

PART 1 - GENERAL

1.01 SUMMARY

- A. This contract shall include the design, engineering, permitting, fabrication, equipment and materials, commissioning, start-up, testing and training associated with the equipment for a Compressed Natural Gas (CNG) fueling station as outlined in these specifications.
1. The requirements of these documents designate the minimum scope of supply.
 2. Proposers must meet the requirements of these specifications or their proposal will be deemed non-responsive and non-compliant.
 3. If the Proposer has Value Engineering, cost reduction proposals, the Proposer shall provide a specification compliant base bid and provide a description of the cost reduction proposal and the net cost reduction at the bottom of the Bid spreadsheet.
 4. All site work must be coordinated and scheduled with Owner.
- B. This Section includes general requirements for all work as specified herein and indicated on the Drawings.
1. This Section applies to all sections within Division 18.
 2. **Secondary equipment suppliers of subassemblies including the dryer, dispenser, storage, and control panel suppliers must review the entire document**, not just the section focused on their specific equipment, to ensure that they have a complete understanding of all general mechanical, electrical, controls and other requirements.
 3. Requirements stated in this Section are in addition to, and supplement requirements stated in other parts of the Project documents.
- C. The CNG Station shall include the design, fabrication, testing, delivery, startup/commissioning and training for the following equipment:
1. Single tower heated manually regenerative natural gas dryer.
 2. One electric driven fully packaged and enclosed simplex CNG compressor with provision for one future simplex compressor package for a total of two compressors at the site.
 3. One natural gas cascade storage system.

4. One dual hose, 1/2-inch, light duty vehicle CNG dispenser complete with required cascade storage controls and electronic temperature compensation controls and instrumentation.
5. Master control panel (MCP) complete with all required controls and software.
6. Pilot Gas System.
7. 480 VAC distribution and control panel assembly.
8. Miscellaneous installation components including automatic and manual gas valves, all flexible connections in the gas piping system, equipment mounted gas detection components, and equipment mounted emergency shutdown (ESD) buttons and remote ESD stations per the specifications.

1.02 DEFINITIONS

A. Within these documents:

1. Owner is defined as the City of North Hempstead, New York.
2. The Consultant is defined as an external designate of Owner that is responsible for design review, inspection and other tasks as instructed by Owner.
3. The Equipment Supplier (or Fabricator) is the party providing equipment to the Contractor.
4. The Contractor is the selected Proposer from this solicitation.
5. The Authority (or Authorities) Having Jurisdiction (AHJ) includes any and all agencies that are legally mandated to review, inspect and permit any aspect of the project.

B. The following list includes acronyms and abbreviations used in the Division 18 sections pertaining to the work of this Division but not necessarily used in other parts of the Project documents. The list does not contain acronyms used for reference standards, or technical and commonly used and understood abbreviations and acronyms.

AHJ	Authority Having Jurisdiction
ATS	Automatic Transfer Switch
CNG	Compressed Natural Gas
DSL	Digital Subscriber Line (broadband communication over a phone line)
ESD	Emergency Shut Down
FACP	Fire Alarm Control Panel
GDP	Gas Detection Panel
GTAW	Gas Tungsten Arc Welding
IS	Intrinsically Safe

MCC	Motor Control Center
MCP	Master Control Panel
MTS	Manual Transfer Switch
NB	National Board
NRTL	Nationally Recognized Testing Laboratory
NTP	Notice to Proceed
OD	Outside Diameter
P&ID	Piping and Instrumentation Diagram
PLC	Programmable Logic Controller
PQR	Procedure Qualification Records
PSIG	Pounds per Square Inch Gauge
RAP	Remote Annunciation Panel
SCADA	System Control and Data Acquisition
SCF	Standard Cubic Foot
SCFM	Standard Cubic Foot per Minute
SCR	Silicon Controlled Rectifier
SMAW	Shielded Metal Arc Welding
SRV	Safety Relief Valve
UCP	Unit Control Panel
VFD	Variable Frequency Drive
WPS	Welding Procedure Specifications

1.03 REFERENCES

- A. Applicable provisions of the latest accepted versions of the following standards shall apply to the work of this Division 18, except as modified herein, and are hereby made a part of these Contract Specifications to the extent required:

ASME ASME B31.3	Boiler Pressure Vessel Code Section VIII Division 1 Refinery Piping
NFPA 30A	Code for Motor Fuel Dispensing Facilities and Repair Garages
NFPA 52	Vehicular Gaseous Fuel Systems Code
NFPA 70	National Electrical Code (NEC)
NFPA 780	Standard for the Installation of Lightning Protection Systems
IBC	International Building Code and all applicable reference codes.
IFC	International Fire Code
IMC	International Mechanical Code
OSHA	Applicable standards and regulations by Occupational Safety and Health Administration
Local Ordinances	All local ordinances including local noise bylaws shall be met.

In the event that one code is more stringent than another, the most stringent code will be used as the basis of design. In the event that codes contradict each other, the local Authority Having Jurisdiction will determine the governing code.

- B. AHJ may also reference additional codes and standards and may impose local or project specific requirements. Contractor is required to meet all such requirements.
- C. All equipment shall include “Third Party” NRTL Certification and/or Inspection and Approval by an NRTL acceptable to the AHJ. Contractor shall arrange for and bear all costs to meet this requirement. No schedule extension will be granted to meet this requirement.
- D. In addition to adhering to the applicable codes, the Contractor shall perform the work with a degree of skill and diligence normally employed by professional engineers and contractors performing the same or similar tasks. The Contractor shall also use its best judgment to install a system that is safe, reliable, and which performs well.
- E. If the Contractor believes that a variance from any of the applicable codes will be required for this project, this shall be clearly indicated within the bid submitted or at any time during the project.
- F. Other Division 18 sections include additional references referring particularly to work in those sections.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: See individual Division 18 sections for specific requirements.
- B. Manufacturer Qualifications:
 - 1. Major components (such as, but not limited to, compressor blocks and cylinders, valves, instrumentation and control) of the same or essentially the same model have been used in similar applications in the United States. If manufacturers other than those listed in this document are proposed, the manufacturer must provide verifiable, positive references citing a minimum of 10 other installations in the previous five years within the USA.
 - 2. Further, it must be demonstrated that any proposed alternate compressor block manufacturer has manufactured at least an average of 20 blocks per year for the past five years and they must be able to demonstrate consistently available, quality spare parts available on a next day basis through references and through the presence of spare parts in inventory sufficient to construct five compressor blocks and cylinders of the proposed model.
 - 3. Other Division 18 sections may include additional requirements.
- C. Fabricator Qualifications: Ensure that assemblies (such as but not limited to compressor packages, gas dryer, dispensers) of the same or essentially the same model have been used in similar CNG station applications in the United States.

This requires verifiable positive references citing a minimum of five other installations commissioned in the previous five years.

D. Regulatory Requirements:

1. Permitting: This Work shall also include:
 - a. Providing technical backup required through this phase.

1.05 SUBMITTALS

A. General requirements include:

1. Manufacturer Approval Drawings: Equipment that is laid out, configured, or designed by the Fabricator based on performance specifications only shall be submitted to the Consultant for approval prior to release of Drawings for manufacturing.
2. All Contractor supplied drawings are to be supplied in D size and B size as follows:
 - a. AutoCAD 2010 and 2005 dwg files at each phase and as-built.
 - b. PDF at each phase and as-built.
3. All drawings are to be submitted at 30, 70 and 100 percent completion. Schedule to submit these drawing packages from date of contract award:
 - a. 30 percent package including all major equipment submittals due 15 days after award.
 - b. 70 percent package and site work safety plan due 45 days after award.
 - c. Approved project package due 60 days after award.
4. No fabrication can proceed until a complete set of fabrication drawings, specifications, and documentation has been submitted and approved by Owner. Proceeding without approval will be at Contractor's risk and expense.
5. Submittals prior to CNG station fabrication include:
 - a. Facility gas, air, vent and drain line Piping and Instrumentation Drawings (P&ID).
 - b. General assembly drawings of packaged dryers, compression units, storage assembly and control system, dispensing system (including internal assembly drawings of dispensers and other panels in the system), other station equipment and process piping including elevation and plan views, and major sub-assembly and component drawings.

- c. Gas dryer P&ID drawings, Bills of Material and piping isometric diagrams
 - d. Compressor P&ID, Bills of Material and piping isometric diagrams
 - e. Storage control P&ID drawings and Bills of Material
 - f. Dispenser P&ID drawings and Bills of Material
 - g. Pilot Gas System P&ID drawings and Bills of Material
 - h. Electrical Distribution and Control Panels, Master Control Panel (MCP) and Unit Control Panel (UCP) Programmable Logic Controller (PLC) electrical power, control and Emergency Shut Down (ESD) schematics and Bills of Material.
 - i. Skid and panel penetration and connection drawings
 - j. Equipment anchoring and grouting details and locations (note that chemical concrete anchor style bolts or approved equal must be used).
 - k. Compressor run simulation based on minimum, maximum and typical suction pressures. These runs shall clearly illustrate operating horsepower draw, pressures, temperatures, rod loads, rod reversal, clearances and piston speeds.
 - l. Product cut sheets listing approvals, materials, dimensions, spare parts, rebuild kits and including exploded parts diagrams for all procured components. Note: If the product cut sheet is for more than one model, size or type of component, the component the product cut sheet is being submitted for must be clearly indicated or the inapplicable information shall be deleted.
 - m. Compressor vibration and pulsation analysis report.
6. The Contractor shall supply complete equipment and installation drawings as outlined herein. Owner will review these drawings and the Contractor will make any required revisions as defined by Owner and the Authorities Having Jurisdiction. Owner will require a minimum of one calendar week to review and comment on initial (30 percent) submittal drawings and documents, and one week to review and comment on subsequent re-submittals. Once these drawings are completed and accepted by Owner the Owner will issue a Fabrication NTP for the equipment production.
- B. Additional requirements are included in the Division 18 sections.
- 1. As-built record documents for Division 18 CNG station work includes but is not limited to following:
 - a. General assembly drawings of packaged dryers, compression units, storage assembly and control system, dispensing system, other station

- equipment and process piping including all elevation and plan views, and major sub-assembly and component drawings.
- b. Gas dryer P&ID, Bills of Material and piping isometric diagrams.
 - c. Compressor P&ID, Bills of Material and piping isometric diagrams.
 - d. Storage control P&ID and Bills of Material.
 - e. Dispenser P&ID and Bills of Material.
 - f. Pilot Gas System P&ID and Bills of Material.
 - g. Distribution and Control Panels, Master Control Panel (MCP) and Unit Control Panel (UCP) Programmable Logic Controller (PLC) electrical power, control and Emergency Shut Down (ESD) schematics and Bills of Material.
 - h. Skid and panel penetration and connection drawings.
 - i. Equipment anchoring and grouting details and locations (note that chemical concrete anchor style bolts or approved equal must be used).
 - j. Product cut sheets listing approvals, materials, dimensions, spare parts, rebuild kits and including exploded parts diagrams for all procured components. Note: If the product cut sheet is for more than one model, size or type of component, the component the product cut sheet is being submitted for must be clearly indicated or the inapplicable information must be deleted.
 - k. Vibration/pulsation test results and conclusions.
2. Quality Control Manual (note that Owner may require periodic submission of portions of this material to confirm compliance.) Include the following:
- a. Welding Procedure Specifications (WPS).
 - b. Procedure Qualification Records (PQR).
 - c. Piping and Instrumentation Drawings referenced to isometric drawings.
 - d. Piping isometric drawings detailing all fittings, flanges, weld locations, pipe size and schedule or tubing size and wall thickness, components, pressure vessels and design pressure. These drawings must indicate which welder performed each weld.
 - e. X-ray films and reports referenced to individual welds on the piping isometric drawings.
 - f. Pressure test reports.

- g. Form U1A for all pressure vessels.
 - h. National Board registration for all pressure vessels.
3. Operations and Maintenance Manuals:
- a. Outline emergency procedures, standard operating procedures, general sequence of operations, recommended maintenance intervals and procedures, recommended parts, troubleshooting and repair procedures.

A table shall be provided to clearly outline all maintenance and inspection intervals for each piece of equipment. This shall designate by hours of service or by calendar intervals as applicable and shall indicate all items that are required or recommended by code or current industry practice such as SRV rebuilds, transducer calibration, etc.

Manuals shall provide site specific log and inspection forms for each inspection interval.

Manuals shall address all parts normally requiring maintenance, repair, or adjustment.

All procedures must be specific to the equipment supplied and must reference specific component ID numbers (such as provided on the valve tags).
 - b. Manuals shall include a complete set of as-built drawings reduced to “B” size. Manuals shall also provide product cut sheets and product manuals on all components used in the system.
 - c. Manuals shall provide a comprehensive list of spare parts with supplier and component manufacturer part numbers as well as recommended stocking quantities.
4. Number and Format of Closeout Submittal Documents:
- a. All Quality Control, Operation Manuals and As-Built drawings are to be provided to Owner in bound form with 6 hard copies and in electronic pdf format with all sections tabbed for ease of access to specific equipment.
 - b. All Operation Manuals, As-Built drawings and all PLC and Operator Interface Programs are to be provided to Owner on USB Flash drive--six sets.

1.06 PROJECT SITE CONDITIONS

- A. Ambient Temperature-Minimum: 0 deg F
- B. Ambient Temperature-Maximum: 100 deg F

- C. Inlet Gas Temperature: 70 deg F
- D. Gas Supply Pressure at 60 deg F (min / typical / max): 30/42/60 psig
- E. Estimated Throughput per Year (Year 10): TBD
- F. Normal Compressor Outlet Pressure: 4,500 psig
- G. Inlet Gas Moisture Content: 7.0 lbs H₂O/MMSCF
- H. Typical Natural Gas Composition: Pipeline Quality

1.07 COORDINATION AND SCHEDULING

- A. Deliveries shall be scheduled in cooperation with the Consultant and Owner.
- B. All work on site that could impact the ongoing operations on site shall be scheduled and executed in cooperation with the Consultant and Owner.
- C. Available Work hours within the buildings and services lanes are as follows:
 - 1. Not Applicable

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the following:
 - 1. Material shall be handled and stored in a manner to prevent damage.

1.09 SAFETY AND PROTECTION

- A. Comply with the safety requirements specified in the General Sections of these Project documents and with OSHA.
- B. Take whatever special precautions may be necessary to ensure the safety of personnel and property given the close proximity of 480 VAC power and natural gas at pressures exceeding 4,500 psig.

1.10 WARRANTY

- A. Provide in accordance with General Sections Warranties and Bond requirements, and the following:
 - 1. Warrant all equipment to be free of defective material and workmanship for a period of 12 months from successful completion of all acceptance testing as required by Sections in Division 18 and as summarized on the attached Completion Checklist spreadsheet, not from date of beneficial use. It is the Equipment Supplier's responsibility to request and receive a letter from the Consultant when tests have been successfully completed. Any defect found

during the warranty period shall be repaired or replaced free of charge, with shipment and labor charges borne by the Equipment Supplier or Contractor.

2. If the station startup is delayed by Owner, the warranty period will commence within six months of the date when the equipment was ready to operate.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND MODELS

- A. Manufacturers and models are outlined in specific Division 18 Sections.
- B. Basis of Design: Products are specified by manufacturer name, description, and/or catalog number to show intended function and quality. Manufacturer's catalog numbers and descriptions establish the quality of product required.
- C. Substitutions:
 1. In order to propose an alternate component, system, supplier of equipment, or a modification to the specified design that uses specified brands, Contractor shall demonstrate that any proposed alternative system is suitable for and has been successfully used in other projects.
 - a. Provide technical specifications required to allow Owner to confirm that design, efficiency, quality, appearance and delivery is comparable to or better than the specified component.
 - b. Provide a detailed description of the design implications, such as the impact on the size of the equipment, impact on electrical service, and the like. These facility and cost implications shall be itemized and a final net cost adder/reduction presented.
 - c. Owner retains the right to refuse any request for substitution that it, in its sole discretion, deems to be less desirable than the specified component.

2.02 MATERIALS

- A. Materials are outlined in Division 18 Sections.
- B. All materials are to be new, unused and current models not scheduled to be discontinued or replaced.

2.03 FINISHES

- A. The equipment shall be cleaned, prepared, primed and painted in accordance with paint manufacturer's recommendations, and the following:
 1. Paint shall be a minimum 6 mil total film thickness including a corrosion resistant primer and epoxy or enamel top coats. All paint must be suitable for outdoor use and rated for the temperatures of the application.

2. Apply anti-seize lubricants such as Loctite to the bolts on flange sets to prevent future removal problems due to paint accumulation on bolts.
 3. Compressor interstage piping paint shall be heat resistant to 400 deg F.
 4. Colors shall be as follows:
 - a. Gas piping shall be heat resistant as applicable. Preferred piping color within the package is bright yellow, however, Equipment Suppliers are permitted to use their standard color.
 - b. Intrinsic conduits and junction/pull boxes shall be labeled as per NEC.
 - c. Fire system panels and conduits shall be painted "Fire" red.
 - d. Other conduits and junction/pull boxes shall be galvanized or factory painted.
 - e. Air lines shall be black. It is not necessary to paint Teflon or stainless steel air line or brass or stainless steel air fittings.
 - f. Stainless steel tubing and fittings shall not be painted.
- B. Touch-up Painting in Field: Touch up equipment marred by shipment or erection using the same color and type of finish as the original. The finished condition shall be to the satisfaction of Owner.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Not used.

3.02 INSTALLATION, APPLICATION AND ERECTION

- A. Equipment Accessibility: Comply with applicable codes and install equipment to be accessible for operation, maintenance and repair. Equipment deemed inaccessible shall be relocated as directed.
- B. Placing, Anchoring and Grouting:
 1. The Contractor shall deliver the equipment to site with offloading by others. Multiple delivery dates may be required.
 2. If required by AHJs, provide structural calculations showing compliance with requirements of local code for loads on anchors.
 3. A final alignment on the compressor drive couplings shall be performed after anchoring and grouting is complete during startup.

3.03 PLANT QUALITY CONTROL

A. Unit/Equipment/System testing shall include the following:

1. Owner reserves the right to inspect the manufacturing facility at any time during this Contract without prior notice. Owner also reserves the right to have test equipment verified and recalibrated for accuracy at any time during the Contract at no cost to Owner.
2. Submit test procedures, blank test report forms, a list of calibrated test equipment items used in testing with manufacturer, model number, serial number, and calibration date, test set-up and P&ID at least 30 days prior to the date of the scheduled test(s).
3. Shop testing and field testing shall be coordinated with Owner a minimum of 14 days prior to intended test date.
4. Factory testing (General): Submit copies of completed test reports to Owner within 48 hours of test completion whether the test was successful or not.
5. Tests witnessed by Owner or Contractor witnessing of third party testing shall require their signature.
6. If the shop function test is not witnessed by Owner, a report outlining the outcome shall be notarized by the Contractor and issued to Owner.
7. After successful completion of factory test(s) and approval by Owner, the unit shall be shipped to the site. Upon completion of installation, field testing and commissioning will commence.
8. Coordinate and execute on site tests which may be required by the various regulatory agencies. This testing may include, but not be limited to, a testing of shut-downs and alarms (including fire alarm and ESD system), noise testing and the like. Pay all costs except the cost of the gas and power.
9. Owner will not unduly delay site tests, and hence will provide vehicles as required for the timely completion of the testing program.

3.04 CLEANING AND PATCHING

- #### A. Not used.

3.05 CLOSEOUT ACTIVITIES

A. Startup: Full system startup shall be included.

1. Coordinate with Owner. Owner will provide 14 days advance notice prior to startup.

2. Provide manpower and equipment as required to test and make the station fully operational at no cost to Owner, subject to approval by Owner.
 3. Acceptance testing shall be completed to confirm all performance parameters as required in these specifications and as represented in the Contractor's bid are met.
 4. Revisit the site after each compressor has accumulated approximately 100 hours.
 - a. Recheck calibration, alignment and operation of equipment.
 - b. Change the air and gas compressor oil and replace all air, oil and gas filters on the station with new OEM branded filters.
 5. Station acceptance shall be granted contingent on the 100 hour service being performed after acceptance.
- B. Training:
1. Include operator training.
 - a. Provide Owner with 14 days' notice prior to training.
 - a. Provide a minimum of three days training on the equipment, at no cost to Owner.
 - b. Training materials are to be comprehensive, professional and shall be given to Owner for Owner's future use in training or retraining. Training materials and O&M manuals must include step by step instructions in the required maintenance procedures with reference to drawings using actual component ID numbers. The training materials shall include a table with required service, maintenance and inspection intervals. Training materials must also indicate the normal operating ranges for all parameters.
 - c. In addition to any general training required by the General Specifications, the Contractor shall provide the following training which shall be specific to this site and this equipment. All training documents shall be color, bound training manuals with color illustrations and pictures from this site. Wherever possible, the manuals shall utilize pictures of equipment on this site and specific equipment numbers (such as valve B-502) to provide clarity and site specificity to the training materials. PowerPoint presentations shall also be assembled to illustrate the content of each of the manuals.
 - d. Complete CNG system training. The first training module shall include user and first responder training:
 - 1) Definition of common terms.

- 2) Properties of the fuel.
 - 3) How does this station CNG system operate? This should include an illustration of the gas flow through the system. This description should identify the isolation and venting points present for major components (tanks, compressors, dispensers, etc.) in this station.
 - 4) Provide a video and print version of a safe vehicle fueling Standard Operating Procedure (SOP) that addresses normal fueling and issues that may complicate normal fueling. Video is to be from this site.
 - 5) Identify the safety risks and the required safety precautions (clothing, procedures, etc.)
 - 6) Review the emergency response procedures. What to do in the case of fire, gas leak or venting, explosion.
 - a) How to make the system safe after an incident.
 - b) When and where to evacuate to in the event of an incident.
 - c) Who and when to call to report an incident.
 - 7) This training session is expected to require a minimum of 2 hours per session and shall be delivered to a minimum of 4 groups and may require delivery after normal working hours. These groups might include Owner staff and contractors, and first responders. 100 copies of the training manual shall be provided.
- e. The second module shall include Owner technical staff training:
- 1) Performance of daily and weekly inspections (log forms must be provided by the Contractor).
 - 2) Routine maintenance, inspection and service requirements. Training shall include, but not be limited to: instrumentation and SRV calibration intervals and resources, filter replacement, lubricator service, inspecting bores, aligning couplers, and other planned maintenance. Training shall also include maintenance such as valve and ring replacements, and crankshaft, crosshead and connecting rod inspection.
 - 3) Safety procedures.
 - 4) System operation overview.

- 5) Troubleshooting and debugging procedures. A fault tree shall be provided.
 - 6) This training session is expected to require a minimum of 16 hours per session and shall be delivered to a minimum of 2 groups and may require delivery after normal working hours. These groups might include Owner staff and contractors, and first responders. 20 copies of the training manual shall be provided.
- f. All training manuals, presentations and documentation must be provided in reproducible form without copyright limitation, to allow Owner to reproduce this information for the purpose of training additional maintenance staff or contractors.
- C. Original copies of all operating permits from all AHJs must be formally submitted by the Contractor.
- D. Station acceptance will not be considered final until the Contractor has provided the Owner with a written “Certification of Code Compliance,” and a “Certification of Testing Completion.” This compliance document shall certify that the CNG station and garage modifications provided meet all applicable codes as listed herein and as required by the AHJ and been fully functionally tested to ensure that all safety systems are fully operable. This certification shall be signed and stamped by a Professional Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

- A. No separate measurement or payment will be made for the work required by this section. The cost for this portion of the Work will be considered incidental to, and included in the Lump Sum price bid for the Project.

End of Section
