wiring, and also any exposed conduits that are discontinued.
11. Any and all work required to leave the location as a fully operable project per the intent of the contract and in conformity with all applicable Codes and Ordinances.

12. Coordinate completely with the Contractor providing modifications to the air intake ductwork, etc. in the existing mechanical (boiler and electrical distribution room). This is work being carried out under a separate Contract by the Owner during the same construction time period as this project.
13. Obtain and pay for all required permits, inspections, etc.

1.3 WORK OF OTHER SECTIONS

- Section 16620 - Standby Generator System
- Section 03300 - Cast in Place Concrete
- Section 02200 - Earthwork
- Section 02525 - Paving, Sidewalks and Curbing

1.4 SUBMITTALS

Shop Drawings. Within thirty days after award of the Contract, submit shop drawings in accordance with requirements of the General Conditions and in the manner described therein. Shop drawings shall indicate specifications section and paragraph requiring equipment indicated.

Shop drawings are required on all major pieces of equipment in the following list, but not necessarily limited thereto: circuit breakers and enclosures; pull, junction, and terminal boxes; panelboards; wiring devices; metering equipment; disconnect switches, etc.

Record Drawings. In accordance with requirements of the Supplementary General Conditions, the Contractor shall furnish and keep on the job at all times one complete set of black line prints of the electrical work, on which shall be clearly, neatly and accurately noted, promptly as the work progresses, all architectural and electrical changes, revisions and additions to the work. Wherever work is installed otherwise than as shown on the Contract Drawings, such changes shall be noted.

The Contractor shall indicate on these prints the daily progress by coloring in the various apparatus and associated appurtenances as they are installed.

No approval of requisition for payment for work installed will be given unless supported by record prints as required above.

At the conclusion of work, prepare record drawings in accordance with the requirements of the Supplementary General Conditions.

Operating Instructions and Maintenance Manual: The Contractor shall instruct, to the Owner's satisfaction, such persons as the Owner designates in the proper operation and maintenance of systems and their parts.

Parties indicated above sign affidavits stating that the above instructions were given by the Contractor.

Furnish in accordance with General Conditions operating and maintenance manuals and forward same to the Engineer for transmittal to the Owner.

The operating instructions shall be specific for each system and shall include copies of posted specific instructions.

For maintenance purposes, provide shop drawings, parts lists, specifications and manufacturer's maintenance bulletins for each piece of equipment. Provide name, address and telephone number of the manufacturer's representative and service company, for each piece of equipment so that service or spare parts can be readily obtained

Manufacturers' Data. Within thirty days of award of Contract, the Contractor shall submit for Engineer's approval a complete list of manufacturers' names of all materials and equipment proposed for the project.

After approval of the above list, the Contractor shall submit for Engineer's approval complete detailed manufacturers' data consisting of bulletins, shop drawings, and parts lists of the materials and equipment to be furnished, as required.

Shop drawings and manufacturers' data submitted must bear the Contractor's stamp stating that the shop drawings and data have been checked and meet the plans and specifications before being submitted for Engineer's approval, or they will not be considered and will be returned for resubmission. If the shop drawings and data show proposed variations from the requirements of the plans and specifications because of standard practice or other reason, specific mention shall be made of such variations in the letter of transmittal.

The Contractor shall assume the entire cost and responsibility for any changes in the work, which may be occasioned by approval of materials other than those specified.

Errors, omissions, and coordination of shop drawings shall be the sole responsibility of the Contractor whether or not the shop drawings are approved.

In the event that any specified manufacturer's number has been superseded by a new number since the writing of this specification, the new manufacturer's number shall be immediately submitted to the Engineer for approval. It shall be the responsibility of the Contractor to notify the Engineer of any superseded manufacturers' numbers mentioned in these specifications.

1.5 QUALITY ASSURANCE

Applicable Standards, Permits and Codes:

The installation shall comply with all laws applying to electrical installations in effect in Moultonborough, New Hampshire, the municipality where the work will be performed and with regulations of any other governmental body or agency having jurisdiction, including OSHA; with regulations of the National Electrical Code where such regulations do not conflict with those laws, with the regulations of the electric utility involved, with the telephone utility, and with ASHRAE Standard 70, as amended.

File all required notices and plans. Obtain and pay for all permits, inspections, licenses, and certificates required for work under this Section.

If any portion of the electrical plans or specifications conflict with any laws or ordinances with regard to type of materials, equipment, or fixtures to be used, the Contractor shall bring it to the Engineer's attention at least seven days before submitting the bid. Otherwise the cost of all work necessary to make the installation comply with said laws or ordinances shall be paid by the Contractor and shall become a part of this Contract.

1.6 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

Before submitting prices or beginning work, thoroughly examine the site and the Contract Documents.

No claim for extra compensation will be recognized if difficulties are encountered which an examination of site conditions and Contract Documents prior to executing the Contract would have revealed.

1.7 DRAWINGS

The Contractor shall refer to the electrical drawings and the architectural floor plans and details for a full comprehension of the extent and detail of the work to be performed. These drawings are intended to be supplementary to the specifications, and any work indicated, mentioned, or implied in either is to be considered as specified by both.

All work shown on the drawings is intended to be approximately correct to the scale of the drawings, but figured dimensions and detailed drawings are diagrammatic and are not intended to show every detail of construction or the exact location of equipment. Where building construction makes it advisable or necessary to change the location of equipment, the Contractor shall perform such work without cost to the Owner on written request of the Engineer. Any doubt as to the intended location of equipment shall be resolved by the Engineer before proceeding with the installation.

The intent is to obtain an electrical installation of all systems, complete in every detail within and about the building, and with all facilities properly interconnected with power and telephone. The Contractor shall furnish and install all such parts as may be necessary to complete the systems in accordance with the best trade practice and to the satisfaction of the Engineer. Upon completion, the electrical systems and all equipment throughout the structures shall operate properly and adequately and function as intended.

In any discrepancy between requirements of any Section, between notes on the drawings, between drawings, between details in the specifications, or between drawings and specifications, that which is in the best interest of the Owner shall apply.

Testing by Contractor: Provide equipment and personnel for operating test of electrical system.

Changes by Contractor: The contract drawings indicate the extent and schematic arrangement of the conduit and wiring systems. If changes from the drawings are deemed necessary by the Contractor, submit details of such changes within 30 days of award of Contract. Make no changes without written authorization of Engineer. Where conduit routings are not indicated, coordinate with Engineer to insure no conflicts result from routings selected.

1.8 ELECTRICAL REFERENCE SYMBOLS

Standard symbols have been employed where such will meet the need. These are augmented and modified to illustrate as necessary. The chart on the Contract Drawings is intended to illustrate all symbols and explain the function and installation method of the device represented. When not clear, or where one has been inadvertently omitted, it shall be the responsibility of the Contractor to obtain a ruling on the intent before proceeding with any work.

1.9 TEMPORARY POWER

The Contractor shall furnish and install temporary feeders of proper capacity power required for the project while under construction. Sufficient outlets shall be installed at convenient locations so that extension cords of not over 50 feet will reach all areas requiring power.

Any Subcontractors shall furnish their own extension cords and such lamps as may be required for their work, and shall pay for the cost of temporary wiring of construction offices or shanties used by them and any temporary wiring of a special nature for light and power required other than that mentioned above.

The Contractor must limit outages at all times, and must coordinate with The Owner, no later than 48 hours prior to any requested/required outage, to verify timing ia acceptable to the Owner.

1.10 UNIT PRICES (if any)

The Contractor shall provide unit prices as requested in Specification "Measurement and Payment".

1.11 ALTERNATE BIDS

The Contractor shall provide alternate bids as requested in the specification and on the bid form.

The Contractor shall provide an Alternate Bid if the manufacturer of the stand-by generator recommends a unit with a rating greater than the noted rating recommended by the Engineer, as is noted in Specification Section 16620.

The Contractor shall provide an Alternate Bid for the cost to be added to the Contract if the Owner elects to have the Contractor provide all preventative maintenance on the equipment for the first year following the Owner's acceptance of the installation. This will not include the cost of fuel to operate the equipment.

1.12 GUARANTEE

Contractor's guarantee for items furnished covers and includes:

- Faulty or inadequate design
- Improper installation
- Defective workmanship and materials

Warranties of Manufacture

- Not less than one year
- As specified
- As normally supplied if greater than one year

1.13 DEFINITION

Where the word "Owner" appears in this specification it shall mean the Town of Moultonborough, NH, as represented by its Town Administrator or the Town Administrator's appointed representative for this project re approvals, etc. Where used in regards to guarantees, etc., it shall refer to the Town of Moultonborough, NH.

1.14 ALTERATIONS

The Contractor shall execute all alterations, additions, removals, relocations, or new work, etc., as indicated or required to provide a complete installation in accordance with the intent of the drawings and specifications.

Remove all existing equipment to be discontinued and/or relocated as directed by the Owner/Engineer.

Existing electrical equipment to be discontinued and removed shall remain the property of the Owner and shall be carefully packed and delivered by the Contractor for on site storage by the Owner. Any discontinued and removed electrical equipment items that the Owner specifically indicates are not wanted by the Owner shall be disposed of in a legal and lawful manner by the Contractor.

Any existing work disturbed or damaged by the alterations or new work shall be repaired or replaced to the Engineer's and Owner's satisfaction at no added cost to the Owner by the Contractor.

Any existing wiring and conduit discontinued under this project shall be completely removed.

1.15 SCHEDULING

The Contractor shall schedule his work in accordance with contract requirements re any interruption of electrical or other services and/or the requirements to maintain building areas or spaces available for the Owner's use during construction.

If required to maintain operations, work may be required to be scheduled when the facility is not fully utilized. If this occurs this Contractor shall provide a suitable work force to accommodate the schedule requirements.

1.16 SEISMIC DESIGN REQUIREMENTS

The Contractor under this specification section shall be responsible for the engineering, design and provision of seismic restraint systems for conduits, wireways, and equipment as required by the 1996 or subsequent edition of the BOCA Code (or IBC Code where that code has been adopted by the State), section 1610.6.4 and table 1610.6.4(1). This Contractor shall provide mounting hardware and provisions for mounting of electrical equipment to resist lateral loads created by seismic disturbances. All mountings shall be designed by a licensed professional engineer specializing in this field of work. This Contractor shall provide all required seismic restraint for conduits in excess of 2 inches diameter (trade size), standby power generating equipment, panelboards, service switchboards, TVSS units, transformers, and other equipment in accordance with the applicable Code. Provide all required vibration isolation to insure excessive vibration is not transmitted from equipment to structures.

All design details, stamped and signed by the engineer licensed to practice professional engineering in the State of New Hampshire shall be provided for review and approved by the Engineer.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

All materials, devices, and equipment, shall be new.

Service: Electrical service is 240/120 volt, single phase, 3 wire, 60 hertz (at the Town Office).

2.2 IDENTIFICATIONS

All materials shall bear UL labels where such have been established for the particular device.

All devices shall show make, type, serial number (where applicable), voltage, amperage, wattage, motor ratings, and all other pertinent data.

All wire shall have make, type of insulation, size, and voltage rating clearly marked upon it.

2.3 SLEEVES/JUNCTION BOXES/ANCHORS

The Contractor shall provide for all sleeves, openings, anchors, supports, conduits, and boxes, and shall provide same so that they may be built into the job wherever feasible.

2.4 ACCESS PANELS

Not applicable to this project.

2.5 CONDUITS

A. Exterior:

Direct buried conduit shall be Schedule 80 PVC or rigid galvanized steel. Where PVC is used, all elbows and/or offsets shall be rigid galvanized steel.

Rigid galvanized steel conduit shall be used for any conduit exposed above grade, except schedule 80 PVC may be used where installed with protection adequate and acceptable to the Owner and Authority Having Jurisdiction which will provide protection from damage, and as required by any applicable Codes and/or Ordinances.

Minimum size conduit for light and power wiring, shall be 3/4".

B. Interior:

Interior conduits may be rigid galvanized steel, or electrical metallic tubing (EMT).

C. General:

The use of nonmetallic conduit or raceway exposed outdoors is only permitted where they are not subject to damage.

Rigid galvanized conduit shall be manufactured by Wheatland Tube Company, or approved equal. It shall conform to UL 6, ANSI C80.1.

PVC conduit shall be Type II by Carlon Products or approved equal.

Electrical Metallic Tubing (EMT) shall conform to UL 797, ANSI C80.3

All terminations of conduits shall have smooth, rounded bushings. All conduit 1" and larger shall have insulation which may be integral with the bushing connector, or an insulated bushing may be added.

All rigid conduit joints shall be threaded. Do not use any type of clamp on fittings. All plastic joints shall be cemented or heat welded.

For EMT fittings shall conform to UL 518 B and ANSI/ NEMA FB1, steel or malleable iron, only. Die-cast or pressure- cast zinc alloy fittings or fittings made of "pot metal" are prohibited. Couplings and connectors shall be concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduits sized 2" and smaller. Use set screw type couplings with four set screws each for conduits sized larger than 2". Set screws shall be of case hardened steel with hex head and cup point to firmly seat in the wall of the conduit for positive grounding. Indent type connectors and couplings are prohibited. 4" is the largest EMT conduit that may be used on the project.

Provide expansion fittings where under ground conduits rise to above grade at any building or other structure and elsewhere as required by Code. Fittings shall be of same material/construction as conduit.

Where conduits pass between exterior of structures and the interior of structures, the Contractor shall provide suitable sealing per NEC Article 300, 300.7 (A).

Provide fireproofing of any penetration of any fire partition, ceiling, or floor in accordance with Code requirements.

2.6 WIRE AND CABLE

All cable and wire shall comply with the latest requirements and specifications of the NFPA and/or the Insulated Power Cable Engineers Association (IPCEA) and shall be as manufactured by General Cable, General Electric, Anaconda, Phelps Dodge, or approval equal, unless otherwise specified or indicated.

All conductors used in the wiring system shall be soft-drawn copper wire having a conductivity of not less than 98% of that of pure copper, unless otherwise indicated or specified. All conductors shall be stranded. Solid conductors are not acceptable. Aluminum conductors are not permitted.

All wire and cable shall be stamped approximately every two feet to indicate voltage, type, temperature rating, UL listing, manufacturers' name, size, etc.

All underground conductors shall be installed in conduits. All underground conductors shall enter manholes, enclosures, fixtures or termination points through a protective conduit sleeve of appropriate size.

All cable and wire shall be: 600 volt; installed in approved raceways or conduit; not less than No. 12 AWG (except that No. 14 AWG may be used for control wiring).

Insulation for cable and wire shall be as follows:

Interior Dry or Wet or Moist Locations	XHHW-2, THWN-2
Service Conductors (utility and generator)	XHHW-2

All internal wiring to fixtures shall be minimum, No. 14 AWG, silicon rubber insulated (150°C) with minimum 300 volt insulation.

All branch circuit wiring from panelboards to any outlet or fixture shall be sized such that the maximum voltage drop at the most remote device does not exceed 5%.

The following color codes, as applicable, shall be used for all conductors. The colors must be fast, fadeless, and capable of withstanding cleaning.

<u>240/120V (single Phase)</u>	
Phase A	Black
Phase B	Red
Phase C	====
Neutral	White
Bond	Green

All circuit wires shall be tagged in cabinets, pull boxes, etc., with 1/16" thick tags securely fastened to the conductors with a heavy type of linen wrap at time wires are pulled in and tested. Circuit numbers shall be indicated on the tags. Tags shall not be removed for any reason.

At least 8" loops or ends shall be left at each outlet for the installation of devices or fixtures. All wires in outlet boxes not for the connection to fixtures at that outlet shall be rolled up, connected together, and taped.

Wires and cables shall be carefully handled during installation.

When a lubricant is necessary for pulling wires, it must be listed by UL and be of such consistency that it will leave no obstruction or tackiness that will prevent pulling out old wires or pulling in new wires or additional wires. No soap flakes or vegetable soaps will be permitted.

Conductors shall be continuous from panelboard to outlet and from outlet to outlet. No splices shall be made except within junction or outlet boxes.

Splices and taps in wires No. 8 AWG and larger shall be made with crimp-on type connectors designed for the purpose. All connections between wires at fixtures and boxes shall be made with UL approved 600 volt pressure connectors equal to ideal "Wire-Nut" or "Wing-Nut" (for general lighting and receptacles) in dry locations only.

Type NM, NMC, AC, or similar cables are not acceptable on this project.

Type MC cable may be used where conductors are installed above accessible ceilings or where concealed within interior building walls.

All conductors and connections shall be free of grounds, shorts and opens.

2.7 OUTLET BOXES

All boxes shall be held to wood surfaces by wood screws. On metal surface, boxes shall be held by metal-to-metal screws or by machine bolts.

Any outside boxes or boxes surface mounted, exposed in the building shall be cast metal type with integral threaded hubs (style similar to Crouse Hinds FS or FD). "Bell" style boxes will not be approved.

2.8 PULL BOXES AND JUNCTION BOXES (in buildings)

Provide code sized as required or requested by the Engineer and as coordinated with the Engineer. Boxes shall be galvanized steel, furnished with screw fastening covers. Where several feeders or circuits pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number and panel designation. Where pull boxes are required in finished areas, the Owner and Engineer shall be consulted as to location, style of cover, and finish of the box. The location shall always be as inconspicuous as possible.

2.9 PULLING CABLES

All raceways are to be equipped with conductors. Swab all conduits before cable is drawn into them. Any crushed raceways shall be replaced before drawing in cable. Where cable pulling compounds are required, materials specifically intended for that purpose may be utilized.

2.10 DISCONNECTS/CIRCUIT BREAKERS

Where shown on the Drawings, or when NEC required whether or not shown, install disconnect switches appropriate for the application. When serving motors they shall be motor rated for the horsepower involved. Those for equipment (if any) outdoors shall be in NEMA 3R enclosures, or as otherwise indicated on Contract Drawings. All outdoor disconnect switches shall be pad-lockable in the "ON" and in the "OFF" positions. Switches installed indoors shall be NEMA 1 enclosed, heavy duty style.

Switches shall be heavy duty, quick make and break type. They may be non-fused by a solid copper bar, silver plated, heavy duty for motors over 2 HP unless otherwise indicated on the Contract Drawings. They shall be Square D Type HU , or approved equal by Siemens or General Electric.

Provide new service entrance labeled circuit breakers for utility and generator at. Breakers shall be rated and have enclosures as noted on Contract Documents. Breakers shall have an interrupting capacity that exceeds the available fault current. Contractor must provide documentation indicating available fault current with shop drawings. Breakers must be pad-lockable in the "ON" and in the "OFF" positions. Breakers at the Town Office service shall have an AIC rating of not less than 100,000 Amperes RMS symmetrical at 240 volts AC rated over 400 Amperes, or not less than 35,000 Amperes RMS symmetrical at 240 volts AC rated 200 to 400 Amperes, or not less than 22,000 Amperes RMS symmetrical at 240 volts AC rated under 200 Amperes. Provide a written letter from the serving utility indicating the available fault current at the main utility breaker. Approval of shop drawings will be delayed without this document.

2.11 OVERCURRENT PROTECTION MOTORS

Not applicable for this project.

2.12 WIRE CONNECTORS AND DEVICES

All wire joints shall be made with a pressure squeezed connector such as T & G Stakon and Ideal, or bolted clamp such as made by Dessert. Twist-on type wire nuts are also permitted for general lighting circuits in dry locations only. Make up to terminals shall be mechanical squeeze connector. Wherever only a screw connector is available, install a conductor terminal like T & G Stakon spade or donut and designed for the application and compression set to the conductor.

Cover all joints made with non-insulated clamp devices with Scotch brand plastic electrical tape. Type #88 may be used at any joint and shall be used whenever the temperature of joint or the room is below 50°F. In the summer, or when temperature is above 60°F, new type #33 plus may be used. Triple wrap joints, each wrap having a 50% overlay.

2.13 SWITCHES AND PLATES (if any)

Provide Hubbell, 20 ampere, 120/277 volt, commercial specification grade switches, Ivory color, with matching plates for the enclosure utilized.

2.14 CONVENIENCE AND OTHER OUTLETS AND PLATES

Convenience outlets shall be ground fault circuit interrupter type, Hubbell GFR 5352A, 20 ampere, 125 volt, Ivory face color, with matching plates for the enclosure utilized.

2.15 MOTORS

Not applicable for this project.

2.16 SECONDARY SERVICE

Electrical utility underground service shall be modified for the facility as noted on the Contract Drawings.

2.17 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM / STAND-BY POWER DURING MODIFICATIONS

The power wiring between the existing utility transformer and the existing main distribution panel or breaker will be modified as noted on Contract Documents.

New power wiring and conduits for the new stand-by generator service will be provided as noted on Contract Documents.

The Contractor must coordinate all power outages during cut-overs with the Owner. Cut-overs may have to be scheduled after normal working hours, on weekends, or on holidays. Any such requirement shall not result in added costs to the Owner.

Refer also to 1.15 Scheduling, this specification section.

2.18 UNDERGROUND ELECTRICAL SERVICE

Underground service shall comply with all the requirements of the National Electrical Code, local utility company, and local enforcing authority.

Underground service shall be modified as noted on the Drawings.

2.19 PRIMARY POWER SERVICE

Primary power for the sites is existing and will not be modified by this project.

2.20 METERING

The existing electric utility metering transformer enclosure is being replaced and relocated under this project. This may require the physical relocation of the existing meter and its enclosure.

Coordinate all new installations and relocations of metering equipment with the utility. The Contractor shall remove all associated wiring that is not reused and not removed by the utility..

Any utility charges for poles, service cable, meters, etc., in connection with the provision of the temporary (construction) building power or new facility electrical service shall be paid in full by the Contractor under this section, as shall any charges by the utility in conjunction with the metering modifications noted; this does not include the cost of temporary power utilized during construction as covered elsewhere.

2.21 PANELBOARDS

Provide panelboards with main breakers or main lugs and branch circuit breakers, according to the schedules on the drawings or included in specifications.

Panelboards shall be provided with a top-mounted main breaker or remote main breaker to panel main lugs and branch circuit breakers, according to the schedule on the drawings.

The general requirements for the panels are shown on the drawings, including mounting and gutters. Mount the panels 6'-6" up to top of roughing cabinets. Gutters not less than five inches (5") will be considered meeting specifications. Breaker frame size is shown on the drawings. Handle ties will NOT be permitted anywhere. Multi-pole breakers shall have common trip and one handle.

All breakers shall be trip free, suitable for switching, and thermal magnetic. All breakers in panels shall be plug-in style. "Space" means provisions for adding breakers. Breakers or busses shall contain terminations or tapings designed for these attachments. All points of contact between bus and sub bus shall be of copper, full tinned or silvered between all contact surfaces. All breakers shall have a minimum capacity of 22,000 amperes at 240 volts AC. Higher IC breakers shall be provided at no added costs to the Owner if local utility available fault current exceeds this.

Note that the breakers supplying designated receptacles and outdoor receptacles are not the ground fault interrupter type. Code-approved ground fault type protected receptacles are provided (as described in these specifications).

Provide a typewritten tabulation indicating fixture outlets, devices, machines, or apparatus served by each breaker and their room location. This shall follow coding on the drawings with breakers numbered from top to bottom. Mount tabulation inside the door in a frame for the purpose, with a transparent plastic cover. Panelboards shall have "door-in-door" covers if available for the NEMA enclosure style indicated.

For holding breakers in "ON" position, provide each load center with slip on screw set devices for holding breakers on "ON" position. These are to be used, as described, to prohibit switching breakers unless clip is first removed. These devices shall not interfere with normal breaker tripping on overload conditions.

Panelboard mounted at the generator location shall be NEMA 3R enclosed.

Panel shall be manufactured by Square D or approved equal.

The new exterior main utility service breaker shall be provided with a new Grounding electrode system. The existing grounding electrode connections at the existing main distribution panel shall be discontinued. The Contractor shall, as part of this project, separate the ground bonding conductors and their terminations from the grounded (neutral) conductors and their terminals and shall remove any bond between the terminal for the grounded (neutral) wires and the ground bond wires.

2.22 BALANCING OF LOADS

The Contractor shall balance all loads between phases in all panels, etc., around the neutral. Common neutral wiring is not permitted. Neutral conductors shall be the same size as phase conductors unless specifically noted otherwise.

All circuits shall be distributed among the phases so as to restrict any line imbalance to less than 10% at any panelboard.

After completion of the installation, record under full load conditions the current flow in each phase feeder. Upon request, submit four (4) copies to the Owner giving name and location of each panel, etc.

Circuit numbers assigned to home run devices on the drawings are for purposes of indicating individual circuits and are intended to correspond with the circuit numbers in the panels. The panelboard directory shall designate each circuit and its associated load. If the numbers deviate from the drawings, the as-built drawings shall reflect this.

2.23 LIGHTING FIXTURES

Not applicable for this project.

2.24 LAMPS, BALLASTS AND ACCESSORIES (if any)

Not applicable for this project.

2.25 FUSES (if any)

Provide a complete set of fuses for each fusible switch. Time-current characteristic curves of fuses serving motors or connected in series with circuit breakers or other circuit protective devices shall be

coordinated for proper operation; submit coordination data for approval. Fuses shall have a voltage rating not less than circuit voltage.

Cartridge Fuses, Current-limiting Type (Class R): UL 198E, Class RK-1 time-delay type. Associated fuse holders shall be Class R only.

Cartridge Fuses, Current-limiting Type (Classes J and L): UL 198C, Class J for 0 to 600 amps and Class L for 601 to 6000 amps.

2.26 STAND-BY GENERATOR

Provide all conduit, wire, trench, backfill, etc. to fully install and connect the automatic transfer switch, generator and ancillary items as provided under Section 16620. Coordinate with Owner for location of the remote annunciator within the Owner's existing building.

2.27 NAMEPLATES

Provide nameplates for all items of equipment on all switchgear, controllers, selector switches, starters, safety switches, pushbutton stations, feeder switches and relay and equipment enclosures.

Nameplates shall be black laminated plastic or bakelite, approximately $\frac{3}{4}$ " x $2\frac{1}{2}$ " x $\frac{1}{16}$ ", with four edges neatly beveled. Lettering shall be engraved, white, with a height of approximately $\frac{3}{16}$ " x $\frac{1}{4}$ ".

Provide two holes in nameplate and secure to equipment with non-ferrous screws. If adequate space is not available on item to which nameplate is to be affixed nameplate may be installed adjacent to and as close to the item as possible, and in a position where it is readily visible.

Notations on nameplates shall be exactly the same as corresponding notations that appear on the drawings. Submit proposed engraving list for approval before obtaining.

2.28 EQUIPMENT SUPPORTS

Provide all structural supports required for proper attachment of all equipment. Wall mounted equipment may be directly secured to walls with approved anchors.

Maintain at least $\frac{1}{2}$ " air space between equipment and supporting walls. Groups or arrays of equipment may be mounted on adequately sized stainless steel channels, angles or bars. Prefabricated stainless steel channels equal to those manufactured by Unistrut or Kindorf are acceptable. Utilize stainless steel fasteners/hardware with stainless steel channels.

Equipment suspended from ceilings shall be supported by adjustable threaded steel rods of adequate strength. No hangers may be secured to furred or suspended ceilings or attached to or carried through duct work

2.29 UNDERGROUND PULL BOXES (if any)

Provide reinforced fiberglass pull boxes approved equal to Nordic Fiberglass or Hubbell Quazite for wiring noted. Size all boxes per Code. All boxes provided shall have a H-20 loading rating and shall be provided with an adequate concrete footing to insure vehicles will not displace them into the earth.

2.30 TRANSIENT VOLTAGE SURGE SUPPRESSORS

Not applicable for this project.

2.31 TRANSFORMERS

Not applicable for this project.

2.32 DELIVERY, STORAGE AND PROTECTION

The Contractor shall be responsible for the work and equipment until finally inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to the site. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.

The Contractor shall protect work and material of all trades from damage that might be caused by any work or workers and shall make good a damage thus caused.

PART 3 - INSTALLATION

3.01 GENERAL

The entire work provided in this specification shall be constructed and finished in every respect in a workmanlike and substantial manner.

The Contractor shall obtain detailed information from the manufacturer of apparatus as to the proper method of installing and connecting same. The Contractor shall also obtain all information from any Subcontractor and other Contractors that may be necessary to facilitate the work and the completion of the whole project.

Before installing any of the work, the Contractor shall see that it does not interfere with the clearances required for other facilities.

Work installed by the Contractor which interferes with or modifies the design as shown on the Contract Drawings shall be changed as directed by the Engineer, and all costs incidental to such changes shall be paid by the Contractor.

In any and all cases of discrepancy in figures, plans or specifications the matter shall be immediately submitted to the Engineer for decision.

3.02 SITE VISITS

The Contractor will be required to visit the site as the work progresses and to carefully investigate the finished conditions affecting all details of the work, and shall arrange such work required to meet such conditions.

3.03 CUTTING AND PATCHING

It is the duty of the Contractor to furnish and install all sleeves required in the performance of this Contract.

3.04 ALUMINUM CONDUITS

Aluminum conduits shall not be installed.

3.05 INTERIOR CONDUIT SYSTEMS

The Contractor shall coordinate with Engineer as to locations, sizes and number of conduit sleeves to be installed through cast concrete.

Exposed runs of conduit shall have supports not more than 6' -0" apart and shall be installed with runs parallel or perpendicular to walls, structural member, or intersections of vertical planes and ceilings with right angle turns consisting of cast metal fittings or symmetrical bends. Conduit bends and offsets shall be avoided where possible, but where necessary, shall be made with an approved hickey or conduit bending machine. Conduit which has been crushed or deformed in any way shall not be installed. Expansion fittings shall be used to provide for expansion joints. Wooden plugs inserted in masonry or concrete shall not be used to secure conduits or boxes. Conduits shall be supported on approved types of stainless steel wall brackets, ceiling trapeze, straphangers or pipe straps, secured by means of toggle bolts in hollow masonry units, expansion bolts in concrete or brick, machine screws on metal surfaces, and wood screws on wood construction. Provide stainless steel hardware for stainless steel support systems. Conduit shall be installed in such a manner as to insure against trouble from the collection of condensation, and all runs of conduit shall be so arranged as to be devoid of traps wherever possible. The contractor shall exercise the necessary precautions to prevent the lodgment of dirt, trash, or plaster in conduits, fittings, or boxes during the course of installation. A run of conduit which has become clogged shall be entirely freed of the accumulation or shall be replaced.

Conduits shall be securely fastened to all sheet metal outlets, junction boxes, pull boxes, and panelboards with galvanized locknuts and bushings, care being taken to establish a firm mechanical and electrical contact between the box and the conduit.

Flexible conduit shall be installed only where necessary to overcome vibration. All flexible conduit shall be of the liquid-tight type similar to "Sealtite", with proper fittings. Provide minimum 2 ft. diameter loop.

All rigid metallic conduit shall utilize threaded fittings.

Pull boxes, junction boxes and cabinet boxes shall be constructed of code gauge galvanized sheet steel of not less than the minimum size recommended by the National Electrical Code. Boxes shall be furnished with screw fastened covers. Where pull boxes are used in finished areas, the Owner and Engineer shall be consulted as to the location, type of cover, and finish of box and cover. Locations shall be as inconspicuous as possible.

3.06 CONDUCTORS

A complete system of conductors shall be installed in the raceway system, except where otherwise noted. Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet or junction boxes. Compression type connectors properly taped shall be utilized for all splices

3.07 GROUNDING

Grounding at the service locations is modified. New grounding electrode connections are required.

Refer to item 2.21 Panelboards, this specification section, also.

The conduit system and the neutral conductor of the wiring system shall be grounded. The ground connection between the electrical system neutral and the conduit system shall be made at the main electrical service. A bare copper conductor sized per NEC shall be installed in nonmetallic conduit from the breaker enclosure to the entrance of the water service. Connection to the water pipe shall be made by a suitable ground clamp or a lug connection to a plugged tee. If flanged pipes are encountered, the connection shall be made with the lug bolted to the street side of the connection.

If nonmetallic water lines are provided on the project and/or if there are no water lines at the service, the ground electrode conductor shall be connected by a process approved equal to "Cadweld" process to a supplemental ground as permitted by Code.

The main grounding electrode conductor shall ALSO be attached by a process approved equal to "Cadweld" to not less than two (2) copper weld ground rods, 3/4" diameter by 10 feet long. Added connections, per code shall be provided to any building steel frame and/or accessible foundation reinforcing steel.

Provide certified test by recognized testing agency that ground resistance does not exceed 25 ohms.

Ground wires shall be grouped and bonded to panel boxes, not to system neutrals. The ground terminals or receptacles shall be bonded to outlet boxes with #12 AWG or larger bare or green insulated wire, or other suitable means per the National Electric Code.

Where flexible metallic conduit is used, it shall be listed for grounding service.

All electrical equipment shall be grounded.

Conduit and/or raceway shall NOT be utilized as the bonding conductor.

3.08 EXPLOSION PROOF REQUIREMENTS

If encountered, equipment shall be as required for the environment involved.

3.09 PULLING CABLES

Cables shall be installed utilizing pulling equipment designed for the types of wireways or conduits installed. Where lubricating material is required, it shall be a material manufactured for and designated by UL label as suitable for the types of insulation involved on the conductors. Care shall

be taken during cable pulling not to cause kinks or sharp bends in the conductors. If insulation on conductors is cut or nicked during pulling, the conductors involved shall be removed and replaced at no added cost to the owner. During pulling, the maximum strain applied to the conductors shall not exceed 50% of the ultimate strength of the conductors.

3.10 EXAMINATION AND APPROVAL WORK

No work shall be covered before examination and approval by the Engineer and by all inspectors and authorities having jurisdiction. Replace any imperfect or condemned work with work conforming to requirements and satisfactory to the authorities having jurisdiction and the Engineer, without extra cost to the Owner. If work is covered before due inspection and approval, the Contractor shall pay all costs of uncovering and reinstating work.

3.11 CLEAN UP AND REPAIR

At the completion of the work, the work area shall be left clean. Any damage caused to work of other trades by electrical installation shall be repaired at the expense of the Contractor.

3.12 GUARANTEE

Attention is directed to provisions of the General Conditions regarding guarantees and warranties for work under this Contract.

Manufacturer shall provide standard guarantees for work under this Section. However, such guarantees shall be in addition to and not in lieu of all other liabilities, which the manufacturer and Contractor may have by law or by other provisions of the Contract Documents.

All materials, items or equipment and workmanship furnished under this Section shall carry the standard warranty against all defects in material and workmanship for a period of not less than one year from the date of final acceptance of the work. Any fault due to defective or improper material, equipment, workmanship or design which may develop within that period shall be made good, forthwith by and at the expense of the Contractor, including all other damage done to areas, materials and other systems resulting from this failure.

This Contractor shall guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as are set forth herein or as indicated.

Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the guarantee period, the affected part or parts shall be replaced by the Contractor.

The Contractor shall furnish, before the final payment is made, a written guarantee covering the above requirements.

END OF SECTION

SECTION 16620
STANDBY GENERATOR SYSTEM

PART I GENERAL

1.01 DESCRIPTION OF WORK

Work under this Section includes the furnishing a standby generator system for the site noted.

1.02 QUALITY ASSURANCE

Manufacturer: Provide systems from one (1) manufacturer.

Warranty: Five (5) years comprehensive extended warranty from date of installation on entire standby power system by the system manufacturer.

NEC Compliance: Comply with applicable standby generator requirements of NEC Electrical Code.

NFPA Compliance: Comply with applicable requirements of NFPA requirements of NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbine". Also fully conform to NFPA 110, Emergency and Stand-by Power Systems".

UL Compliance: Provide standby generator system components, which are UL listed and labeled. System and all components shall be UL 2200 labeled.

ANSI/NEMA Compliance: Comply with applicable requirements of ANSI/NEMA MG 1, "Motors and Generators", and MG 2, "Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators".

IEEE Compliance: Comply with applicable portions of IEEE Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to standby power.

All units must conform to all EPA emissions limitations at the sites involved, and the manufacturer must provide documented certification of this conformity with shop drawing submittals or the submittals will be rejected without review.

1.03 SUBMITTALS

At Bid: Submit the rating of the proposed stand-by power equipment on which the bid is submitted, complete with the manufacturer's sizing calculation and signed indication that the unit is appropriate for the loads as indicated in these specifications.

Product Data: Submit manufacturer's product data, operation and maintenance instruction, and manufacturer's product warranty.

Shop Drawings: Submit dimensioned DRAWINGS and wiring diagrams of generator units and accessories including start stop stations, and instruments, showing accurately scaled generator set layout and its spatial relationship to associated equipment, and connections to remote equipment, and connections to remote equipment.

PART II PRODUCTS

2.01 GENERAL SYSTEM REQUIREMENTS

Power: 240/120 volts, single phase, 3 wire.

Capacity: Ratings noted are based on present system loadings obtained from the Owner. The manufacturer's are required to provide documentation indicating any recommended increase or decrease from the ratings noted, and/or provided a document indicating they concur with the ratings indicated here-in. If a larger rating is the manufacturer's formal recommendation the Contractor shall submit a Base Bid with a unit rated per the Engineer's size recommendation noted below and an Alternate Bid based on the manufacturer's recommended unit rating.

Existing Owner metering data from the serving utility indicates a previous peak demand of approximately 29 KW in August 2009. Present system motor loads are for heating and air conditioning units. The facility's existing 600 Ampere, 240/120 Volt, single phase service is NOT being upgraded by this project. Engineer's generator size recommendation is 40 KW, 40 KVA subject to manufacturer's sizing calculation agreement.

Generators shall be provided Caterpillar or Generac as represented by Milton CAT, Onan as represented by Cummins Northeast, or Kohler as represented by Power Products (size per print-out recommendation is required by manufacturer for this project based on above load information, with a statement indicating the manufacturer's agreement that sizing is appropriate).

Transfer switch shall be rated per contract drawings.

System Components at the site: Provide entire system furnished by generator manufacturer.

- L P gas engine driven generator (with fuel system provisions included).
- Engine start/stop controls
- Automatic transfer switch
- Mounted accessories as specified
- Properly sized black plastic nameplates with engraved white letters to identify all relays, components, etc.
- Sound attenuated enclosure

Performance Certification: Provide certification of the following by an independent testing lab:

- Full power rating
- Stability
- Voltage and frequency regulation
- All other certification per NFPA 110.

Starting Capability: Unit capable of starting after extended periods at -30°F.

Harmonic Interferences: Voltage regulator & electronic governor shall be designed to be immune to SCR and other non-linear load interferences. Generator shall be capable of full capacity with load harmonic distortion caused by SCR and other non-linear loads.

2.02 STANDBY GENERATORS

Provide the following:

Controls: Generator mounted control panel for unit with panel lights, safety devices, and engine starting controls, which include, but are not limited to:

- Battery charge rate ammeter
- Oil pressure gauge
- Water temperature gauge
- Run-stop-remote switch
- AC voltmeter
- Voltage adjusting rheostat
- High water temperature cutout
- Low water level cutout
- Emergency latch-relay with manual reset & indicator light
- Cranking limiter
- Manual reset circuit breaker
- Automatic overspeed shutdown
- Control contacts to control inlet and outlet air dampers, (if applicable), etc.

The controls shall contain the capability for the future addition of a communication's interface as follows:

1. Communications Interface – The controller shall interface, through a serial communication module, and with a network of transfer switches, locally (up to 4000 ft.) or remotely through modem serial communications. Standard software specific for the generator and transfer switch applications shall be provided by the manufacturer complete with all software loaded on the Owner's existing computer, including all necessary programming and training. This software shall allow for the monitoring, control and setup of parameters. All necessary wiring is to be included in the Contract.
2. Communications Module - A full duplex RS485 interface shall be installed in the controller to enable serial communications. The serial communications shall be capable of a direct connect or multi-drop configured network. This module shall allow for the seamless integration of existing or new communication transfer devices including remotely through modem serial communications. The serial communication interface shall be approved equal to the Caterpillar EMCP 3, Asco Accessory 72.

Equipment: Provide the following for unit

- Muffler, critical (maximum sound attenuation)
- Flexible seamless exhaust connection - insulated
- Vibration isolators
- Lube oil filter
- Fuel filters (if any)
- Battery cables
- Battery rack
- Battery charger-float type
- Air cleaner
- 12/24 volt, heavy duty, cold weather starting battery
- 12/24 volt Bendix fuel pumps (if required)

Air discharge duct adapter
Block heater
Flexible fuel supply and/or return line connections
Remote annunciator (NFPA 110) with common alarm dry output contact.
Base mounted fuel tank
Main output power circuit breaker
Radiator fill including glycol
Fuel vaporizer built into the equipment (if recommended by the manufacturer)
Super Sound attenuated enclosure, maximum combined attenuated sound at 23 feet is to be indicated in shop drawing submittal.
Fuel tank fill after all testing.

Specific items for the location are as follows:

Town Office: Transfer switch shall be rated 600 Amperes, 240/120 volts, single phase, 3 wire, 60 Hertz, NEMA 3R enclosed.

2.03 AUTOMATIC TRANSFER SWITCH

General: UL listed (Standard 924) for all classes of load. Ratings shall be per contract drawings and specifications (600 Ampere for this project). Preferred manufacturer is ASCO.

Operation:

1. Sequence as follows: Sense complete loss of power on any phase and signal generator to start.

When emergency power attains a minimum of 90% of rated speed and voltage, transfer load to emergency power.

Transfer load to normal power when normal power is restored; signal generator to stop.

Note: It is intended that transfers shall incorporate a "dead band" time in the neutral position in all operations.

2. Obtain operating current for load transfer from source to which load is to be transferred.
3. Emergency Power Malfunction: Automatically disconnect load to allow generator to restart with no connected load. Reconnect emergency power when 90% of rated speed and voltage is attained.

Features:

1. Disconnect device: Device to electrically disconnect control section from transfer switch to permit safe access for maintenance or service during normal operation.
2. Test switch: Simulate power outage for operational test of engine, alternator and load transfer control.

3. Float type battery charger: Fused, with adjustable charge rate millimeter (may be an individual unit not built into the transfer switch).
4. Cranking limiter: (24/12 volt, 2 wire start) fail to start protection for generator starting system.
5. Operation and selector switch: (24/12 volt, 2 wire start) fail to permit operation of generator at the control site. Provide check, stop, automatic and hand crank functions.
6. Under voltage Protection: Monitor normal source and start emergency power on partial loss of power on any phase where feedback voltages exist. Provide devices: solid-state voltage sensitive, calibrated dial adjustment, temperature compensated for a maximum deviation of +/- 2 volts from -25°F to +175°F.
7. Time delay to start emergency power: Provide to prevent emergency power from starting during normal voltage fluctuations, adjustable from 1.5 to 15 seconds.
8. Time delay to pick up load: Provide to allow emergency power to operate for a period of time before accepting load, adjustable 5 to 50 seconds.
9. Time delay to retransfer load: Provide to delay retransfer of load to normal power to override initial voltage fluctuations of returning normal power and to provide a minimum period of operating time for emergency power.

Bypass time delay if emergency power fails during delay period; retransfer load immediately to normal power.

Adjustment: 2 to 60 minutes

10. Time delay to stop emergency power: Provide to allow engine to run unloaded before being shutdown after load has been retransferred to normal power, adjustable 2 to 60 minutes.
11. Indicating lights: Provide on enclosure door, label indicate transfer switch position.

Green	-	Normal source
Red	-	Emergency source

12. Automatic engine exerciser: Provide built-in unit to exercise generator weekly for adjustable time periods. Loads to be transferred under exercise mode.

Provide circuitry to inhibit "Power Failure" and/or "Generator Run" alarm annunciation under automatic exerciser operation - unless other conditions do simultaneously exist.

13. Provide added auxiliary contacts for purposes required:

- a. alarm (1)
- b. future (2)

Note: Transfers to emergency and from emergency to normal shall have a dead-band period to ensure residual voltages have decayed before new power source is applied.

14. There shall be capability to add a future communications interface, as follows:

- a. Communications Interface – The controller shall interface, through a serial communication module, with a network of transfer switches, locally (up to 4000 ft.) or remotely through modem serial communications. Standard software specific for transfer switch applications shall be provided by the transfer switch manufacturer complete with all software loaded on the Owner's existing computer, including all necessary programming and training. This software shall allow for the monitoring, control and setup of parameters. All necessary wiring shall be included in the Contract.
- b. Communications Module - A full duplex RS485 interface shall be installed in the ATS controller to enable serial communications. The serial communications shall be capable of a direct connect or multi-drop configured network. This module shall allow for the seamless integration of existing or new communication transfer devices. The serial communication interface shall be equal to ASCO Accessory 72.

Rating and Performance

Continuous duty in a non-ventilated NEMA 3R enclosure at Town Office, complete with built-in anti-condensation heater and thermostatic control.

Load: All classes of load including inductive and non-inductive at 600 volts; tungsten lamp load at 250 volts.

Close on inrush current of 20 time continuous rating without welding or excessive burning of the contacts.

Load switching capability: 15 times continuous rating.

Cycles of operation: 600 cycles at rated current at a rate of 6 cycles per minute. One cycle: One complete opening and closing of both sets of contracts on inrush current 10 times continuous rating.

Withstand Ratings

Switch withstand rating based on manufacturer's published UL listing of acceptable protective devices (which limit any fault currents to within switches published withstand rating) must be provided. Vendor must provide written certification that circuit protective devices ahead of the transfer switches provide proper protection (emergency power side only), and what rating is required for service entrance listed/labeled device (to be provided by others at time of installation) on the emergency power side of the switch. All overcurrent devices on the "normal/utility" side of the transfer switch will be by others at the time of installation.

Construction

General: No wearing surfaces or moving parts requiring routine lubrication or maintenance.

Enclosure: NEMA 3R for outdoor installation at the Town Office ; key operated door locks; swing-out service panel, pre-punched for future addition of control components; thermostatically controlled anti-condensation heater.

Interlocking: Mechanical and electrical interlocking to prevent simultaneous energizing of load by normal and emergency power.

Contacts: Double break design for fast arc suppression, solid silver cadmium, completely enclosed in heat resistant contact chambers.

2.04 FUEL SYSTEM

The fuel system shall be provided by the Contractor in coordination with the Owner's fuel supplier. Coordinate with the fuel supplier to insure his ready access to the fuel supply. The design has been based on the use of the Owner's existing underground propane supply being acceptable for the new generator and other existing equipment it serves. If the fuel supplier indicates this will not be adequate, coordinate with the Owner and supplier to arrange for the appropriate facility to serve the new stand-by generator. Include all costs chargeable by the fuel supplier in conjunction with the installations in the bid submitted for the project.

Provide an underground 3 inch PVC conduit sleeve from the generator concrete pad bond-out for the fuel connection to the location indicated by the fuel supplier. This is for the fuel supplier's use in routing his gas piping. Provide suitable radius bends. Coordinate with the fuel supplier.

Flexible fuel lines shall be furnished by the generator manufacturer for each fuel connection to the engine.

2.05 GENERATOR EXHAUST

Provide generator exhaust in compliance with manufacturer's recommendations. Provide flexible continuous, bellows type stainless steel interlocking joints exhaust pipe at least 8 inches long for each engine exhaust outlet. The pipe outlet connections shall be compatible with ASA 125 lb. pipe flange.

2.06 SOUND ATTENUATED ENCLOSURE

Provide manufacturer's super sound attenuated enclosure complete with lockable access doors, etc. Indicate maximum sound level at 23 feet with shop drawing submittal.

Color of enclosure will be as selected by the Owner from manufacturer's standard color options. The availability of single color does not satisfy the requirements of this specification.

The orientation of radiator and engine exhaust must be as noted on the Drawings unless otherwise requested by the Owner.

2.07 MISCELLANEOUS

Anchor Bolts: Galvanized steel, by others at time of installation. Generator manufacturer shall note recommended size, etc., in shop drawings.

Concrete Base Pad: Provide concrete pad sized for unit and per the approved manufacturer's dimensions (length and width) and the depth noted on the Contract Drawings.

Provide initial radiator fill with glycol mixture set for minus 30 degrees F or lower.

PART III EXECUTION

3.01 INSTALLATION

All installation including the fuel system is part of this contract.

The unit shall be installed outdoors on a concrete pad. The automatic transfer switch will be installed outdoors as noted, the remote annunciator will be installed in the Owner's building, at a location as coordinated with the Owner.

3.02 GROUNDING

All grounding to NEC requirements and installation are part of this contract.

All assembled wiring by manufacturer shall be grounded as required by codes.

3.03 TESTING

After installations have been energized with normal power source, test engine-generator to demonstrate standby capability and compliance with requirements. Correct malfunctioning units, then retest demonstrate compliance. Test shall conform to NFPA 110 requirements.

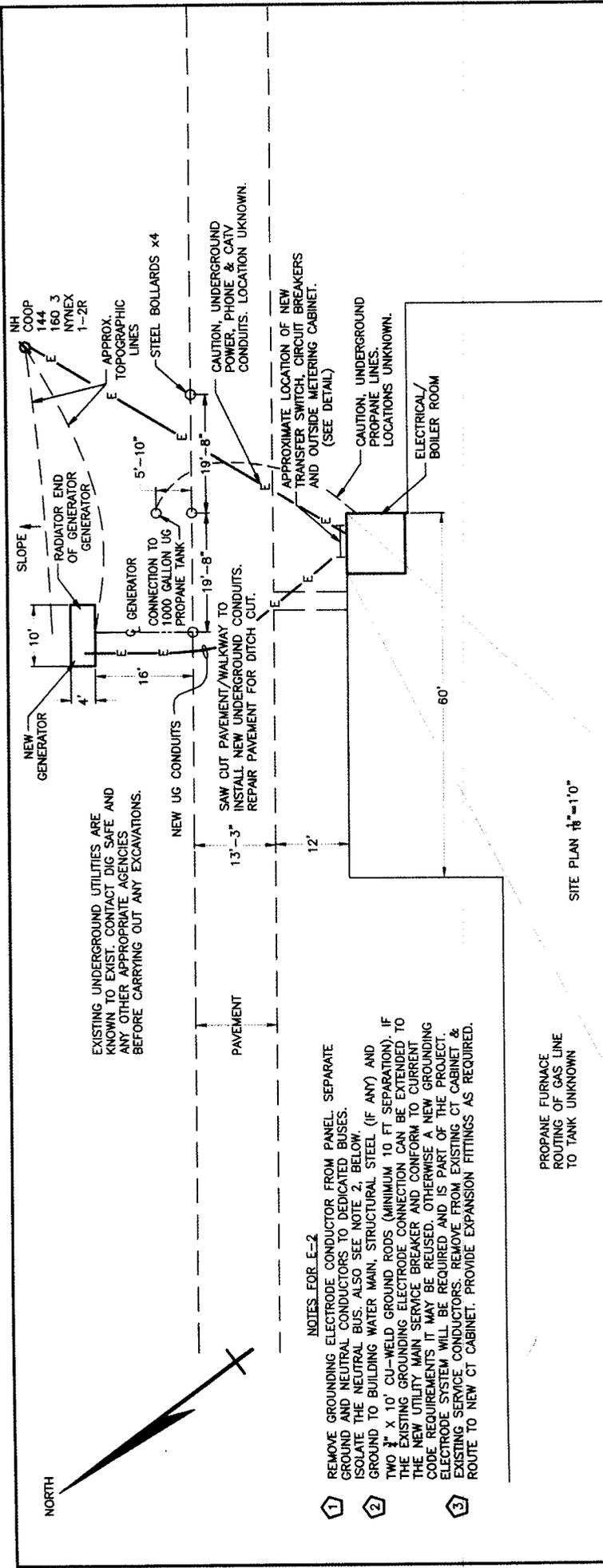
The Contractor shall include not less than a 4 hour start-up and training session for the equipment with the bid. This shall include training the Owner's designated personnel in the proper operation and preventative maintenance of the equipment provided.

The vendor shall include in his equipment proposal for the provisions of start-up testing and training.

3.04 FIRST YEAR PREVENTATIVE MAINTENANCE

The Contractor shall include an alternate bid indicating the cost to be added to the bid if the Owner elects to require the Contractor to provide all preventative maintenance required for the equipment for one year after the Owner's acceptance of the installation. This would not include the cost of fuel to operate the equipment.

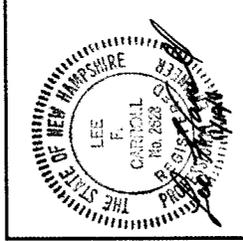
END OF SECTION



PANEL E - SURFACE/MOUNTED - NEMA 3R
 POLES: TOTAL 24, SPARE 4, 1P 20AMP, SPACE 16 POLES
 200 AMP MCB, 120/240 VOLT, 1 PHASE, 3 WIRE, 60 HERTZ

CKT. NO.	NO. POLES	RATING	DESCRIPTION	LOAD
1	1	20	RECEPTACLE	0.2
2	1	20 *	BATTERY CHARGER	0.5
3	1	20	BLOCK HEATER	1.0
4	1	20	ATS HEATER	
5-8	1	20	SPARE	
9-24	1	-	SPACE	

* PROVIDE HANDLE LOCK ON CIRCUITS
 ** PROVIDE TYPE HACR CIRCUIT BREAKER ON CIRCUIT



REVISIONS

ELECTRICAL DESIGN BY:
Lee F. Carroll, PE
 Electrical Consultants
 1 Madison Ave P.O. Box 357
 Gorham, NH 03541-0357
 603-846-1000
 lcarroll@nec.com

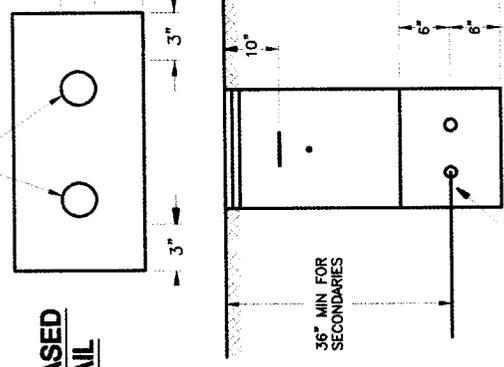
PROJECT NAME: TOWN HALL GENERATOR
 TOWN OF MOULTONBORO
 SHEET NAME: SITE PLAN AND ELECTRICAL/BOILER ROOM
 PROJECT NO.: 1047
 DATE: 10/26/10

NEW HAMSHIRE
 SKETCH NUMBER
E-1

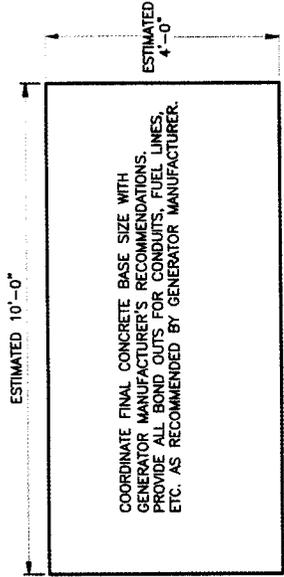
- NEW EXTERIOR CT CABINET. MOUNT TO INTERCEPT EXISTING SERVICE CONDUITS.
- NEW NEMA 3R 600A, 2P CIRCUIT BREAKER (BUILDING MAIN).
- NEW 600A, 2P NEMA 3R TRANSFER SWITCH.
- NEW NEMA 3R 200A, 2P CIRCUIT BREAKER (GENERATOR FEED).
- NEW GENERATOR AUXILIARY PANEL BOARD "E".
- EXISTING INTERIOR CT CABINET, TO BE REMOVED BY UTILITY.
- EXISTING 84 POLE, 600A BUILDING SERVICE PANEL.
- EXISTING UTILITY METER, RELOCATED IF NECESSARY.

CONDUIT SIZES AND NUMBERS PER SITE PLAN

TYPICAL CONCRETE ENCASED CONDUIT DETAIL
N.T.S.

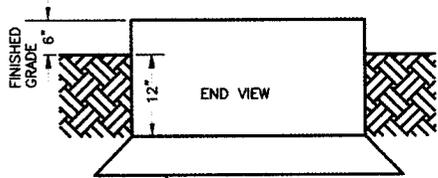


PROVIDE CONCRETE ENCASEMENT WHERE REQUIRED BY CODE OR UTILITY STANDARDS AND WHERE CONDUITS ARE BELOW ROADS AND WALKWAYS
N.T.S.

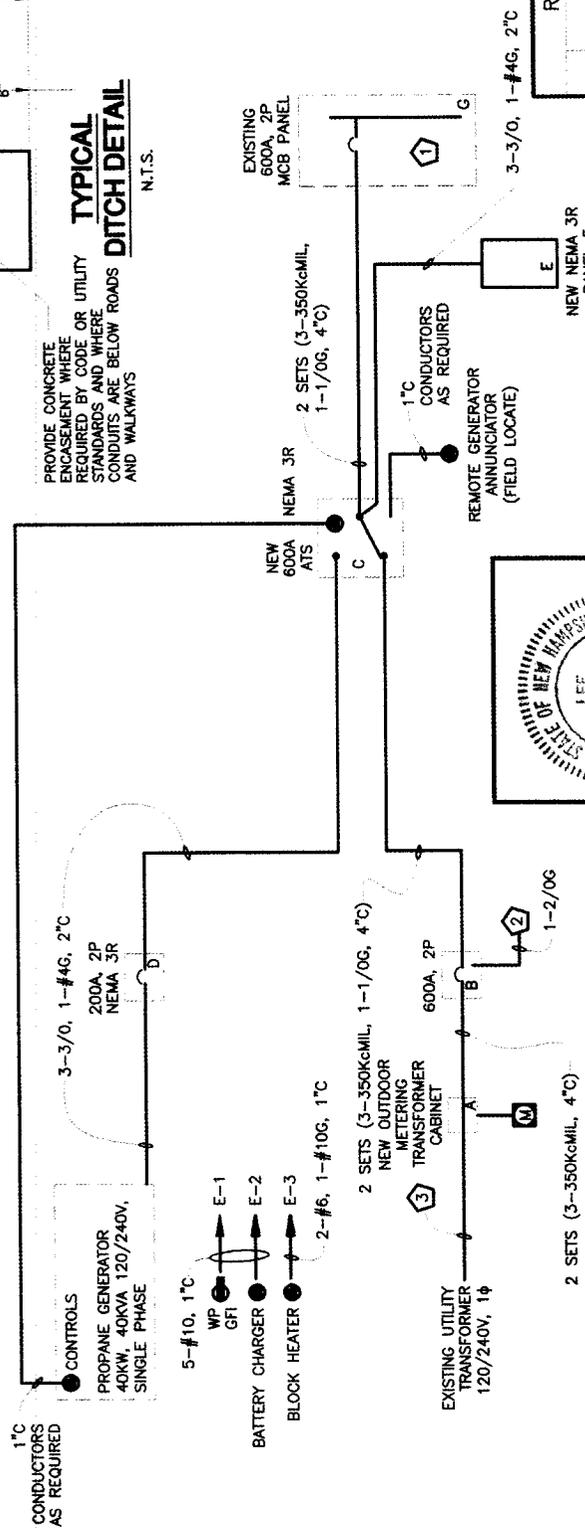


COORDINATE FINAL CONCRETE BASE SIZE WITH GENERATOR MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL BOND 'OUTS' FOR CONDUITS, FUEL LINES, ETC. AS RECOMMENDED BY GENERATOR MANUFACTURER.

TYPICAL GENERATOR CONCRETE BASE
N.T.S.



PROVIDE 24" DEEP COMPACTED BACK FILL BELOW CONCRETE



POWER RISER DETAIL
N.T.S.

ALL WIRE AND CONDUIT SIZES ARE BASED ON COPPER CONDUCTORS WITH 90°C INSULATION



ELECTRICAL DESIGN BY:
Lee F. Carroll, PE
Electrical Consultants
1 Madison Ave P.O. Box 357
Concord, NH 03301-0357
603-224-4444
lcarroll@nec.com

PROJECT NAME: TOWN HALL GENERATOR
TOWN OF MOULTONBORO
PROJECT NO.: 1047
DATE: 10/26/10

REVISIONS

NEW HAMPSHIRE
TOWN OF MOULTONBORO
DETAILS
DRAWING NO.: E-2