



## **BOARD OF EDUCATION — SPECIAL MEETING**

**Thursday, May 23, 2013 - Public Session: 4:00 p.m.**

Location: Murrieta Valley Unified School District Support Center  
41870 McAlby Court, Murrieta, California

### **Board of Education**

*Kris Thomasian—President, Kenneth Dickson—Clerk, Robin Crist, Paul Diffley, Barbara Muir*

### **Superintendent / Secretary to the Board**

*Patrick Kelley*

## **A G E N D A**

### **A. OPENING ACTIVITIES**

1. Call to Order (4:00 p.m.)
2. Pledge of Allegiance
3. Approval of Agenda
4. Public Comments

*Individuals wishing to address the Board are requested to complete a "Request to Address the Board of Education" card located at the entrance to the Board Room and submit it to the Executive Assistant to the Superintendent & Board. Speakers shall be first recognized by the Board President at the designated time on the agenda. In accordance with Board Bylaw 9323, individual speakers shall be allowed three minutes to address the Board on each agenda or non-agenda item. The Governing Board shall limit the total time for public input on each item to 20 minutes. No action or discussion shall be undertaken on any item not appearing on the posted agenda, except as authorized by law (Education Code 35145.5, Government Code 54954.2.)*

5. Presentations/Recognition
6. Approval of Board of Education Meeting Schedule for the 2013/14 School Year

### **B. HUMAN RESOURCES**

1. Approval of Employment of Confidential/Management Applicants
2. Approval of Employment of Certificated Applicant
3. Approval of Employee Job Reclassifications
4. Certification of Athletic Coaches for the Spring Season
5. Approval of Proposed 2013/14 Student Calendar
6. Second Reading and Approval of New Job Description for Lead Designated Instructional Aide (D.I.S.) – IBI/Autism Program

**C. FACILITIES/OPERATIONAL SERVICES**

1. Approval to Award Contract for the Design, Installation and Commissioning of Compressed Natural Gas Systems and Maintenance Services Agreement to Go Natural Gas in the amount of \$1,464,023
2. Public Hearing regarding the adoption of Resolution No. 12/13-28 De-Annexing certain property from Improvement Area B and Annexing to Improvement Area C of Community Facilities District No. 2006-1
3. Adoption of **Resolution No. 12/13-28** De-Annexing certain property from Improvement Area B and Annexing to Improvement Area C of Community Facilities District No. 2006-1
4. Adoption of **Resolution No. 12/13-29** Calling a Special Election for Community Facilities District No. 2006-1
5. Adoption of **Resolution No. 12/13-30** Declaring results of a Special Election and directing recording of an Amended Notice of Special Tax Lien and Notice of Cancellation of Special Tax Lien
6. Approval to Award a Contract to Global CTI for the purchase of Phone Systems, Materials and Installation under CMAS Contract #3-08-70-2630A

**D. BUSINESS SERVICES**

1. Information regarding the Governor's May Revision Budget Proposal for Fiscal Year 2013/14

**CLOSED SESSION**

- CS-1 Conference with Labor Negotiators pursuant to Government Code 54957.6  
Agency designated representatives: Patrick Kelley, Stacy Coleman and Pamela Wilson

**PUBLIC SESSION**

Report Out of Closed Session

**E. ADJOURNMENT**

Agenda documents are available for public inspection at the District Support Center located at 41870 McAlby Court and on the district's website [www.murrieta.k12.ca.us](http://www.murrieta.k12.ca.us)

Pursuant to the Americans with Disabilities Act, persons with a disability who require a disability-related modification or accommodation in order to participate in a meeting, including auxiliary aids or services, may request such modification or accommodation from the Superintendent's Executive Assistant at 951-696-1601 (telephone) or 951-304-1523 (facsimile). Notification 48 hours prior to the meeting will enable the district to make reasonable arrangements to assure accessibility to the meeting.

**Approval of Board of Education Meeting Schedule for the 2013/14 School Year**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: A-6  
May 23, 2013  
Page 1 of 1  
Attachment: 1 page

Prepared by: Patrick Kelley, Superintendent

**Background Information**

The Board is required to adopt a calendar of meetings at its Annual Organizational Meeting in December. It is helpful administratively to approve the calendar on a fiscal year basis rather than calendar year. The Riverside County Office of Education concurs that this process is acceptable, but the Board must continue to conduct the annual organizational meeting as mandated in December.

The attached Board Meeting schedule is presented for consideration.

**Educational Implications**

Not applicable.

**Fiscal Implications**

Not applicable.

**Recommendation**

It is recommended that the Board of Education set regular meetings for the second Thursday of each month at 7:00 p.m., with specified adjustments as listed for the 2013/14 school year; said meetings to be held at Murrieta Valley Unified School District Support Center located at 41870 McAlby Court, Murrieta. Further, that optional special meetings be set for the primary purpose of considering student discipline/expulsion matters.



**2013/14**  
**Board of Education Regular Meetings**  
**7:00 p.m.**

<b>July 2013 – None</b>	<b>January 16, 2014</b>
<b>August 8, 2013</b>	<b>February 12, 2014</b>
<b>September 12, 2013</b>	<b>March 13, 2014</b>
<b>October 10, 2013</b>	<b>April 17, 2014</b>
<b>November 14, 2013</b>	<b>May 8, 2014</b>
<b>December 12, 2013</b>	<b>June 26, 2014</b>
<p>Regular meeting dates are generally set for the second Thursday of each month, with certain adjustments to complement the school calendar. Meetings are held at the Murrieta Valley Unified School District Support Center with public session at 7:00 p.m., but are subject to change pending posting of the official agenda 72 hours in advance of the meeting. Public comments are welcome at regular meetings. Agendas may be accessed on the district website at <a href="http://www.murrieta.k12.ca.us">www.murrieta.k12.ca.us</a></p>	

**2013/14**  
**Board of Education Special (Optional) Meetings**  
**5:00 p.m.**

The following meetings are planned for the primary purpose of considering student discipline/expulsion matters and will be held on an as-needed basis.

<b>July 2013 – None</b>	<b>January 30, 2014</b>
<b>August 22, 2013</b>	<b>February 27, 2014</b>
<b>September 26, 2013</b>	<b>March 2014 – None</b>
<b>October 24, 2013</b>	<b>April 24, 2014</b>
<b>November 2013 – None</b>	<b>May 22, 2014</b>
<b>December 2013 – None</b>	<b>June 12, 2014</b>



**Approval of Employment of Confidential/Management Applicants**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: B-1  
May 23, 2013  
Page 1 of 1

Prepared by: Pamela Wilson, Assistant Superintendent, Human Resources

**Background Information**

The following confidential/management applicants are recommended for employment pending completion of the hiring process:

<u>NAME</u>	<u>ASSIGNMENT</u>	<u>EFFECTIVE DATE</u>	<u>LOCATION</u>
Bonnie Mitzel	School Nurse	7/1/2013	Special Education
Eric Mooney	High School Principal	7/1/2013	Murrieta Valley HS

**Educational Implications**

None.

**Financial Implications**

These positions will be included in the 2013/14 Certificated Staffing Plan that will be presented to the Board of Education at its Regular Meeting on June 27, 2013.

**Recommendation**

It is recommended that the Board of Education approve the employment of the confidential/management applicants listed.

**Approval of Employment of Certificated Applicant**

Action:     X      
Consent:             
Information:             
Presentation:           

**Agenda Item: B-2  
May 23, 2013  
Page 1 of 1**

Prepared by: Pamela Wilson, Assistant Superintendent, Human Resources

**Background Information**

The following Certificated applicant is recommended for employment pending completion of the hiring process and a criminal background investigation:

<u>NAME</u>	<u>ASSIGNMENT</u>	<u>EFFECTIVE DATE</u>	<u>LOCATION</u>
Master Sergeant Paul Spear	Teacher, AFJROTC	7/1/2013	Vista Murrieta HS

**Educational Implications**

This individual is properly credentialed and has talents in areas that will add to the district's educational program.

**Financial Implications**

This position will be included in the 2013/14 Certificated Staffing Plan that will be presented to the Board of Education at its Regular Meeting on June 27, 2013.

**Recommendation**

It is recommended that the Board of Education approve employment of the Certificated applicant listed pending completion of the hiring process.

**Approval of Employee Job Reclassifications**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: B-3  
May 23, 2013  
Page 1 of 1

Prepared by: Pamela Wilson, Assistant Superintendent, Human Resources

**Background Information**

The reclassifications shown below are recommended as part of the process that allows employees in instructional support positions the opportunity for growth based upon education and experience requirements. As a result of this process, the following classified employees are recommended for reclassification:

<u>From</u>	Position	<u>To</u>	Range		Effective <u>Date</u>	<u>Employee</u>
			<u>From</u>	<u>To</u>		
D.I.S. Aide I		D.I.S. Aide II	15	17	4/30/13	Mary Olthoff
D.I.S. Aide I		D.I.S. Aide II	15	17	4/10/13	Michelle Swan

**Educational Implications**

Not applicable.

**Financial Implications**

The fiscal impact to the district as the result of approval of the above reclassifications is approximately \$1,744 annually including benefits.

**Recommendation**

It is recommended that the Board of Education approve the reclassifications of the above listed employees.

**Certification of Athletic Coaches for the Spring Season**

Action:                X      
Consent:                      
Information:                   
Presentation:               

Agenda Item: B-4  
May 23, 2013  
Page 1 of 1  
Attachment: 1 Page

Prepared by: Pamela Wilson, Assistant Superintendent, Human Resources

**Background Information**

As per Title 5 of the California Code of Regulation (CCR), the MVUSD Board of Education must annually certify to the State Board of Education that the provisions of Section 5593 have been met. Our district certifies coaches on a seasonal and as needed basis.

Athletic coaches on the attached listing have met the provisions as set forth in Title 5, California Code of Regulations, Section 5593.

**Educational Implications**

Ensuring athletic coaches have met the provisions of Title 5, California Code of Regulations, Section 5593 is an essential element of any quality athletic program.

**Financial Implications**

Not applicable.

**Recommendation**

It is recommended that the Board of Education certify the list of athletic coaches for the spring season as having met the provisions of Title 5, California Code of Regulations, Section 5593.

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT

**MURRIETA VALLEY HIGH SCHOOL**  
**2012/13 SPRING COACHING STAFF**

**BASEBALL**

Mark Short

**VISTA MURRIETA HIGH SCHOOL**  
**2012/13 SPRING COACHING STAFF**

**VOLLEYBALL (SUMMER CAMP)**

Ray Calderon

**Approval of Proposed 2013/14 Student Calendar**

Action:                X      
Consent:                       
Information:                   
Presentation:                

Agenda Item: B-5  
May 23, 2013  
Page 1 of 1  
Attachment: 1 Page

Prepared by: Pamela Wilson, Assistant Superintendent, Human Resources

**Background Information**

The proposed 2013/14 Student Calendar is presented to the Board for approval. This calendar reflects 180 student attendance days. The first student day will be August 14, 2013 and the last day of school is June 13, 2014.

**Educational Implications**

This calendar was developed with input from staff and community members to best facilitate student learning.

**Financial Implications**

There is no financial implication anticipated.

**Recommendation**

It is recommended that the Board of Education approve the proposed 2013/14 Student Calendar as presented.



**Second Reading and Approval of New Job Description for Lead Designated Instructional Aide (D.I.S.) – IBI/Autism Program**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: B-6  
May 23, 2013  
Page 1 of 1  
Attachment: 3 Pages

Prepared by: Pamela Wilson, Assistant Superintendent, Human Resources

**Background Information**

The above listed job description is presented to the Board of Education for second reading and approval. The district reviews and revises positions and job descriptions on an on-going basis. Efforts are focused on identifying key functions and abilities, consolidation of information of the job description and compliance with state and federal requirements.

The Lead Designated Instructional Aide position has been created as a result for the need in Autism Program classes.

The first reading for this job description was held at the May 9, 2013 Regular Board of Education Meeting. There have been no changes made to this job description since the first reading.

**Educational Implications**

The employee in this position will directly and indirectly provide support to the educational program.

**Financial Implications**

None.

**Recommendation**

It is recommended that the Board of Education approve the job description for Lead Designation Instruction Aide (D.I.S.) – IBI/Autism Program.



## SECOND READING/APPROVAL - NEW

### MURRIETA VALLEY UNIFIED SCHOOL DISTRICT JOB DESCRIPTION

5/23/2012  
Page 1 of 3

**TITLE:** LEAD DESIGNATED INSTRUCTIONAL SERVICES AIDE (D.I.S.)  
– IBI/AUTISM PROGRAM

**REPORTS TO:** Under the general supervision of the Director of Special Education or designee, is responsible for the day to day site supervision and effective implementation of educational programs for students with autism in the home and school environments.

#### **QUALIFICATIONS:**

##### ***Knowledge of:***

1. General concept of child growth and development and child behavioral characteristics.
2. Techniques used in controlling and motivating children.
3. Competency and skills involving interpersonal/group dynamics.
4. Computer skills
5. Assertive and assaultive behavior protection and basic self defense methods
6. Basic subjects taught in District schools, including arithmetic, grammar, spelling, language, and reading.
7. Health and Safety Regulations
8. Proper use and positioning of specialized equipment and apparatus'.
9. Child guidance principles and practices, especially as they related to school-age children with disabilities.
10. Educational expectations based on the California Content Standards
11. Theories of Applied Behavior Analysis
12. Characteristics of Autism Spectrum and Related Disorders
13. Behavior management strategies and techniques relation to pupils who experience atypical control patterns.
14. A variety of methods of data collections and data analysis.

##### ***Ability to:***

1. Assist staff/specialists with instruction and related activities of the assigned learning environment.
2. Be a productive and active team member
3. Learn the procedures, functions, and limitations of assigned duties.
4. Lift, restrain, and discipline students according to approved policies and procedures.
5. Maintain confidentiality of pupil and school information
6. Obtain and maintain a valid First Aid Certificate and CPR Certificate.
7. Operate a district or personal vehicle observing legal and defensive driving practices.
8. Present and maintain a pleasant appearance and demeanor.
9. Provide appropriate special education services in the regular classroom as identified within a child's IEP.
10. Perform routine clerical tasks and operate a variety of educational and office related machines and equipment.
11. Understand and carry out oral and written directions.
12. Communicate effectively with students, faculty, specialists, parents, and other adults.
13. Assist staff with how to manage student behavior and implement current behavior support and intervention plans.

**MURRIETA VALLEY UNIFIED SCHOOL DISTRICT  
JOB DESCRIPTION**

5/23/2013  
Page 2 of 3

**TITLE: LEAD DESIGNATED INSTRUCTIONAL SERVICES AIDE (D.I.S.)  
– IBI/AUTISM PROGRAM**

***Knowledge of: (continued)***

14. Assist personnel working with students towards more acceptable social behaviors.
15. Assist with training and implementation of day to day instruction between staff and student.
16. Act as a liaison between DIS staff and Special Education Administration.
17. Provide effective district and community leadership to align Special Education programs as well as facilitate the Districts' program goals and support its mission.
18. Work both collaboratively and independently.
19. Make accurate and timely decisions.
20. Handle all matters in tactful, courteous, and confidential manner.

***Training, Education and Experience (required)***

1. Any combination of education equivalent to the completion of the twelfth (12<sup>th</sup>) grade.
2. One (1) year of successful experience in working with school- aged children with autism in an organized setting.
3. One year or 1000 hours of working with students with special education services in an organized setting.
4. Possession and maintenance of a valid California Driver's License.
5. Completion of Murrieta Valley Unified School District's TIER III IBI Training Protocol, or the equivalent of 30 hours of verifiable training including a general understanding of Autism, Applied Behavior Analysis, Behavior Management, and Data collection.

***Training, Education and Experience (desired)***

1. A Bachelor's degree in Applied Behavior Analysis, Psychology, Special Education and/or related field.
2. Two years (2) of successful experience in working with school aged children with autism in an organized setting.
3. Supervisory experience of students and staff.

**ESSENTIAL FUNCTIONS:**

1. Follows district policies and procedures.
2. Knows and understands the Mission and Core Values of the district.
3. Prepares instructional material and equipment for use in classroom activities.
4. Facilitates, monitors, and acts as a liaison between DIS staff and Special Education administration for students with in home and school Intensive Behavior Intervention (IBI) programs.
5. Assists in overseeing the implementation of programs and service delivery options to meet the needs of students diagnosed with autism including appropriate behavioral supports in the classroom and home environments.

**SECOND READING/APPROVAL - NEW**

**MURRIETA VALLEY UNIFIED SCHOOL DISTRICT  
JOB DESCRIPTION**

5/23/2013  
Page 3 of 3

**TITLE: LEAD DESIGNATED INSTRUCTIONAL SERVICES AIDE (D.I.S.)  
– IBI/AUTISM PROGRAM**

**ESSENTIAL FUNCTIONS: (continued)**

6. Assists with ongoing training to autism support staff and other designated personnel in IBI and other various methodologies. Assists in supervising assigned classified staff under the general direction of assigned designee.
7. Meets regularly with program and assigned school site staff to ensure program quality and compliance.
8. Communicates any adjustments, changes, or maintenance of a variety of records, logs, and files to appropriate supervisory staff.
9. Performs other related duties as assigned.

**PHYSICAL ABILITIES:**

1. Visual ability to read handwritten or typed documents and the display screen of various office equipment and machines.
2. Able to conduct verbal conversation in English or other designated language.
3. Able to hear normal range verbal conversation (approximately 60 decibels)
4. Able to sit, stand, stoop, kneel, bend, and walk.
5. Able to sit for sustained periods of time.
6. Able to climb slopes, stairs, steps, ramps, and ladders.
7. Able to lift up to ten pounds frequently, and twenty pounds occasionally.
8. Able to carry up to ten pounds frequently and twenty pounds occasionally.
9. Able to push and pull objects weighing up to forty pounds.
10. Able to exhibit full range of motion for shoulder external rotation, internal rotations, shoulder abduction and adduction, elbow flexion and extension, shoulder extension and flexion, back lateral flexion, hip flexion and extension and knee flexion.
11. Able to operate a motor vehicle in a safe and effective manner.

**TERMS OF EMPLOYMENT:** Eleven month work year  
220 work days  
Classified Bargaining Unit Member

**EVALUATION:** Performance of this job will be evaluated in accordance with Board of Education policy on Evaluation of Professional Personnel. The assigned administrator will give the evaluation.

Approved by: Board of Education

Date: \_\_\_\_\_

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT IS  
AN EQUAL OPPORTUNITY EMPLOYER  
MURRIETA VALLEY SCHOOL DISTRICT IS A  
TOBACCO-FREE, DRUG-FREE WORKPLACE

**Approval to Award Contract for the Design, Installation and Commissioning of Compressed Natural Gas Systems and Maintenance Services Agreement to Go Natural Gas in the amount of \$1,464,023**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: C-1  
May 23, 2013  
Page 1 of 1  
Attachment: 274 pages

Prepared by: Bill Olien, Assistant Superintendent, Facilities/Operational Services  
Chuck Jones, Director of Facilities Planning and Purchasing

**Background Information**

Staff has been studying various options for compressed natural gas for the bus transportation fleet. The Board was given an update on some of the initial ideas at the May 26, 2011 Special Board meeting. Further information was provided in an update at the November 8, 2012 Board meeting.

The district released a Request for Proposal (RFP) on March 28, 2013. There was a job walk for all interested companies on March 7, 2013. The RFP responses were due on April 26, 2013.

Government Code section 4217.12(a)(1) authorizes a public agency to enter into an energy service contract with respect to an energy conservation facility on terms that the public agency's governing board determines are in the best interests of the public agency and if the governing board finds that the anticipated cost to the public agency for the energy provided by the energy conservation facility will be less than the anticipated marginal cost to the district of thermal, electrical or other energy that would have been consumed by the district in the absence of those purchases.

Based on the proposals, interviews and reference checks staff is recommending the Board enter into a contract with Go Natural Gas. Staff, along with legal counsel and consultants, entered into negotiations with Go Natural Gas to agree to terms and conditions of the contract. The suggested contract has been approved by staff, district's legal counsel and district's consultant.

**Educational Implication**

None.

**Fiscal Implication**

Community Facilities District (CFD) funds.

**Recommendation**

It is recommended the Board approve to award a contract for the design, installation and commissioning of Compressed Natural Gas Systems and Maintenance Services Agreement to Go Natural Gas in the amount of \$1,464,023.

**AGREEMENT FOR DESIGN AND INSTALLATION  
OF COMPRESSED NATURAL GAS REFUELING STATION  
AND RELATED MODIFICATIONS**

This Agreement for Design and Installation of Compressed Natural Gas Refueling Station and Related Modifications ("Agreement") is made as of May 23, 2013, between the MURRIETA VALLEY UNIFIED SCHOOL DISTRICT ("District") and GO NATURAL GAS ("Design-Builder") (together, "Parties").

- 1. Services.** Design-Builder shall furnish to the District the labor, equipment, material, and services as described in Exhibit "A" attached hereto and incorporated herein by this reference ("Services" or "Work").
- 2. Term.** Design-Builder shall commence providing services under this Agreement upon execution of the Agreement by both parties, and will diligently perform such Services as required and will achieve Final Completion of the Services on or before **August 2, 2013**.
  - 2.1.** Final Completion means that each of the following has been achieved in accordance with Prudent Industry Practices and the other requirements of the Contract Documents: (a) All infrastructure necessary to achieve connection of the System to the Utility's compressed natural gas system are fully installed; (b) Successful testing of all systems comprising the System in accordance with the requirements of the Agreement; and (c) The System is capable of operating safely in accordance with Prudent Industry Practices and all applicable Laws.
- 3. Liquidated Damages.** Time is of the essence for all Work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Design-Builder's delay; therefore, Design-Builder agrees that it shall pay to the District the sum of ONE THOUSAND DOLLARS (\$1,000) per day as liquidated damages for each and every day's delay beyond the Final Completion Date that Final Completion is not achieved.

It is hereby understood and agreed that this amount is not a penalty.

In the event any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due the Design-Builder under this Agreement, the District may seek recovery of Liquidated Damages from the Respondent's Performance Bond Surety and/or the District may seek recovery of Liquidated Damages from the Respondent or the Performance Bond Surety without having exhausted remedies against the other.

- 4. Grants/Rebates/Incentives.** Design-Builder shall use commercially reasonable efforts to support the District in obtaining or maintaining grants/rebates/incentives for the Site(s). Design-Builder shall use commercially reasonable efforts to support the District in obtaining an extension, if allowed and if necessary. If the District does not obtain extensions for the rebates on terms satisfactory to the District on its sole discretion, the District may terminate the Contract Documents upon written notice to Design-Builder without liability to either Party.
- 5. Submittal of Documents.** Design-Builder shall not commence the Work under this Agreement until the Design-Builder has submitted and the District has approved the

performance bond, payment (labor and material) bond, the certificate(s) and affidavit(s), and the endorsement(s) of insurance required as indicated below:

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Signed Agreement                                   | <input checked="" type="checkbox"/> Insurance Certificates and Endorsements                        |
| <input checked="" type="checkbox"/> Notice to Proceed                                  | <input checked="" type="checkbox"/> Performance Bond   |
| <input checked="" type="checkbox"/> Terms and Conditions to Contract                   | <input checked="" type="checkbox"/> Payment Bond   |
| <input checked="" type="checkbox"/> Noncollusion Declaration                           | <input type="checkbox"/> Specifications  |
| <input checked="" type="checkbox"/> Prevailing Wage Certification                      | <input type="checkbox"/> Plans   |
| <input checked="" type="checkbox"/> Workers' Compensation Certification                | <input checked="" type="checkbox"/> Exhibit "A" - Scope of Work                                    |
| <input checked="" type="checkbox"/> Drug-Free Workplace Certification                  | <input checked="" type="checkbox"/> Exhibit "B" - Project Schedule                                 |
| <input checked="" type="checkbox"/> Tobacco-Free Environment Certification             | <input checked="" type="checkbox"/> 5-yr. Preventative Maintenance and Complete Coverage Agreement |
| <input checked="" type="checkbox"/> Asbestos & Other Hazardous Materials Certification | _____ [Other]  |
| <input checked="" type="checkbox"/> Lead-Product(s) Certification                      |  |
| <input checked="" type="checkbox"/> Iran Contracting Act Certification                 |  |

The above-referenced documents shall be presented to the District for approval within seven (7) days after execution of the Agreement.

The complete Agreement consists of all Contract Documents as defined above and incorporated herein by this reference. Any and all obligations of the District and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.

Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the District for interpretation. If a conflict exists in the Contract Documents, modifications, beginning with the most recent, shall control over this Agreement (if any). In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.

- 6. Compensation.** As compensation for the Work, the District shall pay to the Design-Builder ONE MILLION, FOUR HUNDRED SIXTY FOUR THOUSAND, TWENTY-THREE DOLLARS (\$1,464,023) ("Total Contract Price"). Such amount shall not be increased without the express approval of the Board.
- 7. Expenses.** District shall not be liable to Design-Builder for any costs or expenses paid or incurred by Design-Builder in performing services for District.
- 8. Payment.** Based on the Schedule of Values below, Design-Builder shall submit an application for payment based upon the estimated value for materials delivered or services performed under the Agreement as of the date of submission ("Application for Payment"). Within thirty (30) days after District's approval of the Application for Payment, Design-Builder shall be paid a sum equal to ninety-five percent (95%) of the

value of the Work performed (as verified by District's designated representative and Inspector and certified by Design-Builder) up to the last day of the previous application, less the aggregate of previous payments and amount to be withheld. The District may deduct from any payment an amount necessary to protect the District from loss because of: (1) any sums expended by the District in performing any of Design-Builder's obligations under the Agreement which Design-Builder has failed to perform or has performed inadequately; (2) defective Work not remedied; (3) stop notices as allowed by state law; (4) reasonable doubt that the Work can be completed for the unpaid balance of the Total Contract price or by the scheduled completion date; (5) unsatisfactory prosecution of the Work by Design-Builder; (6) unauthorized deviations from the Agreement; (7) failure of the Design-Builder to maintain or submit on a timely basis proper and sufficient documentation as required by the Agreement or by District during the prosecution of the Work; (8) erroneous or false estimates by the Design-Builder of the value of the Work performed; (9) any sums representing expenses, losses, or damages, as determined by the District, incurred by the District for which Design-Builder is liable under the Contract; and (10) any other sums which the District is entitled to recover from Design-Builder under the terms of the Agreement or pursuant to state law, including section 1727 of the California Labor Code. The failure by the District to deduct any of these sums from a progress payment shall not constitute a waiver of the District's right to such sums. The District shall retain 5% from all amounts owing as retention. Retention shall be paid pursuant to Public Contract Code sections 7107 and 7200.

**SCHEDULE OF VALUES:**

<b>Work Description</b>	<b>Amount to be Paid</b>
Submittals (60% Designs, AQMD Permit)	\$95,000
Final Engineering Designs submitted to City	\$47,500
Permit Issuance	\$47,500
Mobilization, Sawcut, Demolition	\$71,250
Underground Construction and Above-Ground Electric (including SoCalGas house line)	\$199,500
Maintenance Bay Upgrade and Delivery of Equipment to Site	\$688,750
Above-Ground Connections (including SoCalGas set meter), Start-Up, Commissioning and As-Builts*	\$96,801
Warranty and Maintenance Agreements	\$152,127
Retention	\$65,595
<b>TOTAL</b>	<b>\$1,464,023</b>

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\* As-Builts shall be submitted in a file format compatible with Computer Aided Design Drafting Technology (e.g., AutoCAD).

**9. Independent Contractor.** Design-Builder, in the performance of this Agreement, shall be and act as an independent contractor. Design-Builder understands and agrees that he/she and all of his/her employees shall not be considered officers, employees, agents, partner, or joint venture of the District, and are not entitled to benefits of any kind or nature normally provided employees of the District and/or to which District's employees are normally entitled, including, but not limited to, State Unemployment Compensation or Worker's Compensation. Design-Builder shall assume full responsibility for payment of all federal, state and local taxes or contributions, including unemployment insurance, social security and income taxes with respect to Design-Builder's employees. Design-Builder shall be liable for its own actions, including its negligence or gross negligence, and shall be liable for the acts, omissions, or errors of its agents or employees.

**10. Standard of Care.** Design-Builder's Services will be performed, findings obtained, reports and recommendations prepared in accordance with generally and currently accepted principles and practices of Solar Practices and all Applicable Law, including the applicable provisions of California Code of Regulations, Title 24, Southern California Gas Company's applicable interconnection requirements ("SOCAL"), the requirements of the applicable Building Department and the California Department of Education, and the District's Design Guides and Technical Specifications. Design-Builder represents and warrants that it is fully experienced in projects of the nature and scope of Work, and that it is properly qualified, licensed and equipped to supply and perform the Work. The Work completed herein must meet the approval of the District and shall be subject to the District's general right of inspection and supervision to secure the satisfactory completion thereof.

**11. Originality of Services.** Design-Builder agrees that all technologies, formulae, procedures, processes, methods, writings, ideas, dialogue, compositions, recordings, teleplays and video productions prepared for, written for, or submitted to the District and/or used in connection with this Agreement, shall be wholly original to Design-Builder and shall not be copied in whole or in part from any other source, except that submitted to Design-Builder by District as a basis for such services.

**12. Copyright/Trademark/Patent.** Design-Builder understands and agrees that all matters produced under this Agreement shall become the property of District and cannot be used without District's express written permission. District shall have all right, title and interest in said matters, including the right to secure and maintain the copyright, trademark and/or patent of said matter in the name of the District. Design-Builder consents to use of Design-Builder's name in conjunction with the sale, use, performance and distribution of the matters, for any purpose and in any medium.

**13. Notice to Proceed.** After the documents have been submitted to and accepted by the District pursuant to section 5, the District shall provide a Notice to Proceed to Design-Builder at which time Design-Builder shall proceed with the Work.

**14. Site Examination.** Design-Builder has examined the Site and certifies that it accepts all measurements, specifications and conditions affecting the Work to be performed at the Site. By submitting its quote, Design-Builder warrants that it has made all Site examination(s) that it deems necessary as to the condition of the Site, its accessibility for materials, workers and utilities, and Design-Builder's ability to protect existing surface and subsurface improvements. No claim for allowance of time or money will be allowed as to any other undiscovered condition on the Site.



**15. Materials.** Design-Builder shall furnish, at his/her own expense, all labor, materials, equipment, supplies and other items necessary to complete the services to be provided pursuant to this Agreement.

**15.1. Anti-Trust Claim.** Design-Builder and its subcontractor(s) agree to assign to the District all rights, title, and interest in and to all causes of action they may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the Contract or a subcontract. This assignment shall be made and become effective at the time the District tenders final payment to the Design-Builder, without further acknowledgment by the parties.

**15.2. Substitutions.** No substitutions of material from those specified in the Work Specifications shall be made without the prior written approval of the District.

**16. Equipment and Labor.** Design-Builder shall furnish all tools, equipment, apparatus, facilities, transportation, labor, and material necessary to furnish the services herein described, the services to be performed at such times and places as directed by and subject to the approval of the authorized District representative indicated in the Work specifications attached hereto.

**17. Warranty/Quality.** Unless a longer warranty is called for elsewhere in this Agreement, the Design-Builder, manufacturer, or their assigned agents shall guarantee the workmanship, product or service performed against defective workmanship, defects or failures of materials for a minimum period of one (1) year from filing the Notice of Completion with the county in which the Site is located. All workmanship and merchandise must be warranted to be in compliance with applicable California energy, conservation, environmental, and educational standards.

**18. Correction of Errors.** Design-Builder shall perform, at its own cost and expense and without reimbursement from the District, any work necessary to correct errors or omissions which are caused by the Design-Builder's failure to comply with the standard of care required herein.

**19. Trench Shoring.** If this Contract is in excess of \$25,000 and is for the excavation of any trench deeper than five (5) feet, Design-Builder must submit and obtain District acceptance, in advance of excavation, of a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If the plan varies from the shoring system standards, the plan shall be prepared by a registered civil or structural engineer.

**20. Excavations Over Four Feet.** If this Contract includes excavations over four (4) feet, Design-Builder shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any: (1) Material that the Design-Builder believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law; (2) Subsurface or latent physical conditions at the site differing from those indicated; or (3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract. The District shall promptly investigate the conditions, and if it finds that the conditions

do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Design-Builder's cost of, or the time required for, performance of any part of the Work shall issue a change order under the procedures described in the Contract. In the event that a dispute arises between the District and the Design-Builder whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Design-Builder's cost of, or time required for, performance of any part of the work, the Design-Builder shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all Work to be performed under the contract. Design-Builder shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

**21. Lead-Based Paint.** Pursuant to the Lead-Safe Schools Protection Act (Education Code Section 32240 et seq.) and other applicable law, no lead-based paint, lead plumbing and solders, or other potential sources of lead contamination shall be utilized on this Project, and only trained and state-certified contractors, inspectors and workers shall undertake any action to abate existing risk factors for lead. Design-Builder must execute the Lead-Based Paint Certification, if applicable.

**22. Change in Scope of Work.** Any change in the scope of the Work, method of performance, nature of materials or price thereof, or any other matter materially affecting the performance or nature of the Work shall not be paid for or accepted unless such change, addition, or deletion is approved in advance and in writing by a valid change order executed by the District. Design-Builder specifically understands, acknowledges, and agrees that the District shall have the right to request any alterations, deviations, reductions, or additions to the Project or Work, and the cost thereof shall be added to or deducted from the amount of the Contract Price by fair and reasonable valuations. Design-Builder also agrees to provide the District with all information requested to substantiate the cost of the change order and to inform the District whether the Work will be done by the Design-Builder or a subcontractor. In addition to any other information requested, Design-Builder shall submit, prior to approval of the change order, its request for a time extension (if any), as well as all information necessary to substantiate its belief that such change will delay the completion of the Work. If Design-Builder fails to submit its request for a time extension or the necessary supporting information, it shall be deemed to have waived its right to request such extension.

For all approved changes in the scope of work that result in a net increase in costs to Design-Builder, the following format shall be used, supported by attached documentation.

	<b>WORK PERFORMED OTHER THAN BY DESIGN-BUILDER</b>	<b>ADD</b>
(a)	Material (attach itemized quantity & unit cost plus sales tax)	\$
(b)	Add Labor (attach itemized hours & rates, fully encumbered)	\$
(c)	Add Equipment (attach suppliers' invoice)	\$
(d)	Subtotal	\$
(e)	Add overhead and profit for any and all tiers of Subcontractor, the total not to exceed 10% of item (d)	\$
(f)	Subtotal	\$
(g)	Add overhead and profit for Design-Builder, not to exceed 5% of Item (f)	\$
(h)	Subtotal	\$
(i)	Add Bond and Insurance, not to exceed two percent (2%) of Item (h)	\$
(j)	TOTAL	\$
(k)	Time	___ Days

	<b>WORK PERFORMED BY DESIGN-BUILDER</b>	<b>ADD</b>
(a)	Material (attach itemized quantity & unit cost plus sales tax)	
(b)	Add Labor (attach itemized hours & rates, fully encumbered)	
(c)	Add Equipment (attach suppliers' invoice)	
(d)	Subtotal	
(e)	Add overhead and profit for Design-Builder, not to exceed 15% of item (d).	
(f)	Subtotal	
(g)	Add Bond and Insurance, not to exceed 2% of Item (f)	
(h)	TOTAL	
(i)	Time	___ Days

**23. Workers.** Design-Builder shall at all times enforce strict discipline and good order among its employees and the employees of its subcontractors and shall not employ or work any unfit person or anyone not skilled in work assigned to him or her. The District may evaluate the Design-Builder in any manner which is permissible under the law. Any person in the employ of the Design-Builder or a subcontractor whom the District may deem incompetent or unfit shall be dismissed from the Site and shall not again be employed at Site without written consent from the District.

**24. Fingerprinting of Employees.** Pursuant to Education Code section 45125.2, District has determined on the basis of scope of Services in this Agreement of this Project, that Design-Builder, subcontractors, and their employees will have only limited contact with pupils at most. Design-Builder shall promptly notify District in writing of any facts or circumstances which might reasonably lead District to determine that contact will be more than limited as defined by Education Code section 45125.1(d). If Design-Builder will have contact with any pupils, Design-Builder shall comply with the provisions of Education Code section 45125.1 regarding the submission of employee fingerprints to the California Department of Justice and the completion of criminal background investigations of its employees. Design-Builder shall not permit any employee to have

any contact with District pupils until such time as the Design-Builder has verified in writing to the governing board of the District that the employee has not been convicted of a felony, as defined in Education Code section 45122.1. Design-Builder's responsibility shall extend to all employees, subcontractors, agents, and employees or agents of subcontractors regardless of whether those individuals are paid or unpaid, concurrently employed by the District, or acting as independent contractors of the Design-Builder. Verification of compliance with this section and the Criminal Background Investigation Certification that may be required with this Agreement, shall be provided in writing to the District prior to each individual's commencement of employment or performing any portion of the Services and prior to permitting contact with any student.

**25.Design-Builder Supervision.** Design-Builder shall provide competent supervision of personnel employed on the job Site, use of equipment, and quality of workmanship.

**26.Safety and Security.** Design-Builder is responsible for maintaining safety in the performance of this Agreement. Design-Builder shall be responsible to ascertain from the District the rules and regulations pertaining to safety, security, and driving on school grounds, particularly when children are present.

**27.Clean Up.** Debris shall be removed from the Premises. The Site shall be in order at all times when work is not actually being performed and shall be maintained in a reasonably clean condition.

**28.Access to Work.** District representatives shall at all time have access to the Work wherever it is in preparation or in progress. Design-Builder shall provide safe and proper facilities for such access.

**29.Protection of Work and Property.** Design-Builder shall erect and properly maintain at all times, as required by conditions and progress of the Work, all necessary safeguards, signs, barriers, lights, and security persons for protection of workers and the public, and shall post danger signs warning against hazards created by the Work. In an emergency affecting life and safety of life or of Work or of adjoining property, Design-Builder, without special instruction or authorization from District, is permitted to act at his discretion to prevent such threatened loss or injury.

**30.Occupancy.** District reserves the right to occupy buildings at any time before formal Contract completion and such occupancy shall not constitute final acceptance or approval of any part of the Work covered by this Contract, nor shall such occupancy extend the date specified for completion of the Work.

**31.Force Majeure.** Design-Builder shall be excused from performance hereunder during the time and to the extent that it is prevented from obtaining delivery, or performing by act of God, fire, strike, loss, or shortage of transportation facilities, lock-out, commandeering of materials, product, plant, or facilities by the government, when satisfactory evidence thereof is presented to the District, provided that it is satisfactorily established that the non-performance is not due to the fault or neglect of the Design-Builder.

**32.Termination.**

**32.1. For Convenience by District.** District may, at any time, with or without reason, terminate this Agreement and compensate Design-Builder only for services satisfactorily rendered to the date of termination. Written notice by District shall

be sufficient to stop further performance of services by Design-Builder. Notice shall be deemed given when received by the Design-Builder or no later than three (3) days after the day of mailing, whichever is sooner. In the event that District terminates this Agreement pursuant to this section, District shall compensate Design-Builder for work completed to date as a pro-rata amount of the full fees, costs, and expenses.

**32.2. With Cause by District.** District may terminate this Agreement upon giving of written notice of intention to terminate for cause. Cause shall include:

- 32.2.1.** material violation of this Agreement by the Design-Builder; or
- 32.2.2.** any act by Design-Builder exposing the District to liability to others for personal injury or property damage; or
- 32.2.3.** Design-Builder is adjudged a bankrupt, Design-Builder makes a general assignment for the benefit of creditors or a receiver is appointed on account of Design-Builder's insolvency.

Written notice by District shall contain the reasons for such intention to terminate and unless within three (3) calendar days after that notice the condition or violation shall cease, or satisfactory arrangements for the correction thereof be made, this Agreement shall upon the expiration of the three (3) calendar days cease and terminate. In the event of this termination, the District may secure the required services from another Design-Builder. If the expense, fees, and costs to the District exceed the cost of providing the service pursuant to this Agreement, Design-Builder shall immediately pay the excess expense, fees, and/or costs to the District upon the receipt of the District's notice of these expense, fees, and/or costs. The foregoing provisions are in addition to and not a limitation of any other rights or remedies available to District.

**32.3.** Upon termination, Design-Builder shall provide the District with all documents produced maintained or collected by Design-Builder pursuant to this Agreement, whether or not such documents are final or draft documents.

**33. Indemnification.** To the furthest extent permitted by California law, Design-Builder shall defend, indemnify, and hold harmless the District, its Governing Board, agents, representatives, officers, consultants, employees, trustees, and volunteers (the "indemnified parties") from any and all claims arising out of, pertaining to, or relating to the negligence, recklessness, or willful misconduct of the Design-Builder. The District shall have the right to accept or reject any legal representation that Design-Builder proposes to defend the indemnified parties.

### **34. Insurance.**

**34.1.** The Design-Builder shall procure and maintain at all times it performs any portion of the Services the following insurance:

- 34.1.1. General Liability.** Two Million Dollars (\$2,000,000) combined single limit per occurrence for bodily injury, personal injury and property damage in the form of Comprehensive General Liability and Contractual Liability. If Commercial General Liability or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to each

project/location or the general aggregate limit shall be twice the required occurrence limit.

- 34.1.2. Automobile Liability Insurance.** One Million Dollars (\$1,000,000) combined single limit per occurrence for any automobile that shall protect the Design-Builder and the District from all claims of bodily injury, property damage, personal injury, death, and medical payments arising performing any portion of the Services by Design-Builder.
- 34.1.3. Workers' Compensation and Employers' Liability Insurance.** For all of the Design-Builder's employees who are subject to this Agreement and to the extent required by the applicable state or federal law, Design-Builder shall keep in full force and effect, a Workers' Compensation policy. That policy shall provide employers' liability coverage with minimum liability coverage of One Million Dollars (\$1,000,000) per accident for bodily injury or disease. Design-Builder shall provide an endorsement that the insurer waives the right of subrogation against the District and its respective elected officials, officers, employees, agents, representatives, consultants, trustees, and volunteers.
- 34.1.4. Professional Liability (Errors and Omissions).** One Million Dollars (\$1,000,000) for errors and omissions as appropriate to profession of engineer designing photovoltaic system, coverage to continue through completion of construction plus two years thereafter.
- 34.1.5. Builder's Risk Insurance.** On a replacement cost value basis, Builder's Risk (Course of Construction), or similar first party property coverage to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall include debris removal, demolition, increased costs due to enforcement of all applicable ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.
- 34.1.6. Umbrella or Excess Liability.** Four Million Dollars (\$4,000,000) per occurrence to meet the policy limit requirements of the required policies if Design-Builder's underlying policy limits are less than required. There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella Liability Insurance Policy. Any Umbrella Liability Insurance Policy shall protect Design-Builder, District, State, and Project Manager(s) in amounts, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.
- 34.1.7. Pollution Liability Insurance.** One Million Dollars (\$1,000,000) for all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Agreement, and defense,

including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 2415, or Design-Builder shall procure and maintain these coverages separately. Design-Builder shall warrant that any retroactive date applicable to coverage under the policy predates the effective date of the Agreement and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Agreement is completed. If Design-Builder is responsible for removing any pollutants from a site, then Design-Builder shall ensure that Any Auto, including owned, non-owned, and hired, are included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

**34.1.8. Other Insurance Provisions:** The policies are to contain, or be endorsed to contain, the following provisions:

**34.1.8.1.** For the general liability and automobile liability policies:

**34.1.8.1.1.** The District, its representatives, consultants, trustees, officers, officials, employees, agents, and volunteers ("Additional Insureds") are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of Design-Builder; instruments of Service and completed operations of the Design-Builder; premises owned, occupied or used by Design-Builder; or automobiles owned, leased, hired or borrowed by Design-Builder. The coverage shall contain no special limitations on the scope of protection afforded to the Additional Insureds.

**34.1.8.1.2.** For any claims related to the projects, Design-Builder's insurance coverage shall be primary insurance as respects the Additional Insureds. Any insurance or self-insurance maintained by the Additional Insureds shall be in excess of the Design-Builder's insurance and shall not contribute with it.

**34.1.8.1.3.** Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the Additional Insureds.

**34.1.8.2.** Design-Builder's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

**34.1.8.3.** Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the District.

**34.1.8.4.** Design-Builder shall furnish the District with Certificates of Insurance showing maintenance of the required insurance coverage and original endorsements affecting coverage. The endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All endorsements are to be received and approved by the District before Work commence.

**34.1.9. Acceptability of Insurers.** Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII, unless otherwise acceptable to the District.

**35.Payment Bond and Performance Bond.** Design-Builder shall not commence the Work until it has provided to the District, in a form acceptable to the District, a Payment (Labor and Material) Bond and a Performance Bond, each in an amount equivalent to one hundred percent (100%) of the Construction Price issued by a surety admitted to issue bonds in the State of California and otherwise acceptable to the District.

**36.Permits and Licenses.** Design-Builder and all Design-Builder's employees or agents shall secure and maintain in force, at Design-Builder's sole cost and expense, such permits and licenses as are required by law in connection with the furnishing of materials, supplies, or services pursuant to this Agreement. Design-Builder hereby acknowledges that it currently holds a valid Class A Contractor's license issued by the State of California, Contractor's State Licensing Board, in accordance with division 3, chapter 9, of the Business and Professions Code.

**37.Assignment.** The rights, burdens, duties, or obligations of Design-Builder pursuant to this Agreement shall not be assigned by the Design-Builder without the prior written consent of the District.

**38.Subcontractors.** Subcontractors, if any, engaged by the Design-Builder for any Service or Work under this Agreement shall be subject to the approval of the District. Design-Builder agrees to bind every subcontractor by the terms of the Agreement as far as such terms are applicable to subcontractor's work, including, without limitation, all indemnification, insurance, bond, and warranty requirements. If Design-Builder shall subcontract any part of this Agreement, Design-Builder shall be fully responsible to the District for acts and omissions of its subcontractor and of persons either directly or indirectly employed by itself. Nothing contained in this Agreement shall create any contractual relations between any subcontractor and the District.

**39.Compliance with Laws.** Design-Builder shall observe and comply with all rules and regulations of the governing board of the District and all federal, state, and local laws, ordinances and regulations. Design-Builder shall give all notices required by any law,



ordinance, rule and regulation bearing on conduct of the Work as indicated or specified. If Design-Builder observes that any of the Work required by this Agreement is at variance with any such laws, ordinance, rules or regulations, Design-Builder shall notify the District, in writing, and, at the sole option of the District, any necessary changes to the scope of the Work shall be made and this Agreement shall be appropriately amended in writing, or this Agreement shall be terminated effective upon Design-Builder's receipt of a written termination notice from the District. If Design-Builder performs any work that is in violation of any laws, ordinances, rules or regulations, without first notifying the District of the violation, Design-Builder shall bear all costs arising therefrom.

**39.1.** Design-Builder hereby acknowledges that the Construction Manager(s), the Project Inspector(s), and the Division of the State Architect have authority to approve and/or stop Work if the Design-Builder's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws. Design-Builder shall be liable for any delay caused by its non-compliant Work.

**39.2. Labor Code Requirements.** Design-Builder shall comply with all applicable provisions of the California Labor Code, Division 3, Part 7, Chapter 1, Articles 1-5, including, without limitation, the payment of the general prevailing per diem wage rates for public work projects of more than one thousand dollars (\$1,000). Copies of the prevailing rate of per diem wages are on file with the District. In addition, the Design-Builder and each subcontractor shall comply with Chapter 1 of Division 2, Part 7 of the California Labor Code, beginning with Section 1720, and including Section 1735, 1777.5 and 1777.6, forbidding discrimination, and Sections 1776, 1777.5 and 1777.6 concerning the employment of apprentices by Design-Builder or subcontractors. Willful failure to comply may result in penalties, including loss of the right to bid on or receive public works contracts.

**40. Certified Payroll Records:** Design-Builder and its subcontractor(s) shall keep accurate certified payroll records of employees and shall make them available to the District immediately upon request.

**41. Audit.** Design-Builder shall establish and maintain books, records, and systems of account, in accordance with generally accepted accounting principles, reflecting all business operations of Design-Builder transacted under this Agreement. Design-Builder shall retain these books, records, and systems of account during the Term of this Agreement and for three (3) years thereafter. Design-Builder shall permit the District, its agent, other representatives, or an independent auditor to audit, examine, and make excerpts, copies, and transcripts from all books and records, and to make audit(s) of all billing statements, invoices, records, and other data related to the Services covered by this Agreement. Audit(s) may be performed at any time, provided that the District shall give reasonable prior notice to Design-Builder and shall conduct audit(s) during Design-Builder's normal business hours, unless Design-Builder otherwise consents.

**42. Anti-Discrimination.** It is the policy of the District that in connection with all work performed under contracts there be no discrimination against any employee engaged in the work because of race, color, ancestry, national origin, religious creed, physical disability, medical condition, marital status, sexual orientation, gender, or age and therefore the Design-Builder agrees to comply with applicable Federal and California laws including, but not limited to the California Fair Employment and Housing Act beginning with Government Code Section 12900 and Labor Code Section 1735. In addition, the Design-Builder agrees to require like compliance by all its subcontractors.

**43. Limitation of District Liability.** Other than as provided in this Agreement, District's financial obligations under this Agreement shall be limited to the payment of the compensation provided in this Agreement. Notwithstanding any other provision of this Agreement, in no event, shall District be liable, regardless of whether any claim is based on contract or tort, for any special, consequential, indirect or incidental damages, including, but not limited to, lost profits or revenue, arising out of or in connection with this Agreement for the services performed in connection with this Agreement.

**44. Confidentiality.** Design-Builder and all Design-Builder's agents, personnel, employee(s), and/or subcontractor(s) shall maintain the confidentiality of all information received in the course of performing the Services to the extent allowed by law. This requirement to maintain confidentiality shall extend beyond the termination of this Agreement.

**45. Disputes.** In the event of a dispute between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for work performed or not performed, the parties shall attempt to resolve the dispute by those procedures set forth in Public Contract Code section 20104, et seq., if applicable. Pending resolution of the dispute, Design-Builder agrees it will neither rescind the Contract nor stop the progress of the Work, but will allow determination by the court of the State of California, in the county in which the District's administration office is located, having competent jurisdiction of the dispute. All claims of over \$375,000, which are outside the scope of Public Contract Code section 20104, et seq., may be determined by mediation if mutually agreeable, otherwise by litigation. The demand for mediation of any claim over \$375,000 shall be made within a reasonable time after written notice of the dispute has been provided to the other party, but in no case longer than ninety (90) days after initial written notice, and the demand shall not be made later than the time of Design-Builder's submission of the request for final payment. If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable dispute resolution requirements, the Design-Builder shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Design-Builder's right to bring a civil action against the District. For purposes of those provisions, the running of the time within which a claim must be presented to the District shall be tolled from the time the claimant submits its written claim until the time the claim is denied, including any time utilized by any applicable meet and confer process.

**46. Attorney Fees and Costs.** Should litigation be necessary to enforce any terms or provisions of this Agreement, then each party shall bear its own litigation and collection expenses, witness fees, court costs, and attorney's fees.

**47. Notice.** Any notice required or permitted to be given under this Agreement shall be deemed to have been given, served, and received if given in writing and either personally delivered or deposited in the United States mail, registered or certified mail, postage prepaid, return receipt required, or sent by overnight delivery service, facsimile transmission, or electronic mail, addressed as follows:

**District**

Murrieta Valley Unified School District  
41870 McAlby Court  
Murrieta, CA 92562  
ATTN: Director of Planning and Purchasing  
TEL: (951) 696-1600 ext \_\_\_\_  
FAX: (951) 304-1530  
EML: \_\_\_\_\_@murrietta.k12.ca.us

**Design-Builder**

Go Natural Gas  
1644 N. El Camino Real  
San Clemente, CA 92672  
ATTN: Timothy Nelligan, CEO  
TEL: (949) 340-7702  
FAX: (949) 315-3844  
EML: tim@gonaturalgas.com

Any notice personally given or sent by facsimile transmission or electronic mail shall be effective upon receipt. Any notice sent by overnight delivery service shall be effective the business day next following delivery thereof to the overnight delivery service. Any notice given by mail shall be effective three (3) days after deposit in the United States mail.

**48. Governing Law.** This Agreement shall be governed by and the rights, duties and obligations of the Parties shall be determined and enforced in accordance with the laws of the State of California. The Parties further agree that any action or proceeding brought to enforce the terms and conditions of this Agreement shall be maintained in county in which the District's administrative offices are located.

**49. Severability.** If any term, condition or provision of this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force and effect, and shall not be affected, impaired or invalidated in any way.

**50. Waiver.** The waiver by either party of any breach of any term, covenant, or condition herein contained shall not be deemed to be a waiver of such term, covenant, condition, or any subsequent breach of the same or any other term, covenant, or condition herein contained.

**51. Captions and Interpretations.** Paragraph headings in this Agreement are used solely for convenience, and shall be wholly disregarded in the construction of this Agreement. No provision of this Agreement shall be interpreted for or against a party because that party of its legal representative drafted such provision, and this Agreement shall be construed as if jointly prepared by the Parties.

**52. Incorporation of Recitals and Exhibits.** The Recitals and each exhibit attached hereto are hereby incorporated herein by reference.

**53. Cooperation.** The Parties hereto hereby agree to execute all such other documents and to take all such other action as may be reasonably necessary to effect the purposes of this Agreement.

**54. Binding Contract.** This Agreement shall be binding upon the parties hereto and upon their successors and assigns, and shall inure to the benefit of said parties and their successors and assigns.

**55. Authority to Bind Parties.** Neither party in the performance of any and all duties under this Agreement, except as otherwise provided in this Agreement, has any authority to bind the other to any agreements or undertakings.

**56. No Rights in Third Parties.** This Agreement does not create any rights in, or inure to the benefit of, any third party except as expressly provided herein.

**57. Signature Authority.** Each party has the full power and authority to enter into and perform this Agreement, and the person signing this Agreement on behalf of each Party has been properly authorized and empowered to enter into this Agreement.

**58. Counterparts.** This Agreement and all amendments to it may be executed in counterparts, each of which shall be deemed an original. A facsimile or electronic signature shall be deemed to be the equivalent of the actual original signature. All counterparts so executed shall constitute one document binding all the Parties hereto.

**59. Provisions Required By Law Deemed Inserted.** Each and every provision of law and clause required by law to be inserted in this Agreement shall be deemed to be inserted herein and this Agreement shall be read and enforced as though it were included therein.

**60. Entire Contract.** This Agreement sets forth the entire contract between the parties hereto and fully supersedes any and all prior agreements, understanding, written or oral, between the parties hereto pertaining to the subject matter thereof. This Agreement may be modified only in writing upon mutual consent.

**[REMAINDER OF PAGE INTENTIONALLY BLANK]**

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement on the date indicated below.

**MURRIETA VALLEY UNIFIED SCHOOL DISTRICT**

**GO NATURAL GAS**

Date: \_\_\_\_\_, 2013  
By: \_\_\_\_\_  
Print Name: \_\_\_\_\_  
Print Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Facsimile: \_\_\_\_\_  
E-Mail: \_\_\_\_\_

Date: \_\_\_\_\_, 2013  
By: \_\_\_\_\_  
Print Name: \_\_\_\_\_  
Print Title: \_\_\_\_\_  
License No.: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Facsimile: \_\_\_\_\_  
E-Mail: \_\_\_\_\_

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**Information regarding Design-Builder:**

Proper Name: \_\_\_\_\_  
License No.: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Facsimile: \_\_\_\_\_  
E-Mail: \_\_\_\_\_

\_\_\_\_\_  
Employer Identification and/or Social Security Number

**NOTE: Section 6041 of the Internal Revenue Code (26 U.S.C. 6041) and Section 1.6041-1 of Title 26 of the Code of Federal Regulations (26 C.F.R. 1.6041-1) requires the recipients of \$600.00 or more to furnish their taxpayer information to the payer. In order to comply with these requirements, the District requires the Design-Builder to furnish the information requested in this section.**

Type of Business Entity:  
 Individual  
 Sole Proprietorship  
 Partnership  
 Limited Partnership  
 Corporation, State: \_\_\_\_\_  
 Limited Liability Company  
 Other: \_\_\_\_\_

**Exhibit A**

**Scope of Work**

**[SEE ATTACHED MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY  
JOINT SPECIFICATIONS]**

# MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

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# **MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS**

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# MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

## 1. PROJECT DESCRIPTION

This document specifies the scope of work, equipment requirements, and construction requirements for:

- A facility to compress and dispense compressed natural gas (CNG) into natural gas fueled school buses (NGVs) without the use of CNG storage.

This equipment will compress, clean, and refine natural-gas from the local pipeline to produce fuel compatible with the requirements of the intended vehicles. It will then dispense that fuel into the vehicle's fuel containers over one or more hours (a process known as "time-fill" or "slow-fill") until those containers are filled to their design capacity.

- Modifications and upgrades to the current fleet Maintenance Facility to ensure a safe environment for the maintenance, repair, and storage of NGVs.
- Installation of an emergency generator to ensure the continued operation of the refueling facilities (both CNG and liquid fuels), maintenance facility, and emergency systems in the administration building in the event of a power interruption to the site.

The purchaser of this facility is the **Murrieta Valley Unified School District (hereinafter referred to as "MVUSD" or "Purchaser")**. The facility will be located at:

**41870 McAlby Ct  
Murrieta, CA 92562-7036**

### Features:

The refueling facility will incorporate the following major features:

- Dispensing Facility featuring:
  - Thirty two time-fill refueling stalls, each sized and configured to accommodate a (40) foot long bus parked at a (45) degree angle to the traffic lane.
  - Sixteen time-fill refueling posts, each mounted to a concrete bollard, and each supporting two (15) foot long refueling hoses with hose retractors.
  - Nominal refueling pressure of 3,600 psi.
- Compression Facility featuring:
  - A (13) foot by (44) foot concrete compression pad to mount compression equipment. The pad will be located in the southern row of refueling stalls approximately (30) feet from the far east stall and will be protected by (6) inch diameter bollards around its perimeter.
  - Compression equipment consisting of: two self contained, skid-mounted compression packages with a minimum capacity of (60) SCFM; gas conditioning equipment; controls; and ancillary equipment. All will be mounted to the compression pad.

## **MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS**

- Upgrades to the light standard and lighting fixtures adjacent to the compression pad. These upgrades will include: compatibility with the area electrical classification; integration of all circuits on the light standard with the facility ESD (Emergency Shutdown Device).
  
- Support Facilities and Interconnects featuring:
  - A new gas service dedicated to the refueling facility. The new gas service will include an MSA (Meter Set Assembly) to be installed by SCG near the driveway entrance and connected to the street supply; and a new “house line” to connect the MSA outlet to the compression equipment. The new “house line” will run underground along the perimeter wall from the MSA and then turn (90) degrees and continue underground to the compression pad.
  
  - A transfer panel to be located in the main electrical room to facilitate the transfer of site electrical power from the electrical utility to the generator in the event of a power outage.
  
  - Underground electrical connections from the transfer panel to the generator and compression equipment through new conduit run underground; and from the transfer panel to the maintenance garage through existing underground conduit.
  
  - Underground connections for CNG and ESD circuits between the compression equipment and refueling stalls.
  
- Safety Features including:
  - Four safety stations: one at each end of the northern row of stalls, a third in the middle of the southern row of stalls, and a fourth at the compression pad. Each safety station will include one ESD (Emergency Shutdown Device), one fire extinguisher, and signage.
  
  - Facility status indicating lights at the compression pad.

The Maintenance Facility modifications and upgrades will incorporate the following major features:

- The installation of a natural-gas detection system.
- The installation of an emergency ventilation system.
- Modifications and upgrades to electrical and HVAC systems, as well as the building structure, to ensure compliance with safety requirements.
- The installation of emergency ventilation devices.

The Emergency Generator will incorporate the following major features:

- Diesel powered prime mover.
- 24 hr. fuel reserve.
- Automatic start.

## **MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS**

- Automatic transfer of facility power to generator.
- Sound attenuating enclosure.
- Easy access.

### **Definitions:**

The following definitions shall apply throughout this document unless indicated otherwise:

**RESPONDENT:** The term “Respondent” shall refer to qualified contractors submitting proposals for this project.

**CONTRACTOR:** The term “Contractor” shall refer to the winning Respondent and general contractor for this project.

**MANUFACTURER:** The term “Manufacturer” shall refer to new equipment manufacturers and compression equipment packagers.

**PSI:** The term “psi” shall refer to psig or “pounds per square inch gauge”.

# MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

## 2. APPLICABLE DOCUMENTS

The following documents form a part of this specification. Where conflict exists between this specification and the documents listed immediately below, then the listed documents shall be adhered to in the order listed. These documents are listed in declining order of precedence.

### **California Code of Regulations (CCR)**

- Title 8: Industrial Relations, Division 1: Industrial Relations, Chapter 4: Industrial Safety
  - Subchapter 1: Unfired Pressure Vessel Safety Orders
  - Subchapter 5: Electrical Safety Orders
- Title 24: California Building Standards Code, Part 2: California Building Code

### **American Society of Mechanical Engineers (ASME)**

- ASME Boiler and Pressure Vessel Code, §VIII Division 1 Pressure Vessels, latest edition
- ASME/ANSI B31.3: Chemical Plant and Petroleum Refinery Piping, latest edition.

### **National Fire Protection Association (NFPA)**

- NFPA 70 - National Electric Code (NEC), latest edition.
- NFPA 52 - Vehicular Gaseous Fuel Systems Code, 2010 edition.

The following documents form a part of the specification to the extents specified herein.

### **American Welding Society (AWS)**

- D 1.1 Structural Welding Specification, latest edition

### **American Society for Testing and Materials (ASTM)**

- A36 Standard Specification for Carbon Structural Steel, latest edition
- C90 Standard Specification for Loadbearing Concrete Masonry Units, latest edition
- D572 Standard Test Method for Rubber-Deterioration by Heat and Oxygen, latest edition
- A615 Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement, latest edition
- A706 Standard Specification for Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement, latest edition
- A767 Standard Specification for Zinc Coated (Galvanized) Steel Bars for Concrete Reinforcement, latest edition
- A775 Standard Specification for Epoxy Coated Steel Reinforcing Bars, latest edition
- D1171 Standard Test Method for Rubber Deterioration, latest edition

### **National Electrical Testing Association (NETA)**

# **MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS**

## **National Fire Protection Association (NFPA)**

- NFPA 30A - Fuel Dispensing Systems, latest edition

## **Uniform Building Code (UBC), latest edition**

## **Steel Structures Painting Council (SSPC)**

- Manual 10 – Near White Metal Blast Cleaning, latest edition.

## **State of California, Department of Transportation, Engineering Service Center**

- California Test 550 Method for Determining the Surface Abrasion Resistance of Concrete Specimens.
- California Test 551 Method of Test for Determining Suitability of Materials for Overlayment and Repair of Portland Cement Concrete Pavement and Structures.

# MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

## 3. GENERAL REQUIREMENTS

### 3.1 PERMITTING AND CODES

#### 3.1.1 Drawings.

- 3.1.1.1 Drawings included with this specification are available in AutoCAD.dwg format upon request of the Purchaser.
- 3.1.1.2 It shall be the responsibility of the Contractor to create any drawings necessary for permitting. All drawings submitted for permitting shall be stamped by a professional engineer registered and licensed in the state of California.
- 3.1.1.3 One set of hardcopies and any digital versions of all drawings to be submitted for permitting shall first be submitted to the Purchaser.
- 3.1.1.4 One set of all drawings submitted for permitting and approved shall be transmitted to the Purchaser in digital format (PDF or DWG) upon completion of the project.

#### 3.1.2 Permit requirements.

Contractor shall obtain all required permits from all AHJs (Authorities Having Jurisdiction).

#### 3.1.3 Code requirements.

Contractor is responsible for ensuring that all work complies with all applicable local, state, and federal codes and laws, and particularly the codes, standards, and specifications cited in §2: “Applicable Documents”, of this specification.

#### 3.1.4 Conflicts.

- 3.1.4.1 Conformance: Nothing in this specification shall be construed to permit work not conforming to applicable codes, standards, and specifications.
- 3.1.4.2 Conflicts with this specification: In case of conflicts between: local, state, or federal codes and laws; industry standards; utility company regulations; and this specification, the most stringent shall be applied.
- 3.1.4.3 Conflicts between “Applicable Documents”: In case of conflicts between the “Applicable Documents” in §2, and the most stringent is in question, Contractor shall conform to the documents in the order listed.
- 3.1.4.4 Conflicts between specification and project drawings: In case of conflicts between this specification and project drawings, Contractor shall immediately contact Purchaser for resolution.
- 3.1.4.5 Purchaser Notification: Contractor shall promptly notify the Purchaser in writing of any of the above conflicts or any ambiguities.



# MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

## 3.2 SUBMITTALS

### 3.2.1 Proposal Submittals.

Respondents are required to submit the following documentation with their proposal unless specifically noted otherwise:

3.2.1.1 Line Item Pricing: Pricing shall include parts, labor, and etc., and be itemized according to the following:

3.2.1.1.1 Mandatory Features: Respondent shall submit total costs for the following:

- Cost for the refueling facility described in this specification, including specifications in the appendix for: the Compression Package; the Regenerative Dryer; and User and Operator Training; but excluding features specifically cited as options (below).
- Maintenance costs during warranty period (per §3.4.4.5 for services submitted per §3.2.1.7.2)
- Maintenance Agreement (per §3.5)
- Complete Coverage Agreement (per §3.6)
- Maintenance Facility Modifications (per specification in the appendix)
- Emergency Generator (per specifications in the appendix)

3.2.1.1.2 Optional Features: Respondent may submit total costs for the following. Sections indicated are in the main specification unless otherwise noted.

- Optional safety devices (per Dryer Specification §4.5.8.1.3)
- Moisture sensor calibration equipment (per Dryer Specification §4.5.7.5)

3.2.1.2 Manufacturer Qualifications:

Respondent shall submit the following for each Manufacturer of significant assemblies (e.g. compression packages, dryer, refueling posts, control systems, generator set, methane detection system, etc.) proposed for this facility:

- Contact information for Manufacturer's US and worldwide (if different from US) headquarters, and any satellite offices located in California.
- Years in business of the division or activity directly manufacturing the assembly.
- Continuous years in US market to present, if headquartered outside of US.
- Continuous years in US market to present offering CNG products.

3.2.1.3 Equipment Qualifications:

Respondent shall submit the following for each distinct major assembly (i.e. compression packages, dryer, refueling posts, generator set, and methane detection system) proposed for this facility as evidence of equipment quality and suitability to this application:

- Equipment Literature (sales brochures, cut/spec sheets).
- Equipment Warranty statements.
- Equipment Delivery Schedule.

## MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

- Approximate number of years that the model proposed for this installation has been manufactured.
- Approximate installed population of the same model (whether at the same or separate sites) in the US.
  - If this will be the first installation of this model in the US, then provide:
    - The approximate population of the same model installed in North America.
    - The approximate population of the same model installed worldwide.
    - The number of installations in the US of (a) model(s) from the same manufacturer with closely similar design and capacity, along with the respective model number(s) and the significant differences from the model proposed for this facility.

Respondent shall also submit the following:

- Materials specified in §3.2.2 of the Compression Package Specifications, particularly including the Compressor Vendor Data Sheet (CVDS).
- Materials specified in §3.8.1 of the Regenerative Dryer Specifications, particularly including the Regenerative Dryer Vendor Data Sheet (RDVDS).

3.2.1.4 Respondent Construction Qualifications: Respondent shall submit the following as evidence of ability to successfully complete these facilities according to this specification:

3.2.1.4.1 CNG Refueling Facility:

3.2.1.4.1.1 Prior experience with manufacturers and models: For the manufacturer and model of each major assembly proposed for this refueling facility (i.e. compression package, dryer, and refueling post) Respondent shall submit:

- The number of years Respondent has been installing the same type of equipment made by that manufacturer, and the number of facilities Respondent has installed them in.
- The number of years Respondent has been installing the same model of equipment made by that manufacturer, and the number of facilities Respondent has installed it in.

3.2.1.4.1.2 References: Respondent shall list at least five CNG refueling facility projects they have participated in constructing:

- Greater weight will be placed on projects in the same state, and particularly the same county, as this project.
- For each major assembly, the list shall include at least three facilities which use the same manufacturer and model as that proposed for this project.
- If the Respondent is unable to list at least three facilities they have constructed using the same manufacturer and model of a major assembly as they are proposing for this project, then complete the list using both:
  - a. Facilities in which the Respondent has installed models from the same manufacturer with similar design and performance. For each facility indicate:
    - The model number used.

## **MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS**

- The significant differences of that model from the model proposed for this facility.
    - b. Facilities constructed by others which use the same manufacturer and model as the Respondent is proposing for this facility.
  - For each project listed provide the following information:
    - Location
    - Contact information (including a responsible party at the facility)
    - Configuration (e.g. slow or fast-fill, buffer or cascade, card-lock)
    - Total facility capacity
    - Major assembly manufacturers and models.
    - Extent of Respondent’s involvement (e.g. equipment supply, installation, construction, commissioning, maintenance, etc.)
    - Approximate dollar amount of contract
- 3.2.1.4.2 Maintenance Facility:
  - 3.2.1.4.2.1 Prior experience with manufacturers and models: For the manufacturer and model of each major assembly proposed for this maintenance facility upgrade (i.e. gas detection system, ventilators, and sensors) Respondent shall submit:
    - The number of years Respondent has been installing the same type of equipment made by that manufacturer, and the number of facilities Respondent has installed them in.
    - The number of years Respondent has been installing the same model of equipment made by that manufacturer, and the number of facilities Respondent has installed it in.
  - 3.2.1.4.2.2 References: Respondent shall list at least two maintenance facility projects they have participated in constructing:
    - Greater weight will be placed on projects in the same state, and particularly the same county, as this project.
    - For each major assembly, the list shall include at least one facility which uses the same manufacturer and model as that proposed for this project.
    - If the Respondent is unable to list at least one facility they have constructed using the same manufacturer and model of a major assembly as they are proposing for this project, then complete the list using both:
      - a. Facilities in which the Respondent has installed models from the same manufacturer with similar design and performance. For each facility indicate:
        - The model number used.
        - The significant differences of that model from the model proposed for this facility.
      - b. Facilities constructed by others which use the same manufacturer and model as the Respondent is proposing for this facility.

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- For each project listed provide the following information (if the project has already been listed a notation to that effect is sufficient as long as the information below has been provided):
  - Location
  - Contact information (including a responsible party at the facility)
  - Configuration (e.g. type of gas detection sensors, type of ventilation, type of HVAC system)
  - Total facility size (sq. ft.)
  - Major assembly manufacturers and models.
  - Extent of Respondent's involvement (e.g. equipment supply, installation, construction, commissioning, maintenance, etc.)
  - Approximate dollar amount of contract

### 3.2.1.4.3 Emergency Generator:

3.2.1.4.3.1 Prior experience with manufacturers and models: For the manufacturer and model of each major assembly proposed for this generator installation (i.e. generator set and transfer panel) Respondent shall submit:

- The number of years Respondent has been installing the same type of equipment made by that manufacturer, and the number of facilities Respondent has installed them in.
- The number of years Respondent has been installing the same model of equipment made by that manufacturer, and the number of facilities Respondent has installed it in.

3.2.1.4.3.2 References: Respondent shall list at least two generator installations they have participated in:

- Greater weight will be placed on projects in the same state, and particularly the same county, as this project.
- For each major assembly, the list shall include at least one facility which uses the same manufacturer and model as that proposed for this project.
- If the Respondent is unable to list at least one facility they have constructed using the same manufacturer and model of a major assembly as they are proposing for this project, then complete the list using both:
  - a. Facilities in which the Respondent has installed models from the same manufacturer with similar design and performance. For each facility indicate:
    - The model number used.
    - The significant differences of that model from the model proposed for this facility.
  - b. Facilities constructed by others which use the same manufacturer and model as the Respondent is proposing for this facility.
- For each installation listed provide the following information (if the installation has already been listed a notation to that effect is sufficient as long as the information below has been provided):
  - Location

## MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS

- Contact information (including a responsible party at the facility)
- Configuration (e.g. auto start, type of fuel)
- Generator capacity (kW)
- Major assembly manufacturers and models.
- Extent of Respondent's involvement (e.g. equipment supply, installation, construction, commissioning, maintenance, etc.)
- Approximate dollar amount of contract

### 3.2.1.4.4 General CNG Qualifications:

- Length of time in business.
- Length of time involved in CNG refueling facility construction and/or service.
- Total number of full-time employees.
- Total years of experience with CNG and/or NGVs among employees.
- Applicable employee qualifications/certifications (state date of qualification/certification, expiration date [if any], qualification/certification authority or manufacturer, scope of qualification/certification), e.g.:
  - High pressure tubing assembly
  - Manufacturer training
  - Professional licenses
  - Industry certifications

### 3.2.1.5 Respondent Service and Maintenance Qualifications: Respondent shall submit the following as evidence of ability to successfully service and maintain the facility or to arrange for service and maintenance:

#### 3.2.1.5.1 CNG Refueling Facility:

- Current CNG refueling facilities Respondent is responsible for servicing/maintaining or has regularly serviced/maintained including:
  - Location
  - Contact information (including a responsible party at facility)
  - Configuration (slow or fast-fill, buffer or cascade, card-lock)
  - Total facility capacity
  - Equipment manufacturers (particularly compression package manufacturer/s)
  - Length of time servicing/maintaining facility
- CNG equipment that Respondent is an authorized dealer or service agent for, including:
  - Length of time as authorized dealer/service agent
  - Region covered

#### 3.2.1.5.2 Maintenance Facility:

- Current CNG vehicle maintenance facilities Respondent is responsible for servicing/maintaining or has regularly serviced/maintained including:

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- Location
- Contact information (including a responsible party at facility)
- Configuration
- Total facility size (sq. ft.)
- Equipment manufacturers (particularly gas sensor and detection systems, and ventilation systems manufacturer/s)
- Length of time servicing/maintaining facility
- CNG vehicle maintenance facility equipment that Respondent is an authorized dealer or service agent for, including:
  - Length of time as authorized dealer/service agent
  - Region covered

### **3.2.1.5.3 Emergency Generator:**

- Current generator facilities Respondent is responsible for servicing/maintaining or has regularly serviced/maintained including:
  - Location
  - Contact information (including a responsible party at facility)
  - Configuration
  - Total facility capacity
  - Equipment manufacturers (e.g. generator, transfer panel)
  - Length of time servicing/maintaining facility
- Generator equipment that Respondent is an authorized dealer or service agent for, including:
  - Length of time as authorized dealer/service agent
  - Region covered

If Respondent is proposing to arrange for the service and maintenance of these facilities (including warranty repairs and Maintenance Agreement and Complete Coverage agreement services) with a third party, Respondent shall submit the above information for that party as well as the location of their facilities. If more than one party shall be responsible (e.g. one party for warranty repairs, another for regular maintenance and service, or different parties for different facilities) Respondent shall submit the above information for each party, the location of their facilities, and the scope of service, maintenance, and repairs each party shall be responsible for.

### **3.2.1.6 Equipment Support Qualifications:** Respondent shall submit the following as evidence of availability of parts and support for the equipment proposed for these facilities:

- Authorized dealers and service agents for the location of the proposed facilities and for the following equipment Respondent proposes for these facilities (include contact information):
  - Compression Package
  - Pressure relief devices

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- Fuel filters and dryers not part of the compression package
  - Generator
  - Generator prime mover (if serviced separately from generator)
  - Transfer panel
  - Natural gas detection system
  - Natural gas sensors
  - Ventilators
- If the Respondent is an authorized service agent for the compression package they are proposing they shall submit the following:
    - Inventory list of major repair parts and assemblies, including approximate quantities, for that particular package (e.g. cylinders or cylinder liners, crankshafts, rods, pistons, valves, prime-movers, controllers, etc.)

### 3.2.1.7 Other Submittals:

- 3.2.1.7.1 Exceptions to Specifications: Per §3.7: any exceptions to this specification must be noted by the Respondent on a separate attachment and included with the proposal. The separate attachment shall be entitled “Exceptions to Specifications” and will be a part of this proposal package. Respondent shall include the information required by §3.7 for each exception.

**ANY EXCEPTIONS TO, OR DEVIATIONS FROM, THIS SPECIFICATION NOT LISTED IN THE “EXCEPTIONS TO SPECIFICATIONS”, AND APPROVED BY THE PURCHASER, WILL BE CONSIDERED NON-COMPLIANCE WITH THIS SPECIFICATION.**

- 3.2.1.7.2 List of maintenance services to be performed during warranty period to uphold manufacturer’s warranties. Respondent may refer to other materials submitted with this proposal (e.g. manufacturer’s lists of required maintenance for individual pieces of equipment).
- 3.2.1.7.3 Maintenance Agreement Documentation (§3.5):
- Detailed listing of inspection and maintenance services to be provided.
  - Sample of inspection and maintenance report form.
- 3.2.1.7.4 Complete Coverage Agreement Documentation (§3.6):
- Detailed listing of inspection and maintenance services to be provided unless it is identical to that for the Maintenance Agreement, in which case a notation to that effect is sufficient.
  - Sample of inspection and maintenance report form unless it is identical to that for the Maintenance Agreement, in which case a notation to that effect is sufficient.
- 3.2.1.7.5 Specifications in Appendix: Respondent shall submit materials required by individual specifications in the Appendix of this document.

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## 3.2.2 Drawing Submittals.

3.2.2.1 Time-Fill Facility Layout: Prior to start of construction or plan check by the local AHJ, Contractor shall submit to Purchaser a detailed layout drawing of the time-fill facility.

3.2.2.1.1 The drawing shall include, but not be limited to, the locations of the following:

- All conduit, tubing, pipe risers, and pull-boxes adjacent to and between proposed locations for compression equipment & refueling stalls.
- All K-rail.
- All refueling posts.
- All ESDs and signage.
- All refueling stall demarcations.

3.2.2.1.2 The locations of these features shall be referenced to existing, permanent physical landmarks.

3.2.2.1.3 The actual locations of the above features, upon completion of construction, shall be within (1) foot of the position indicated in the drawing.

3.2.2.1.4 Due regard shall be given in the facility layout to accommodate bus traffic patterns, maneuvering, and parking locations.

3.2.2.2 CNG Storage Vessel Pre-Fab: Prior to fabrication of any CNG Storage Vessels for this facility, Respondent is required to submit the documents referenced in §4.3.8.2.

3.2.2.3 CNG Storage Vessel Post-Fab: Upon completion of fabrication of any CNG Storage Vessels for this facility Respondent is required to submit the documents referenced in §4.3.8.3.3.

3.2.2.4 Specifications in Appendix: Respondent shall submit any drawings required by individual specifications in the Appendix of this document.

## 3.2.3 Submittals Prior To Equipment Delivery.

Respondent is required to submit the following documents, where applicable, prior to delivery of the specified equipment to the facility:

3.2.3.1 Compression Package:

- Controller program description
- Automatic shutdown settings

3.2.3.2 Other Specifications in Appendix: Respondent shall submit any materials required prior to equipment delivery by individual specifications in the Appendix of this document.

## 3.2.4 Commissioning Submittals.

Respondent is required to submit the following documents, where applicable, upon successful commissioning of the facility:



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## 3.2.4.1 General Equipment Documentation:

3.2.4.1.1 Equipment to Be Documented: One copy each of all Manufacturer documentation for the following equipment (where applicable):

- Compression Package including:
  - Prime Mover
  - Controller
  - Filtration
- Refueling Hoses (including breakaway couplings)
- Gas dryer
- Automatic Temperature Compensation Devices
- CNG Storage Vessels
- Generator
- Transfer Panel
- Equipment documentation required by individual specifications in the Appendix of this document.

3.2.4.1.2 Documentation Description: Documentation shall include the following (where applicable and available):

- Operating Manuals
- Service/Maintenance Manuals
- Service/Maintenance Schedules
- Parts diagrams
- Interface drawings
- Certification documents
- P&ID diagrams
- Electrical diagrams

## 3.2.4.2 Specific Equipment Documentation:

3.2.4.2.1 Gauges: Respondent shall provide gauge certification records per §4.5.3.2.

3.2.4.2.2 Compression Package: Respondent shall provide the documentation listed in §3.2.4 “Commissioning Submittals.” of the Compression Package Specifications.

## 3.3 WORKMANSHIP

### 3.3.1 General requirements.

3.3.1.1 All workmanship shall be to generally accepted commercial and industrial standards.

3.3.1.2 Contractor shall complete all installations in a neat, professional and workman-like manner.

3.3.1.3 All equipment and appurtenances shall be installed per Manufacturer’s instructions and recommendations

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## 3.3.2 **Installer requirements.**

All tubing and piping shall be installed by qualified personnel. Tubing installers must be certified. It shall be the responsibility of the Contractor to ensure that tubing installers are trained and certified by the Manufacturer of the tubing and fittings used, and that they are being installed per the Manufacturer's instructions. The Contractor shall keep certification records of all personnel installing tubing. Such records shall be produced to the Purchaser upon request.

## 3.3.3 **Change Orders.**

Should any changes to work indicated on the drawings or described in these specifications be necessary, Purchaser's representative shall be notified immediately In Writing for approval of required modifications; and Contractor shall receive approval In Writing prior to proceeding.

## 3.4 **WARRANTY.**

### 3.4.1 **Warranty Requirements.**

Unless indicated otherwise for specific equipment or features, the facilities modified or constructed under the specifications in this document, including all installed equipment, shall be warranted by the Contractor to be:

- Free of defects in materials and workmanship.
- In compliance with all equipment Manufacturer's warranty requirements for equipment installed under this specification so that all warranties are in full force.
- Operating within equipment Manufacturer's specifications.
- In compliance with Manufacturer's specifications at all times and in all regards unless specific exemptions have been obtained from Purchaser in writing.
- In compliance with all applicable local, state, and national codes and regulations, all applicable industry standards and specifications, and these specifications unless specific exemptions have been justified and conveyed in writing to Purchaser and Purchaser has given approval.
- In compliance with all permitting requirements by all AHJs (Authorities Having Jurisdiction).

### 3.4.2 **Warranty Period.**

The warranty period shall start upon the completion of 30 consecutive days of Trouble-Free Operation as described below. The warranty period shall last for one year. All of the Warranty Requirements detailed in §3.4.1 shall be in force and all of the Warranty Provisions detailed in §3.4.4 shall be provided during that period.

The warranty period shall be extended for any issues arising during the warranty period until the issue is completely resolved; particularly issues arising as a result of design, workmanship, or service/repair deficiencies.

### 3.4.3 **Trouble-Free Operation.**

Trouble-Free Operation is defined as:

- A facility operating or available for operation at full output and within specifications.

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- No errors, faults, or service interruptions.
- No excessive equipment wear.
- No leakage of any fluids (e.g. natural-gas, compressor oil, extracted moisture) in excess of Manufacturer's tolerances or these specifications (if no tolerances are given in this specification or the submittals, none will be assumed)
- No evidence being present that would indicate the inability of the equipment to maintain trouble-free service throughout the warranty period.

### **3.4.4 Warranty Provisions.**

3.4.4.1 All service, maintenance, and repairs shall be performed according to Manufacturer's recommended and required procedures and using Manufacturer's recommended and required parts and materials. Any conflicts between those procedures, parts, and materials with applicable codes shall be brought to the immediate attention of the Purchaser.

3.4.4.2 There shall be no charge to the Purchaser for any remedies (e.g. parts replacement or installation, labor, travel expenses, shipping, etc.) provided under this specification or the Manufacturer's warranty.

3.4.4.3 Contractor shall provide, throughout the warranty period, a single point of contact, available (24) hours/day, (7) days/week, for Purchaser to contact in the event of equipment malfunction, facility fault, emergency, etc.

3.4.4.4 This warranty shall not cover facility damage or faults due to abuse or misuse by the Purchaser's staff, vandalism, or natural disasters.

3.4.4.5 It shall be the responsibility of the Contractor to ensure that all regularly scheduled maintenance and service required to comply with installed equipment warranties is performed during the warranty period.

- Any and all costs to the Purchaser for these services must be included in the proposal as a separate line item along with a detailed list of required services. The Average Monthly Facility Throughput stated in the CPDS may be used to calculate any such costs.

### **3.4.5 Warranty Remedies.**

Contractor shall provide the following remedies under the terms of this warranty:

- Any services or repairs required to remedy any flaws, defects, or failures in the facilities and their equipment, and to prevent their recurrence.
- Any services or repairs, including improvements, required to keep the facilities operating within the requirements of this specification, particularly in reference to safety and performance.
- Any services or repairs, including improvements, required to keep all equipment within Manufacturer's allowable tolerances; keep all equipment performing to Manufacturer's specifications; and ensure the safe and efficient operation of the facilities.

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- Any services or repairs required by Manufacturers of installed equipment to: comply with Manufacturer's warranties, updates, technical service bulletins (or equivalent), or recalls.
- Perform any services or repairs necessary to return a facility to full capacity and normal and safe operating parameters within (3) days.
- Perform any services or repairs necessary to return a facility to at least 50% capacity and normal and safe operating parameters within (24) hours.
- Upon notification of a facility issue (fault, malfunction, or suspected malfunction), service personnel will:
  - Contact Purchaser's personnel within (12) hours of notification to coordinate a site visit.
  - Respond to the equipment site within (24) hours of notification unless a later time is acceptable to Purchaser or the malfunction is remedied to the Purchaser's satisfaction through remote means.Notification is deemed to have occurred when information regarding the facility issue is conveyed to the point of contact noted above. Purchaser will make every reasonable effort to cooperate with service personnel response (e.g. providing contact information, site accessibility, etc.).

### **3.5 MAINTENANCE AGREEMENT.**

Contractor shall include a quote for a Maintenance Agreement. Under this agreement Respondent shall:

- Perform all Manufacturer recommended or required maintenance for the equipment described in the specifications in this document.
- Perform any maintenance, not including parts replacement, required to keep all facilities operating within the requirements of this specification and in a safe and efficient manner.
- Perform an on-site inspection of the facilities at least once a month and submit the findings in a report to the Purchaser within one week of completion. The inspection shall determine if a facility is operating in a safe and efficient matter and within specifications.
- Remove and discard any waste materials.
- Keep all facilities in a clean and neat state.
- Alert the purchaser immediately upon the finding of any necessary or impending repairs, faults, failures, or deficiencies, especially those regarding safety.
- Provide identical services to those specified for the one year warranty regarding contact availability and service personnel response.

All maintenance and service shall be performed according to Manufacturer's recommended and required procedures and using Manufacturer's recommended and required parts and materials. Any conflicts between those procedures, parts, and materials with applicable codes shall be brought to the immediate attention of the Purchaser.

The quote shall:

- Detail the services to be provided (e.g. leak check slow-fill facility, clean and lubricate nozzles, empty blowdown receiver, test ESDs; EADs; generator; gas detection system; alarms; etc.).

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- Include a sample of the report form.
- Cover the above services for a period of 4 years beginning at the expiration of the one year warranty listed in §3.4.
- Assume the average Monthly Facility Throughput stated in the CPDS.
- Assume full payment at the start of coverage.
- Be a separate line item on the proposal.

### **3.6 COMPLETE COVERAGE AGREEMENT (CCA).**

Contractor shall include a quote for a “Complete Coverage Agreement” (CCA). Under this agreement Respondent shall:

- Provide all of the services and comply with all of the requirements listed in §3.4 for the one year Warranty, and §3.5 for the 4 year Maintenance Agreement. These services and requirements shall continue for the coverage period of the CCA.
- Perform all service, maintenance, and repairs (including parts replacement or remanufacture) required by Manufacturers of installed equipment to comply with Manufacturer’s service, maintenance, and repair schedules and requirements.
- Perform all service, maintenance, and repairs to keep all facilities in compliance with all applicable local, state, and national codes and regulations and all applicable industry standards and specifications, as well as the specifications in this document. This includes Pressure Relief Valve and Pressure Relief Device re-certification.

The coverage under the CCA shall be complete. That is: there shall be no charge to the Purchaser for any services or repairs (e.g. parts, labor, travel expenses, shipping, etc.) provided as remedies under the CCA or listed in §3.4.5.

The CCA shall not cover facility damage or faults due to abuse or misuse by the Purchaser’s staff, vandalism, or natural disasters.

The quote shall assume the same provisions (including coverage period and payment terms), and include the equivalent submittals, as the quote for the Maintenance Agreement in §3.5. Where a submittal is identical to that for the Maintenance Agreement a notation to that effect is sufficient.

### **3.7 EXCEPTIONS TO SPECIFICATIONS.**

It is desired that the Respondent propose standard production model equipment for this proposal whenever possible. Consequently, and unless stated otherwise in this specification or on the accompanying drawings, slight exceptions to these specifications will be considered so long as they do not materially impact the proposed equipment’s, or the completed facilities’, ability to meet the performance, safety, reliability, and code compliance intended by these specifications.

Any exceptions to these specifications must be noted by the Respondent on a separate attachment and included with the proposal. The separate attachment shall be entitled “Exceptions to Specifications” and will be a part of this proposal package. For each exception, the Respondent shall reference:

- The section and paragraph to which the exception is taken.

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- The reasons for the exception.
- Justification for the exception including: cost impact; operating experience; design calculations; and any other evidence which supports the reasonableness of the exception.
- A description of the Respondent's alternate recommendation, if one is offered.

**ANY EXCEPTIONS TO, OR DEVIATIONS FROM, THIS SPECIFICATION NOT LISTED IN THE "EXCEPTIONS TO SPECIFICATIONS", AND APPROVED BY THE PURCHASER, WILL BE CONSIDERED NON-COMPLIANCE WITH THIS SPECIFICATION.**

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## 4. GENERAL CONSTRUCTION REQUIREMENTS

### 4.1 ENVIRONMENTAL REQUIREMENTS

#### 4.1.1 General.

All equipment shall be designed for outdoor use.

#### 4.1.2 Temperature.

All equipment will be rated for normal operation at temperatures from (20°F) to (115°F).

#### 4.1.3 Humidity.

All equipment shall be rated for normal operation at humidity levels of (15) to (100) percent.

#### 4.1.4 Wind Loads.

All structures, equipment, and their mountings shall be capable of withstanding sustained wind speeds of (40) mph (miles per hour) and gusts of up to (60) mph without damage or impairment to normal function.

#### 4.1.5 Seismic Loads.

All structures, equipment, and their supports, mounts, and anchoring shall be designed, fabricated, and in compliance with all codes for installation in a seismic 4 zone.

#### 4.1.6 Facility Leakage.

No equipment assembly shall leak natural gas at a rate in excess of 1 cubic inch per minute. Also, all equipment assemblies shall comply with Manufacturer's maximum leak rate specifications.

### 4.2 PIPING, TUBING, AND APPURTENANCES.

#### 4.2.1 Compatibility.

All Piping, tubing, and appurtenances shall be compatible with the fluid being conveyed under service conditions.

#### 4.2.2 Standards.

Unless otherwise stated, all natural gas piping, tubing, and appurtenances shall be specified, installed, inspected, and tested in compliance with ANSI/ASME B31.3, and NFPA 52 (particularly §4.6 through §4.9), whichever is applicable.

#### 4.2.3 Minimum Schedule.

All low pressure piping shall be a minimum schedule 80.

#### 4.2.4 Sizing and Rating.

##### 4.2.4.1 General Requirements:

Unless stated otherwise, all piping, tubing, and appurtenances shall be rated, sized, and specified for the maximum flow rate, pressures, loads, and maximum and minimum temperatures they will experience under normal operating conditions.

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### 4.2.4.2 CNG Delivery:

Unless otherwise stated, all piping, tubing, and appurtenances used for the delivery of CNG from the compressor to the refueling posts shall be rated for a working pressure of 4,500 psi minimum.

### 4.2.5 **Alignment.**

All tubing and piping shall run true to the horizontal and vertical axis of the facility whenever possible.

### 4.2.6 **Service Access.**

Piping, Tubing, and Appurtenances shall not hinder access to any equipment for normal service or maintenance.

### 4.2.7 **Tubing.**

4.2.7.1 General Requirements: All tubing used for high pressure natural gas equipment connections shall be:

- seamless
- cold drawn
- fully annealed
- conforming to ASTM A269 (latest edition) for Grades TP 304 or TP 316
- have a minimum ultimate tensile strength of 75,000 psi.
- have a maximum hardness of Rb90 (Rb80 preferred)
- be cold finished and free of scratches and surface imperfections

4.2.7.2 Suitability for fittings: All tubing shall meet the fitting Manufacturer's requirements and recommendations including hardness and freedom from surface imperfections (e.g. scratches).

4.2.7.3 Bends: Conduit bends which house high pressure tubing shall have a minimum radius of 3 ft. All tubing bends shall be smooth, free of kinks, and 90° whenever possible.

4.2.7.4 Valve Requirements: All valves and fittings for high pressure tubing shall be made of 300 series stainless steel.

### 4.2.7.5 Horizontal Runs of High Pressure Tubing:

4.2.7.5.1 Lengths Greater Than 6": All horizontal runs of high pressure tubing greater than 6 in. in length shall be:

- Supported along its entire length.
- If elevated less than 1 ft. off of any potential walking surface shall run inside of protective sleeving (conduit, pipe, or channel), unless the tubing lies within an enclosure or the perimeter of a major assembly.

4.2.7.5.2 Anchoring: Tubing not inside of a protective sleeve must be anchored at distances no greater than 3 ft. Tubing shall be anchored by or within 3 in. of a fitting. No



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tubing shall be anchored at both ends of a straight run unless one anchor allows unrestrained lengthwise movement of the tubing to accommodate tubing expansion and contraction due to temperature changes.

Due consideration shall be given in the anchoring of tubing to accommodate expansion and contraction due to temperature changes by employing suitable stress reliefs (e.g. loops, doglegs, etc.).

### 4.2.7.6 Vertical Runs of High Pressure Tubing:

4.2.7.6.1 Protection: Vertical lengths of high pressure tubing within (2) ft. of a potential walking surface shall run inside of protective sleeving (conduit, pipe, or channel), unless the tubing lies within an enclosure or the perimeter of a major assembly.

4.2.7.6.2 Anchoring: Vertical tubing not inside of a protective sleeve must be anchored at distances no greater than (2) ft. Tubing shall be anchored by or within (3) in. of a fitting, No tubing shall be anchored at both ends of a straight run unless one anchor allows unrestrained lengthwise movement of the tubing to accommodate tubing expansion and contraction due to temperature changes.

Due consideration shall be given in the anchoring of tubing to accommodate expansion and contraction due to temperature changes by employing suitable stress reliefs (e.g. loops, doglegs, etc.).

4.2.7.7 Protective Sleeving: All lengths of protective sleeving for tubing shall be anchored. Lengths of protective sleeving longer than 1 ft. shall be anchored at a minimum of both ends. Lengths of protective sleeving longer than 4 ft. shall be anchored at distances no greater than 4 ft. apart. If anchoring the protective sleeving at multiple locations would create excessive stress due to temperature fluctuations then all but one of the anchors must allow the unrestrained lengthwise movement of the sleeving.

### 4.2.8 **Horizontal Piping and Conduit Anchoring.**

Low pressure piping and electrical conduit 1" and under shall be anchored at distances no greater than 6 ft. Low pressure piping and conduit over 1" shall be anchored at distances no greater than 10 ft.

### 4.2.9 **Vertical Piping and Conduit Anchoring.**

Vertical runs of low pressure piping and electrical conduit 1" and under shall be anchored at distances no greater than 4 ft. Low pressure piping and conduit over 1" shall be anchored at distances no greater than 6 ft.

### 4.2.10 **Stress Relief.**

In no event shall the length of conduit, pipe, or tubing from riser to anchor or equipment mounting, or between anchors, be routed or configured so as to create excessive stresses due to ambient temperature fluctuations or equipment vibration. In order to comply with the anchoring provisions of this section, tubing may be looped and must be anchored within (6) in. of the loop.

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## 4.2.11 Valves.

### 4.2.11.1 Construction:

Valves intended to be disassembled and serviced in the field shall not require the use of non-standard tools to do so, and shall be designed so that replacement service parts cannot easily be improperly installed.

### 4.2.11.2 Accessibility:

All valves shall be accessible for easy operation and maintenance.

## 4.2.12 Leakage.

4.2.12.1: Upon completion of piping and tubing assembly at site, assemblies shall be pressure tested pneumatically for leaks in accordance with ASME/ANSI B31.3:

- All pressure sensitive devices (regulators, relief valves, etc.) shall be removed from the system and their fittings plugged.
- The leak test pressures shall be as follows:
  - Slow-fill facility (where applicable): 4,500 psig
  - Fast-fill facility (where applicable): 5,500 psig
  - Compressor package gas supply: 50 psig
- Inert gas (e.g. nitrogen) shall be discharged into the subject assembly to provide test pressures.
- For high pressure assemblies increase the pressure in 500 psi. increments until the maximum test pressure is reached.
- For low pressure assemblies (less than 500 psi.) increase the pressure directly to the maximum test pressure.
- After each pressure increase hold the pressure for 15 minutes minimum while all joints and connections are checked for leaks.

### Standing Pressure Test:

After all joints and connections are proved sealed:

- Pressurize the assembly to the maximum test pressure
- Allow the assembly temperature to equilibrate to ambient.
- Seal assembly from inert gas source.
- Record the actual pressure (start pressure).
- Let assembly stand for one hour and again record the pressure (end pressure).

If the end pressure is greater than 0.5% of the start pressure repeat the standing pressure test (the test fluid temperature was not equilibrated or is being affected by a source of heat).

If the end pressure is less than 0.5% of the start pressure, find and seal the leak and repeat the Standing Pressure Test.

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If the end pressure is within 0.5% of the start pressure:

- Bleed off the inert gas in a controlled and safe manner.
- Re-install all pressure sensitive devices and test at operating pressures.
- Submit a record of each tested assembly and the associated test times and pressures to Purchaser.

#### Testing Equipment:

- A fluid specifically intended to test for gaseous leaks will be used for leak detection.
- A pressure gauge in good condition and calibrated within the previous 12 months will be used for pressure readings.

4.2.12.2 No joint, fitting, weldment, pipe, tube, or valve shall leak natural gas at a rate in excess of that specified in §4.1.6 for “Facility Leakage”.

#### 4.2.13 **Trenching.**

##### 4.2.13.1 Component Placement:

###### 4.2.13.1.1 Minimum Depths for Pipes:

All trenches for gas pipes shall have a minimum cover of eighteen (18) inches above the top of pipe (or sleeve) from finish grade.

###### 4.2.13.1.2 Minimum Depths for Conduit:

See §4.4.13.

###### 4.2.13.1.3 Clearances:

All underground conduit runs must be clear of crossing pipes or structures by at least 6 inches; thus, minimum depths may be required that are greater than the 24 inches previously described (see §4.4.13).

Conduits run in multiple shall be separated at least 2 inches clear. They shall be separated evenly throughout the run, except where it is necessary to fan out at risers and transitions (see §4.4.13).

###### 4.2.13.1.4 Routing:

Change of horizontal directions of conduit runs shall be made in long, gentle sweeps.

##### 4.2.13.2 Backfill:

###### 4.2.13.2.1 General Composition:

Materials used for backfill shall be clean and free of all debris (wood scraps, welding rod, pipe scraps, or other deleterious substances). No lumps or rock larger than 4 inches are allowed within twelve (12) inches of any foundations. Material shall have a plasticity index of 15 or less and a liquid limit of 30 or less. The expansion index of the material shall be less than 20 per UBC or local codes.

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Materials used for fill under grade slabs shall be crushed gravel or crushed stone conforming to the following sieve analysis:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	45 TO 90
#4	20 TO 50
#30	6 TO 29
#100	0 TO 12

### 4.2.13.2.2 Piping Installations:

A minimum of twelve (12) inches of sand shall be provided (six inches above and below pipe). Sand is not required for plastic sleeves containing stainless tubing, as long as the backfill is clean of large debris or objects which might damage the sleeve.

### 4.2.13.2.3 Electrical Conduit Installations:

Backfill shall be clean natural soil per 4.2.13.2.1 unless otherwise specified.

### 4.2.13.2.4 Expansive Soil Requirements:

Expansive soils shall require that trenches for piping and electrical conduit(s) be backfilled with sand a minimum of six (6) inches above top of piping/conduit(s).

### 4.2.13.2.5 High Traffic Areas:

Slurry backfill may be required in high traffic areas for expediting completion of those trenches as required to maintain existing site operations.

### 4.2.13.2.6 Compaction:

All backfill under foundations or slabs shall be compacted to a minimum of 95% at the optimum moisture content. Backfill not under foundations or slabs shall be compacted to a minimum of 90% at the optimum moisture content. Contractor shall be responsible for obtaining a compaction report and submitting the results to Purchaser.

### 4.2.13.3 Marking:

#### 4.2.13.3.1 Code:

In compliance with CCR Title 24, Part 5, §1211.1.7 (C): any trench incorporating facilities to convey gas, whether or not connected to a gas supply, shall be marked by metalized plastic warning tape.

#### 4.2.13.3.2 Material:

The warning tape shall be similar in materials, physical characteristics, and appearance (including markings) to:

- C.H. Hanson's 16630, 16631, and 16632 tapes  
OR
- 3M's 400 series Detectable Buried Barricade tapes

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### 4.2.13.3.3 Placement:

The tape shall be placed according to trench configuration drawings. Maximum depth shall be:

- (4) in. below unimproved grade.
- (4) in. below the underside of any patching, slab, or footing.

### 4.2.13.4 Surface Preparation and Features:

#### 4.2.13.4.1 Preparation for footings and slabs:

All existing asphalt shall be saw cut to allow placement of footings and slabs.

#### 4.2.13.4.2 Patching:

Asphalt shall be patched to match the existing original surface. Contractor shall ensure that patched areas do not puddle.

#### 4.2.13.4.3 Conduit and Piping Emergence:

Where a single conduit pierces the surface through slabs or pads, concrete encasement shall terminate at the slab or pad surface. If rising into slab-mounted or pad mounted switchboards, motor control centers, and similar equipment, extend the conduit up 3 inches and bush with an insulated grounding bushing.

Where multiple conduits pierce the surface, through slabs or pads, concrete encasement shall continue to 6 inches above the surface. The concrete cross section above the surface shall be round or rectangular as appropriate, trowled smooth, with 45 degree beveled corners.

All PVC conduit runs coming up to a concrete slab, pad, or above grade conduit run shall be terminated with a rigid steel conduit riser and the appropriate adapter for this transition.

### 4.2.13.5 Workmanship:

#### 4.2.13.5.1 Protection from weather:

Contractor shall protect open trenches from water run off or rain. Contractor shall anticipate and be prepared to avoid any delays due to water infiltration or rain.

#### 4.2.13.5.2 Conduit and Pipe support:

Conduits placed underground shall be run as shown on drawings and supported a minimum of every 10 feet to prevent sagging while waiting for encasement or backfill.

## 4.3 **PRESSURE VESSELS.**

### 4.3.1 **Codes.**

Materials, equipment, and installation provided and performed under this section shall conform to the latest requirements of the following codes in addition to others cited in §2: Applicable Documents and §3.1: Permitting:

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## American Welding Society (AWS)

- D 1.1 Structural Welding Specification, latest edition

### 4.3.2 General Requirements.

4.3.2.1 Working Pressure: Each pressure vessel shall be designed for a maximum allowable operating pressure (MAWP) of no less than 5000 psi over the entire metal temperature range of -20° F to +200° F.

4.3.2.2 Connections: Each vessel shall have a minimum of three connections:

- A SAE minimum 1 1/16-12 straight thread o-ring nipple or 1” NPT port with a minimum design safety factor of four (4) shall be provided at the inlet/ discharge end of the vessel.
- A SAE minimum 3/4-16 straight thread o-ring nipple or 1” NPT port with a minimum design safety factor of four (4) shall be provided on the relief valve end of the vessel.
- A SAE 7/16-20 straight thread o-ring port or 1” NPT port for the drain valve located at the lowest point of the vessel to allow condensates to be drained off.

4.3.2.3 Flow Limiter: A CNG flow-limiting 23/64 (0.359)-inch inside diameter orifice shall be incorporated into the face of the vessel inlet/ discharge port.

4.3.2.4 Drain Valve: Each pressure vessel shall have one drain valve connected to the drain port.

- Drain Valves Valve shall have a stainless steel ball and stem.
- The drain valve shall be mounted for maintenance access.
- Piping or valve connections shall be suitable to drain into a containment vessel.
- The drain valve and associated piping shall be capped or plugged with suitable hardware that shall withstand operating pressure.

4.3.2.5 Protective Coating

- Vessel exteriors shall be blast cleaned in accordance with SSPC-SP 10, Near White Metal Blast, and primed within 24 hours of blasting.
- Blasted metal surfaces shall have a surface profile of not less than 2 mils. The primer shall have at least 85% zinc content.
- Primer thickness for the vessel exteriors (and frames if applicable) shall be a minimum of 2.5 mils.
- The topcoat shall be a high build of white vinyl paint with a minimum thickness of 5 mils.

4.3.2.6 Environmental Conditions

- The pressure vessels (and frame assembly if applicable) shall be designed and fabricated for outdoor service.
- The pressure vessels and their supports shall meet the environmental requirements stated in §4.1

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- The pressure vessels and their supports shall be designed, fabricated, and in compliance with all codes for installation in a seismic 4 zone.

## 4.3.3 **Materials.**

4.3.3.1 Exceptions: A request by the supplier for material substitution shall:

- Be accompanied by complete information including corrected thickness.
- Shall state the complete ASME (or ASTM) designation for the material including any applicable grade, type, quality or finish such as “ASME SA-515-GR55.”

In cases where the material has no standard designation

- A complete description of chemical and mechanical properties shall be submitted.
- It shall be the responsibility of the fabricator to obtain ASME code approval.
- The fabricator shall state in his request whether or not ASME code approval has been obtained.
- Trade names and proprietary designations do not constitute sufficient information, except when accompanied by descriptions of chemical and mechanical properties.

## 4.3.4 **Marking and Stamping.**

4.3.4.1 Stamping: The vessel shall be stamped on the thickened portion of the head (or the upper hemisphere for spheres). The stamping shall include:

- ASME “U” Stamp
- National Board Number
- All requirements of the ASME Boiler and Pressure Vessel (BPV) Code §VIII, Div. 1, UG-115 through UG-119 and Appendix 22.
- The head and shell thicknesses (shell thickness only for spheres)
- The words “For CNG”
- The volumetric capacity in standard cubic feet natural gas when filled to the MAWP.
- A unique serial number stamped on the vessel for the purpose of identification, material traceability, and test records.

4.3.4.2 Marking:

4.3.4.2.1 The vessel shall be marked with the following on two sides:

- “CNG Only” with at least one-inch high black letters
- “FLAMMABLE” in at least four-inch high red letters.

4.3.4.2.2 Racks, if provided, shall have an assembly nameplate listing the Manufacturer’s name, Manufacturer’s location, date of manufacture, assembly description, “Total unit capacity in SCF @ maximum operating pressure”, and Purchaser purchase order number.

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## 4.3.5 Workmanship.

4.3.5.1 The supplier shall furnish, for approval, a list of all subcontractors or suppliers who fabricate, weld or stress relieve all or any part of the vessel or rack assembly.

### 4.3.5.2 Vessel Fabrication:

- The pressure vessels shall be fabricated in accordance with ASME BPV Code §VIII Division 1 Appendix 22.
- The inside and outside surfaces shall be free of arc burns and deleterious gouges, grooves, scratches, and dents.
- The repair of any such defect shall be subject to the acceptance of Purchaser and at the fabricator's expense. In such cases, the proposed procedure shall be submitted to Purchaser for written acceptance prior to being used.

4.3.5.3 Rack Welding: Any skid assembly shall be welded in accordance with AWS D1.1.

## 4.3.6 Quality Assurance.

### 4.3.6.1 Responsibility for Inspection:

All materials and work used in the fabrication of pressure vessels, their supports and appurtenances shall be tested and inspected according to applicable codes and standards, particularly those cited in this document. Waiver of any test or inspection shall be obtained in writing from Purchaser. The vendor shall pay for all required tests and inspections.

### 4.3.6.2 Required Tests and Examinations:

- Welding Procedures Specification (WPS) and Procedure Qualification Record (PQR) shall be submitted to Purchaser for approval prior to any repair welding on vessel.
- Liquid penetrant testing shall be performed by an inspector certified to ASNT-TC- 1A, Level n. All threaded outlets on vessels shall be liquid penetrant inspected.

## 4.3.7 Preparation for Delivery.

### 4.3.7.1 General:

Preparation for shipment shall be in accordance with vessel Manufacturer's standards and as noted herein. The Manufacturer shall be solely responsible for the adequacy of the provisions employed in respect to materials and application to protect vessels to their destination in ex-works condition when handled by commercial carrier. Any additional requirements imposed by the commercial carrier shall be complied with at Manufacturer's expense.

All external attachments shall be removed, properly identified, packed and shipped separately.

### 4.3.7.2 Specific Requirements:

Each pressure vessel shall be shot blast free of loose scale, vacuum cleaned, purged with dry nitrogen gas, and sealed for shipment. All threaded pipe fittings shall be plugged or



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capped prior to shipping. Chains or wire rope shall not be used to secure the vessel during transportation.

Mounting hole templates shall be supplied for each vessel mounting assembly. Separate templates shall be made for each mounting assembly in the case of multiple mounting assemblies for a single tank assembly (e.g. one at each end for a horizontal tube) and marked according to their orientation and location with regard to the tank assembly.

## 4.3.8 Documentation.

### 4.3.8.1 Fabrication Drawing Requirements:

- Fabrication tolerances shall be shown on all drawings submitted to Purchaser.
- Where nondestructive testing is required, appropriate symbols as specified in AWS A2.2 shall be shown on fabrication drawings at the part or area concerned.
- The fabrication drawings shall be fully checked and signed by the Manufacturer before they are submitted to Purchaser for acceptance.
- The structural drawings for the frame assembled with pressure vessels installed shall be submitted with a California registered structural engineer's wet stamp. Supporting calculations for seismic zone 4 loads as defined by the UBC shall be submitted with a California registered structural engineer's wet stamp.

### 4.3.8.2 Fabrication Design Drawing Submittal: Prior to fabrication, the Manufacturer shall provide to Purchaser the fabrication drawings listed below for Purchaser's approval.

- Final certified pressure vessel fabrication drawings.
- Final certified rack assembly drawings (if applicable).
- Final certified bill of materials.
- Vessel delivery schedule

### 4.3.8.3 Inspection Report Submittal:

4.3.8.3.1 All test and material inspection reports shall be kept by the Manufacturer indefinitely. Records to confirm compliance of the material and fabrication with the requirements of this specification (including all codes, standards, and specifications referenced herein) shall be made available by the fabricator at purchaser's request. All documents shall be properly edited and assembled as a package.

4.3.8.3.2 Data sheets showing chemical and physical properties of all materials of construction shall be available for review during fabrication.

4.3.8.3.3 Upon completion of fabrication, the Manufacturer shall supply the following data:

- ASME form U-1 or U-1A: Either form, fully completed and signed by Code Inspector, shall be used for Manufacturer's data report.
- Hydrostatic Test Chart: A copy of the hydrostatic test chart shall be included.
- Photograph: A photograph of the nameplate shall be included.

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- Material Data: Certified record showing location, heat numbers, chemical and physical properties of materials used for all pressure pans, and major carbon steel non-pressure parts such as skirts and saddles shall be provided.
- Charpy Impact Test: Charpy V-Notch impact test records showing specimen as base metal, weld metal, or HAZ, and the corresponding Charpy values.

## 4.4 ELECTRICAL SYSTEMS.

### 4.4.1 Codes.

Materials, equipment, and installation provided and performed under this section shall conform to the latest requirements of the following codes in addition to others cited in §2: Applicable Documents and §3.1: Permitting:

**National Electrical Testing Association (NETA)**

### 4.4.2 Contractor Requirements.

Electrical Contractor shall be a licensed (C-10) firm with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for the project.

Design drawings are diagrammatic and may not show all offsets, bends, elbows, or other specific elements which may be required for proper installation. Except where shown in dimensional detail, the locations of switches, receptacles, lights, motors, outlets, and other equipment shown on plans are approximate. Such items shall be placed so as to eliminate interference with ducts, piping, and equipment. The exact location shall be determined in the field.

Equipment sizes shown on the drawings are approximate unless otherwise indicated. However, wire and conduit sizes shown on the drawings shall be taken as a minimum and shall not be reduced without prior written approval by Purchaser's representative.

Before installing any wire or conduit, Contractor shall obtain the exact equipment requirements and shall install wire, conduit, disconnect switches, motor starters, heaters, circuit breakers, and other items of the correct size for the preexisting equipment where applicable.

The electrical work shall be coordinated with the work of all other trades. Coordination shall include: adequate clearances for the installation and maintenance of equipment; accommodating the physical and electrical requirements of items and equipment requiring electrical connections; and modifying connections as required to minimize interruption of services.

### 4.4.3 Cable, Wire, and Components.

4.4.3.1 General: Wiring shall be done with insulated conductors having current-carrying capacity, voltage, and temperature ratings consistent with their use.

4.4.3.2 Minimum Size: Wiring shall be sized for the current draw and shall not be less than 18 AWG (0.82 mm<sup>2</sup>), unless it is an integral part of a component.

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4.4.3.3 Medium Voltage Ratings: Cable and wire for service at 30 volts to 600 volts shall be 600 volt stranded copper, Type THHN/THWN for Size #12 AWG through #8 AWG, and Type XHHW for Size #6 AWG and larger.

4.4.3.4 Ground Wire: Ground wire shall be medium drawn bare copper stranded. All connections and fittings shall be cast copper alloy body.

4.4.3.5 Switches:

4.4.3.5.1 Switches shall have current and voltage ratings not less than that of the circuit loads they control.

4.4.3.5.2 Switches and similar devices shall be mounted securely and prevented from turning.

### 4.4.4 **Ground Rods.**

Ground rods shall be 3/4-inch diameter by 10-foot long copper clad steel. Connections to ground rods and the main ground grid shall be made with exothermic welds or Teledyne-pennunion series GGCP compression connectors. Connections to equipment shall be made with copper or bronze split bolt connectors. Split bolt connectors shall be attached to equipment structure that has been steel brushed to brightness and lubricated with an electrically conducting compound made for that purpose.

### 4.4.5 **Material.**

- Electrical and instrumentation materials and equipment shall conform to the requirements of Underwriters Laboratories (UL) and be listed and labeled for the intended application.
- Unless specific exemptions are requested and approved by the purchaser in writing, all materials and equipment furnished by the Contractor shall:
  - Be in compliance with these specifications and requirements.
  - Be new (unused) and all Manufacturer's policies regarding new equipment shall be in force.
- Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use at least two years prior to award of contract.
- All conduit, conduit fittings and enclosures shall be properly protected from any moisture exposure during storage. The Contractor shall insure that at the time of use, the materials are clean, dry and suitable for its intended use.

### 4.4.6 **Cable and Wire Terminations.**

- All power cable shall be terminated in pressure lugs.
- Control alarm and signal wire shall be terminated with pressure applied spade or ring lugs on screw terminals. Solder connections are not allowed.

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## 4.4.7 Connections and Controls.

- Contractor shall wire all control devices furnished by others in accordance with schematic and wiring diagrams furnished with the equipment, this specification, and construction drawings.
- Control and instrumentation wiring shall be continuous from point to point. In-line splices shall not be allowed.
- The maximum number of control wires terminating at one terminal connector shall be two. In cases where additional terminating points are required, the terminal directly adjacent is to be used with the opposite side bridged if it is not used.
- Wire and cable shall be pulled into conduit using a type of lubricating compound recommended by the wire and cable Manufacturer. Hand assist wire into conduits. Maximum tension shall not exceed Manufacturer's recommendations.
- All wire in equipment shall be neatly laid in and be harnessed with nylon straps.
- Splices in wiring shall be located only in accessible junction boxes.
- Splices shall be made mechanically secure, soldered, and insulated with tape, or fixture-type splicing connectors may be employed. Provision shall be made to prevent accidental mechanical strain on splicing devices. (Strain relief is not necessary when wiring is done in conduit, metal-clad cable or raceways.)

## 4.4.8 Grounding.

- Ground wires shall be carried with phase wires where applicable.
- Wire shall be green colored stranded type THW or THWN.
- Secure connections shall be made to all equipment at ground busses and bars in the panel board or at a connection intended for that purpose when panel boards are absent.
- Depth of ground loops shall be 18 inches minimum below finished grade in all areas unless noted otherwise.
- Below grade ground cable shall be medium drawn bare stranded copper unless noted otherwise.
- All contact surfaces shall be thoroughly cleaned and bright before connections are made to insure making good electrical contact.
- Resistance of the electrode and grid system to ground shall not exceed 25 ohms unless specified or approved otherwise; if the resistance exceeds 25 ohms, additional electrodes shall be driven and connected in parallel, as required.
- All below grade cable connections shall be made by the "Cadweld" process.
- Ground cables shall be carefully placed in such a manner as not to be dislodged or displaced by back-filling or other construction.

## 4.4.9 Identification and Labeling.

- Install non-corroding metal-strip conduit tags with embossed conduit numbers at end points of all conduits and at penetrations into slabs, ground, and the equipment, attached with double metal bands.
- Control wires shall be identified with imprinted slip-on heat shrink sleeves.

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- All spare conductors shall be taped at each end and identified as spare.
- The insulation of a single-conductor wire will be colored as follows:

## 120/208-Volt Circuits

Neutral --- White  
Phase A --- Black  
Phase B --- Red  
Phase C --- Blue

## 277/480-Volt Circuits

Neutral --- White  
Phase A --- Brown  
Phase B --- Orange  
Phase C --- Yellow

### 4.4.10 Enclosures.

- Enclosures for equipment and devices shall be U.L. listed minimum NEMA 4X (dust and water tight) in non-hazardous exterior areas, and NEMA 7 in Class 1, Group “D” exterior areas.
- Enclosures in exterior non-hazardous areas shall be provided with water tight conduit hubs on top and vertical surfaces. Gasket and O-rings shall be installed as instructed by manufacturer to maintain weather tightness.
- Pull boxes or junction boxes shall be U.L. listed for NEMA 4X (dust and water tight) in non-hazardous exterior areas, and NEMA 7 in Class 1, Group “D” exterior areas.

### 4.4.11 Equipment Mounting and Supports.

- Enclosures shall be provided for all equipment.
- All equipment shall be anchored and supported.
- All equipment anchoring, supports, and mounting shall be per manufacturer’s requirements and recommendations.
- All equipment anchoring, supports, and mounting shall comply with §4.1.
- Bolt electrical equipment to racks, to plates welded to racks, to plates welded or bolted to other structures, to buildings, or where permitted to equipment. Do not weld electrical equipment. Provide backing plates where equipment is attached to metal that is less than 1/8 inch thick. Conduit boxes up to 6 inches square may be supported in conduit runs without additional support; however, boxes on free-standing stub-ups shall be provided with extra support.
- Supplementary supports, clips and brackets shall be constructed from standard rolled steel shapes, hot dipped galvanized after fabrication. Angles, plates, channels, uni-strut, power strut or rods may be used for this purpose. Welding to a galvanized structure shall not be permitted. Use corrosion-proof bolts, straps, etc.
- Racks shall be structural shapes welded or bolted together and supported from other structure, or independently supported by concrete foundations.

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## 4.4.12 Conduit.

- Conduit for permanently installed non-flexing service shall be rigid galvanized steel or PVC.
- At all points where conduit or armor terminate, the conductors shall be protected from abrasion.
- Conduit installed underground shall be PVC schedule 40 unless otherwise noted or required to meet Utility Company requirements.
- Flexible conduit shall be steel liquid-tight with a PVC jacket suitable for the area classification in which it is to be installed.
- If armored cable is used, an insulating bushing or its equivalent shall be provided between the conductors and the armor, and the connector or clamp shall be of such design that the insulating bushing or its equivalent will be visible for inspection.

## 4.4.13 Underground Conduits.

- All single and multiple underground conduit runs shall be a minimum of 24 inches below finish grade to top of first conduit. All underground conduit runs must be clear of crossing pipes or structures by at least 6 inches; thus, minimum depths may be required that are greater than the 24 inches previously described.
- Conduits placed underground shall be supported a minimum of every 10 feet to prevent sagging while waiting for encasement or backfill.
- Conduits run in multiple shall be separated at least 2 inches clear. They shall be separated evenly throughout the run, except where it is necessary to fan out at risers and transitions. Change of horizontal directions of conduit runs shall be made in long, gentle sweeps. Backfill and trenching shall be consistent with the provisions of this specification.
- Where multiple conduits come to the surface, through slabs or pads, concrete encasement shall continue to 6 inches above the surface. The concrete cross section above the surface shall be round or rectangular as appropriate, troweled smooth, with 45 degree beveled corners.
- Where a single conduit comes to the surface through slabs or pads, concrete encasement shall terminate at the slab or pad surface. If rising into slab-mounted or pad mounted switchboards, motor control centers, and similar equipment, extend the conduit up 3 inches and bush with an insulated grounding bushing.
- All PVC conduit runs coming up to a concrete slab, pad, or above grade conduit run shall be terminated with a rigid steel conduit riser and the appropriate adapter for the transition.

## 4.4.14 Above Grade Conduit.

- Support exposed conduit on maximum six (6) foot centers and within two (2) feet of any connection point. Conduit and fittings may be supported from machinery supporting structures adequate for additional weight. Conduit and fittings can not be clamped or welded or bolted to vessels for machinery except as specifically permitted by Purchaser or as shown on the drawings.

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- Factory 90 degree conduit bends shall be used for conduit sizes 1-1/2 inches and above. Radius of field bends shall be not less than 10 times diameter of conduit. Conduit bends and offsets shall be avoided where possible. Conduit flattened or wrinkled during bending shall not be used.
- Ends of all conduits terminating in other than wiring device boxes shall be provided with insulating bushings. Insulated grounding bushings with through-terminals for No. 6 AWG wire shall be provided on all conduits rising into motor control centers and switchboards.
- Install flexible liquid-tight steel conduit between rigid conduit and all motors, vibrating equipment, movable equipment, and instruments minimum 1 foot and maximum 3 feet in length.
- Install conduit seals where required. Pour seals with the seal Manufacturer's specified compound after systems are functional and have been accepted by Purchaser. Seal fitting plugs shall not be installed for 24 hours after pouring sealing compound.
- Open ends of conduits shall be carefully plugged during construction to prevent the entrance of foreign materials. After conduits are installed, pull a mandrel through each conduit to clear the conduit of debris. Follow the mandrel with wire brushes and swabs to completely clean the conduit. Immediately after a conduit is cleaned, plug or cap the run. Install pull strings in all spare conduits.
- Cover openings on conduit fittings shall not be blocked by structural steel or pipe which would cause the necessity of disassembly of pipe or other extreme measures for access to the interior of fittings for future wire replacement and pulling.
- On masonry and concrete structures, conduits shall be attached with one-hole pipe straps and clamp-backs using screw anchors or expansion bolts.
- Exposed conduit shall be installed parallel to structural members and surfaces.
- Two or more conduits in the same general routing shall be parallel with symmetrical bends.
- Conduits shall be at least 6 inches from high temperature piping, ducts, and flues.
- Conduit connections to sheet metal enclosures shall be securely fastened by locknuts inside and outside.
- Conduits shall be installed between the reinforcing steel in walls or slabs which have reinforcement in both faces. In slabs which have only a single layer of reinforcing steel, conduits shall be placed under the reinforcement.

#### **4.4.15 Conduit Fittings.**

- Conduit fittings shall be PVC coated and made of non-corroding ferrous alloy. Standard fittings with covers shall have gaskets and non-corroding attaching screws.
- Conduit bushings on risers into switch-gear shall be insulating type with grounding terminal. Bushings in panels and equipment shall be insulating type.

#### **4.4.16 Inspection and Testing.**

##### **4.4.16.1 General Requirements:**

- Contractor shall provide equipment, material and labor required to perform the operations and tests herein described.

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- Tests shall be performed by qualified and experienced persons and witnessed by the Purchaser's representative.
- All equipment used for testing shall be suitable for the intended use. All meters used in tests shall be calibrated prior to use and a record of the calibration attached to the respective test memorandum.
- The Contractor shall perform such tests as described below to demonstrate to the Purchaser's designated representative that the electrical components and systems are complete, installed properly, to the Purchaser's representative's satisfaction, and are functioning properly.

### **4.4.16.2 Inspection:**

- Interlocking control and instrumentation wiring for each system and/or part of a system shall be carefully checked to ascertain that the system will function properly as indicated by wiring diagrams, schematic diagrams, description of operation, etc.
- Purchaser's representative shall make visual inspection of all electrical systems to ensure that equipment is clean; structural elements are complete and tight; covers, and plates, and trim are in place; electrical connections are tight; wire and cable are properly harnessed, secured, and identified; conduits are bushed, tagged, and supported; seals are in place; ground wires are provided and connected; tags, label plates, and instruction plates are attached and secure.

### **4.4.16.3 Test Procedure:**

When deficiencies are found, the deficiency shall be corrected and the test rerun. This procedure shall be repeated until the deficiency is cleared.

1. All installations and wiring shall be thoroughly tested to determine proper polarity, phasing, freedom from grounds and short circuits, and for continuity and operation of equipment, meters, relays, instruments, etc.
2. Complete test and inspection records shall be made by the Contractor and incorporated into a report which shall be given to the Purchaser's representative. All readings taken shall be recorded. The Contractor shall give the Purchaser's representative sufficient notice of all tests so that the Purchaser's representative may be present (minimum of 48 hours).
3. All tests shall be performed in the presence of the Purchaser's representative unless instructed otherwise
4. All testing shall be scheduled by the Contractor and coordinated with the Purchaser's representative. No testing shall be done without the Purchaser's approval.
5. Authorization must be obtained from the Purchaser's representative before any work is done on an energized circuit. There shall be no interruption of energized circuits without previous arrangements with the Purchaser's representative.
6. All cables and equipment, including motors and transformers, shall be tested for ground and shorts by means of a Megger insulation testing instrument, which shall impress a voltage of not less than 500 volts DC upon the circuit under test.
7. Insulation resistance test on 480 volt circuits shall be made to 1-1/2 times the circuit voltage rating.



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8. Where examination or tests indicate that insulation was damaged by handling or during installation, new cable shall be installed at Contractor's expense.

After the grounding system has been installed. Contractor shall perform the following:

1. Measure ground resistance of the grounding system with a Megger (two test probes type) ground tester. Test shall be made in three (3) widely separated locations as specified by the Purchaser's representative and shall show a resistance of twenty-five (25) ohms or less. All grounds should be thru slab, hidden where possible and protected by 1" PVC conduit.
2. Tests must be completed and the grounding system approved before ground rods are covered.
3. All above grade connections shall be accessible for inspection and testing.

#### 4.4.17 Pre-Commissioning.

- Contractor shall operate all circuit breakers, hand switches, and push-buttons by hand to demonstrate proper mechanical functioning.
- Contractor shall set circuit breakers and relays so that equipment will be in proper operating condition before being placed in service.
- Upon completion of the work and prior to acceptance by Purchaser's representative, Contractor shall install a complete set of lamps and tubes of the size required for the fixtures specified on the drawings.
- Fixtures shall be energized to check for proper working ability, failure of ballast's and circuiting where applicable.
- Upon completion of preliminary inspection and tests, all equipment shall be tested for satisfactory operation. Contractor shall start equipment as directed by the Purchaser's or equipment Manufacturer's representative.

## 4.5 DISPENSING EQUIPMENT

### 4.5.1 Refueling Hose Assemblies.

4.5.1.1 Each refueling post shall be equipped with at least one fueling hose and nozzle. The number of fueling hoses, their locations and lengths shall be per §5.6.1 of these specifications and drawing: A-1.0 "Site Plan".

#### 4.5.1.2 Hose specification

- Construction. The hose shall consist of a core tube of conductive polymer material with a liner of thermoplastic materials (nylon or equal). Hoses shall have reinforcement of high tensile synthetic fiber applied to the core tube in one or multi-braided layers. An outer cover of specialized polymer materials (polyurethane or equal) shall be bonded to the reinforcement.
- Core Tube. The core tube liner shall be seamless, smooth, and free from obstructions and foreign materials. The core tube with liner shall have an integral static conductor, be resistant to corrosion, and be compatible with natural gas.

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- Reinforcement. The reinforcement shall be flexible and designed to prevent kinking at the minimum bend radius. Reinforcement shall maintain dimensional stability under maximum working pressure.
- Cover. The cover shall be abrasion, ozone, and weather resistant. It must be pliable so that it will not chip or crack in normal service. In addition, the cover must be pin-pricked at an interval not to exceed (6) inches.
- Construction Requirements. Each of the above hose components shall be bonded to the adjacent component by appropriate agents. A non-reusable steel coupling of matching diameter size, with a rust-resistant coating, shall be attached to each end of the hose in a thoroughly workmanlike manner so as not to cut the hose, twist or work loose. The body (stem) of the coupling must be of one piece construction. A continuous electrical circuit is to be provided throughout the length of the hose by applying conductive paste to the end of the hose when attaching the couplings. Couplings shall have a minimum burst pressure of at least four (4) times the maximum working pressure of the hose (NFPA 52 2-10.2)
- Temperature Range. The hose shall be designed to operate through a temperature range of 0°F to 150°F.
- Working Pressure. The rated maximum working pressure of the hose assembly shall be at least 4000 psig.
- Burst Pressure. A hose assembly shall show no sign of leakage, burst, or indication of failure below the minimum burst pressure of at least four (4) times the rated maximum working pressure of the hose when tested hydrostatically (CCR Title 8 §538 NFPA 52: 4.10.2).
- Proof Test. Each hose assembly, complete with couplings, shall be tested by the supplier, prior to shipment, at a hydrostatic pressure of at least two (2) times the working pressure for a period of one minute, and also tested to a pneumatic pressure of at least 600 psi under water. Any indication of leakage or failure from the tests shall be reason for rejection (CCR Title 8 §538. NFPA 52 2-10.2).
- Electrical Conductivity. Prior to shipment, the hose assembly with couplings, at 0 psig and 75° F, shall have a minimum conductivity of at least  $2.5 \times 10^{-5}$  Mhos per lineal foot to drain away static charge build up. This minimum conductivity corresponds to a maximum resistance of 40 kohm per lineal foot for the hose assembly.
- Accelerated Aging. The tube and cover shall be capable of passing an aging test per ASTM D-572. The tube and cover shall retain 75 percent of its original tensile strength and 65 percent of its original elongation after aging fourteen (14) days in an oxygen pressure vessel at 158° F and 300 psi.
- Ozone Resistance. The cover of the hose shall be capable of passing an ozone resistance test per ASTM D-1 171. At the end of a 70 to 72 hour exposure time in an ozone chamber the cover shall show no visible cracking under two (2) times magnification.
- Marking. The hose shall be permanently marked or tagged at an interval no greater than five (5) feet. The text of the marking should include the manufacturer's name or

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trademark, the service and working pressures and an indication of compatibility with natural gas service. (CCR Title 8 §538(g). NFPA 52 4.10.4).

- Packaging. While in transit the hose assembly shall be protected from wear or injury and the couplings capped.
- Certification. The supplier of the hose assembly shall be prepared to certify that the chemical, electrical and physical properties of the materials conform to these requirements.
- Workmanship. Prior to fabrication, the supplier shall furnish, upon request and for approval by the Purchaser, a list of all subcontractors or suppliers who will fabricate or test all or any part of the hose assembly.
- Documentation. Hose labeling and testing procedures shall be reviewed and approved by Purchaser prior to fabrication of hose assemblies.

4.5.1.3 One nozzle shall be connected to the dispensing end of the hose. Nozzles shall comply with the ANSI / NGV-1 standard for CNG Vehicle (NGV) Fueling. The nozzle fitting shall be designed for connection to the mating hose fitting.

4.5.1.4 The nozzle shall be designed and constructed such that it shuts off gas flow when it is not connected to the vehicle receptacle.

4.5.1.5 The refueling hose assembly shall incorporate a manual flow control/vent valve within (8) inches of the nozzle. The valve shall have two positions:

- Fill: Allowing fuel to flow from the hose to the nozzle.
- Vent: Shutting off the fuel supply from the nozzle and venting the inlet side of the nozzle.

The valve shall include a provision to connect a vent tube to carry away the vented gas.

### 4.5.2 Refueling Posts.

4.5.2.1 Hose Breakaway Coupling. A break-away coupling/s shall be provided for connection of each refueling hose assembly to a refueling post. The break-away coupling shall minimize the escape of natural gas when a NGV is driven away with the nozzle attached to the NGV fueling receptacle. The hose breakaway safety feature shall allow the hose/s to come free from the refueling post upon application of a maximum of 44 lbs direct pull at the nozzle.

4.5.2.2 Hose Retractor: A hose retractor shall be attached to the refueling post and connected to the hose. The retractor shall be configured such that the refueling nozzle will be elevated at least (1) ft. above grade when the hose is retracted. The retractor shall also be configured so as not to interfere with the proper operation of the hose breakaways. The retractor shall not require more than (3) lbs. of force to fully extend.

4.5.2.3 Gauges. At a minimum, the refueling posts for the stalls indicated in the parent specifications and/or project drawings shall be equipped with a gauge to indicate the line pressure. If no indications are made in the parent specifications or project drawings, then each refueling post shall be equipped with a gauge to indicate the line pressure. Each

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gauge shall be located in a visible location on the post to which the refueling hose is connected.

- 4.5.2.4 Shut-Off Valve. Each refueling post shall be equipped with a valve to shut off gas flow to the refueling hose(s).
- 4.5.2.5 Gas Inlet Vent. Each refueling post shall be equipped with a valve to vent the breakaway coupling(s) gas inlet. The valve shall be located between the breakaway coupling inlet(s) and the shut-off valve described in §4.5.2.4.
- 4.5.2.6 Nozzle vent. If the vent discharge of the nozzle vent valve is not connected to a hose, it shall be directed away from the valve operator. If it is connected to a hose, the hose shall be joined to the fuel hose, be attached to the refueling post, and shall include a break-away coupling to function in concert with the break-away coupling for the fuel hose. If a vent hose is used, the refueling post shall include a means to discharge the vented gases above the post at a minimum height of (8) ft. above grade. The vent discharge shall be directed up and shall be fitted with a suitable rain cap.
- 4.5.2.7 Nozzle retention: Refueling posts shall be equipped with a permanently attached fixture to secure the fueling nozzle when not in use. It will be designed to protect the open end of the nozzle from the environment (e.g. dust/dirt, moisture, debris). It will be positioned on the post in such a way as to minimize the exposure of the fixture, nozzle, and hose assembly to personnel and vehicular movement.
- 4.5.2.8 Grounding:
- 4.5.2.8.1 Post Continuity. A refueling post shall be constructed so the break-away coupling, frame, and similar non-current carrying metal parts are electrically continuous to the point of connection of the post to the facility ground. This provision shall be deemed met when the electrical resistance between the point of connection of the equipment grounding means and any non-current carrying metal part is not more than 0.1 ohm.
- 4.5.2.8.2 Post Connection. All refueling posts shall be grounded to a common grounding conductor which is connected to an earth ground. Piping and tubing shall not be used for this purpose.
- 4.5.2.8.3 Facility Connections. All equipment grounds for the refueling facility shall be connected to the same common grounding conductor cited in 4.3.3.2.2. This includes, but is not limited to: compressor skids; dryers; controls, refueling posts, dispensers, lighting, utility outlets; and ESDs. Piping and tubing shall not be used for this purpose.
- 4.5.3 **Gauges**.
- 4.5.3.1 Construction. Gauges shall read at least 1.2 times the highest system pressure and shall have a dial face at least (2-1/2) inches diameter, a blow-out type back, and an inlet opening no greater than (0.055) inches (1.4 mm) in diameter. Pressure gauges shall be

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made of stainless steel and be liquid filled with glycerin. Gauges shall be graduated in pounds per square inch (psi)

4.5.3.2 Certification and Documentation. The following shall be provided to purchaser upon equipment commissioning:

- For each gauge model:
  - The manufacturer's specifications for that model gauge.
  - If not already indicated in the manufacturer's specifications, a letter from the manufacturer indicating:
    - The ANSI grade of that model gauge.
    - That that model gauge conforms to ANSI B40.1 or ANSI/ASME B40.100-2005 Standards.
- For each gauge:
  - A letter from the manufacturer stating the serial number and model number of the gauge and confirming that the gauge meets the manufacturer's specifications.

### 4.6 SAFETY SYSTEMS

#### 4.6.1 Emergency Shutdown Devices (ESDs).

4.6.1.1 Integration. All ESDs for the refueling facility will be integrated so that activating one ESD will activate all facility ESD features. All conditions after activation of the ESD shall be designed to be fail-safe (e.g. de-energized, normally closed, or disconnected).

4.6.1.2 Resetting. The ESD circuit shall be designed such that, once activated, the affected equipment will remain disabled until manually reset. Access to the resetting device shall be restricted to authorized personnel only. This can be accomplished by housing the resetting device in the facility's main switchboard, or in an enclosure near the compressor pad that is protected by lock and key.

#### 4.6.2 Fire Extinguishers.

4.6.2.1 General: All fire extinguishers shall be dry chemical with a rating not less than 2A:20BC and shall be mounted in a weatherproof enclosure.

#### 4.6.3 Signage.

4.6.3.1 ESD and Fire Extinguisher Indicating Signs: All ESDs and Fire Extinguishers shall be prominently identified with appropriate signage.

4.6.3.1.1 Location and Height: The location of ESD and fire extinguisher signs shall be as indicated elsewhere in this specification or on the accompanying drawings. The signs shall be a minimum of (8) ft. above grade unless otherwise indicated.

4.6.3.1.2 Direction: Unless indicated otherwise in this specification or on the accompanying drawings, ESD and fire extinguisher signs shall face the intended audience. For signage facing opposite directions two single faced signs or one double-faced sign may be used.

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- 4.6.3.1.3 Visibility: All signage shall be obviously visible to the intended audience without obstruction.
- 4.6.3.1.4 Marking: Each sign face shall be marked with the following in minimum (3) in. high letters on a high contrast background:
- “EMERGENCY SHUT-OFF”
  - “FIRE EXTINGUISHER”
- 4.6.3.1.5 Same Placard: Where ESD and Fire Extinguisher signs are collocated and facing the same direction, the markings for both may be on the same placard.
- 4.6.3.2 Flammable Gas and Fuel Cylinder Warning Signs:
- 4.6.3.2.1 Location and Height: The location of Flammable Gas and Fuel Cylinder Warning signs shall be as indicated elsewhere in this specification or on the accompanying drawings. The signs shall be a minimum of (8) ft. above grade unless otherwise indicated.
- 4.6.3.2.2 Direction: Unless indicated otherwise in this specification or on the accompanying drawings, Flammable Gas and Fuel Cylinder Warning signs shall face the intended audience. For signage facing opposite directions two single faced signs or one double-faced sign may be used. If a double-faced sign is used, both faces must be completely visible.
- 4.6.3.2.3 Visibility: All signage shall be obviously visible to the intended audience without obstruction.
- 4.6.3.2.4 Marking: Each sign face shall be marked with the following in minimum (3) in. high letters on a high contrast background:
- A. STOP MOTOR.**
  - B. NO SMOKING**
  - C. FLAMMABLE GAS**
  - D. NATURAL GAS VEHICLE FUEL CYLINDERS SHALL BE PERIODICALLY INSPECTED (NORMALLY EVERY 3 YEARS) TO ENSURE SAFE OPERATION OF THE VEHICLE. CONTACT VEHICLE OR CYLINDER MANUFACTURER.**
- 4.6.3.3 Dispensing Pressure Signs: Dispensing Pressure signs shall be posted at or near all refueling posts.
- 4.6.3.3.1 Location and Height: The location of Dispensing Pressure signs shall be as indicated elsewhere in this specification or on the accompanying drawings. The signs shall be a minimum of (6) ft. above grade unless otherwise indicated.
- 4.6.3.3.2 Direction: Unless indicated otherwise in this specification or on the accompanying drawings, Dispensing Pressure signs shall face the intended audience. For signage facing opposite directions two single faced signs or one double-faced sign may be used.

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4.6.3.3.3 Visibility: All signage shall be obviously visible to the intended audience without obstruction.

4.6.3.3.4 Marking: Each sign face shall be marked with the following in minimum (3) in. high letters on a high contrast background:

**NOMINAL DISPENSING PRESSURE: 3,600 PSI**

### 4.6.4 **K-rail.**

#### 4.6.4.1 Contiguous Attachment:

K-rails positioned contiguously end-to-end shall be connected by pinning the end loops. Pins shall be a minimum of (1-1/4) inches in diameter and 26 inches long.

#### 4.6.4.2 Anchoring:

##### 4.6.4.2.1 Configuration:

K-rails shall be anchored to grade using a minimum of two capped stakes. The stakes shall be located at opposite ends of the K-rail on the traffic side (the side opposite the equipment to be protected).

##### 4.6.4.2.2 Stakes:

The stakes shall be a minimum of (1) inch in diameter and 24 inches long and be capped at one end.

##### 4.6.4.2.3 Stake Anchoring:

Stakes shall be anchored by bonding them inside holes drilled into the grade. The holes shall be a minimum of (1) inch larger in diameter than the stake and a minimum of (3) inches deeper than the stakes penetration into grade. The holes shall be drilled by a method that will not damage the pavement adjacent to them.

The bonding materials shall conform to the following requirements:

Property	Test Method	Requirements
Compressive Strength		
at 3 hours, MPa	California Test 551	21 min.
at 24 hours, MPa	California Test 551	35 min.
Flexure Strength		
at 24 hours, MPa	California Test 551	3.5 min.
Bond Strength: at 24 hours		
SSD Concrete, MPa	California Test 551	2.1 min.
Dry Concrete, MPa	California Test 551	2.8 min.
Water Absorption, %	California Test 551	10 max.
Abrasion Resistance		
at 24 hours, grams	California Test 550	25 max.
Drying Shrinkage at 4 days, %	ASTM Designation: C 596	0.13 max.

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The bonding agent shall be mixed and applied according to the manufacturer's recommendations and requirements, and shall not have exceeded any expiration date.

If magnesium phosphate concrete is used as the bonding agent;

- It shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper metals.
- The surface of any stake coated with zinc or cadmium shall be coated with a colored lacquer prior to installation. The lacquer shall be allowed to dry thoroughly before embedment of the stake.

### **4.6.4.3 Attachments:**

Nothing shall be attached to surfaces of k-rail which are vulnerable to vehicle impact unless specifically designed and intended for impact protection.

## **4.7 FACILITY COMMISSIONING.**

Contractor is responsible for delivering a fully functional facility, defect free and meeting all requirements of this document, including all inspection, testing, equipment startup services, and commissioning. If equipment defects are discovered during startup, it is Contractor's responsibility to remedy those problems at its cost.



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## 5. DETAIL CONSTRUCTION REQUIREMENTS

### 5.1 GENERAL REQUIREMENTS

#### 5.1.1 Equipment and Feature Locations.

All facility equipment, features, and appurtenances shall be located and oriented according to the accompanying drawing/s and this specification. In case of ambiguities or conflicts between this specification and project drawings, Contractor shall immediately notify Purchaser for resolution. Refer to §3.1.4 in such cases.

### 5.2 COMPRESSION PAD

#### 5.2.1 General.

5.2.1.1 Safety Clearances: All electrical equipment within (15) ft. of the compression pad shall be rated for Class 1 Div. 2 Group D service.

5.2.1.2 Equipment Clearances: It is preferred that major equipment assemblies (e.g. compressor skids, dryers, gas storage vessels), be located on the pad so that a minimum clearance of 3 ft. is maintained between them for service, repair, and maintenance access. In no event shall major assemblies be located less than 2 ft. apart without the prior approval of the Purchaser. In no event shall any equipment be located closer than Manufacturer required clearances, or in such a way that service access is hindered.

5.2.1.3 Equipment Locations: The arrangement of equipment on the compressor pad shown in drawing: A-2.0 "Compression Pad Detail" is preferred. Exact location is at the discretion of the Contractor with due regard for the requirements in §5.2.1.1 and §5.2.1.2.

#### 5.2.2 Concrete Pad.

5.2.2.1 Area: Contractor shall pour a concrete pad located and dimensioned according the accompanying drawing/s. In no event shall the dimensions of the pad be insufficient to mount all of the equipment specified and maintain the clearances detailed in §5.2.1.1 and §5.2.1.2.

5.2.2.2 Thickness: The concrete pad shall project a minimum of 1 ft. below grade and 4 in. above grade. In no event shall the pad be thinner than the Manufacturer's requirements for the equipment mounted on it.

5.2.2.3 Drainage: The pad shall be sloped to drain towards one edge.

5.2.2.4 Chamfer: The top edge of the pad shall be chamfered a minimum radius of 3/8".

#### 5.2.2.5 Risers and service runs:

5.2.2.5.1 Risers: Risers for electrical and gas lines (services) shall be located as close to the final equipment connection as possible. The objective is to keep pathways between the equipment as free of obstructions and trip hazards as possible.

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5.2.2.5.2 Sleeving: All piping, tubing, and electrical wiring run through the pad must run inside of non-metallic sleeving. The exposed ends of the sleeves must be sealed from the environment .

### 5.2.2.6 Mounting:

5.2.2.6.1 Equipment Mounting: All equipment shall be mounted to the pad per Manufacturer's requirements and recommendations.

### 5.2.3 **Compression Equipment.**

5.2.3.1 Description: Two compression packages of the type specified in the "Compression Package Specifications" in the Appendix shall be mounted and anchored onto the compression pad at the approximate locations shown in the accompanying drawing/s with due regard to §5.2.1.3 above. Means of anchoring shall comply with any requirements and recommendations set by the compression package Manufacturer.

### 5.2.3.2 Gas Supply:

5.2.3.2.1 Connections: Contractor will connect the output of the house gas line adjacent to the compression pad to the dryer or compression package inlets, whichever is applicable. All pipe and pipe fittings shall be (2") nominal size or larger.

5.2.3.2.2 Gas Supply Regulator: If desired, the Contractor may install a gas supply regulator between the gas riser and the dryer or compression packages. The regulator shall be adjustable within a minimum range of (5) psi. above and below the nominal set pressure. If a regulator is installed, a vent valve with a minimum (1/4") NPT outlet fitting shall be installed immediately downstream of the regulator discharge to facilitate pressure readings. The vent valve outlet fitting shall be suitably capped.

5.2.3.2.3 Gas Supply Shut-offs: If the compression packages do not include a manually operated inlet shut-off valve the Contractor shall install one immediately upstream of the gas supply connection to each compression package.

5.2.3.3 Compressed Gas Discharge: The compression package discharges shall be a minimum (1/2) inch tubing connection. Minimum (1/2) inch tubing shall be used for all CNG equipment connections from the compressor discharges to the last fitting adjacent to the compression pad, unless indicated otherwise on the accompanying drawing/s.

5.1.3.4 Redundancy: The two compression packages shall function independently. If one of the compression packages is disabled, either manually or automatically, the second compression package shall function normally.

### 5.2.4 **Dryer.**

5.2.4.1 Description: The compression equipment shall include a skid mounted dryer to remove moisture from the fuel. Regeneration of the dryer desiccant bed shall be manually initiated.

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## 5.2.4.2 General Requirements:

5.2.4.2.1 Performance: The dryer shall meet the following general performance requirements:

5.2.4.2.1.1 Moisture Removal: The dryer shall bring the moisture level of the dispensed fuel to within CARB specifications at minimum dryer inlet pressures of (30) psig. for inlet dryers or (1,000) psig. for outlet dryers. The 99% Winter Design Temperature for the site shall be assumed to be that given in the CPDS.

5.2.4.2.1.2 Adsorbent Capacity: The dryer shall have sufficient adsorbent capacity to process (5) MMscf of gas, with the water content level listed for the supply gas in the CPDS (Compressor Package Data Sheet), between adsorbent regenerations (for dryers where the adsorbent is regenerated) or adsorbent replacement (for dryers where the adsorbent is replaced).

5.2.4.2.1.3 Pressure Drop: At a flow rate of (150) scfm, the pressure drop across the dryer system (between inlet and outlet connections) shall not exceed (5) psi. for inlet dryers or (100) psig. for outlet dryers.

5.2.4.2.2 Bypass: A bypass shall be provided to route gas flow around the dryer.

5.2.4.2.2.1 Sizing: The bypass shall use piping and appurtenances of sufficient size so that, when in use, it will not to create a flow restriction greater than the dryer (when the dryer is functioning properly).

5.2.4.2.2.2 Controls: The bypass shall be controlled by manual valves.

5.2.4.2.2.3 Connections: The bypass shall be located as close as practicable to the dryer's main gas service connections. The connections shall permit the removal of the largest serviceable dryer assembly (e.g. skid) without affecting bypass function.

5.2.4.2.2.4 Accessibility: The bypass shall not impede access to the dryer or any of its appurtenances for operation, maintenance, service, or dryer removal.

5.2.4.2.3 Pressure Taps: Two vent valves shall be installed to facilitate measurements of the pressure drop across the dryer.

5.2.4.2.3.1 Locations: One vent valve shall be located at the dryer inlet and another at the dryer outlet. It is preferred that these pressure taps be located off of the dryer skid and as close to the dryer connections as possible.

5.2.4.2.3.2 Sizing: For inlet dryers, the vent valves shall have a minimum (1/4") NPT outlet fitting. For outlet dryers, they shall have a minimum (1/8") NPT outlet fitting. The vent valve outlet fittings shall be suitably capped.

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## 5.2.4.2.4 Pressure Vessels:

5.2.4.2.4.1 Ratings: Pressure vessels used in dryers connected to the compression package inlet shall be rated for a minimum working pressure of (250) psig. Pressure vessels used in dryers connected to the compression package outlet shall be rated for a minimum working pressure of (5,000) psig. In no event shall a pressure vessel rating be less than the pressure it can reasonably be expected to be exposed to during normal operation of the facility.

5.2.4.2.4.2 Certification: Pressure vessels which have an inside diameter greater than (6 in.) shall be designed, fabricated, tested and code stamped in accordance with the requirements of ASME Pressure Vessel Code, §VIII, Division 1 and have a ASME “U” stamp. Vessels with an internal diameter greater than (6 in.), an internal volume of no greater than (5) cubic ft. and operating pressure of no greater than (250) psig may be stamped “UM” as allowed per ASME code.

## 5.2.4.2.5 Mounting:

5.2.4.2.5.1 Location: The Dryer shall be located on the compression pad approximately as shown in drawing: A-2.0 “Compression Pad Detail” with due regard to §5.2.1.3 above.

### 5.2.4.2.5.2 Anchoring:

- The dryer skid shall be mounted and anchored according to its manufacturer’s requirements and recommendations.
- The dryer and its anchoring shall meet the requirements of §4.1.

5.2.4.2.5.3 Serviceability: Mountings shall use screws or nuts and bolts to facilitate removal and replacement of the dryer if necessary for servicing.

## 5.2.4.2.6 Connections:

5.2.4.2.6.1 Unless prohibited by the dryer manufacturer, it is preferred that the dryer be connected upstream of any regulators connected to the gas supply for the compression package/s. If the dryer is located downstream of any regulators, then the dryer must meet the specifications given in §5.2.4.2.1 at the regulator set pressure.

5.2.4.2.6.2 Serviceability: In order to facilitate easy removal and replacement of the dryer, connections for inlet dryers shall be pipe unions or, preferably, flanges. Connections for outlet dryers shall be o-ring or tubing connections. Tubing connections shall be double ferrule Swagelok® type fittings or equivalent.

## 5.2.4.3 Particular Requirements:

The dryer shall comply with the “Regenerative Dryer Specifications” in the Appendix.

## 5.2.5 **Lighting and Utility Power.**

### 5.2.5.1 Lighting next to compression pad:

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5.2.5.1.1 Electrical Classification: All electrical systems, including light fixtures, within an envelope extending (15) feet horizontally from the edge of the compression pad and (30) feet high shall be upgraded to comply with Class 1, Div. 2, Group D area electrical classification requirements.

Equipment and fixtures that are replaced as a consequence of the upgrade shall meet or exceed the performance of the original equipment and fixtures (e.g. light intensity, weather resistance, etc.).

5.2.5.1.2. ESD Controls: All lighting circuits on the light standard adjacent to the compression pad shall be de-energized in the event any facility ESD is activated.

### 5.2.5.2 Utility Outlets:

5.2.5.2.1 A minimum of one: 110/120 VAC; 3-wire 2-pole (duplex); 20 amp minimum rated; GFCI outlet shall be installed at the compression pad, preferably near the motor control center, and at a height of (1) ft. to (3) ft. above the concrete pad.

5.2.5.2.2 The outlet shall have a weatherproof cover.

5.2.5.2.3 The outlet shall be protected by a 20 A circuit breaker located in the refueling facility switch panel. The outlets shall not be switched except by the circuit breaker. The circuit breaker shall disconnect the circuit in the event any ESD is activated.

5.2.5.3 Wiring: All wiring shall be sized for the maximum current rating of the circuit breaker for that circuit. Conduit shall be of sufficient size to enable the installation of one additional circuit of the same rating.

### 5.2.6 **Safety.**

#### 5.2.6.1 Emergency Shutdown Device (ESD):

5.2.6.1.1 Location: There shall be one ESD mounted to the light standard adjacent to the compression pad (refer to the drawing: A-2.0 "Compression Pad Detail"). It shall be securely mounted at a height of (3) to (5) feet above grade and face the compression pad.

5.2.6.1.2 Integration. The ESD at the compression pad shall tie into all other ESD circuits at the refueling facility so that its activation will activate all facility ESD features. All conditions after activation of the ESD(s) shall be designed to be fail-safe (e.g. normally closed or de-energized).

5.2.6.2 Fire Extinguisher: A dry chemical fire extinguisher with a rating not less than 2A:20BC shall be mounted in a weatherproof enclosure adjacent to the ESD described in the section above.

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### 5.2.6.3 Signage:

5.2.6.3.1 ESD and Fire Extinguisher Indicating Signs: The ESD and Fire Extinguisher referenced above shall be prominently identified with appropriate signage complying with §4.6.3.1.

5.2.6.3.1.1 Location and Height: Two sets of signs shall be mounted above the ESD and fire extinguisher, one or more not more than (2) feet above the ESD, and the remainder at a minimum of (15) feet above grade.

5.2.6.3.1.2 Direction: The lower sign(s) shall face the two directions perpendicular to the line of refueling stalls. The higher signs shall face the two directions perpendicular and the two directions parallel to the line of refueling stalls.

5.2.6.3.2 Flammable Gas Warning Signs: Flammable Gas and Fuel Cylinder Warning signs shall meet the requirements of §4.6.3.2

5.2.6.3.2.1 Location and Height: Flammable Gas and Fuel Cylinder Warning signs shall be mounted to the light standard adjacent to the compression pad (refer to the drawing: A-2.0 “Compression Pad Detail”), at a minimum height of (14) feet above grade.

5.2.6.3.2.2 Direction: The signs shall face the two directions perpendicular and the two directions parallel to the line of refueling stalls.

5.2.6.4 Impact Protection: Bollards shall be installed around the compression pad for impact protection.

5.2.6.4.1 Location: Bollards shall be located as indicated in drawing: A-2.0 “Compression Pad Detail”.

5.2.6.4.1.1 Spacing: Bollards shall be spaced a maximum of five (5) feet apart, center to center.

5.2.6.4.1.2 Clearance: Bollards shall be located so as to provide a minimum clearance of (2) feet from any portion of adjacent equipment requiring service access. In no event shall bollards be located so close to equipment as to prohibit access to equipment for service, maintenance, or inspection, or closer than manufacturer’s minimum required clearances.

5.2.6.4.2 Size: Bollards shall stand a minimum of (4) feet above grade and be a minimum of (6) inches in diameter.

5.2.6.4.3 Construction: Bollards shall be constructed of standard rolled steel pipe or tubing, hot dip galvanized, and concrete filled.

5.2.6.4.4 Mounting: Bollards shall be mounted in a concrete footing with an outside diameter at least twice the diameter of the bollard. Bollard and footing shall extend

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to a depth of at least (3) feet below grade. The footing shall be located underneath the compression pad. Concrete for the footing and compression pad may be poured simultaneously.

- 5.2.6.4.5 Finish: All exposed surfaces of bollards shall be primed and painted with primer and paint intended by the manufacturer for outdoor use and application to galvanized coatings and concrete. The top coat color shall be bright yellow.

### 5.3 GAS SERVICE

#### 5.3.1 General

All gas installations shall meet the requirements of §4.2.

#### 5.3.2 New House Line.

Contractor shall install a new “house line” to convey gas from the new MSA (Meter Set Assembly) to the compression pad.

- 5.3.2.1 Construction: The house line shall be routed per drawing: A-1.0 “Site Plan”.

- 5.3.2.2 Valves and Fittings: All valves and fittings for the house line up to and including the riser at the compression pad shall be (2) inch nominal size, and shall be rated for a minimum 100 psi. service pressure.

- 5.3.2.3 Installation: MDPE ASTM 2513 pipe with a minimum nominal size of (2) inches shall be installed according to manufacturer’s requirements and recommendations by qualified personnel.

- 5.3.2.4 Routing: The house line shall be routed below grade (per drawing: A-1.0 “Site Plan”), including under the surface of the compression pad (to avoid trip hazards and damage to the line), to the riser at the compression pad.

- 5.3.2.5 Riser: The riser shall be located as close as practical to the dryer inlet, without prohibiting the later installation of a valve and associated fittings to install a branch line to a second dryer.

### 5.4 ELECTRICAL SERVICE

#### 5.4.1 General

All electrical installations shall meet the requirements of §4.4.

#### 5.4.2 New Distribution Panel.

Contractor shall install a new distribution panel / Motor Control Center (MCC) on the compression pad (per drawing: A-2.0 “Compression Pad Detail”). This new panel shall provide all electrical power requirements for the refueling facility.

All power connections to the refueling facility shall be made through the new distribution panel. The new distribution panel shall receive power from the transfer panel for the new generator.

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All electrical connections for the new refueling facility made at the new distribution panel shall be made through suitably rated and configured shunt-trip circuit breakers and conduit stubs. All circuit breakers in the distribution panel shall be clearly labeled with the name of the circuit they control. Label marking shall be with indelible ink.

## 5.4.3 **Compression Package Disconnect.**

A separate electrical service disconnect shall be installed by Respondent for the compression package. The disconnect shall be mounted next to the new distribution panel for the compression package described in §5.4.2. The disconnect shall have an easy to operate handle and shall be capable of being padlocked in the disconnected position (to lock-out the compression package). The disconnect shall have a minimum rating equal to the rating of the circuit breaker for that circuit in the electrical panel. The disconnect may be incorporated into the new distribution panel as long as it meets the above requirements.

## 5.4.4 **Main Power Connections.**

Contractor shall connect the compression package's power circuits through the disconnect specified in §5.4.3 to the new distribution panel.

All three phase connections to equipment shall be in a "wye" configuration with one of the phases grounded unless the equipment Manufacturer specifies a different connection configuration.

All wiring shall be sized for the current rating of the circuit breaker or fuse for that circuit.

## 5.4.5 **Low Voltage Connections.**

A (1) inch conduit shall extend from the electrical room to a stub-up adjacent to the compression pad and capped. This conduit is intended for the later addition of telemetry, alarm, and low-voltage instrument circuits.

## 5.4.6 **Other Connections.**

Wiring for the ESDs at the compression pad shall be run in a separate conduit from any other circuits and shall be connected directly to the appropriate terminals of the main power breaker/s so that activating any ESD will disable all electrical power to the refueling facility and electrical fixtures adjacent to the compression pad.

## 5.4.7 **Voltage Separations.**

Wiring for circuits with different voltages shall be run in separate conduits.

## 5.5 **FACILITY CONTROLS AND INDICATORS**

### 5.5.1 **Facility Status Lights.**

- 5.5.1.1 **Location:** One pair of facility status lights shall be installed by the Contractor on the light standard adjacent to the compression pad at a height between (18) feet and (22) feet. They shall be positioned on the north side of the light standard facing the administration building.



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## 5.5.1.2 Color and Ratings:

- The pair of status lights shall consist of one yellow light and one red light, each producing a minimum of (1,000) lumens.
- The status lights shall be housed in one or more weatherproof enclosures.

5.5.1.3 Red Light Operation: The red light shall be energized whenever an ESD is activated or an automatically controlled piece of equipment (such as a compression package or regenerative dryer) detects a fault requiring it to shut-down (a critical fault). It shall be de-energized when the ESD is reset and all critical faults are cleared.

5.5.1.4 Yellow Light Operation: The yellow light shall be energized whenever a non-critical fault, or any condition requiring the attention of the facility operator, occurs with any piece of automatically controlled equipment at the facility. It shall be de-energized when all faults are cleared.

## 5.5.2 **Power Failure Compressor Lockout.**

The compressor controls shall be configured so that only one compressor can operate at a time when the refueling facility is operating on generator power.

## 5.6 REFUELING STALLS

### 5.6.1 **Refueling posts and hoses.**

5.6.1.1 Location: Refueling posts shall be located as indicated in drawing: A-1.0 "Site Plan".

5.6.1.2 Mounting: Refueling posts shall be mounted to bollards (described below):

- At the approximate center of the bollard.
- Using a system designed and intended for that purpose.

### 5.6.1.3 Bollards:

5.6.1.3.1 Cross Section: Bollards shall be circular or square in cross section, and have a minimum cross sectional area of (440) square inches.

5.6.1.3.2 Height: Bollards shall extend to a minimum depth of (3) feet below grade and a minimum height of (2) feet above grade.

5.6.1.3.3 Construction: Bollards shall be constructed of concrete.

5.6.1.3.4 Provisions for Service Connections: The bollard shall encase conduit to accommodate service connections to the refueling post. The conduit shall:

- Be of sufficient size and radius to accommodate the intended tubing or wiring.
- Be of sufficient number to accommodate direct connections to at least two other refueling posts (regardless of whether all will be used).
- Be of sufficient number to keep wiring for powered circuits and tubing separate.
- Oriented for proper alignment with underground conduit.

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- on bollards mounting the last refueling post for a distribution branch (i.e. connections are to only one other refueling post), the unused conduits shall be stubbed to underground pull boxes for future expansion.

5.6.1.4 Refueling Hose Configuration: Unless indicated otherwise in the project drawing/s, each refueling post shall be equipped with two refueling hoses.

5.6.1.5 Refueling Hose Length: Unless indicated otherwise in the project drawing/s, each refueling hose shall be (15) feet long.

### 5.6.2 Safety.

#### 5.6.2.1 Emergency Shutdown Device (ESD):

5.6.2.1.1 Locations: There shall be three ESD(s) among the refueling stalls. Two of each will be located at either end of the northern row of refueling stalls and the third of each near the middle of the southern row of refueling stalls. Refer to drawing: A-1.0 "Site Plan" and drawing: A-2.0 "Compression Pad Detail" for exact ESD locations. Each ESD shall be securely mounted to the associated refueling post at a height not less than (4-1/2) feet and not more than (5-1/2) feet above grade.

5.6.2.1.2 Integration. The ESDs referenced in the above section shall tie into all other ESD circuits at the refueling facility so that the activation of any will activate all facility ESD features. All conditions after activation of the ESDs shall be designed to be fail-safe (e.g. normally closed or de-energized).

5.6.2.2 Fire Extinguisher: A dry chemical fire extinguisher with a rating not less than 2A:20BC shall be mounted in a weatherproof enclosure adjacent to each ESD described in the section above.

#### 5.6.2.3 Signage.

5.6.2.3.1 ESD and Fire Extinguisher Signage: Each ESD and fire extinguisher location shall be prominently identified with appropriate signage complying with §4.6.3.1.

5.6.2.3.1.1 Location and Height: Two sets of signs shall be placed above each ESD and fire extinguisher, one or more not more than (2) feet above the ESD, and the remainder at a minimum of (12) feet above grade.

5.6.2.3.1.2 Direction: The lower sign(s) shall face the two directions perpendicular to the line of refueling stalls. The higher signs shall face the two directions perpendicular and the two directions parallel to the line of refueling stalls.

5.6.2.3.2 Flammable Gas and Fuel Cylinder Warning Signs: Flammable Gas and Fuel Cylinder Warning signs shall meet the requirements of §4.6.3.2

5.6.2.3.2.1 Location and Height: Flammable Gas and Fuel Cylinder Warning signs shall be prominently posted on or adjacent to each refueling post at a minimum height of (6) feet above grade.

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5.6.2.3.2.2 Direction: The sign(s) shall face in the two directions perpendicular to the line of refueling stalls.

5.6.2.3.3 Dispensing Pressure Signs: Dispensing Pressure signs shall meet the requirements of §4.6.3.3

5.6.2.3.3.1 Location and Height: Dispensing Pressure signs shall be prominently posted on or adjacent to each refueling post at a minimum height of (6) feet above grade.

5.6.2.3.3.2 Direction: The sign(s) shall face in the two directions perpendicular to the line of refueling stalls.

5.6.2.3.3.3 Same Placard: Where Flammable Gas and Fuel Cylinder Warning signs and Dispensing Pressure signs are collocated and facing the same direction, the markings for both may be on the same placard.

### 5.6.3 Pressure Gauges.

Pressure gauges indicating the current facility output pressure shall be installed at the locations indicated drawings: A-1.0 "Site Plan" and A-2.0 "Compression Pad Detail". They shall be in compliance with §4.5.2.3 and §4.5.3 of this specification. They shall be viewable to a person of average height standing next to them.

### 5.6.4 Pavement Marking.

5.6.4.1 Refueling stall separating lines: At the end of facility construction, refueling stall separating lines shall be marked with a suitable reflective yellow paint as indicated in drawing: A-1.0 "Site Plan". Line width and layout shall duplicate existing except where noted in the aforementioned drawing.

5.6.4.2 Refueling stall numbers: At the end of facility construction, refueling stall numbers shall be marked for each stall with a suitable reflective yellow paint in minimum (10) inch high numbers on a minimum (12) inch wide black background, as indicated in drawing: A-1.0 "Site Plan". Note that the numbers for some stalls will be changed from existing.

5.6.4.3 ESD Location Markings: At the end of facility construction, the locations of ESDs and Fire Extinguishers shall be marked with suitable red paint in minimum (6) inch high letters as indicated in the drawing: A-1.0 "Site Plan".

### 5.6.5 Service Connections.

5.6.5.1 Trenching from compression equipment: All electric and gas services connecting the time-fill Facility to the compression pad shall be run underground per the drawing: A-1.0 "Site Plan".

5.6.5.2 K-rail strain relief: All tubing, pipe, and electrical connections to k-rail from risers shall provide sufficient strain relief to accommodate (1) foot of movement of the k-rail in any direction without affecting their function or integrity.

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### 5.6.5.3 Fuel connections:

5.6.5.3.1 Between compression equipment and refueling posts: A minimum of one line of (1/2) in. minimum dia. high pressure tubing shall extend from the CNG output of the compression pad to each aisle of refueling stalls. No portion of these lines may be shared between the aisles.

5.6.5.3.2 Between refueling posts: Minimum (1/2) inch dia. high pressure tubing shall be used to connect the CNG supply from one refueling post to another.

5.6.5.3.3 Connections at the compression pad: Connection of the compression output to the tubing serving stalls #15 and #16 shall be separate and upstream from the tubing connections to the remaining refueling stalls.

5.6.5.3.4 Priority Fill Valve: A locking isolation ball valve shall be installed between the tubing connection(s) for stalls #15 and #16 and those for the remaining refueling stalls.

5.6.5.3.4.1 Location and Mounting: The valve shall be securely mounted to one of the bollards at the periphery of the compression pad (the northeast corner of the pad is preferred). The valve shall be mounted at a height of not less than (2) feet above the pad and shall be easily accessible.

5.6.5.3.4.2 Installed Position: The valve shall be installed locked in the open position.

5.6.5.3.4.3 Labeling: The valve body shall be labeled to indicate the open and closed positions of the valve handle.

5.6.5.3.4.4 Signage: The valve shall be tagged or signed with the following or similar: "This Valve Is To Be Kept In The Open Position At All Times Unless Filling From Stall #15 or #16 exclusively. After Filling Is Completed This Valve Must Be Returned To The Open Position And Locked To Refuel From All Posts."

5.6.5.3.4.5 Keying:

There shall be a minimum of 4 sets of keys for the lock:

- One key shall be retained by the Contractor.
- Two keys shall be given to the Purchaser's designated agent at the time of facility commissioning.
- One key shall be given to any separate activity responsible for maintenance/service/repair of the facility.

5.6.5.4 ESD connections: ESDs for the time-fill facility shall be connected to the same circuit as all other ESDs at the site. Refer to §4.6.1 of this specification.

5.6.5.5 Ground connections: The ground loop for the time-fill facility shall be connected to the ground loop for all other CNG refueling equipment at the site. Refer to §4.5.2.8 of this specification.

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## 5.7 SAFETY SYSTEMS

### 5.7.1 ESDs.

Provisions for an emergency shutdown (ESD) circuit shall be provided. Power circuits for all equipment shall be de-energized by activating any ESD. ESD switch locations are indicated elsewhere in this specification.

5.7.2 **Fire Extinguishers.** A dry chemical fire extinguisher with a rating not less than 2A:20BC shall be mounted in a weatherproof enclosure adjacent to each ESD.

### 5.7.3 Signage.

5.7.3.1 Compression Facility Signage: Signage at or adjacent to the compression equipment shall meet the requirements of §5.2.6.3.

5.7.3.2 Dispensing Facility Signage: Signage at or adjacent to the time-fill stalls shall meet the requirements of §5.6.2.3.

## 5.8 SITE AND CONSTRUCTION OPERATIONS

### 5.8.1 Facility to Remain in Operation.

Contractor shall make every effort to minimize disruptions to school district operations at the site during construction, equipment installation, and testing for the new refueling facility.

5.8.1.1 Contractor shall coordinate any activity that may affect school district operations with designated district personnel.

5.8.1.2 Contractor shall not conduct any activity that will significantly impact district operations at the site without prior approval of designated district personnel.

5.8.1.3 Contractor shall conduct trenching operations and other procedures which may affect traffic flow after normal operating hours.

5.8.1.4 Contractor shall make any accommodation necessary to ensure the safe and efficient flow of traffic and pedestrians during normal operating hours.

5.8.1.5 Contractor shall make every effort to minimize disruptions to parking arrangements. In particular, Respondent shall coordinate with designated district personnel to ensure alternate parking for school district vehicles when necessary.

5.8.1.6 Contractor shall conduct his activities in such a manner that the safety of school district personnel, visitors to the site, and construction workers at the site is not diminished.

5.8.1.7 Contractor shall coordinate with other contractors on sight as well as designated district personnel to achieve the preceding.

### 5.8.2 Construction Activity Restrictions.

5.8.2.1 Schedule Restrictions: No schedule restrictions shall be imposed for this project.

# **MVUSD CNG REFUELING FACILITY AND MAINTENANCE FACILITY JOINT SPECIFICATIONS**

## **6. OTHER REQUIREMENTS**

### **6.1 FACILITY TRAINING**

Within 1 week of facility commissioning, or as soon thereafter as is convenient to the purchaser, Contractor shall conduct two one-hour minimum training sessions. The first session shall be for facility “Users”: those who will be dispensing fuel from the facility into vehicles on a regular basis (e.g. bus drivers). The second, and subsequent, training session will be for facility “Operators”: on-site technical personnel who will be responsible for overseeing refueling facility operation and light maintenance.

The training session for facility Users shall acquaint them with basic refueling facility concepts, dispensing equipment and procedures, safety equipment and proper use, and emergency procedures.

The training session for facility Operators shall acquaint them with the concepts and function of all facility components, regular (e.g. daily and weekly) inspection and maintenance procedures, preliminary diagnostics, procedures for disabling individual equipment, and in-depth training on safety equipment and use, and emergency procedures.

The minimum requirements for both sessions are listed in the “FACILITY USER AND OPERATOR TRAINING” specifications in the Appendix.

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JOINT SPECIFICATIONS**

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**MVUSD CNG  
COMPRESSION PACKAGE SPECIFICATION**

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# MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

## 1 SCOPE

1.1 This document specifies the minimum requirements for a packager or manufacturer (hereinafter referred to as “Packager”) supplied, designed and fabricated, reciprocating CNG (compressed natural-gas) compressor and electric motor driver package. It also includes the minimum requirements for ancillary equipment such as: controllers; instrumentation; coolers; filters; pressure vessels; tubing and piping; wiring; etc. required to install a compression package which will meet the requirements of this application and can be installed with a minimum of field construction and field purchased equipment. All components shall be “skid mounted” (securely mounted on a frame either directly or indirectly through a structural member, or another component designed for that purpose), properly connected and integrated for immediate installation.

1.2 Service and operating conditions and interface requirements are set out in the **CPDS (Compressor Package Data Sheets)**. Respondent or Packager shall indicate the specifics of their offering by completing the **Compressor Vendor Data Sheets (CVDS)**. One copy of the completed data sheets shall accompany the proposal.

1.3 The following items are excluded from the scope of this specification:

- Storage containers, related controls, and other equipment used for the dispensing of fuel into vehicle tanks.
- Construction design and permitting.
- Foundation and anchor bolts.
- External piping and wiring.
- Site preparation and installation at the job site.

## 2 APPLICABLE DOCUMENTS

The following documents form a part of this specification, along with the documents listed in §2 “Applicable Documents” of the main Specification. Where conflict exists between this specification and the documents listed in the main Specification, then the documents listed in the main Specification shall control in the order listed. Where conflict exists between this specification and the documents listed immediately below, then the documents below shall control. The Contractor shall notify Purchaser of any instance of conflicting or apparently conflicting requirements or any ambiguities.

The following documents are listed in alphabetical order, and no inference of authority or precedence shall be construed by the document’s position in the list.

### Air-Conditioning And Refrigeration Institute

- ARI 270-95: Sound Rating of Outdoor Unitary Equipment

### American National Standards Institute

- NGV 4.8-2002: Natural Gas Vehicle Fueling Station Reciprocating Compressor Guidelines

The following documents form a part of this specification to the extents specified herein.

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### **American Society for Nondestructive Testing**

- ASNT-TC-1A: Recommended Practice

### **American Society for Testing and Materials (ASTM)**

- ASTM A-36-90: Standard specification for structural steel
- ASTM A-213: Seamless ferritic or austenitic alloy-steel boiler, superheater or heat-exchanger tubes.
- ASTM A-214: Resistance-welded carbon-steel heat-exchanger or condenser tubes.

### **American Welding Society (AWS)**

- D1.1-88: Structural Welding Code - Steel

### **California, State of**

- General Order No. 112-D, Rules Governing Design, Construction, Testing, Maintenance and Operation of Utility Gas Gathering, Transmission & Distribution Piping Systems:
  - §192.355, Customer meters & regulators: protection from damage.

### **Compressed Air And Gas Institute**

- CAGI S5.1-1971: Pneurop Test Code for the Measurement of Sound from Pneumatic Equipment

### **National Electrical Manufacturers Association (NEMA)**

- NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum), latest edition

# MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

## 3. GENERAL REQUIREMENTS

### 3.1 DEFINITION OF TERMS.

Terms used in this specification are consistent with those defined in NGV 4.8-2002. Listed below are additional terms used in this specification.

- Well-Ventilated Area:
  - A space in which not less than six (6) air changes per hour occur by natural infiltration of fresh air.
- Compression Package:
  - Compressor and all ancillary equipment mounted to the skid (e.g. prime mover, receiver vessels, piping and tubing, control system, etc.).
- CPDS:
  - Compressor Package Data Sheet
- CVDS:
  - Compressor Vendor Data Sheet
- psi:
  - Pounds per square inch gauge

### 3.2 SUBMITTALS.

#### 3.2.1 General.

Proprietary or Confidential Data: Where the data requested in the submittals is considered proprietary or confidential by the Manufacturer, the Respondent will so note in each instance, and provide as much related information as possible, and in as much detail as possible, without exceeding manufacturer's restrictions, so as to convey the suitability of the equipment to the Purchaser's application. For instance, where a description of the material used is requested in the CVDS, the exact composition is not required, only the type of base material.

#### 3.2.2 Proposal Submittals.

Respondents are required to submit the following documentation with their proposal, along with the documentation required in §3.2.1.3 of the Main Proposal Specification, for each unique compressor skid and all associated equipment, where applicable.

- Completed Compressor Vendor Data Sheet (CVDS)
- Drawings
  - Compressor Skid Assembly Outline (including layout and dimensions)
  - Compressor Skid Assembly Interconnect
- P&ID
- Single line Electrical Diagram
- Compressor Skid Bill of Material for Major Assemblies (e.g: compressor, controller, blow-down/receiver vessels, filters, etc.)
- Specifications for Major Assemblies
- Maintenance, Service, and Testing Procedures
- Maintenance, Service, and Testing Schedules

## **MVUSD CNG COMPRESSION PACKAGE SPECIFICATION**

### **3.2.3 Submittals Prior To Equipment Delivery.**

Contractor is required to submit the following documents, where applicable, prior to delivery of the compression equipment to the facility:

- Sound level test results per §4.9.2
- Packager's quality control program (per §4.11.2.5)
- Packager's pressure and leak testing procedure (per §4.11.3.2)
- Controller program description
- Automatic shutdown settings

### **3.2.4 Commissioning Submittals.**

- Gauge certification records per §4.6.3.1.2
- Operating Manual
- Interface Wiring Diagrams
  - Control Panel(s) Wiring Diagram
  - Control Panel Schematic
  - Point-to-Point Wiring Diagram
- Controller logic diagrams.
- Spare Parts List

### **3.3 STARTUP SERVICE.**

Respondent shall include the cost for startup assistance in the total proposal price. It is the responsibility of Contractor to ensure that the equipment is delivered defect-free and in complete compliance with this specification. If equipment defects are discovered during startup, it is Contractor's responsibility to remedy those problems at its cost.

### **3.4 WARRANTY.**

The Compression Package Warranty shall, in all regards, match the warranty for the entire facility detailed in §3.4 of the Main Proposal Specification.

### **3.5 EXCEPTIONS TO SPECIFICATIONS.**

It is desired that the Respondent propose a standard production model compression package for this proposal. Consequently, and unless stated otherwise in this specification or on the accompanying drawings, slight exceptions to this specification will be considered so long as they do not materially impact the proposed equipment's, or the completed facility's, ability to meet the performance, safety, reliability, and code compliance intended by this specification.

Any exceptions to this specification must be noted by the Respondent on a separate attachment and included with the proposal. The separate attachment shall be entitled "Exceptions to Specifications" and will be a part of this proposal package. For each exception, the Respondent shall reference:

- The section and paragraph to which the exception is taken.
- The reasons for the exception.

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- Justification for the exception including: cost impact; operating experience; design calculations; and any other evidence which supports the reasonableness of the exception.
- A description of the Respondent's alternate recommendation, if one is offered.

**ANY EXCEPTIONS TO, OR DEVIATIONS FROM, THIS SPECIFICATION NOT LISTED IN THE "EXCEPTIONS TO SPECIFICATIONS", AND APPROVED BY THE PURCHASER, WILL BE CONSIDERED NON-COMPLIANCE WITH THIS SPECIFICATION.**

# MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

## 4. DESIGN REQUIREMENTS

### 4.1 COMPRESSOR

#### 4.1.1 General.

- 4.1.1.1 Quoted Capacity: The compressor shall be sized to deliver the quoted capacity at the gas supply conditions, rated discharge pressure, and site conditions specified in the CPDS. The package design shall also allow for all pressure drops through regulators, filters, pulsation bottles (if any), coolers and piping from the inlet flange to the outlet tubing connection on the skid.
- 4.1.1.2 Maximum Allowable Discharge Temperature: The actual discharge temperature of each stage shall comply with the limit set forth in NGV 4.8-2002 §2.3. This limit shall hold for all specified operating and load conditions.

#### 4.1.2 Compressor Cylinders.

- 4.1.2.1 Industry Specifications: Compressor Cylinders shall meet the requirements of NGV 4.8-2002 §2.5.
- 4.1.2.2 Ratings: Cylinders, piping and coolers shall all be rated at least 120% of maximum operating pressure at maximum suction conditions, except for the final stage which may be rated at 110%.

#### 4.1.3 Valves.

Valves shall meet the requirements of NGV 4.8-2002 §2.6.

#### 4.1.4 Pistons, Piston Rods, and Piston Rings.

- 4.1.4.1 Industry Specification: Pistons, Piston Rods, and Piston Rings shall meet the requirements of NGV 4.8-2002 §2.7.
- 4.1.4.2 Piston Rings: Piston rings shall have a minimum design life of 4000 compressor hours under typical CNG station operating conditions (i.e., 2 starts per day, 10 compressor hours per day). Vendor shall indicate the ring manufacturer, material and design life in the CVDS.

#### 4.1.5 Crankshafts, Connecting Rods, and Bearings.

- 4.1.5.1 Industry Specifications: Crankshafts, Connecting Rods, and Bearings shall meet the requirements of NGV 4.8-2002 §2.8.
- 4.1.5.2 Bearings. If a V-belt drive is proposed then the L10 rating shall incorporate the side loading and tension from such drive.

#### 4.1.6 Packing Cases and Pressure Packing.

- 4.1.6.1 Industry Specifications: Packing Cases and Pressure Packing shall meet the requirements of NGV 4.8-2002 §2.10.

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- 4.1.6.2 Type: Respondent shall indicate in the CVDS the packing manufacturer name and part number for any packings, as well as an estimate of gas by-pass in new (i.e., 100 hours of operating time) and end-of-life conditions (i.e., when the compressor manufacturer recommends that packing gland be replaced).
- 4.1.7 Compressor Lubrication System:**
- 4.1.7.1 Industry Specifications: Compressor Lubrication Systems shall meet the requirements of NGV 4.8-2002 §2.11 and §2.12
- 4.1.7.2 Manufacturer Conformance: Compressor lubrication systems shall conform to compressor manufacturer's recommended practice.
- 4.1.7.3 Lubrication Oil Consumption: Total consumption of lubrication oil shall be no greater than the following:
- For compressors of less than 300 SCFM capacity: 2.0 pounds of oil per million SCF of compressed natural gas.
  - For compressors of 300 SCFM capacity or greater: 1.0 pound of oil per million SCF of compressed natural gas.
- If permitted by compressor manufacturer, packager may provide a means of recycling oil from the blowdown tank back into the compressor crankcase to meet these requirements.
- 4.1.7.4 Lubrication Oil Vaporization: Compressor lubricating oil shall not change the natural gas' hydrocarbon dewpoint characteristic. The maximum hydrocarbon dewpoint temperature of CNG shall be 45° F at pressures between 300 to 600 psig. Hydrocarbon dewpoint temperature shall be measured using a Bureau of Mines dewpoint tester.
- 4.1.7.5 Lubrication Oil: Packager shall state in the CVDS the recommended lubrication oil and oil change intervals. If the manufacturer recommends a different oil for a break-in period, that oil and the specified break-in period shall also be specified in the CVDS.
- 4.1.8 Materials.**
- 4.1.8.1 Industry Specifications: Materials shall meet the requirements of NGV 4.8-2002 §2.13.
- 4.1.8.2 Cylinder Material: Respondent shall specify in the CVDS the material and forging process of its final stage cylinder as well as how the final cylinder is pressure rated.
- 4.1.9 Compressor Crankcase Ventilation.**
- Each compressor shall be equipped with means to prevent the compressor crankcase from being pressurized above the pressure that the crankcase is rated.
- 4.1.10 Power Transmission.**
- 4.1.10.1 Industry Specifications: Power Transmission shall meet the requirements of NGV 4.8-2002 §2.14.
- 4.1.10.2 Notification: Respondent shall indicate in the CVDS the type of power transmission assembly to be provided.



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4.1.10.3 Guards: Guards shall be constructed of aluminum to reduce risks of sparking and reduce weight for service.

4.1.10.4 V-Belt Restrictions: Unless Packager can otherwise justify in its proposal, v-belt drives shall not be provided with compressor drivers exceeding 200 hp.

### 4.1.11 Capacity Control.

4.1.11.1 Industry Specifications: Capacity control shall meet the requirements of NGV 4.8-2002 Part 3.

4.1.11.2 Automatic Gas Recycle: The compressor assembly shall be piped such that the compressor can startup and idle with as little load on the driver as is reasonably possible. Each interstage separator and the discharge filter (downstream of interstage and after-cooler) shall be tubed into the blowdown tank with a check and actuated ball valve. Provisions shall be made for sufficient lube oil knockout and cooling so that the compressor can idle for a minimum of ten (10) minutes. Tubing shall be sized for reasonable gas velocities. Respondent shall indicate in CVDS the maximum duration for compressor idling.

## 4.2 COOLING SYSTEM

### 4.2.1 Design.

4.2.1.1 Industry Specification: The Design shall meet the requirements of NGV 4.8-2002 Part 5.

4.2.1.2 Basis, The following criteria shall be used for design:

- |                                   |          |
|-----------------------------------|----------|
| • Max. ambient temperature        | See CPDS |
| • Site Elevation                  | See CPDS |
| • Max. supply gas temp            | See CPDS |
| • Aftercooler discharge gas temp  | See CPDS |
| • Specific gravity of gas         | See CPDS |
| • Gross heating value of gas      | See CPDS |
| • Hydrogen sulfide content of gas | See CPDS |
| • Water content of gas            | See CPDS |

## 4.3 PRESSURE VESSELS

### 4.3.1 General.

4.3.1.1 Industry Specifications: Pressure Vessels shall meet the requirements of NGV 4.8-2002 Part 6.

4.3.1.2 Stamping: All vessels requiring ASME stamping shall also be stamped with the following:

- The volumetric capacity in standard cubic feet of natural gas when filled to design pressure.
- The words "For CNG."
- The head and shell thicknesses.

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- 4.3.1.3 Special Markings: All vessels in excess of 60 gallons water capacity shall have the word "FLAMMABLE" painted or otherwise suitably applied on each side that is readily visible. The letters of this sign shall be standard type and shall have a height of at least 1/12 of the diameter of the tank, but need not be in excess of 1-1/2 inches.
- 4.3.2 **Blowdown Receiver.**  
A Blowdown Receiver shall be used to contain all compressor gases upon compressor shut-down. The contents of the Blowdown Receiver shall be drawn into the compressor inlet upon compressor start-up.
- 4.3.2.1 Industry Specifications: Blowdown Receivers shall meet the requirements of NGV 4.8-2002 Part 6, and NGV 4.8-2002 §7.9.
- 4.3.2.2 Quantity: One Blowdown Receiver shall be provided for each compressor.
- 4.3.2.3 Pressure Rating: The Blowdown Receiver shall be rated for a minimum service pressure of 200 psig, unless Packager can provide supporting calculations for a lower rating.
- 4.3.2.4 Drain Valve: The Blowdown Receiver shall have a manual drain valve. The valve handle shall be easily accessible and the valve discharge will be located so as to easily capture the discharged liquids into a 1 gallon container.
- 4.4 PIPING AND APPURTENANCES**
- 4.4.1 **General.**
- 4.4.1.1 Industry Specifications: Piping and appurtenances shall meet the requirements of NGV 4.8-2002 Part 7.
- 4.4.1.2 Interconnects: Inlet piping interconnection to Purchaser's system shall terminate with raised face flanged connections at the edge of the skid.
- 4.4.1.3 Design Conditions: Connections for hose, metallic hose, flexible metal hose and tubing shall be designed with a burst pressure of at least 4 times the most severe pressure and temperature conditions expected.
- 4.4.1.4 Markings: Hose, metallic hose, flexible metal hose and tubing shall be distinctly marked either by the manufacturer's permanently attached tag or by distinct markings every 5 feet indicating the manufacturer's name or trademark, service and working pressure.
- 4.4.1.5 Prohibited materials: Refer to CCR §536 (a) (5) for a list of prohibited materials.
- 4.4.1.6 Blowdown Tees: All piping and tubing systems including instrumentation tubing shall be equipped with blowdown tees or needle valves to facilitate equipment maintenance.
- 4.4.2 **Piping.**
- 4.4.2.1 Pipe Specification: Pipe containing flammable fluids shall be seamless carbon steel manufactured in accordance with ASTM A-106 Grade B or a Purchaser approved

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equivalent. All pipe, fittings and other piping components shall be suitable for the full range of pressures, temperatures and loadings to which they may be subjected with a factor of safety of at least four (4). Any material used, including gaskets and packing, shall be compatible with natural gas and its service conditions.

4.4.2.2 Pipe Fabrication: The internal pipe surface shall be cleaned over its entire length, removing all dirt, debris and loose corrosion products before pipe is lined up for welding. The open ends of all strings of pipe shall be kept securely closed to prevent the entrance of dirt, debris, water or animals into the pipe.

4.4.2.3 Leak Testing: All pipe welds shall be leak tested to 1-1/2 times the relief valve set pressure for the system in which the weld is located. The gauge shall be calibrated within the previous sixty (60) days and shall have a range between 125% and 200% of the required test pressure.

### 4.4.3 **Tubing.**

4.4.3.1 Tubing Specification: All tubing except for that associated with the compressor oil lubrication system shall be stainless steel ASTM A269-90A or TP316 ASME SA213 cold drawn bright annealed seamless tubing with surface hardness suitable for use with compression tube fittings. All tubing and tubing components shall be suitable for the full range of pressures, temperatures and loadings to which they may be subjected with a factor of safety of at least four (4).

4.4.3.2 Tubing Fittings: 300 series stainless steel fittings shall be used with stainless steel tubing. Tube fitting installation shall conform to manufacturer's guidelines. Packager's personnel who install tube and tube fitting shall be trained and certified by a fitting manufacturer's distributor for such activity. All tubing shall be installed neatly and in a workman-like manner. All tubing shall be properly anchored, supported and / or pitched. All tubing shall run true to the vertical and horizontal axis of the skid whenever possible. All valves shall be accessible for easy operation and maintenance.

### 4.4.4 **Frame Lubricating Oil Piping.**

Frame Lubricating Oil Piping shall meet the requirements of NGV 4.8-2002 §7.3.

### 4.4.5 **Instrument Piping.**

4.4.5.1 Industry Specifications: Instrument Piping shall meet the requirements of NGV 4.8-2002 §7.5.

4.4.5.2 Serviceability: Provisions shall be made in assembly piping and tubing to accommodate field servicing and calibration of instruments. Compressed air tubing may be plastic and rated for a minimum of 150 psig.

### 4.4.6 **Suction Filter.**

One or more suction particulate filter(s) shall be provided at the compressor inlet. This filter(s) will be located downstream of any dryer. To avoid excessive redundancy, if an inlet dryer is used, it need not have a discharge filter.

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- 4.4.6.1 Industry Specifications: Suction filters shall meet the requirements of NGV 4.8-2002 §7.6.
- 4.4.6.2 Size: The suction filter(s) shall be sized to comply with the compressor manufacturer's requirements and recommendations.
- 4.4.6.3 Filtration. The suction filter(s) shall eliminate all suction gas particles (liquid and solids) with diameters of five (5) microns or less for fully lubricated compressors and 0.9 micron or less for non-lubricated compressors. Total liquids discharge shall meet the compressor manufacturer's requirements and recommendations.
- 4.4.6.4 Pressure rating: Filter body design pressure shall not be less than the blowdown receiver relief valve set pressure.
- 4.4.6.5 Ancillary Equipment. A drain with manual valve and differential pressure gauge shall be provided with this filter. The drain system shall be designed such that velocities through the filter element are controlled during depressurization.
- 4.4.7 Interstage Centrifugal Separators.**  
Packager shall provide a coalescing filter or interstage centrifugal liquid knockout separators downstream of each pressure lubricated cylinder between the interstage coolers and next stage compressor suction. Such device is not required downstream of the final stage cylinder. Cylinders without direct pressurized lubrication shall have sufficient provisions for interstage separation to minimize compressor damage from inlet gas condensables.
- 4.4.7.1 Size. Separators shall be designed to eliminate ninety five (95) percent of entrained liquids and handle liquid accumulation which may result from 24 hours of continuous compressor operation. Separators with less liquid retention capacity may be acceptable if Packager devises a means for transferring liquid accumulation to the blowdown receiver while compressors are running.
- 4.4.7.2 Drains. Drain lines and the actuated valve shall be sized to handle compressor idling gas volumes.
- 4.4.8 Discharge Filter.**  
For "lubricated" compressors, both pre-coalescer and coalescer filters shall be located downstream of the final stage aftercooler. For "non-lubricated" or "mini-lubricated" compressors, only a single coalescing filter is required.
- 4.4.8.1 Specification: The discharge of the final coalescer filter shall contain no more oil or other liquid hydrocarbons, exclusive of non-condensables, than (5) parts per million on a weight basis. Also the maximum particulate size shall be 5 microns. The filters shall be adequately sized for the maximum compressor gas flowrate over gas pressures ranging from 1000 to 5000 psig. Filters shall have a design pressure not less than 5000 psig.

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4.4.8.2 Drains: The filter(s) shall have an automatic liquids purge to the blowdown receiver. The coalescing filter shall have an actuated valve which opens upon compressor shutdown or regular intervals of compressor runtime.

### 4.4.9 **Inlet Ball Valves.**

4.4.9.1 Compressor Isolation Valve: For skids with multiple compressors, each compressor shall be equipped with a manually operated isolation ball valve at each compressor inlet gas supply connection. Such ball valve shall have a rated working pressure not less than the pressure relief valve setting for the blowdown receiver.

4.4.9.2 Actuated Suction Valve: A fail-safe electrically actuated ball valve shall be installed upstream of compressor suction. When this valve is closed, the compressor shall be isolated from the blowdown receiver and inlet gas. This valve shall have a rated working pressure not less than the pressure relief valve setting for the blowdown receiver.

### 4.4.10 **Discharge Ball Valves.**

4.4.10.1 Compressor Isolation Valve: For skids with multiple compressors, each compressor discharge shall be equipped with a manually operated isolation ball valve adjacent to the discharge connection.

4.4.10.2 Skid Isolation Valve: The compression package discharge shall be equipped with a manually operated isolation ball valve adjacent to the discharge connection.

### 4.4.11 **Backflow Preventers.**

4.4.11.1 Suction Check Valve: General Order 112-D requires that the gas utility's gas meter be protected from backpressure. A wafer swing check valve shall be provided immediately downstream of the skid inlet gas connection. This check valve shall operate to prevent high pressure bleed-back to the inlet gas supply line during compressor off-cycles and protect the gas meter should a discharge regulator (if applicable) malfunction on the blowdown receiver.

4.4.11.2 Discharge Check Valve: A check valve shall be provided at the compressor skid discharge to prevent backflow into the compressor from ancillary equipment.

### 4.4.12 **Pressure Relief Valves.**

4.4.12.1 Industry Specifications: Pressure Relief Valves shall meet the requirements of NGV 4.8-2002 §7.8.

4.4.12.2 Protected Circuits: Pressure relief devices shall be installed to prevent over-pressurization of the following systems:

- Compressor suction
- Interstage connecting
- Compressor discharge
- Blowdown receiver

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- 4.4.12.3 Relief Valve Setting: Relief devices installed to protect a piping system shall have sufficient capacity and shall be set to open at a pressure not exceeding 110% of system MAWP or the pressure which produces a hoop stress of 75% of specified minimum yield strength, whichever is lower.
- 4.4.12.4 Stamping: All relief valves shall be ASME rated and stamped.
- 4.4.12.5 Service Shut-off: There shall be no shutoff means in the discharge line of a pressure limiting device or between the valve and the pressure source which it controls.
- 4.4.12.6 Relief Valve Venting: Each relief valve shall be connected to a vent pipe. The vent pipe shall vent released gas at an elevation ten (10) feet above the lowest skid elevation. Escaping gas shall not impinge on a vessel, valves or fittings. Except for safety valves that are integral with service valves, relief valves on tanks shall be installed in a vertical position and shall be fitted with suitable rain caps.
- 4.4.12.7 Prohibited items: Fusible plugs and/or rupture plug are prohibited for primary relief devices.

### 4.5 ELECTRICAL SYSTEMS

#### 4.5.1 General.

- 4.5.1.1 Industry Specifications: Electrical Systems shall meet the requirements of NGV 4.8-2002 Part 8.
- 4.5.1.2 Codes: All electrical installations shall conform to the requirements of CCR Title 8 Electrical Safety Orders and NFPA 70 (NEC). The most restrictive shall apply.
- 4.5.1.3 Conduits and Cable Runs: All wiring within any skid enclosure shall be installed in accordance with Class 1 Division 1 Group D area classification requirements, unless otherwise noted in the CPDS. Wiring outside of skid enclosures shall be in accordance with Class 1 Division 2 Group D area classification requirements.
- 4.5.1.4 Approved Materials: Electrical equipment and wiring shall be UL listed or FM approved. Electrical equipment and wiring shall be judged with respect to its suitability for the particular application. Electrical equipment and wiring listed or certified by a Nationally Recognized Testing Laboratory (NRTL) qualified to certify or list electrical equipment or wiring shall be deemed to be an approved type for the application and location.
- 4.5.1.5 Strain Relief: Strain relief between wiring and the device(s) to which it connects shall be provided whenever the conditions of normal servicing of the compressor create the likelihood of placing a strain on wiring junctions.

#### 4.5.2 Electric Motors.

- 4.5.2.1 Description: Electric motor prime movers shall be a constant speed induction type, and shall be designed for continuous operation. The motor description including electrical data, starting conditions, area classification, ambient temperature, elevation, and

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accessories such as temperature detectors, vibration sensors, and instrumentation is specified in the CPDS.

- 4.5.2.2 Industry Specifications: Electrical Motors shall meet the requirements of NGV 4.8-2002 §4.3.
- 4.5.2.3 General Requirements: Electric motor prime movers shall meet the following requirements:
- Be suitable for the most severe operating conditions and requirements specified in the CPDS.
  - Those within enclosures shall conform to NFPA 52 and NFPA 70 unless otherwise noted in the CPDS.
  - Those outside of enclosures shall be suitable for Class 1, Division 2, Group D classified areas.
  - Be provided with overcurrent protection in accordance with NFPA 70 and the CPDS.
  - Have a Totally Enclosed Fan Cooled (TEFC) motor frame.
- 4.5.2.4 High Power Motors: Motors larger than 100 horsepower shall be equipped/installed with thermal overload protection and thermostatically controlled winding heaters to prevent condensation in the windings. Starters shall automatically disconnect these heaters when the motor operates.
- 4.5.2.5 Motor Starter Type: The motor starter shall meet the requirements stated in the CPDS. Any external motor starter shall be mounted off-skid adjacent to or in the power center.
- 4.5.2.6 Lubrication: Motor, blower or fan bearings shall be either (a) permanently lubricated or (b) provided with accessible means for manual lubrication.
- 4.5.2.7 Motor Current Variations: The inertia of the rotating parts of the combined motor / compressor installation shall be sufficient to limit motor current variations to a value not exceeding 66% of the full load current in accordance with Paragraph 20.82 of NEMA MG-1 for induction motors and Paragraph 21.84 of MG-1 for synchronous motors for all specified compressor operating conditions.

### 4.6 INSTRUMENTS AND CONTROLS

#### 4.6.1 General.

- 4.6.1.1 Industry Specifications: Instruments and Controls shall meet the requirements of NGV 4.8-2002 Part 9.
- 4.6.1.2 Type: Package control systems (start, shutdown, capacity, speed) shall be electronic or electrical and shall be automatically controlled with manual overrides.
- 4.6.1.3 Pneumatic Supply. Filtered and regulated compressed dry gas shall be used to operate pneumatic instruments and controls. The CPDS indicates whether this gas shall be air or regulated CNG. If regulated CNG, Packager shall provide the regulator and source tie-in.

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### 4.6.2 Instrument and Control Panel.

4.6.2.1 Industry Specifications: The Instrument and Control Panel shall meet the requirements of NGV 4.8-2002 §9.2.

4.6.2.2 Enclosure: The controller shall be enclosed in a weatherproof NEMA 4 enclosure which is mounted on an outer enclosure wall if an enclosure is specified or anywhere on the skid convenient to access if no enclosure is specified. Such controller shall be rated for a Class 1, Division 2, Group D hazardous environment.

4.6.2.3 Performance: A controller shall be provided for each compressor/motor pair. It is preferred, but not required, that an LCD digital display be provided to indicate alphanumerically the cause and condition of each fault shutdown and to annunciate the status of shutdowns. If an LCD display is not used, adequate indicators shall be provided to convey similar information. Unless specifically stated otherwise, all set points for this controller shall be modifiable at the panel.

4.6.2.4 Manual Controls: The compression package shall include the following manual controls. All manual controls shall be located on or immediately adjacent to the control panel unless specifically stated otherwise. All manual controls shall be conspicuously labeled:

- Manual shutdown switch
- Key lockout
- An emergency shutdown switch shall be provided on the skid. The ESD switch shall shut down all compressor(s) and close the actuated suction valve. Packager shall allow in its design for integration of an unspecified number of ESD switches off skid.

### 4.6.3 Instrumentation.

#### 4.6.3.1 Calibration:

4.6.3.1.1 Sensors: All sensors shall be calibrated by the manufacturer or an independent lab prior to installation. Packager shall keep a record of all calibration data and produce it to purchaser upon purchaser's request.

4.6.3.1.2 Gauges: The following shall be provided to purchaser upon equipment commissioning:

- For each gauge model:
  - The manufacturer's specifications for that model gauge.
  - If not already indicated in the manufacturer's specifications, a letter from the manufacturer indicating:
    - The ANSI grade of that model gauge.
    - That that model gauge conforms to ANSI B40.1 or ANSI/ASME B40.100-2005 Standards.



## MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

- For each gauge:
    - A letter from the manufacturer stating the serial number and model number of the gauge and confirming that the gauge meets the manufacturer's specifications.
- 4.6.3.2 Temperature Measurement: RTDs shall be used for temperature sensing. Use of surface mounted thermocouples in lieu of thermowell mounted RTDs shall be approved by Purchaser.
- 4.6.3.3 Pressure Measurement:
- 4.6.3.3.1 Required Pressure Gages and Sensors: A gage or sensor with readout capability shall be provided for the following functions for each compressor at the facility:
1. first stage suction
  2. each interstage discharge
  3. compressor discharge<sup>1</sup>
  4. skid discharge<sup>1</sup>
  5. compressor lube oil (if pressurized)
  6. blowdown receiver
- 4.6.3.3.2 Calibration Valve: All pressure switches and transducer/transmitters shall have a dedicated block and vent valve to facilitate pressure calibration (such as AGCO's M25 2-valve manifold or equivalent). The block valve should be lockable with a wire and lead seal.
- 4.6.3.4 Level Measurement:
- A sight-glass or other external means of indicating compressor oil level shall be provided on lubricated compressors. If indication is by sight, the means shall be easily visible and not obscured in the final installation. If the means is by manual manipulation (e.g. dipstick), it shall be easily accessible in the final installation.
- 4.6.3.5 Time Measurement:
- An hour-meter indicating the total operating time of the compressor shall be provided for each compressor. The hour-meter may be part of a multi-functional digital display.
- 4.6.4 **Control Strategy.**
- 4.6.4.1 Description: A description of the controller strategy shall be provided prior to delivery of skid for Purchaser's review.
- 4.6.4.2 Start Set Point:
- 4.6.4.2.1 Start Set Point Requirements: The compressor shall automatically start when the following conditions are met:
- No faults are set.

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<sup>1</sup> Separate readings for compressor and skid discharge are necessary only if there are any potentially significant restrictive elements (e.g. filters) between them.

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- The discharge pressure of the final stage falls below the Initial Start Point Setting indicated in the CPDS.

4.6.4.2.2 Start Set Point Adjustment: Per §4.6.2.3 above, the Start Point Setting shall be adjustable. The range of adjustment is given in the CPDS.

### 4.6.4.3 Stop Set Point:

4.6.4.3.1 Stop Set Point Requirements: The compressor shall automatically shut-off when any of the following occurs:

- Any ESD at the facility is activated.
- A critical fault code is set.
- A required shut-down condition listed below or in the CPDS is met.
- The discharge pressure of the final stage has reached a static set pressure (see §4.6.4.3.2 below).
- The discharge pressure of the final stage has reached the Nominal Facility Pressure compensated for temperature. (See CPDS and §4.6.4.3.3 below).

4.6.4.3.2 Static Stop Set Point: The compressor controls shall have the capability to implement a Static Stop Set Point. When the discharge pressure of the final stage reaches this pressure the compressor(s) shall automatically shut down. The default setting for this feature shall be disabled, and its disabling shall be confirmed during facility commissioning. This feature shall be protected (by password or physical lock and key) so that it can only be enabled or modified by properly authorized personnel. This feature shall override the temperature adjusted Nominal Facility Pressure shut down described in §4.6.4.3.3. Per §4.6.2.3 above, this set point shall be adjustable. The range of adjustment is given in the CPDS.

4.6.4.3.3 Maximum Discharge Pressure: The maximum discharge pressure shall be adjusted, based on ambient temperature, such that a closed vessel filled to that pressure and stabilized to the ambient temperature would yield a pressure equal to the Nominal Facility Pressure when the vessel is stabilized to a temperature of 70° F. This feature shall not throttle CNG flow as the shut down pressure is approached. It is preferred that this function be integral to and implemented through the compressor controls. This feature shall be protected (by password or physical lock and key) so that it can only be modified by properly authorized personnel.

## 4.7 SHUTDOWNS, ALARMS AND ANNUNCIATORS.

### 4.7.1 **General.**

All shutdowns, alarms, and annunciators shall meet the requirements of NGV 4.8-2002 Part 10. All indicators and annunciators shall be located on or immediately adjacent to the control panel unless specifically stated otherwise, and shall be conspicuously labeled.

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### 4.7.2 **Mandatory Shutdowns.**

The following shutdowns must be implemented by the Packager per NGV 4.8-2002 §10.3. The compression package controls must detect the following conditions and shut-down the compression package and set a hard fault as a result. There are no exceptions to this section and non-compliance shall be considered a no-bid.

- Compressor
  1. High / low suction gas pressure - first stage
  2. High discharge gas pressure - final stage
  3. High discharge gas temperature - final stage
  4. Lubricator no-flow (pressure lubricated compressors only)
  5. Low lube oil level or pressure (lubricated compressors only)
  6. High coolant temperature (liquid cooled compressors only)
  7. High vibration

### 4.7.3 **CPDS Shutdowns, Alarms, and Annunciators.**

4.7.3.1 CPDS: The CPDS lists the shutdowns, alarms, and annunciators desired by the Purchaser along with the type of indication, type of sensors and sensor locations desired by the Purchaser.

4.7.3.2 Alarm types: Visual indicators for alarms shall include:

- Indicator light or display readout at control panel.
- Activation of Facility Status Light/s per §4.7.5

### 4.7.4 **Desired Indicators and Annunciators.**

In addition to the devices listed in the CPDS, the compression package shall include the following indicators and/or annunciators:

- Lights to indicate main power is energized, compressor running or stand by.
- Compressor automatic start cycle failure.
- First out annunciator (where applicable).
- Compressor and cooler (where applicable) motor overload. The annunciator need not specifically call out "compressor motor overload" or "cooler motor overload." Rather the annunciator may indicate a message such as "compressor motor failure" or "cooler motor failure."

### 4.7.5 **Facility Status Lights.**

The compression package controller shall implement two outputs for the two colors of facility status lights described in §5.5.1 of the main specification.

4.7.5.1 Output configuration: The two outputs shall be configured and implemented so that the facility status lights are activated according to the following:

- 4.7.5.1.1 Red Light Operation: The red status light shall be energized whenever an ESD is activated or a critical fault occurs. A critical fault is one that normally causes the automatic shutdown of the compression package. The red status light shall be de-

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energized when the ESD is reset and all critical compression package faults are cleared.

4.7.5.1.2 Yellow Light Operation: The yellow status light shall be energized whenever a non-critical fault occurs (one that does not require an automatic shutdown of the compression package). It shall be de-energized when all compression package faults are cleared.

4.7.5.2 Output Signal: It is preferred that the output signal be a standard type such as a 5V DC or 120VAC output or a contact closure.

4.7.5.3 Integration: The outputs from the compression package shall be configured and integrated with the status light outputs from other electronically controlled equipment (such as other compression packages and automatically regenerating dryers) such that they will not interfere with each other, and that the appropriate status light shall be properly energized when any piece of equipment activates it.

#### 4.7.6 **Telemetry.**

No telemetry will be required for this project.

### 4.8 **STRUCTURAL.**

#### 4.8.1 **General.**

Structural steel shall be of sufficient strength for transportation and installation, and to transmit equipment generated forces and couples to the foundation. The structural frame and all equipment mounted thereon shall comply with UBC-1991 seismic zone 4 requirements. The structure, including any enclosures, shall meet the requirements of NGV 4.8-2002 Part 11.

#### 4.8.2 **Design.**

4.8.2.1 Industry Specifications: Structural Designs shall meet the requirements of NGV 4.8-2002 §11.2.

4.8.2.2 Members: Load bearing components shall be full depth members and of sufficient strength to prevent excess deflection that would damage installed equipment when the skid is moved or installed.

4.8.2.3 ASME Vessels: ASME vessels shall be supported by full depth structural skid members and not the floor plate. ASME vessels may be welded or bolted to the members.

#### 4.8.3 **Construction.**

Construction shall meet the requirements of NGV 4.8-2002 §11.3.

#### 4.8.4 **Enclosures.**

4.8.4.1 Industry Specifications: Enclosures shall meet the requirements of NGV 4.8-2002 §11.4.

## MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

- 4.8.4.2 Wind: Enclosure design shall meet or exceed requirements of UBC-1991 "Exposure C"-- 80 mile per hour winds.
- 4.8.4.3 Corrosion Protection: All exposed metal surfaces shall be primed and painted, galvanized or have equivalent corrosion protection. All materials shall meet ASTM test standards. All welding shall conform to AWS requirements.
- 4.8.4.4 Appurtenances: Skid enclosures shall be equipped with one explosion-proof light per compressor, one methane detector per compressor, and one 120 volt explosion-proof duplex receptacle. When a methane concentration of one-quarter (1/4) the lower flammability limit or greater is detected, cooling or ventilating motors shall be activated. When a methane concentration of one-half (1/2) the lower flammability limit or greater is detected, audible and visual alarms shall be activated and the compressor motor deactivated.

### 4.9 SOUND LEVEL.

#### 4.9.1 Requirements.

The compression package shall meet the maximum sound level specifications indicated in the CPDS. If no maximum sound level is listed, none shall apply. The sound level shall be measured at a distance of ten (10) feet from the skid and an elevation of 6 feet in an open field condition. Recommended method of test can be found in ARI 270, Sound Rating of Outdoor Unitary Equipment, or CAGI S5.1, Pneurop Test Code for the Measurement of Sound from Pneumatic Equipment.

#### 4.9.2 Purchaser Approval.

Packager shall provide evidence to Purchaser's satisfaction prior to equipment delivery that any limits specified for the compression package sound level in the CVDS shall be satisfied.

### 4.10 PAINT AND PAINTING.

#### 4.10.1 General.

Protective coatings shall meet the requirements of NGV 4.8-2002 Part 12 unless otherwise indicated below.

#### 4.10.2 Deck (if applicable).

It is preferred that any deck surface be covered with a non-skid coating with a minimum coefficient of friction value of 0.5.

#### 4.10.3 Pipe and Equipment.

##### 4.10.3.1 Materials:

- All materials used shall be first-line, high quality, standard products of the manufacturer.
- All materials shall be used within their expiration dates.

4.10.3.2 Surface Preparation: All surfaces shall be clean, dry and in suitable conditions to receive the finish according to manufacturer's recommendations. Cleaning and painting shall be programmed so that dust or spray from the cleaning process will not damage adjacent

## MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

surfaces, materials or equipment. All materials shall be prepared and applied according to manufacturers instructions by properly trained and qualified personnel.

4.10.3.3 Warranty: All coatings shall have a minimum expected lifespan or manufacturers warranty of (5) yrs. under the environmental conditions expected at the site. During that period the Respondent shall warrant all coatings against:

- Peeling
- Chipping
- Bubbling/Blistering
- Cracking
- Shrinking
- Substrate corrosion
- Any other defects which affect the appearance, durability, or corrosion inhibiting properties of the coating.

During the warranty period Respondent shall promptly refinish areas exhibiting such defects upon Purchaser's notice and to Purchaser's satisfaction.

4.10.3.4 Items not to be Painted. Items not to be painted are listed in NGV 4.8-2002 §12.4.

### 4.11 INSPECTION, TESTING AND PREPARATION FOR SHIPMENT.

#### 4.11.1 General.

Inspection, Testing, and Preparation for Shipment shall comply with NGV 4.8-2002 Part 13. Packager shall cooperate fully with Purchaser's representative in planning, scheduling, and conducting any prescribed performance tests, and shall make test information and reports promptly available.

#### 4.11.2 Inspection.

Inspection procedures shall comply with NGV 4.8-2002 §13.2. Vendor shall also meet the general inspection and testing requirements listed below:

4.11.2.1 Inspection by Packager: Packager shall perform adequate inspections and tests of its own to insure that the equipment meets Packager's and Purchaser's specification and is suitable for the intended service. Packager's own inspections shall be appropriate for the intended purpose and shall conform to good industry practices and to applicable regulations, codes and standards. Packager shall adequately document its inspections and shall maintain adequate files of such information.

4.11.2.2 Authority of Purchaser's Inspector: Purchaser's inspectors have the authority to require conformance to all specifications which are a part of the purchase order. However, Purchaser's inspectors do not have the authority to waive any specification requirements. Only Purchaser is authorized to waive specification requirements.

4.11.2.3 Acceptance Not a Performance Waiver: Approval of inspections and shop performance tests and acceptance of shipment and delivery of equipment does not constitute a waiver

## MVUSD CNG COMPRESSION PACKAGE SPECIFICATION

of requirements to meet field performance under the specified operating conditions. Likewise, Purchaser's inspection does not relieve Packager of any responsibilities to insure that the equipment is manufactured, assembled, and tested to Purchaser's requirements.

4.11.2.4 Procedures: Packager shall furnish for Purchaser approval copies of its equipment test procedures. The procedures shall be written such that they may be used for installation testing by Purchaser or Installation Contractor. Each test procedure shall contain Pass/Fail criteria for each step.

4.11.2.5 Quality Control: Purchaser's representative shall have access to Packager's quality control program for review prior to the start of fabrication.

### 4.11.3 **Testing.**

#### 4.11.3.1 General:

- Test procedures shall comply with NGV 4.8-2002 §13.3.
- Each compressor package shall conduct the sound tests as described in this specification.
- Packager shall conduct a functional operations test of the instrumentation and electrical components.

4.11.3.2 Pressure Tests: Pressure testing shall be conducted according to the requirements of NGV 4.8-2002 §13.3.1. Pressure testing shall include inspection checking for leaks. Packager shall submit its proposed pressure and leak testing procedure to Purchaser for approval prior to equipment testing.

#### 4.11.4 **Mechanical Running Tests.**

Mechanical Running Tests shall be conducted according to the requirements of NGV 4.8-2002 §13.4.

#### 4.11.5 **Preparation for Shipment.**

The equipment shall be prepared for shipment in compliance with NGV 4.8-2002 §13.5. All tubing, including connections, shall be protected from wear or injury and shall be capped.

### 4.12 **MARKING.**

The equipment shall be prepared for shipment in compliance with NGV 4.8-2002 Part 14.

### 4.13 **USER INSTRUCTIONS.**

#### 4.13.1 **Requirements.**

Each compression package shall be accompanied by clear, concise, printed instructions and diagrams, stated in terms clearly understandable to the consumer, adequate for proper installation, safe use and maintenance. The safety-related items included in the instructions shall be prominently displayed and shall precede the instructions concerning the functional use of the compression package. The instructions shall include:

- a. A statement that the installation conforms with CCR Title 8 Electrical and Unfired Pressure Vessel Safety Orders, NFPA 70 and NFPA 52.

**MVUSD CNG  
COMPRESSION PACKAGE SPECIFICATION**

- b. Electrical ratings and power supply requirements.
- c. A statement that the compressor, when installed, must be electrically grounded in accordance with CCR Title 8 Electrical Safety Orders.
- d. Directions for the proper assembly of field installed parts and accessories supplied with the compressor.
- e. A statement of the maximum inlet gas supply pressure in accordance with the inlet pressure rating of the compressor.
- f. Maintenance instructions including recommended frequency for: cleaning; lubricating moving parts (including type and amount of lubricant); servicing gas filters and/or dryers; servicing pressure vessels such as the blowdown receiver; and servicing oil separator systems.



# MVUSD COMPRESSION PACKAGE DATA SHEET

## SITE DESCRIPTION:

Ambient temperatures (°F): Minimum: 20 Maximum : 115 99% Winter Design: 29  
Site altitude (feet): 1,200  
Average monthly facility throughput (scf): 863,000

## **Gas Supply:**

Minimum pressure (psig)<sup>2</sup>: 30  
Maximum gas temperature (°F): 75  
Specific gravity: 0.59  
Gross (higher) heating value: 1027 BTU / scf  
Hydrogen sulfide: 0 to 0.25 grains / 100 scf  
Water content: 7 lbs / mmscf

## GENERAL REQUIREMENTS

Rated Discharge Pressure (psig): 3,600 Nominal Facility Pressure (psig): 3,600  
**Capacity at Rated Discharge Pressure, Maximum Ambient Temperature:**  
Minimum (scfm): 60 Maximum (scfm): 90 (note electric motor limits below)  
**Compressor Start Point (psig):**  
Initial setting: 3,300 Range Of Setting: Min: 3,000 Max: 4,200  
**Compressor Static Stop Point (psig):**  
Initial setting: 3,600 Range Of Setting: Min: 3,000 Max: 5,000  
Maximum cylinder discharge temp (°F): 350  
Maximum final aftercooler discharge temp (°F above ambient): 20  
Minimum design ring life for all stages and rings (hrs.): 4,000  
Maximum equipment height above grade (disregarding vent stacks, feet): 12

## SOUND LEVEL

Maximum sound level at rated discharge pressure and capacity (dbA measured 10 ft. from skid): 80

## ELECTRIC MOTOR

**Power:** Volts: 240/480 Phase: 3 Hertz: 60  
**Power limits:** Maximum steady state amperage draw at 480 volts: 90  
**Performance:** Minimum Service Factor: 1.15 Minimum Efficiency: 92%

## **Electrical Class:**

Inside Skid Enclosure: Per NFPA 52 and NFPA 70  
No Skid Enclosure: Class: 1 Division: 2 Group: D

**Motor Starter:** "Soft Start"

**Protections:** Steady State Overcurrent Instantaneous Overcurrent Single Phase

**Controls (to be located on motor control center):**

Shut-down switch Power-on light Starter-reset button

## INSTRUMENTS AND CONTROLS

Compressed air will not be supplied for pneumatic controls.

<sup>2</sup> At house line riser adjacent to compression pad, and at the rated compressor capacity for throughput.

# MVUSD COMPRESSION PACKAGE DATA SHEET

## SHUTDOWNS, ALARMS AND ANNUNCIATORS

Note: Checked items indicate the minimum desired action, preferred type and location of annunciation, and location of the sensing device. Implementation of unchecked items is at the discretion of the Packager.

<u>Parameter Sensed</u>	<u>Sensing Device</u>								
	<u>Desired Action</u>			<u>Type</u>		<u>Location</u>		<u>Sensor Type</u>	
	<u>Shutdown</u>	<u>Alarm</u>	<u>Indicator</u>	<u>Visual</u>	<u>Audible</u>	<u>Panel</u>	<u>Remote</u>	<u>Digital</u>	<u>Analog</u>
<b>COMPRESSOR</b>									
Suction Gas Pressure - First Stage			√						√
Low	√	√	√	√					√
High	√	√	√	√					√
Suction Gas Pressure - Interstage									
Low									
High									
Discharge Gas Pressure - Interstage				√					√
Low				√	√				√
High	√	√	√	√					√
Discharge Gas Pressure - Final Stage				√					√
Low			√	√	√				√
High	√	√	√	√		√			√
Discharge Gas Temp									
High – Each Stage	√	√							
High – Final Stage	√	√	√	√					√
Cylinder Coolant Temperature <sup>3</sup>									
In									
Out - Each Cylinder									
High	√	√	√	√					√
Lube Oil Pressure <sup>4</sup>									
In-Filter									
Out-Filter				√	√				√
Low	√	√	√	√					√
Lube Oil Temperature <sup>5</sup>									
Out									
High	√	√	√	√					√
Lube Oil Level <sup>4</sup>				√	√				
Low Frame	√	√	√	√					√
Low - Lubricator	√	√	√	√					√
Lubricator			√	√					√
No-flow	√	√	√	√					√
Vibration - High	√	√	√	√					√

<sup>3</sup> Liquid cooled compressors only.

<sup>4</sup> Pressure lubricated compressors only.

<sup>5</sup> Lubricated compressors only. Indicator may be sight glass (preferred) or dipstick.

# MVUSD COMPRESSION PACKAGE DATA SHEET

## SHUTDOWNS, ALARMS AND ANNUNCIATORS

Note: Checked items indicate the minimum desired action, preferred type and location of annunciation, and location of the sensing device. Implementation of unchecked items is at the discretion of the Packager.

<u>Parameter Sensed</u>	<u>Sensing Device</u>								
	<u>Desired Action</u>			<u>Type</u>		<u>Location</u>		<u>Sensor Type</u>	
	<u>Shutdown</u>	<u>Alarm</u>	<u>Indicator</u>	<u>Visual</u>	<u>Audible</u>	<u>Panel</u>	<u>Remote</u>	<u>Digital</u>	<u>Analog</u>
<b>ELECTRIC MOTOR</b>									
Stator Winding									
High Temperature <sup>6</sup>	√		√	√					√
High Vibration <sup>5</sup>	√	√	√	√					√
<b>OTHER</b>									
Skid Vibration									
High	√	√	√	√					√
Cooler Coolant Level <sup>7</sup>									
Low		√	√	√					√
Blowdown Receiver									
High Liquid Level	√	√	√	√					√
Low Liquid Level									
High Pressure	√	√	√	√					√

<sup>6</sup> Applicable only to larger than NEMA frame motors, per NGV 4.8-2002 §10.3.1

<sup>7</sup> Liquid cooled compressors only.

# MVUSD COMPRESSION VENDOR DATA SHEET

## GENERAL INFORMATION

Vendor Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_ FAX: \_\_\_\_\_ Website: \_\_\_\_\_  
Contact: \_\_\_\_\_ Ext: \_\_\_\_\_ E-Mail: \_\_\_\_\_

## COMPRESSOR

Manufacturer: \_\_\_\_\_ Model #: \_\_\_\_\_  
Country of Manufacture: \_\_\_\_\_ Designed for natural-gas (Y/N): \_\_\_\_\_  
Rated capacity: \_\_\_\_\_ (SCFM) Rated speed: \_\_\_\_\_ (RPM) Rated power: \_\_\_\_\_ (HP)  
Rated Inlet Pressure (psig): \_\_\_\_\_ Rated Discharge Pressure (psig): \_\_\_\_\_  
Allowable Inlet Pressure (psig): (min) \_\_\_\_\_ (max) \_\_\_\_\_ Max Discharge Pressure (psig): \_\_\_\_\_  
Ambient temperature range (°F): (min) \_\_\_\_\_ (max) \_\_\_\_\_ Maximum Altitude (ft.): \_\_\_\_\_  
Ambient humidity range (% rel.): (min) \_\_\_\_\_ (max) \_\_\_\_\_  
Number of Cylinders: \_\_\_\_\_ Number of Stages: \_\_\_\_\_  
Stages (except final)<sup>8</sup>:  
Cylinder material: \_\_\_\_\_ Cyl. liner material: \_\_\_\_\_ Piston material: \_\_\_\_\_  
Piston ring mat'l: \_\_\_\_\_ Piston ring mfg'r: \_\_\_\_\_ Piston ring life (hrs.): \_\_\_\_\_  
Final Stage Cylinder: Material: \_\_\_\_\_ Liner material: \_\_\_\_\_  
Forging process: \_\_\_\_\_ Pressure rating (psi.): \_\_\_\_\_ Piston mat'l: \_\_\_\_\_  
Piston ring mat'l: \_\_\_\_\_ Piston ring mfg'r: \_\_\_\_\_ Piston ring life (hrs.): \_\_\_\_\_  
Lubrication:  
Pressurized Lubrication by Stage (Y/N): 1st: \_\_\_\_\_ 2nd: \_\_\_\_\_ 3rd: \_\_\_\_\_ 4th: \_\_\_\_\_ 5th: \_\_\_\_\_ 6th: \_\_\_\_\_  
Frame Lubrication: (Y/N): \_\_\_\_\_ Oil Tank Capacity \_\_\_\_\_ (Gal.) Heated: (Y/N) \_\_\_\_\_  
Lube Oil Consumption (max): \_\_\_\_\_ (lbs per MMSCF) Lube Oil CNG Content (max): \_\_\_\_\_ (ppm mass)  
Recommended Lube Oil: \_\_\_\_\_ Compatible with synthetic (Y/N): \_\_\_\_\_  
Oil change interval (hrs.): \_\_\_\_\_  
Recommended Break-in Oil: \_\_\_\_\_ Break-in Period (hrs.): \_\_\_\_\_  
Maximum continuous idle time (CPS §4.1.11.2), (min.): \_\_\_\_\_

### Packing Cases and Pressure Packing (CPS §4.1.6.2):

#### 1st Stage

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_  
Gas leakage: New: \_\_\_\_\_ End of life: \_\_\_\_\_

#### 2nd Stage

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_  
Gas leakage: New: \_\_\_\_\_ End of life: \_\_\_\_\_

#### 3rd Stage

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

<sup>8</sup> Indicate any differences for this data between stages/cylinders on a separate page and attach.

## MVUSD COMPRESSION VENDOR DATA SHEET

Gas leakage: New: \_\_\_\_\_ End of life: \_\_\_\_\_  
4th Stage  
Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_  
Gas leakage: New: \_\_\_\_\_ End of life: \_\_\_\_\_

### ELECTRIC MOTOR

Manufacturer: \_\_\_\_\_ Model #: \_\_\_\_\_  
Country of Manufacture: \_\_\_\_\_  
Site Rated: Power: \_\_\_\_\_ (HP) Speed: \_\_\_\_\_ (RPM) Amps \_\_\_\_\_  
Volts: \_\_\_\_\_ Phases: \_\_\_\_\_ Connection (delta/wye): \_\_\_\_\_  
Synchronous (Y/N): \_\_\_\_\_ Induction (Y/N): \_\_\_\_\_  
Electrical Rating: Class: \_\_\_\_\_ Group: \_\_\_\_\_ Div: \_\_\_\_\_  
Motor Starter: (Y/N): \_\_\_\_\_ On-frame or Remote: \_\_\_\_\_ NEMA Rating: \_\_\_\_\_  
Type of power transmission (§4.1.10.2): \_\_\_\_\_

### PRESSURE VESSELS

Pulsation Chamber Vol (in<sup>3</sup>): Suction: \_\_\_\_\_ Interstage: \_\_\_\_\_ Interstage: \_\_\_\_\_ Discharge: \_\_\_\_\_  
Blowdown Receiver Vol (in<sup>3</sup>): \_\_\_\_\_ ASME Stamped (Y/N): \_\_\_\_\_

#### Suction Filter:

Qty: \_\_\_ Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

#### Interstage Separators

##### 1st Stage Discharge

Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

##### 2nd Stage Discharge

Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

##### 3rd Stage Discharge

Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

##### 4th Stage Discharge

Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

#### Discharge Pre-Coalescing Filter:

Qty: \_\_\_ Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

#### Discharge Coalescing Filter:

Qty: \_\_\_ Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

# MVUSD COMPRESSION VENDOR DATA SHEET

## INSTRUMENTS AND CONTROLS

### Control Panel

Type: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

Skid mounted or remote: \_\_\_\_\_

Description: \_\_\_\_\_

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# MVUSD COMPRESSION VENDOR DATA SHEET

## SHUTDOWNS, ALARMS AND ANNUNCIATORS

Respondent shall indicate by checking off the appropriate boxes all parameters sensed, the type and location of the sensor and the type of output, and any actions implemented. Respondent shall cross out any parameters not sensed.

<u>Parameter Sensed</u>	<u>Sensing Device</u>				<u>Sensor Type</u>		
	<u>Desired Action</u>			<u>Type</u>		<u>Location</u>	
	<u>Shutdown</u>	<u>Alarm</u>	<u>Indicator</u>	<u>Visual</u>	<u>Audible</u>	<u>Panel</u>	<u>Remote</u>
	<u>Digital</u>	<u>Analog</u>					
<b>COMPRESSOR</b>							
Suction Gas Pressure – First Stage							
Low							
High							
Suction Gas Pressure – Interstage							
Low							
High							
Discharge Gas Pressure – Interstage							
Low							
High							
Discharge Gas Pressure – Final Stage							
Low							
High							
Discharge Gas Temp							
High – Each Stage							
High – Final Stage							
Cylinder Coolant Temperature							
In							
Out - Each Cylinder							
High							
Lube Oil Pressure							
In-Filter							
Out-Filter							
Low							
Lube Oil Temperature							
Out							
High							
Lube Oil Level							
Low Frame							
Low – Lubricator							
Lubricator							
No-flow							
Vibration - High							

# MVUSD COMPRESSION VENDOR DATA SHEET

## SHUTDOWNS, ALARMS AND ANNUNCIATORS

Respondent shall indicate by checking off the appropriate boxes all parameters sensed, the type and location of the sensor and the type of output, and any actions implemented. Respondent shall cross out any parameters not sensed.

Parameter Sensed

Sensing Device

Desired Action      Type      Location      Sensor Type  
Shutdown   Alarm   Indicator   Visual   Audible   Panel   Remote   Digital   Analog

### ELECTRIC MOTOR

Stator Winding

High Temperature

High Vibration

### OTHER

Skid Vibration

High

Cooler Coolant Level

Low

Blowdown Receiver

High Liquid Level

Low Liquid Level

High Pressure



# MVUSD COMPRESSION VENDOR DATA SHEET

## SKID

### Construction:

Structural Steel (Y/N): \_\_\_\_ Pre/post Steel (Y/N): \_\_\_\_ Other (describe): \_\_\_\_\_  
Deck Plate (Y/N): \_\_\_\_\_  
Frame Mounting: Bolted (Y/N): \_\_\_\_ Grouted (Y/N): \_\_\_\_ Sole plate/rail (Y/N): \_\_\_\_  
Compressor Mounting: Bolted (Y/N): \_\_\_\_ Grouted (Y/N): \_\_\_\_ Sole plate/rail (Y/N): \_\_\_\_  
Motor Mounting: Bolted (Y/N): \_\_\_\_ Grouted (Y/N): \_\_\_\_ Sole plate/rail (Y/N): \_\_\_\_  
Blowdown Receiver Mounting: Bolted (Y/N): \_\_\_\_ Grouted (Y/N): \_\_\_\_ Sole plate/rail (Y/N): \_\_\_\_

## OVERALL SHIPPING DIMENSIONS AND WEIGHT

Length: \_\_\_\_ (ft.) Width: \_\_\_\_ (ft.) Height \_\_\_\_ (ft.) Weight \_\_\_\_ (lbs.)

## INSPECTION, TESTING AND PREPARATION FOR SHIPMENT

### Tests and Inspections Performed:

Review of In-Process Inspections (Y/N): \_\_\_\_ Hydrostatic (Y/N): \_\_\_\_ Run-In (Y/N): \_\_\_\_  
Noise Level (Y/N): \_\_\_\_ Other (describe): \_\_\_\_\_

## SOUND LEVEL

Maximum Sound Level at 10 feet and rated compressor throughput (dbA): \_\_\_\_

# **MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS**

## **1. DESCRIPTION**

This specification describes Purchaser's requirements for a skid mounted, self-regenerative, single or dual tower assembly for natural gas drying. The system shall continuously remove water vapor from natural gas upstream of a CNG compression skid, except during periods of regeneration. The dryer shall be mounted on its own skid which is preassembled, piped, wired, instrumented, and painted by the Manufacturer in its shop. The dryer shall be ready to tie-in with Purchaser's field piping and wiring. Unless otherwise indicated in the attached data sheet, there will be no compressed air supply for valve actuation or electrical panel z-purge.

All equipment, materials, and workmanship shall be new and in accordance with this specification and any referenced codes. This specification is intended to give the minimum standards of design and workmanship required by Purchaser. The Contractor shall furnish, in accordance with normal manufacturers' standards, any items or categories not specifically covered by this specification.

Refer to Main Proposal Specification for site pressure, flowrate, and maximum moisture content.

## **2. APPLICABLE DOCUMENTS**

The following documents form a part of this specification, along with the documents listed in §2 "Applicable Documents" of the main Specification. Where conflict exists between this specification and the documents listed in the main Specification, then the documents listed in the main Specification shall control in the order listed. Where conflict exists between this specification and the documents listed immediately below, then the documents below shall control. The Contractor shall notify Purchaser of any instance of conflicting or apparently conflicting requirements or any ambiguities.

The following documents are listed in alphabetical order, and no inference of authority or precedence shall be construed by the document's position in the list.

### **Instrumentation Society of America (ISA)**

- RP7.1           Pneumatic Control Circuit Pressure Test.

### **National Fire Protection Association (NFPA)**

- NFPA 496 - Purged and Pressurized Enclosures for Electrical Equipment

### **Steel Structures Painting Council (SSPC)**

- Manual 10 – Near White Metal Blast Cleaning, latest edition.

# **MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS**

## **3. GENERAL REQUIREMENTS**

### **3.1 ADSORPTION FLOW.**

The direction of gas flow through the adsorbent shall be downward.

### **3.2 REGENERATION.**

Adsorbent regeneration shall be by temperature swing using natural gas in a closed-loop cycle. Adsorbent heating may be direct or indirect. Regeneration shall be manually initiated and processed. Adsorbent regeneration time (heating and cooling cycles combined) shall not exceed 8 hours.

### **3.3 ADSORBENT.**

The adsorbent shall be molecular sieve 3A and shall not affect the character (including odor level) of the incoming gas. The dryer discharge gas shall have a natural gas odor of sufficient intensity so that the presence of the gas may be readily detectable down to the concentration in air of not over one-fifth (1/5) of the lower limit of flammability (CCR Title 8 §527 (b)). The dryer design shall be such that the adsorbent shall have a minimum useful life of five (5) years.

### **3.4 LIQUIDS ACCUMULATION VESSEL.**

All condensate drain discharge (from inlet coalescing filter, regeneration separator, etc.) shall be manifolded together to be captured by a liquids accumulation vessel. This vessel shall utilize a corrosion resistant material and/or finish with a minimum design life of (7) years. The vessel shall be sized to hold the liquid condensate resulting from (2) regeneration cycles.

### **3.5 NAMEPLATE.**

The dryer shall have an assembly nameplate listing the manufacturer's name, manufacturer's location, date of manufacture, and assembly description or model number.

### **3.6 INLET AND BY-PASS VALVES.**

Dryer bypass and isolation manual ball valves may be provided as part of the dryer skid package. However, their presence does not excuse the Contractor from meeting the requirements of §5.2.4.2.2 (Bypass) of the Main Proposal Specification.

### **3.7 EXCEPTIONS TO SPECIFICATIONS.**

It is desired that the Respondent propose a standard production model regenerative dryer for this proposal. Consequently, and unless stated otherwise in this specification or on the accompanying drawings, slight exceptions to this specification will be considered so long as they do not materially impact the proposed equipment's, or the completed facility's, ability to meet the performance, safety, reliability, and code compliance intended by this specification.

Any exceptions to this specification must be noted by the Respondent on a separate attachment and included with the proposal. The separate attachment shall be entitled "Exceptions to Specifications" and will be a part of this proposal package. For each exception, the Respondent shall reference:

- The section and paragraph to which the exception is taken.
- The reasons for the exception.

## **MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS**

- Justification for the exception including: cost impact; operating experience; design calculations; and any other evidence which supports the reasonableness of the exception.
- A description of the Respondent's alternate recommendation, if one is offered.

**ANY EXCEPTIONS TO, OR DEVIATIONS FROM, THIS SPECIFICATION NOT LISTED IN THE "EXCEPTIONS TO SPECIFICATIONS", AND APPROVED BY THE PURCHASER, WILL BE CONSIDERED NON-COMPLIANCE WITH THIS SPECIFICATION.**

### **3.8 SUBMITTALS.**

#### **3.8.1 Proposal Submittals.**

Respondents are required to submit the following documentation with their proposal, along with the documentation required in §3.2.1.3 of the Main Proposal Specification, for the dryer and all associated equipment, where applicable.

- Completed Dryer Vendor Data Sheet (RDVDS)
- Control system description and operation (including moisture analyzer)
- Drawings
  - Dryer Skid Assembly Outline (including layout and dimensions)
  - Dryer Skid Assembly Interconnect
- P&ID
- Maintenance, Service, and Testing Schedules

#### **3.8.2 Commissioning Submittals.**

Contractor is required to submit one copy each of all manufacturer documentation for the dryer upon successful commissioning of the facility. This documentation shall include, but not be limited to, the following:

- Installation and Operating Manual
- Service and Maintenance schedule and procedures
- Parts list
- General arrangement drawing
- Process and Instrumentation Diagram
- Electrical Control Schematics
- Gauge certification records per §4.5.6.3

# MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS

## 4. DESIGN REQUIREMENTS

### 4.1 PRESSURE VESSELS.

#### 4.1.1 Certification.

All pressure vessels (pre-filter, absorber, heat exchanger, blower housing, after-filter housing, etc.) which have an inside diameter greater than six (6) inches shall be designed, fabricated, tested and code stamped in accordance with the requirements of ASME Pressure Vessel Code, §VIII, Division 1 and have a ASME "U" stamp.

- Vessels with an inside diameter greater than six (6) inches, an internal volume of no greater than 5 cubic ft. and operating pressure of no greater than 250 psig may be stamped "UM" as allowed per ASME code.
- Vessels with an internal diameter greater than six (6) inches which do not qualify for "UM" stamping shall be fabricated with a minimum 1/16-inch corrosion allowance and shall be stamped, which stamp shall include :
  - ASME "U" Stamp
  - National Board Number
  - All requirements of ASME UPV Code §VIII, Div. 1, UG-115 through UG-119.
- Vessels with an inside diameter less than or equal to six (6) inches shall be designed and constructed in accordance with good industry practices, have a factor of safety of four (4) and shall be fitted with necessary controls and safety devices to permit safe operation.

#### 4.1.2 Construction.

All pressure vessel shell seams and head to shell welds shall be full penetration groove welds.

### 4.2 INLET FILTER.

An inlet coalescing filter shall be provided with a manual drain valve. It is desired that the drain valve discharge to the accumulation tank through tubing. The filter sump shall be sized to capture liquid slugs from the gas supply pipeline. A differential pressure indicator shall be provided. Isolation valves shall be provided at the inlet and outlet fittings to facilitate filter element replacement without adsorbent vessel blowdown.

### 4.3 AFTER-FILTER.

A particulate filter shall be provided at the dryer discharge, which is rated for 15 microns absolute and 3 microns nominal. The filter element material shall be Nomex or fiberglass rated for a maximum temperature of 450°F. Filter element collapse differential pressure shall be 100 psi. A differential pressure indicator shall be provided for indicating filter condition.

# MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS

## 4.4 PIPING AND FITTINGS.

### 4.4.1 Tubing.

#### 4.4.1.1 General Requirements:

##### 4.4.1.1.1 Suitability:

All tubing and tubing components shall be suitable for the full range of pressures, temperatures and loadings to which they may be subjected with a factor of safety of at least four (4).

##### 4.4.1.1.2 Control Lines:

Stainless steel tubing and stainless steel compression fittings shall be used for all control gas lines.

##### 4.4.1.1.3 Workmanship:

All tubing shall be installed neatly and in a workman-like manner. All tubing shall be properly anchored, supported and / or pitched. All tubing shall run true to the vertical and horizontal axis of the skid whenever possible. Personnel who install tube and tube fittings shall be trained and certified by a fitting manufacturer's distributor or other approved trainer for such activity.

#### 4.4.1.2 Tubing Specifications:

All tubing shall be stainless steel ASTM A269-90A or TP316 ASME SA213 cold drawn bright annealed seamless tubing with surface hardness suitable for use with compression tube fittings.

#### 4.4.1.3 Tubing Fittings:

300 series stainless steel fittings shall be used with stainless steel tubing. Tube fitting installation shall conform to manufacturer's guidelines.

### 4.4.2 Piping.

#### 4.4.2.1 Suitability:

All natural gas-containing pipe, fittings, and other piping components shall be suitable for the full range of pressures, temperatures, and loadings to which they may be subjected with a safety factor of four (4).

#### 4.4.2.2 Code:

Compliance with CCR Title 8 particularly §536 (a) (3 to 5) and (b) is required.

#### 4.4.2.3 Valves:

All valves shall be accessible for easy operation and maintenance.

## 4.5 SYSTEM CONTROLS.

### 4.5.1 Description.

The automatic operation of the adsorbent system (regeneration of the adsorbent once initiated including: regeneration; gas temperature control; interlocking; and all alarms) shall be configured by the Manufacturer. The Manufacturer shall supply all instrumentation on the skid required for automatic operation.

## MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS

### 4.5.2 Enclosure.

4.5.2.1 Type: Dryer controls and related systems (e.g. the moisture analyzer) shall be housed in one or more weatherproof enclosures of the following type:

- If the controls and related systems are rated for Class I Division 2 Group D hazardous areas than NEMA 4 enclosures may be used.
- If the controls and related systems are not rated for Class I Division 2 Group D hazardous areas than NEMA 7 enclosures shall be used.

4.5.2.2 Accessibility: The enclosure and all attached inputs shall be easily accessible. All displays and indicators shall be easily viewable. Any fault indicators shall be conspicuous.

### 4.5.3 Instrumentation Tees.

Instrumentation tee fittings for dryer purge gas shall be provided for external dew point monitoring. The instrumentation tees shall be capped with an appropriate cap plug. Connection points for differential pressure gauges shall be provided on the blower vessel housing and the regeneration separator housing (associated gauges are not required). Instrumentation piping shall be fitted for 1/4-inch NPT fittings.

### 4.5.4 Pressure Relief Valve.

#### 4.5.4.1 Description:

A re-seatable safety Pressure Relief Valve (PRV) shall be connected to the adsorbent vessel through an instrumentation tee (normally capped). The pressure setting for the relief valve shall be no greater than 110 percent of vessel design pressure. This valve shall be "UV" stamped.

#### 4.5.4.2 Installation:

The valve shall be installed in a vertical direction and vented to a safe area at least 10 feet above the mounting surface (skid foundation).

### 4.5.5 Pressure Relief Isolation Valve.

#### 4.5.5.1 Installation:

The PRV (§4.5.4.1 above) shall be connected to the instrumentation tee through a locking isolation ball valve to allow for relief valve testing and maintenance. The valve shall be installed locked in the open position.

#### 4.5.5.2 Signage:

The valve shall be tagged or signed with the following or similar: "This Valve Is To Be Kept In The Open Position At All Times Except For Testing or Emergencies. Always Close All Gas Connections And De-pressurized This Dryer Prior To Closing This Valve".

#### 4.5.5.3 Keying:

There shall be a minimum of 4 sets of keys for the lock:

- One key shall be retained by the Contractor.
- Two keys shall be given to the Purchaser's designated agent at the time of facility commissioning.

## MVUSD CNG FACILITY REGENERATIVE DRYER SPECIFICATIONS

- One key shall be given to any separate activity responsible for maintenance/service/repair of the facility.
- The locks for all PRV Shut-Off and Isolation Valves for the refueling facility shall be keyed alike.

### 4.5.6 Pressure Gauges.

#### 4.5.6.1 Installation:

Each adsorbent vessel shall have a pressure gauge with adequate range to indicate all normal vessel pressure.

#### 4.5.6.2 Construction:

All pressure gauges shall read in pounds per square inch gauge (psig). All pressure gauge housings shall be made of stainless steel. The dial face shall have a minimum size of 2-1/2 inches in diameter. The pressure gauge shall be liquid filled with glycerin.

#### 4.5.6.3 Certification: The following shall be provided to purchaser upon equipment commissioning:

- For each gauge model:
  - The manufacturer's specifications for that model gauge.
  - If not already indicated in the manufacturer's specifications, a letter from the manufacturer indicating:
    - The ANSI grade of that model gauge.
    - That that model gauge conforms to ANSI B40.1 or ANSI/ASME B40.100-2005 Standards.
- For each gauge:
  - A letter from the manufacturer stating the serial number and model number of the gauge and that that gauge meets the manufacturer's specifications.

### 4.5.7 Moisture Analyzer.

#### 4.5.7.1 Description:

The dryer shall be equipped with a moisture analyzer to: determine the moisture content of the discharge gas; convey that information using a display; initiate annunciators and alarms based on the moisture content, as well as to notify facility personnel of significant changes in status or the need for service/maintenance or operator input.

#### 4.5.7.2 Operation:

The analyzer shall automatically take readings at least every thirty (30) seconds. The sampling and measurement system shall be able to safely function up to the design pressure of the dryer. The operation of the analyzer shall be explained in detail with the proposal.

#### 4.5.7.3 Display:

The analyzer shall have an easy to read display indicating moisture content in "lb/MMSCF" (a dewpoint temperature reading in "°F" or "°C" will also be acceptable).



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### 4.5.7.4 Accuracy:

The accuracy of the moisture analyzer shall be within  $\pm 2^{\circ}\text{C}$  of dewpoint after calibration. The accuracy of the analyzer after three (3) months of service shall be within  $\pm 3^{\circ}\text{C}$  of dewpoint.

### 4.5.7.5 Calibration:

The sensor calibration shall be verifiable using a moisture generator and Purchaser shall be able to program new calibration factors into the analyzer. Any specialized equipment required to calibrate the sensor, determine calculation factors, or program new calibration data shall be listed in the proposal along with associated costs.

### 4.5.7.6 Sensor:

The sensor shall have a dewpoint temperature range of at least  $(-80)$  to  $(+20^{\circ}\text{C})$  and provide accurate readings from (0) psig to the design pressure of the dryer. The sensing probe shall be readily accessible and easy to remove for re-calibration.

## 4.5.8 **Shutdowns, Alarms, and Annunciators.**

### 4.5.8.1 Shutdown Devices:

4.5.8.1.1 High Temperature: High temperature alarm shutdown devices shall be provided for the aftercooler discharge and the regeneration heater discharge.

4.5.8.1.2 Facility ESD: The dryer shall be connected to the facility electrical supply such that it will be de-energized and cease operation when any ESD at the refueling facility is activated.

4.5.8.1.3 Optional Safety Devices: Contractor shall quote as options any other safety devices that will facilitate safe unmanned dryer regeneration.

### 4.5.8.2 Alarms and Annunciators:

All critical (e.g. requiring dryer shutdown) and non-critical faults shall be:

- Indicated conspicuously on the control panel with indicator lights.
- Output to the Facility Status Lights (see §4.5.8.3 below).

4.5.8.3 Facility Status Lights: The dryer controller shall implement two outputs for the two colors of facility status lights described in §5.5.1 of the main specification.

4.5.8.3.1 Output configuration: The two outputs shall be configured and implemented so that the facility status lights are activated according to the following:

4.5.8.3.1.1 Red Light Operation: The red status light shall be energized whenever an ESD is activated or a critical dryer fault occurs. The red status light shall be de-energized when the ESD is reset and all critical dryer faults are cleared.

4.5.8.3.1.2 Yellow Light Operation: The yellow status light shall be energized whenever a non-critical dryer fault occurs (one that does not require an automatic shutdown of the dryer). It shall be de-energized when all dryer faults are cleared.

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4.5.8.3.2 **Output Signal:** It is preferred that the output signal be a standard type such as a 5V DC or 120VAC output or a contact closure.

4.5.8.3.3 **Integration:** The outputs from the dryer shall be configured and integrated with the status light outputs from other electronically controlled equipment (such as compression packages) such that they will not interfere with each other, and that the appropriate status light shall be properly energized when any piece of equipment activates it.

### **4.6 ELECTRICAL.**

#### **4.6.1 Code Requirements.**

All electrical devices and wiring shall be installed in accordance with the most restrictive codes per §2 "Applicable Documents" of this specification.

#### **4.6.2 Available Service.**

The skid will be provided with 480 volt three-phase and 120 volt single-phase electric power.

#### **4.6.3 Area Classification.**

The dryer shall use electrical equipment that is rated for Class I, Division 2, Group D hazardous area service. Electrical junction boxes, conduits, enclosures, solenoids, transducers, and pull boxes shall be weatherproof.

#### **4.6.4 Qualifications.**

All electrical components shall be Underwriters Laboratories "LISTED" or Factory Mutual "APPROVED" for their intended use and operating location. UL-listing of the entire dryer skid assembly is not required. Any deviations shall be submitted to Purchaser for review prior to fabrication.

#### **4.6.5 Wiring.**

Wiring in terminal boxes shall be neatly routed and bundled using nylon cable ties or spot ties. Service loops in the cable bundles shall be provided for all wiring bundles to the electrical enclosure door panels. All wires shall be identified with printed tags or labels to correspond to the electrical wiring diagram. Use crimp type ring lugs and splices. Do not use spade type or solder type lugs or splices.

### **4.7 COATINGS AND FINISHES.**

All coatings and finishes shall be to best commercial practice, intended for continuous outdoor (exterior) exposure, and the maximum and minimum surface temperatures they will be exposed to.

## **5. PREPARATION FOR DELIVERY**

Preparation for shipment shall be in accordance with supplier's standards and as noted herein. The supplier shall be solely responsible for the adequacy of the provisions employed in respect to materials and application to protect the equipment to their destination in ex-works condition when handled by commercial carrier. All external attachments shall be removed, properly identified, packed and

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REGENERATIVE DRYER SPECIFICATIONS**

shipped separately. All threaded pipe fittings shall be plugged or capped prior to shipping. Chains or wire ropes shall not be used to tie-down the dryer during transportation.

**MVUSD REGENERATIVE DRYER  
VENDOR DATA SHEET**

Project name: \_\_\_\_\_ Date: \_\_\_\_\_  
Vendor name: \_\_\_\_\_ Model number: \_\_\_\_\_  
Shipping weight (lbs): \_\_\_\_\_ Dimensions (in.): \_\_\_\_\_ L x \_\_\_\_\_ W x \_\_\_\_\_ H  
FOB location \_\_\_\_\_ Lead time after proposal approval (weeks): \_\_\_\_\_

**SYSTEM OPERATION**

Design operating pressure (psig): \_\_\_\_\_ Rated flowrate (scfm): \_\_\_\_\_  
Design pressure drop @ rated flow (psig): \_\_\_\_\_ Max gas flowrate @ op press (scfm) \_\_\_\_\_  
Design inlet moisture (lbs/mmscf): \_\_\_\_\_ Outlet moisture (lbs/mmscf): \_\_\_\_\_  
Type: Heat Regenerative - Single Adsorber [ ] Twin Adsorber [ ] Other \_\_\_\_\_  
Direction of adsorption flow: Down [ ] Up [ ] Adsorption cycle time (hrs): \_\_\_\_\_  
Direction of heating flow: Down [ ] Up [ ] Heating cycle time (hrs): \_\_\_\_\_  
Direction of cooling flow: Down [ ] Up [ ] Cooling cycle time (hrs): \_\_\_\_\_  
Max adsorbent activation temperature (°F): \_\_\_\_\_ Heater discharge temp (°F): \_\_\_\_\_  
Overall electrical area rating: \_\_\_\_\_ Design ambient temp (°F): \_\_\_\_\_  
Electric consumption / regen (kW-hr): \_\_\_\_\_ Regen frequency (comp hours): \_\_\_\_\_  
Regen circuit design pressure (psig): \_\_\_\_\_ Regen circuit design temp (°F): \_\_\_\_\_  
Regen initiating mechanism: Manual [ ] Timed [ ] Dewpoint Sensor [ ] Other \_\_\_\_\_  
Closed loop flow rate of regen gas (scfm): \_\_\_\_\_  
Adsorbent moisture capacity after regen (% of adsorbent weight) \_\_\_\_\_

**PIPING**

Inlet interface-size (inch): \_\_\_\_\_ Type: RF Flange [ ] NPT [ ] other \_\_\_\_\_  
Primary pipe size (inch): \_\_\_\_\_ Mercaptan by-pass: Yes [ ] No [ ] describe \_\_\_\_\_  
Discharge interface-size (inch): \_\_\_\_\_ Type: RF Flange [ ] NPT [ ] other \_\_\_\_\_  
Dryer skid by-pass valves: Yes [ ] No [ ] If no, explain: \_\_\_\_\_

**MVUSD REGENERATIVE DRYER  
VENDOR DATA SHEET**

**INLET COALESCING FILTER**

**Present: Yes [ ] No [ ]**

Manufacturer name: \_\_\_\_\_ Part number: \_\_\_\_\_

Max particulate size (micron): \_\_\_\_\_ Body construction: CS [ ] SS [ ] Other \_\_\_\_\_

Body inside diameter (in.): \_\_\_\_\_ ASME stamped: Yes [ ] No [ ] Design temp (°F): \_\_\_\_\_

Differential pressure gauge: Yes [ ] No [ ] Sump volume (in3): \_\_\_\_\_

Automatic drain trap: Yes [ ] No [ ] Describe: \_\_\_\_\_

Block/Vent Valves: Yes [ ] No [ ] Describe: \_\_\_\_\_

**ADSORBENT VESSEL**

Vessel count: One [ ] Two [ ] Other \_\_\_\_\_ Corrosion Allowance [inch] \_\_\_\_\_

Vessel design pressure (psig): \_\_\_\_\_ ASME stamped: Yes [ ] No [ ] X-ray (%): \_\_\_\_\_

PRV set pressure (psig) \_\_\_\_\_ PRV manufacturer \_\_\_\_\_ PRV "UV stamped: Yes [ ] No [ ]

Adsorbent: Manufacturer name: \_\_\_\_\_ Product number \_\_\_\_\_

Adsorbent pore diameter (Angstrom): \_\_\_\_\_ Adsorbent mesh: \_\_\_\_\_

Adsorbent weight per vessel (lbs): \_\_\_\_\_ Bed Height (ft): \_\_\_\_\_ Bed Diameter (inches): \_\_\_\_\_

Insulation Thickness (inches): \_\_\_\_\_ Describe: \_\_\_\_\_

Aluminum Cladding: Yes [ ] No [ ] Describe: \_\_\_\_\_

Inlet diffuser description: \_\_\_\_\_

Bed support description: \_\_\_\_\_

**SWITCHING VALVES**

Count: \_\_\_\_\_ Type: \_\_\_\_\_

Manufacturer \_\_\_\_\_ Part# \_\_\_\_\_ Lubricated [ ] Non-lubricated [ ] Other \_\_\_\_\_

Valve Port or Cv: \_\_\_\_\_ Actuator: Gas [ ] Air [ ] Motor [ ] Other \_\_\_\_\_

Actuator description: \_\_\_\_\_ Instrument Air Required: Yes [ ] No [ ] Describe: \_\_\_\_\_

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**COOLER**

**Present: Yes [ ] No [ ]**

Fan Motor: Manufacturer \_\_\_\_\_ Part No: \_\_\_\_\_ Size (hp): \_\_\_\_\_

Fan Motor: Electrical Area Class: \_\_\_\_\_ Description: \_\_\_\_\_

Type: Air cooled tube / fin [ ] Other \_\_\_\_\_

**HEATER**

Type: Internal [ ] External [ ] Other \_\_\_\_\_

Heater: Manufacturer \_\_\_\_\_ Part No: \_\_\_\_\_ Sheath Material: \_\_\_\_\_

Size (kW): \_\_\_\_\_ Electrical Area Class: \_\_\_\_\_

Description: \_\_\_\_\_

Heater temperature controller: \_\_\_\_\_ Watt Density (W/in<sup>2</sup>): \_\_\_\_\_

**HEATER BLOWER**

**Present: Yes [ ] No [ ]**

Fan Motor: Manufacturer \_\_\_\_\_ Part No: \_\_\_\_\_ Size (hp): \_\_\_\_\_

Fan Motor: Electrical Area Class: \_\_\_\_\_ Description: \_\_\_\_\_

Sparkless fan: Yes [ ] No [ ] Blower housing: separate: Yes [ ] No [ ] ASME coded: Yes [ ] No [ ]

**MOISTURE SEPARATOR**

**Yes [ ] No [ ]**

Type: Filter [ ] Mesh [ ] Centrifugal [ ] Other \_\_\_\_\_

Differential pressure gauge required: Yes [ ] No [ ]

How is separator plugging minimized? \_\_\_\_\_

**ACCUMULATION TANK**

**Present: Yes [ ] No [ ]**

Material: Carbon steel [ ] Stainless steel [ ] Other \_\_\_\_\_

Capacity (gallon): \_\_\_\_\_ Operating Pressure (psig): \_\_\_\_\_ Integrated w/ separator: Yes [ ] No [ ]

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H<sub>2</sub>S trap: Yes [ ] No [ ] Describe \_\_\_\_\_

Insulated: Yes [ ] No [ ] Heat-traced: Yes [ ] No [ ] Level indicator: Yes [ ] No [ ]

Regenerations per tank drainage: \_\_\_\_\_ Tank drain valve: Ball [ ] Needle [ ] Other \_\_\_\_\_

**PARTICULATE FILTER**

**Present: Yes [ ] No [ ]**

Manufacturer name: \_\_\_\_\_ Part number: \_\_\_\_\_

Max particulate size (micron): \_\_\_\_\_ Element: Material: \_\_\_\_\_ Max Temp (°F): \_\_\_\_\_

Body construction: CS [ ] SS [ ] Other \_\_\_\_\_

Body inside diameter (in.): \_\_\_\_\_ ASME stamped: Yes [ ] No [ ] Design temp (°F): \_\_\_\_\_

Differential pressure gauge: Yes [ ] No [ ]

Block/Vent Valves: Yes [ ] No [ ] Describe: \_\_\_\_\_

**CONTROL PANEL**

**Yes [ ] No [ ]**

Electrical Area Class: \_\_\_\_\_ Enclosure NEMA rating: \_\_\_\_\_

Enclosure weather-proof: Yes [ ] No [ ] Enclosure purge: X [ ] Z [ ] N/A [ ]

Compressed purge air required: Yes [ ] No [ ] Location: On-skid [ ] Off-skid [ ]

PLC Manufacturer: \_\_\_\_\_ Part # / description: \_\_\_\_\_

Programming logic: \_\_\_\_\_ Program CD provided with skid: Yes [ ] No [ ]

Moisture sensor: Readout units: \_\_\_\_\_ Location: \_\_\_\_\_

**INSTRUMENTATION**

**(Instrumentation may be by gauge or readout unless specified below)**

Adsorber pressure gauge: Yes [ ] No [ ] Adsorber vessel temp: Yes [ ] No [ ]

Regen chamber discharge temp: Yes [ ] No [ ] Cooler discharge temp: Yes [ ] No [ ]

Heater discharge gas temp: Yes [ ] No [ ] Blower gas differential pressure: Yes [ ] No [ ]

Inlet filter differential pressure: Yes [ ] No [ ] After-filter differential pressure: Yes [ ] No [ ]

**MVUSD REGENERATIVE DRYER  
VENDOR DATA SHEET**

Other \_\_\_\_\_ Other \_\_\_\_\_

**ALARMS, ANNUNCIATION & SHUTDOWNS**

High Humidity: Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_  
Blower motor overload: Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_  
High cooler disch temp: Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_  
High heater temperature: Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_  
High blower diff press: Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_  
High separator liquid level Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_  
Other: Alarm [ ] Shutdown [ ] Annuctn: Type: \_\_\_\_\_ Location: \_\_\_\_\_

**ELECTRICAL**

Main power supply:  
480v 3-phase [ ] amps: \_\_\_\_\_ 240v3-phase [ ] amps: \_\_\_\_\_ 120v 1-phase [ ] amps: \_\_\_\_\_  
Other \_\_\_\_\_

Control power supply: 120v 1-phase [ ] amps: \_\_\_\_\_ Other \_\_\_\_\_

List of components not UL-listed or FM-approved (attach separate list if necessary):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**TESTING TO BE PERFORMED PRIOR TO SHIPMENT**

All ASME pressure vessels pressure tested: Yes [ ] No [ ] If no, explain: \_\_\_\_\_

All gas piping tested per ANSI B31.3 code: Yes [ ] No [ ] If no, explain: \_\_\_\_\_

Shop test of dryer functions: Yes [ ] No [ ] Duration \_\_\_\_\_ If no, explain: \_\_\_\_\_

Shop test of control systems, safety alarms & shutdowns: Yes [ ] No [ ] If no, explain: \_\_\_\_\_

Calibration of instruments: Yes [ ] No [ ] If no, explain: \_\_\_\_\_



**MVUSD REGENERATIVE DRYER  
VENDOR DATA SHEET**

Performance tests to check motor voltage, current draw and power: Yes [ ] No [ ]

24-hour leak test at operating pressure with chart recorder: Yes [ ] No [ ]

# **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

## **GENERAL**

This specification lists the requirements for training Purchaser's staff on the use, care, rudimentary maintenance, and emergency procedures of a CNG refueling facility. For the purposes of this document, a "User" is anyone that dispenses fuel from the facility; an "Operator" is any on-site technical personnel that are competent to monitor the facility and perform rudimentary maintenance, diagnostic, and emergency procedures and that have been elected for those tasks by the Purchaser.

This specification is not intended to be all encompassing, but simply a listing of the minimum training Contractor is required to conduct for Purchaser's staff. Equipment manufacturers, service agencies, and the Contractor may recommend or require additional training. It is expected that Contractor shall follow such recommendations and requirements in constructing a training program.

There are no time limits for training. Contractor is expected to take sufficient time to convey the information and conduct the demonstrations referenced in this specification and answer any questions in order to ensure that the students comprehend all of the information and procedures presented.

## **1. USER TRAINING**

The topics to be covered in User Training shall include but not be limited to:

### **1.1 GENERAL INFORMATION**

The following general information regarding the refueling facility and NGVs shall be conveyed to all Users present at the training session.

- Facility is time-fill
- Facility specifications
- Facility output always goes to lowest pressure bus
- Facility output constant, divided between number of buses.
- Compressor shut-off is completely automatic and occurs when the vehicle's tanks have been filled to the appropriate pressure.
- Output pressure is compensated for ambient temperature to ensure safety if vehicle transported to heated garage.
  - hand out temp compensation chart
- natural gas is safer than gas or diesel
  - higher ignition temp
  - lighter than air
    - leaks dissipate quickly
    - doesn't puddle like liquid fuels
- The facility is designed for unattended refueling overnight
- You should never smell gas
- Safety response
  - ESD
  - Call 911
  - Fire extinguishers

# MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING

## 1.2 TOUR

The following shall be presented and described to all Users present at the training session. The description shall include basic purpose/function, operation, and cautions:

### Compression Pad

- Compressor
  - main gas shutoff
  - gas inlet
  - Controller Panel
    - Error codes and/or indicators
    - START/STOP button
  - cylinders
  - intercoolers
  - blow-down vessel
  - If compressor/s are still running in morning contact responsible party.
- Prime Mover
- Dryer
  - desiccant needs periodic regeneration
  - regeneration will be initiated manually based on dewpoint sensor, indicator and/or alarm
- Filters
- Compression Package disconnects
- Facility status lights
- ESD
- Fire extinguisher

### Time-Fill Facility

- Refueling posts
  - Gauges
    - indicate facility pressure
  - shut-off valves
- Breakaways
  - will seal lines if hose pulled out
  - if hose pulled out:
    - disconnect hose from vehicle
    - give hose and affected refueling post location to facility operator
- Hoses
  - always pressurized
  - check condition before each use
    - abrasions
    - cut/tears

## **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

- kinks
  - if damaged contact facility operator and DO NOT USE!
- Hose Vent Valves
  - used to control pressure to nozzle for connection/disconnection
  - used to control fuel flow to vehicle
- Nozzles
  - nozzles must be kept clean
    - dirt will cause:
      - difficulty connecting and disconnecting
      - leaks
    - keep nozzles off ground
    - nozzle should either be connected to vehicle or stored on refueling post mount
- Receptacles
  - be sure dust caps are in place when nozzles are disconnected
  - if no dust cap or dust cap damaged notify mechanic immediately

### **Safety Equipment**

- Fire extinguishers
- ESDs
  - Point out ESDs
  - Emphasize: If any leaks or concerns, PRESS ESD!!

### **1.3 DEMONSTRATION**

Demonstrations shall be given on the proper operation of the following to all Users present:

#### **Time-Fill Facility**

- Refueling posts
  - shut-off valves
  - dismounting and mounting nozzle from and to post
- Breakaways
  - pull out hose to demonstrate self-seal
- Hose Vent Valves and Nozzles:
  - demonstrate connection
    - remove receptacle cap
    - dismount nozzle from post
    - turn vent valve handle to “Vent” position (arrow points towards vehicle) to vent nozzle for connection/disconnection
    - connect nozzle
      - Pull back outer sleeve, press nozzle onto receptacle, and release sleeve.
      - Pull back on Vent Valve to be sure nozzle is captured!
    - turn vent valve handle to “Fill” position (arrow points towards hose)

## **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

- Do Not Stand Directly Behind Nozzle/Vent Valve In Case They Are Not Securely Captured!
- demonstrate disconnection
  - reverse procedure
  - note any difficulty connecting/disconnecting nozzle and contact facility operator

### **Safety Equipment**

- demonstrate ESD operation

## **2. OPERATOR TRAINING**

The topics to be covered in Operator Training shall include but not be limited to:

### **2.1 PREREQUISITE**

The facility operators shall attend the User Training session (Section 1) prior to attending the Operator Training session.

### **2.2 OPERATING CONCEPTS**

The following concepts regarding refueling facility and NGV theory and operation shall be conveyed to all Operators present at the training session.

#### **General**

- Maintenance agency 24 hr. contact information
- District responsible staff contact information
- Document storage location
- Typical driver complaints, causes, and appropriate responses
- Problem vehicle identification and recording
- General facility problem indicators
  - gas smells
  - inadequate fuel

#### **Main Switch Board**

- location
- compressor disconnects and breakers
- dryer disconnects and breakers
- ancillary equipment breakers (e.g. lights and utility outlets for compression pad)
- key location if locked

#### **Compression Pad**

- Compressors
  - Compressor configuration
    - inlet pressure
    - number of stages

## **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

- discharge pressure
- operating timer
- blow-down and other pressure vessels, including drains and vents
- filtration
  - filter type
  - purpose
  - drains
- miscellaneous vents
- Control panel
  - status and fault indicators
- Dryer
  - Effects and symptoms of excessive moisture in fuel
    - vehicle fuel system freeze-ups on cold starts
    - hose vent valves continuing to vent when the handle is turned to the “vent” position
    - excessive moisture build-up in vehicle fuel tanks
  - Acceptable levels of moisture
  - How moisture content is monitored
    - need to check daily
  - Control panel
    - moisture indication
    - regen indication
    - status and fault indicators
  - Regeneration
    - process
    - duration
    - predicting period between regenerations
    - how to initiate

### **Time-Fill Facility**

- Refueling posts
  - shut-off valves
  - dismounting and mounting nozzle from and to post
- Hoses
  - insulation thickness
  - core
  - common causes of damage
    - laying on ground
    - pulling when coiled or tangled

## **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

- Breakaways
  - maximum allowable pull-out force
- Hose Vent Valves and nozzles:
  - direction of gas flow in “Fill” and “Vent” positions
  - causes of constant venting
- Nozzles
  - internal check valve
  - spring-loaded nipple
    - internal o-rings
    - operation
    - symptoms of dirt and grit contamination
  - spring-loaded sleeve
  - retaining fingers
- Vehicle Receptacles
  - internal check valve

### **Emergency Response**

- Situation indicators:
  - fire
  - gas smells
  - uncontrolled venting
  - periodic venting from PRDs/PRVs
  - sounds
  - Facility Status Lights
  - Compressor control display
  - Dryer control display
  - breaker tripping
- Appropriate responses and response priorities
  - ESD
  - 911
  - Fire Extinguishers
  - compressor disablement
  - dryer disablement
  - evacuation of area
  - Service personnel 24 hr. contact
  - USD staff emergency contact info and response contacts

### **2.3 OPERATING TASKS**

The following tasks shall be explained and, when possible, demonstrated to all Operators present at the training session.

# MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING

## Main Switch Board

- determining breaker status
- resetting breakers
- locking-out equipment
- ESD resetting procedure

## Compression Pad

- Daily inspection/maintenance
  - Manufacturer's requirements/recommendations
  - Maintenance agent requirements/recommendations
  - record keeping
- Main gas shut-off operation
- Compressors
  - Control panel
    - responses to status and fault indicators
    - operator inputs
      - START/STOP
      - Reset
      - pulling-up fault codes and system parameter values
  - Individual compressor disablement procedure
- Dryers
  - Control Panel
    - responses to status and fault indicators
    - Operator inputs
      - START/STOP
      - Reset
  - gas bypass controls
    - procedure
  - removal from service procedure

## Time-Fill Facility

- Refueling posts
  - shut-off valves (post disablement)
- Breakaways
  - periodically inspect for pull-out force and sealing upon re-attachment
- Hoses
  - hose re-attachment procedure:
    - disconnect hose from vehicle if still attached
    - inspect hose for damage
      - IF HOSE APPEARS DAMAGED DO NOT RE-USE
    - shut off refueling post supply valve



## **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

- remove cap from vent valve
- SLOWLY open vent valve and let breakaway vent completely
- close vent valve and re-install cap
- clean breakaway end of hose
- re-insert breakaway end of hose into breakaway
- pull on hose firmly to be sure it's seated
- turn on refueling post supply valve
- after compressors have run for 10 minutes or turned off automatically, sniff or swab around breakaway to be sure it doesn't leak.
- inspection
  - abrasions
  - cut/tears
  - kinks
  - retractor operation
  - determining extent of above requiring hose replacement
- Hose Vent Valves
  - inspection:
    - bent or damaged valve stem or handle
    - binding vent valve handle
    - leaks
    - service limits (requiring HVV service or replacement)
  - cleaning
    - user handling surfaces
- Nozzles
  - inspection:
    - dirty mating surfaces
    - binding nipple
    - binding nozzle sleeve
    - leaks
    - service limits (requiring nozzle service or replacement)
  - cleaning
    - nozzle mating surfaces
    - user handling surfaces
- Vehicle Receptacles
  - leaky check valves
  - missing or damaged o-rings
  - missing caps

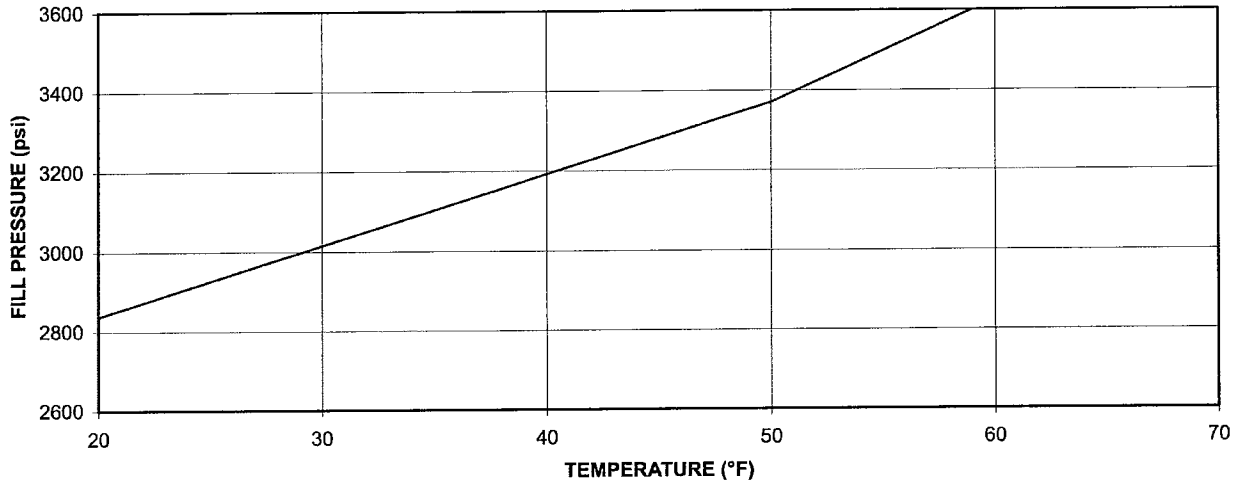
## **MVUSD REFUELING FACILITY USER AND OPERATOR TRAINING**

### **Emergency Response**

- Response procedures
  - ESD locations
  - telephone locations and dialing procedures
  - Fire Extinguishers operation
  - on-site staff notification
  - compressor disablement
  - dryer disablement
  - refueling post disablement
  - evacuation procedures

# MVUSD TEMPERATURE COMPENSATION CHART

## 3600 PSI FACILITY TEMPERATURE COMPENSATION



Temperature (°F)	Fill Pressure (psi)
59	3600
50	3370
32	3050
14	2730

**MVUSD**  
**MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS**

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# MVUSD MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

## 1 SCOPE

### 1.1 SCOPE OF SPECIFICATION

This document specifies the minimum requirements for the installation and performance of systems, the upgrade of existing systems, and the integration of both to enable the safe execution of service and repair of CNG fueled vehicles in the school district's Maintenance Building.

### 1.2 SCOPE OF WORK

Contractor shall engineer, design, permit, install, test, and warrant the systems described herein to meet the performance and code requirements described herein. All work shall be performed at and on MVUSD's Maintenance Building at:

41870 McAlby Ct  
Murrieta, CA 92562-7036

## 2 APPLICABLE DOCUMENTS

### 2.1 MAIN SPECIFICATION

Unless specifically indicated otherwise, Contractor shall comply in all regards with §2 and §3 of the Main Specification.

### 2.1 ADDITIONAL DOCUMENTS

The following documents form a part of this specification, in addition to the documents listed in §2 "Applicable Documents" of the Main Specification.

#### **California Code of Regulations (CCR)**

- Title 24: California Building Standards Code, Part 9: California Fire Code
- Title 24: California Building Standards Code, Part 4: California Mechanical Code

#### **National Fire Protection Association (NFPA)**

- NFPA 30A - Code for Motor Fuel Dispensing Facilities and Repair Garages, 2012 edition.

The following documents form a part of the specification to the extents specified herein.

#### **National Fire Protection Association (NFPA)**

- NFPA 54: National Fuel Gas Code.
- NFPA 90A: Standard for the Installation of air-Conditioning and Ventilation systems

# MVUSD MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

## 3. GENERAL REQUIREMENTS

### 3.1 PERMITTING AND CODES

§3.1 of the Main Specification shall apply with the following exceptions:

3.1.1 **Drawings.** This section does not apply.

#### 3.1.4 **Conflicts.**

##### 3.1.4.2 Conflicts with this specification:

3.1.4.2.1 Most stringent shall apply: In case of conflicts between: local, state, or federal codes and laws; industry standards; utility company regulations; and this specification, the most stringent shall be applied.

3.1.4.2.2 Conflicts with this specification and the documents in §2 of the Main Specification: Where conflict exists between this specification and the documents listed in the Main Specification, then the documents listed in the Main Specification shall control in the order listed.

3.1.4.2.3 Conflicts with this specification and the documents in §2 of this specification: Where conflict exists between this specification and the documents listed in §2 of this specification, then the documents in §2 of this specification shall control.

3.1.4.3 Conflicts between “Applicable Documents”: In case of conflicts between the “Applicable Documents” in §2 of this specification, and the most stringent is in question, Contractor shall conform to the documents in the order listed.

3.1.4.4 Conflicts between specification and project drawings: This section does not apply.

### 3.2 SUBMITTALS

#### 3.2.1 **General.**

Proprietary or Confidential Data: Where the data requested in the submittals is considered proprietary or confidential by the Manufacturer, the Contractor will so note in each instance, and provide as much related information as possible, and in as much detail as possible, without exceeding manufacturer’s restrictions, so as to convey the suitability of the equipment to the Purchaser’s application.

#### 3.2.2 **Proposal Submittals.**

Contractors are required to submit the following documentation with their proposal, along with the documentation required in §3.2.1.3 of the Main Proposal Specification.

- Specifications for Major Assemblies
- Maintenance, Service, and Testing Procedures
- Maintenance, Service, and Testing Schedules

#### 3.2.3 **Submittals Prior To Detailed Design and Engineering.**

Contractor is required to submit the following documents, where applicable, prior to the start of applying for permits or starting construction:

- Engineering results per §5.1.2

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## MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

### 3.2.4 Commissioning Submittals.

- Engineering analysis calculations and results from §5.1
- Equipment specification sheets
- Equipment Operating Manuals
- Equipment Service and Maintenance Manuals, including:
  - Equipment maintenance and calibration procedures and schedules
  - Component and system diagnostic and troubleshooting procedures
  - Equipment and system test procedures
- Interface Wiring Diagrams
  - Control Panel Wiring Diagram
  - Point-to-Point Wiring Diagram
  - Control panel logic diagram, including current parameter settings
- Equipment warranties
- Test results from §5.7.1
- A copy of the evacuation plan required in §5.2.8
- Hardcopies of project drawings
- Staff Training Materials

### 3.3 COMMISSIONING.

Contractor shall include the cost for integration and testing of the systems covered in this specification in the total proposal price. It is the responsibility of Contractor to ensure that the equipment is delivered defect-free and in complete compliance with this specification. If equipment defects are discovered during commissioning, it is Contractor's responsibility to remedy those problems at its cost.

### 3.4 WARRANTY.

The components and systems covered in this specification or modified by the Contractor shall, in all regards, receive the same warranty coverage and services as that for the refueling facility detailed in §3.4 of the Main Proposal Specification.

### 3.5 DEFINITION OF TERMS.

Terms used in this specification are consistent with those defined in NGV 4.8-2002. Listed below are additional terms used in this specification.

- Contractor:
  - The term "Contractor" shall refer to the winning Respondent and general contractor for this project.
- Maintenance Building:
  - For the purposes of this document "Maintenance Building", "Maintenance Facility", "Shop", and "Garage" will be synonymous and refer to the building in which service and repair is executed on MVUSD fleet vehicles.



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### MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

- Vehicle Bay:
  - For the purposes of this document “Vehicle Bay”, “Repair Bay”, or simply “Bay” will be synonymous and will refer to the interior areas of the Maintenance Facility where vehicles may be parked and service conducted.
  
- Primary Bay:
  - For the purposes of this document “Primary Bay” will refer to one of the drive lanes inside the Maintenance Facility which is bounded at the front and rear by vehicle access doors.
  
- Primary Bay Area:
  - For the purposes of this document “Primary Bay Area” will refer to the entire room containing both Primary Bays.
  
- Half Bay:
  - For the purposes of this document “Half Bay” will refer to the smaller service bay at the southwest corner of the Maintenance Facility which is accessed by only one vehicle door.
  
- LFL:
  - For the purposes of this document “LFL” will refer to the Lower Flammability Level.
  
- EAD:
  - For the purposes of this document “EAD” will refer to an Emergency Activation Device.
  
- HVAC:
  - For the purposes of this document “HVAC” will refer to the heating, ventilation, and air conditioning system including all equipment and appurtenances.

#### 3.6 EXCEPTIONS TO SPECIFICATIONS.

It is desired that the Contractor propose standard production models of the components and systems covered herein. Consequently, and unless stated otherwise in this specification or on the accompanying drawings, slight exceptions to this specification will be considered so long as they do not materially impact the proposed component’s or system’s ability to meet the performance, safety, reliability, and code compliance intended by this specification.

Any exceptions to this specification must be noted by the Contractor on a separate attachment and included with the proposal. The separate attachment shall be entitled “Exceptions to Specifications” and will be a part of this proposal package. For each exception, the Contractor shall reference:

- The section and paragraph to which the exception is taken.
- The reasons for the exception.
- Justification for the exception including: cost impact; operating experience; design calculations; and any other evidence which supports the reasonableness of the exception.
- A description of the Contractor’s alternate recommendation, if one is offered.

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MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS**

**ANY EXCEPTIONS TO, OR DEVIATIONS FROM, THIS SPECIFICATION NOT LISTED IN THE “EXCEPTIONS TO SPECIFICATIONS”, AND APPROVED BY THE PURCHASER, WILL BE CONSIDERED NON-COMPLIANCE WITH THIS SPECIFICATION.**

# MVUSD MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

## 4. GENERAL CONSTRUCTION REQUIREMENTS

### 4.1 ADOPTION OF MAIN SPECIFICATIONS

All requirements of §4 of the Main Specifications shall be enforced in this specification where relevant, unless specifically exempted.

#### 4.1.1 General.

Unless stated otherwise, equipment installed inside the maintenance facility does not need to be designed for outdoor use unless there is a significant chance it will be exposed to:

- Liquids
- High levels of dust or particulates
- Extreme temperatures

#### 4.1.4 Wind Loads.

Unless stated otherwise, equipment installed inside the maintenance facility does not need to be designed for wind loads.

#### 4.6.3 Signage.

- 4.6.3.1 ESD and Fire Extinguisher Indicating Signs: Fire Extinguishers located adjacent to EADs need not comply with the requirements of this section in the main specification.

## 5. DETAIL CONSTRUCTION REQUIREMENTS

### 5.1 ENGINEERING ANALYSIS

#### 5.1.1 Qualifications.

The following analysis, results, and determinations shall be directed, reviewed, and approved by a professional engineer registered and licensed in the state of California with expertise in the subjects covered.

#### 5.1.2 Reporting.

The results of the following analysis, including a summary, shall be conveyed to the Purchaser by hardcopy or in digital format.

#### 5.1.3 Approval.

The Purchaser shall review the results of the following analysis and approve the findings and conclusions prior to the start of detailed design work, permit applications, equipment purchases, or construction.

#### 5.1.4 Analysis Subjects.

Contractor shall conduct or cause to be conducted an analysis of the following subjects. The results shall include, but not be limited to, those listed:

- 5.1.4.1 Gas Accumulation: Per NFPA 30A §7.6.6, an analysis of the potential for gas accumulation in the Primary Bay Area and adjoining rooms shall be performed. The results of the analysis shall include, but not be limited to:
1. Identifying pockets where gas can accumulate.

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### MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

2. Identifying the volume above the Primary Bay Area that would be filled with natural-gas by its release from a vehicle fuel vessel. The analysis shall assume the fuel vessel is filled to capacity and is the largest vehicle fuel vessel to be used by the fleet.
  3. The distance from the ceiling (or height from the floor) above which would contain 150 percent of the volume identified in "2" above, and classify that area as a Class 1, Div. 2, Group D area.
- 5.1.4.2 Gas Detector Configuration: An analysis shall be performed to identify the optimum type and location of natural-gas sensors to provide the earliest and most accurate detection of natural-gas, and particularly concentrations of natural gas at or above 25 percent LFL.
- 5.1.4.2.1 Considerations: The analysis shall take the following into account:
- Natural-gas vehicles and fuel system components containing natural-gas will only be serviced and stored in the Primary Bay Area.
  - The results of §5.1.4.1 above.
  - Current staff work practices, particularly regarding: the placement of vehicles and components when being serviced, repaired, and stored; the type of work being performed.
  - Reliability of sensor type.
  - System redundancy.
- 5.1.4.2.2 Comparison to Specification: The analysis shall identify any actions beyond those indicated in this specification which will ensure the early and accurate detection of natural-gas concentrations approaching or above 25 percent LFL.
- 5.1.4.3 Gas Detector Notifications: Contractor shall determine if the local fire department requires real-time notification of natural-gas release events at the Maintenance Facility. If yes, Contractor shall install an Autodialer meeting the requirements of §5.2.4
- 5.1.4.4 Area Electrical Classification Compliance: Based on the area electrical classification determined in §5.1.4.1-3, determine:
- The compliance or non-compliance of all electrical fixtures and appurtenances in that area with the electrical classification.
  - The compliance or non-compliance of all electrical fixtures and appurtenances in that area with applicable codes, and particularly NFPA 30A §8 and CFC §2211.7.
  - Any actions beyond those indicated in this specification required to bring all electrical fixtures and appurtenances into compliance.
- 5.1.4.5 Mechanical System Compliance: An analysis of the current heating, ventilation, and air conditioning system of the building, including heating appliances, shall be conducted to determine:
- The compliance or non-compliance of the system, it's components, and separate appliances, with applicable codes, and particularly NFPA 30A §7 and CFC §2211.7.
  - The optimum location of exhaust vents to exhaust accumulations of natural-gas.

## MVUSD MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

- Any actions beyond those indicated in this specification required to bring the system, it's components, and separate appliances into compliance.

5.1.4.6 Structural Compliance: An analysis of the building structure and fixtures surrounding the Primary Bay Area shall be conducted to determine:

- The compliance or non-compliance of the structure and fixtures with applicable codes, and particularly NFPA 30A §7 and CFC §2211.7.
- Any actions beyond those indicated in this specification required to bring the system, it's components, and separate appliances into compliance.

### 5.2 GAS DETECTION SYSTEM

#### 5.2.1 Natural Gas Sensors.

5.2.1.1 General: Natural-gas sensors shall be utilized in the Primary Bay Area to detect and indicate levels of natural-gas from 5 percent LFL to 100% LFL.

5.2.1.2 Suitability: All natural-gas sensors shall be intended, rated for, and calibrated for the detection of natural-gas.

5.2.1.3 Technology: All natural-gas sensors shall utilize infrared technology to detect the level of gas concentration.

5.2.1.4 Features: All natural-gas sensors shall incorporate the following features:

- Low maintenance or maintenance free.
- Rated for Class 1, Division 2, Group D environments.
- Continuous self-test.

5.2.1.5 Open Path Sensors: At least one open path sensor shall be utilized for the earliest response.

5.2.1.6 Point Sensors: Point sensors shall be used where the shape of the ceiling promotes the accumulation of natural-gas in one or more small areas or cavities.

5.2.1.7 Arrangement:

5.2.1.7.1 General: Open Path and Point sensors shall be arranged in location, orientation, and number so as to provide the earliest possible detection of a natural-gas leak anywhere in the Primary Bay Area.

5.2.1.7.2 Single Open Path Sensor: Where only one open path sensor is utilized it shall be oriented as closely as possible with the diagonal from one corner of the Primary Bay Area to the opposite corner.

5.2.1.7.3 Multiple Open Path Sensors: Where more then one open path sensor is utilized at least one shall be located along the centerline of each drive bay in the Primary Bay Area.

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### MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

#### 5.2.1.8 Height:

5.2.1.8.1 Open Path Sensors: Open path sensors shall be located as low as possible but not so low that the infrared beam may be interrupted by normal activities in the facility.

5.2.1.8.2 Point Sensors: Point sensors shall be located as high and as close to the center as possible of any areas where the accumulation of natural-gas is anticipated.

#### 5.2.2 **Instruments and Controls.**

5.2.2.1 Control Panel: All natural-gas sensors shall connect to a main control panel located in the Primary Bay Area.

5.2.2.1.1 Main Display: The control panel shall include a digital display to indicate, at a minimum, the following:

- The current concentration of natural-gas detected by at least one sensor, selectable in parts per million or percent of LFL (simultaneous display of both units is not required).
- The location or zone of the sensor being displayed.
- The type or source of any system or component error or failure (e.g. diagnostic code).

5.2.2.1.2 Indicators: The control panel shall indicate the following:

- The system status (e.g. pass/fail system self test, system power on, etc).
- The location or zone of any sensor detecting natural-gas concentrations of 25 percent LFL or greater.
- The location or zone of any sensor detecting natural-gas concentrations of 40 percent LFL or greater.

5.2.2.1.3 Controls: The control panel shall offer the following controls:

- If the main display can only display the output of one sensor at a time, the control panel shall include a means of changing the sensor being displayed.
- A means of changing the display units of natural-gas concentration from parts per million to percent LFL.
- Manual activation of system self-test.
- Disabling the output for the audible alarm for a period of up to 15 minutes after it has been activated. The output shall automatically re-enable at the end of that period if the alarm condition still exists.

5.2.2.1.4 Diagnostics: The control panel shall perform and/or monitor the following diagnostics on a continual basis:

- System self-test
- Sensor self-test for each sensor

5.2.2.1.5 Location: The control panel shall be located in a highly visible and easily accessible location inside the Primary Bay Area. The location of the control panel shall be coordinated with and approved by the Purchaser prior to system design.

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### MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

- 5.2.2.1.6 Electrical Rating: Since the Control Panel will be energized when natural-gas is present, it shall be rated for the area electrical classification of its location, particularly with regards to the determination of §5.1.4.1.
- 5.2.2.1.7 Labeling: The Control Panel will be labeled with the following in minimum (1) inch high letters on a high contrast background:
- “GAS DETECTION SYSTEM CONTROLS”
- 5.2.2.2 Inputs: In addition to inputs from each natural-gas sensor as well as any other manufacturer required inputs, the Gas Detection System shall sense the following additional inputs:
- Emergency Activation Device (EAD)
- 5.2.2.3 Outputs:
- 5.2.2.3.1 Type: Gas Detection System outputs designed to actuate third party devices shall be one of the following types:
- Contact closure
  - 0-5VDC
  - 0-12VDC
  - -12VDC to +12VDC
- 5.2.2.3.2 Number: The Gas Detection System shall include a minimum of (10) outputs designed to actuate third party devices. However, any output designed by the manufacturer to activate one or more of the alarms required in §5.2.3 will count for the same number of outputs to third party devices.
- 5.2.2.4 Actions: The Gas Detection System shall perform the following actions under the following conditions:
- All systems functioning properly, no detection by any sensor of a natural-gas concentration greater than (25) percent LFL:
    - Set a “Level 0” output to the visual alarm.
    - Set the output for power to the light fixtures and heating appliances so that they are enabled.
    - Set the output for the ventilating fans so that they are disabled.
  - Detection by any sensor of a natural-gas concentration greater than (25) percent LFL:
    - Set the output for power to electrical fixtures and heating appliances which are not Class 1, Division 2, Group D rated so that they are de-energized.
    - Set the output for the ventilating fans so that they are activated.
    - Set the output for emergency lighting so that it is activated.
    - Display the level of natural-gas detected in percent LFL.
    - Display the location or zone of the sensor(s) detecting elevated levels of natural-gas.
    - Activate the auto-dial feature (if installed).

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### MAINTENANCE FACILITY MODIFICATION SPECIFICATIONS

- Detection by any sensor of a natural-gas concentration of 25 percent LFL to 40 percent LFL:
  - Set a “Level 1” output to the visual alarm.
  - Set a “Level 1” output to the audible alarm
  
- Detection by any sensor of a natural-gas concentration greater than 40 percent LFL:
  - Set a “Level 2” output to the visual alarm.
  - Set a “Level 2” output to the audible alarm
  
- When any of the following occur: failure of the system to pass self-test, failure of any natural-gas sensor, activation of the EAD:
  - Set a “Level 3” output to the audible alarm.
  - Set the output for power to electrical fixtures and heating appliances which are not Class 1, Division 2, Group D rated so that they are de-energized.
  - Set the output for the ventilating fans so that they are activated.
  - Set the output for emergency lighting so that it is activated.

#### 5.2.3 Alarms.

##### 5.2.3.1 General:

5.2.3.1.1 Locations: Alarms shall be co-located in a highly visible location inside the Primary Bay Area. The location of alarms shall be coordinated with and approved by the Purchaser prior to system design

5.2.3.1.2 Electrical Rating: Since alarms will be energized when natural-gas is present, they shall be rated for the area electrical classification of their location, particularly with regards to the determination of §5.1.4.1.

##### 5.2.3.2 Visual:

###### 5.2.3.2.1 Type:

5.2.3.2.1.1 Color: The Gas Detection System shall activate (3) types of visual alarms:

- Green light
- Yellow or amber light
- Red light

5.2.3.2.1.2 Intensity: When energized, each light shall produce a minimum of (1,000) lumens.

5.2.3.2.1.3 Pattern: The intensity of each color light shall be constant by default. Purchaser may be consulted regarding the implementation of different pulse rates for different colors.

5.2.3.2.2 Activation: The following visual alarms shall be activated when the following outputs are set at the Gas Detection System Control Panel:



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<b>Output</b>	<b>Green Light</b>	<b>Yellow Light</b>	<b>Red Light</b>
“Level 0”	On	Off	Off
“Level 1”	Off	On	Off
“Level 2”	Off	Off	On
“Level 3”	Off	Off	Off

5.2.3.2.3 Labeling: Each light shall be labeled according to the following table. The labeling shall be in minimum (2) inch high letters on a high contrast background. Where separate lights are used for the three colors, wording for “Separate Lights” shall be used and obviously refer to the associated light. Where lights for the three colors are co-located, the wording for “Co-located Lights” shall be used.

<b>Light Color</b>	<b>Labels for Separate Lights</b>	<b>Labels for Co-located Lights</b>
Green	STANDBY	GREEN - STANDBY
Yellow	NATURAL GAS PRESENT	YELLOW – NATURAL GAS PRESENT
Red	EVACUATE AREA	RED – EVACUATE AREA

5.2.3.3 Audible:

5.2.3.3.1 Type: The Gas Detection System shall activate (3) types of audible alarms:

- Low pitched tone
- High pitched variable tone (e.g. warble, siren, etc.)
- Unique “trouble” sound

5.2.3.3.2 Activation: The following audible alarms shall be activated when the following outputs are set at the Gas Detection System Control Panel:

<b>Output</b>	<b>Low Pitched Tone</b>	<b>High Pitched Variable Tone</b>	<b>“Trouble” Sound</b>
“Level 0”	Off	Off	Off
“Level 1”	On	Off	Off
“Level 2”	Off	On	Off
“Level 3”	Off	Off	On

**5.2.4 Power Connections.**

All components covered by §5.2 shall be powered by circuits energized by the site generator in the event of an electrical service interruption to the site.

**5.2.5 Safety Equipment.**

5.2.5.1 Emergency Activation Device (EAD): One or more EAD(s) shall be provided at or near the Primary Bay Area.

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- 5.2.5.1.1 Function: When activated the EAD(s) shall perform the functions indicated in §5.2.2.4.
- 5.2.5.1.2 Connections: The EAD(s) covered by this section shall be connected to the Gas Detection System Control Panel only. They shall not interconnect with any other EAD or ESD systems at the site.
- 5.2.5.1.3 Integration: All EADs for the maintenance facility will be integrated so that activating one EAD will activate all facility EAD features.
- 5.2.5.1.4 Resetting. The EAD circuit shall be designed such that, once activated, all EAD functions will continue until manually reset. Access to the resetting device shall be restricted to authorized personnel only. It is preferred that this restriction be implemented by password or lock and key.
- 5.2.5.1.5 Location: The location of the EADs shall be coordinated with and approved by the Purchaser prior to system design. At a minimum, EADs shall be located:
- Next to the Gas Detection System Control Panel.
  - Between the two roll-up doors at the east side of the Primary Bay Area (per NFPA 30A §A.7.5.1).
  - Between the two roll-up doors at the west side of the Primary Bay Area (per NFPA 30A §A.7.5.1).
- 5.2.5.2 Fire Extinguisher: A dry chemical fire extinguisher with a rating not less than 2A:20BC shall be mounted adjacent to each EAD. If the fire extinguisher is exposed to weather then it shall be mounted in a weatherproof enclosure.
- 5.2.6 **Signage.**
- 5.2.6.1 EAD and Fire Extinguisher Indicating Signs: All EADs and Fire Extinguishers shall be prominently identified with appropriate signage.
- 5.2.6.1.1 Location and Height: The location of EAD and fire extinguisher signs shall be directly above the associated equipment. The signs shall be a minimum of (8) ft. above the floor or as high as the ceiling will allow.
- 5.2.6.1.2 Direction: Unless indicated otherwise in this specification or on the accompanying drawings, EAD and fire extinguisher signs shall face the intended audience. For signage facing opposite directions two single faced signs or one double-faced sign may be used.
- 5.2.6.1.3 Visibility: All signage shall be obviously visible to the intended audience without obstruction.
- 5.2.6.1.4 Marking: Each sign face shall be marked with the following in minimum (2-1/2) inch high letters on a high contrast red background:
- “EMERGENCY VENTILATION, ACTIVATE IF GAS PRESENT”

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- “FIRE EXTINGUISHER”

5.2.6.1.5 Same Placard: Where EAD and Fire Extinguisher signs are collocated and facing the same direction, the markings for both may be on the same placard.

### 5.2.7 **Evacuation Plan.**

The Contractor shall develop an area evacuation plan in coordination with the Purchaser. The evacuation plan shall be:

- Prominently posted next to each EAD.
- Prominently posted next to the system’s visual alarms.
- Displayed in a durable, dust-proof case.
- Composed of a media that will not discolor with age.

## 5.3 **EMERGENCY VENTILATION SYSTEM**

### 5.3.1 **General Requirements.**

5.3.1.1 Interconnects: The Emergency Ventilation System shall be completely independent of any other heating, ventilation, or air conditioning system in the building.

### 5.3.2 **Performance.**

5.3.2.1 Capacity: The total capacity of the ventilation system shall be sufficient to discharge air from the Primary Bay Area at a minimum rate of 1 cubic foot per minute for each 12 cubic feet of room volume (minimum of (5) air changes per hour) per CFC §2211.7.1.

5.3.2.2 Distribution: Ventilator inlets and outlets shall be positioned to provide uniform air movement to the greatest extent possible, per CFC §2211.7.1.

### 5.3.3 **Rating.**

Ventilation equipment shall be rated for the area electrical classification of its location, particularly with regards to the determination of §5.1.4.1.

### 5.3.4 **Operation.**

5.3.4.1 Activation: The Emergency Ventilation System shall be activated according to the actions required in §5.2.2.4.

5.3.4.2 Disablement: The Emergency Ventilation System shall be disabled in the event that a fire alarm is issued or a sprinkler or other fire suppression system is activated.

### 5.3.5 **Placement.**

5.3.5.1 Inlets: Air inlets shall be located at exterior walls near floor level, per CFC §2211.7.1.

5.3.5.2 Outlets: Outlets for interior air shall be located at the high points of exterior walls and/or the roof.

### 5.3.6 **Power Connections.**

All components covered by §5.3 shall be powered by circuits energized by the site generator in the event of an electrical service interruption to the site.

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### 5.4 HVAC SYSTEM

#### 5.4.1 Compliance and ratings.

5.4.1.1 Codes and Standards: All gas heating units and installations in the Primary Bay Area shall comply, or be modified to comply, with: the documents listed or referred to in §2 of this specification; §5.4 of this specification; and the following:

- NFPA 54: National Fuel Gas Code.
- NFPA 90A: Standard for the Installation of air-Conditioning and Ventilation systems

5.4.1.2 Ratings: All gas heating units, appurtenances, and installations shall be rated for the area electrical classification of their location, particularly with regards to the determination of §5.1.4.1.

#### 5.4.2 Capacity.

The capacity and performance of the heating system upon completion of any modification or replacement shall be no less than its current capacity and performance.

#### 5.4.3 Operation.

5.4.3.1 Emergency Shut-down: All heating units in the Primary Bay Area shall be disabled according to the actions indicated in §5.2.2.4.

5.4.3.2 Controls: When not disabled per §5.2.2.4 all heating units shall operate by means of the existing controls and control configuration where possible. If the controls must be modified or replaced, the location of new input devices shall stay the same as current input devices to the greatest extent possible.

#### 5.4.4 System Modifications.

5.4.4.1 Retention: It is desired that the current heating units be retained if possible. Accordingly, a determination shall be made pursuant to the findings of §5.1.4.4 whether the current heating units and appurtenances can be made compliant to this specification and applicable codes through little or no modification (e.g. lowering the heating units and appurtenances below the Class 1, Division 2 area determined in §5.1.4.1-3). If yes, then the Contractor shall perform the necessary modifications.

5.4.4.2 Replacement: If the determination made in §5.4.4.1 is that the current heating units must be replaced, then they shall be replaced with infrared gas heating units of the proper capacity and area electrical classification rating. Any other modifications necessary for the heating system to comply with this specification and applicable codes shall also be performed.

#### 5.4.5 Isolation.

Any existing HVAC components which could allow gas migration between the Primary Bay Area and adjoining rooms shall be sealed.

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### 5.5 ELECTRICAL SYSTEM

#### 5.5.1 Compliance and ratings.

5.5.1.1 Codes and Standards: All electrical units and installations in the Primary Bay Area shall comply, or be modified to comply, with: the documents listed or referred to in §2 of this specification; §5.5 of this specification.

5.5.1.2 Ratings: All electrical units, appurtenances, and installations shall be rated for the area electrical classification of their location, particularly with regards to the determination of §5.1.4.1.

#### 5.5.2 Capacity.

The capacity and performance of the electrical system upon completion of any modification or replacement shall be no less than its current capacity and performance.

#### 5.5.3 Operation.

5.5.3.1 Emergency Shut-down: All electrical units in the Primary Bay Area which are not rated for, or compliant with, a Class 1, Division 2, Group D environment shall be de-energized according to the actions indicated in §5.2.2.4.

5.5.3.2 Controls: When not disabled per §5.2.2.4 all electrical units shall operate by means of the existing controls and control configuration where possible. If the controls must be modified or replaced, the location of new input devices shall stay the same as current input devices to the greatest extent possible.

#### 5.5.4 System Modifications.

5.5.4.1 Retention: It is desired that the current lighting fixtures be retained if possible. Accordingly, a determination shall be made pursuant to the findings of §5.1.4.4 whether the current lighting fixtures and appurtenances can be made compliant to this specification and applicable codes through little or no modification (e.g. lowering the lighting fixtures and appurtenances below the Class 1, Division 2 area determined in §5.1.4.1-3). If yes, then the Contractor shall perform the necessary modifications.

5.5.4.2 Replacement: If the determination made in §5.5.4.1 is that the current lighting fixtures must be replaced, then they shall be replaced with lighting fixtures of the proper capacity and area electrical classification rating. Any other modifications necessary for the lighting system to comply with this specification and applicable codes shall also be performed.

#### 5.5.5 Emergency lights.

Emergency lighting shall be installed at the emergency exits indicated in the evacuation plan. Emergency lighting shall be activated according to the actions indicated in §5.2.2.4.

### 5.6 STRUCTURAL

#### 5.6.1 Isolation.

Any gaps or voids in interior walls allowing the movement of gas from the Primary Bay Area to adjoining rooms shall be sealed with fire resistant material.

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### **5.6.2 Gas Pockets.**

Any pockets or recesses in the Class 1 Division 2 area determined in §5.1.4.1-3 which could collect natural-gas shall be filled or removed to the greatest extent practicable.

### **5.6.3 Windows.**

Any windows between the Primary Bay Area and adjoining rooms shall be upgraded with shatter resistant safety glass.

### **5.6.4 Doors.**

Any doors between the Primary Bay Area and adjoining rooms shall be upgraded with (5) hour fire rated doors.

Openings without doors intended for access between the Primary Bay Area and adjoining rooms shall have (5) hour fire rated doors installed. Openings greater than (4) feet wide shall have double doors installed. All doors shall be self-closing using appropriate mechanisms.

## **5.7 SYSTEM TESTING AND COMMISSIONING**

### **5.7.1 Testing.**

Upon completion of work Contractor will perform the following:

- Test all system components individually to ensure they meet the requirements of this specification.
- Test interconnects between all systems to ensure proper communication and activation.
- Test operation of all systems under each alarm scenario to ensure they meet the requirements of this specification.
- Record results of all tests.

### **5.7.2 Commissioning.**

Upon completion of testing Contractor will perform the following:

- Clean all areas where work was conducted.
- Compile one or more binders containing the materials specified in §3.2.4.
- Repair or repaint areas damaged or defaced by Contractor's work to their original appearance.

## **6. OTHER REQUIREMENTS**

### **6.1 STAFF TRAINING**

#### **6.1.1 General Requirements.**

- 6.1.1.1 Scope: Contractor shall train or cause to be trained Purchaser's designated staff regarding the topics listed in §6.1.3 and §6.1.4. These lists are not intended to be all encompassing, but simply a listing of the minimum training Contractor is required to conduct for Purchaser's staff.

Equipment manufacturers, service agencies, and the Contractor may recommend or require additional training. It is expected that Contractor shall follow such recommendations and requirements in constructing a training program.

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- 6.1.1.2 Duration: There are no time limits for training. Contractor is expected to take sufficient time to convey the information and conduct the demonstrations referenced in this section and answer any questions in order to ensure that the attendees comprehend all of the information and procedures presented.
- 6.1.1.3 Video Recording: The contractor is required to make a video recording of each training session. These videos shall be suitable for training new-hires into similar positions (i.e. “Users” and “Operators”), as well as refreshing the memory of those who attended the training sessions in person. Copies in digital format on optical media (i.e. DVD or BRD) of both videos shall be conveyed to purchaser within 2 weeks of the conclusion of the last training session.

### 6.1.2 **Training schedule and attendees.**

Within 1 week of system commissioning, or as soon thereafter as is convenient to the Purchaser, Contractor shall conduct two training sessions. The first session shall be for facility “Users” (those who will be working in the facility on a regular basis, e.g. technicians), as well as facility “Operators” (on-site technical personnel who will be responsible for overseeing Gas Detection System operation and, possibly, maintenance). The second, and subsequent, training session will be exclusively for facility “Operators”:

The training session for facility Users and Operators shall acquaint them with basic natural-gas release concepts, hazards, emergency system response, proper emergency procedures, and safety equipment use.

The training session for facility Operators only shall acquaint them with: the concepts and function of all facility components; inspection, testing, and maintenance procedures; preliminary diagnostics; in-depth training on safety equipment and use, and detailed emergency response.

### 6.1.3 **User Training Topics.**

- Basic concepts of gas accumulation and migration, risks, and system response
- Gas Detection System Component identification and location
- Gas Detection System operation
- Expected system actions resulting from each alarm scenario
- Appropriate staff responses to each alarm scenario
- Evacuation plan and posted locations
- Location of all EADs, activation procedures and resulting system actions

### 6.1.4 **Operator Training Topics.**

- Component and system inspection, maintenance, calibration, and test procedures
- EAD test procedures
- Component and system diagnostic and troubleshooting procedures
- Required responses to outside agencies
- Alarm silencing procedures

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- Gas release isolation and venting procedures (e.g. which doors to close and open)
- Gas release suppression procedures
- Determination of the re-establishment of a safe environment after a release event
- System reset procedures



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## SECTION 26 01 00

### ELECTRICAL GENERAL PROVISIONS

#### ARTICLE 1 SUMMARY

- 1.1 This Division of the specification outlines the provisions of the contract work to be performed under this Division.
- 1.2 This Section applies to and forms a part of each section of specifications in Division 26 and all work performed under the electrical and communications contracts.
- 1.3 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under general requirements.
- 1.4 These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.
- 1.5 Where the words 'provide' or 'provision' are used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.
- 1.6 Where items are specified in the singular, this Division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

#### ARTICLE 2 CONTRACTOR QUALIFICATIONS

- 2.1 The Contractor shall have a current California C-10 Electrical Contractor's license and all individuals working on this project shall have passed the Department of Industrial Relations Division of apprenticeship Standards – "Electrician Certification Program."

#### ARTICLE 3 CODES, PERMITS AND FEES

- 3.1 Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of NFPA, and serving utility requirements.
- 3.2 Obtain permits, fees, inspections, meter and the like, associated with work in each section of this Division.
- 3.3 Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

#### ARTICLE 4 EXAMINATION OF PREMISES

- 4.1 Examine the construction drawings and premises prior to bidding. No allowances will be made for not being knowledgeable of existing conditions.

## ARTICLE 5 STANDARDS

- 5.1 The following standard publications of the latest editions enforced and supplements thereto shall form a part of these specifications. All electrical work must, as a minimum, be in accordance with these standards.
- 5.1.1 2010 California Electrical Code (CEC), Part 3 Title 24 CCR.
  - 5.1.2 National Fire Protection Association.
  - 5.1.3 Underwriters' Laboratories, Inc. (UL).
  - 5.1.4 Certified Ballast Manufacturers' Association (CBM).
  - 5.1.5 National Electrical Manufacturers' Association (NEMA).
  - 5.1.6 Institution of Electrical & Electronics Engineers (IEEE).
  - 5.1.7 American Society for Testing & Materials (ASTM).
  - 5.1.8 National Board of Fire Underwriters (NBFU).
  - 5.1.9 National Board of Standards (NBS).
  - 5.1.10 American National Standards Institute (ANSI).
  - 5.1.11 Insulated Power Cable Engineers Association (IPECS).
  - 5.1.12 Electrical Testing Laboratories (ETL).
  - 5.1.13 National Electrical Safety Code (NESC).
  - 5.1.14 2010 California Building Code (CBC), Part 2, Title 24 CCR.
  - 5.1.15 2010 California Fire Code (CFC), Part 9, Title 24, CCR.
  - 5.1.16 2010 NFPA 72 with California State Amendments
  - 5.1.17 National Electrical Testing Association (NETA), 2010 or most current

## ARTICLE 6 DEFINITIONS

- 6.1 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
- 6.2 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.
- 6.3 Finish Space: Any space ordinarily visible, including exterior areas.

## ARTICLE 7 WORK AND MATERIALS

- 7.1 Unless otherwise specified, all materials must be new and of the best quality. Materials previously incorporated into other projects, salvaged, or refurbished are not considered new. Perform all labor in a thorough and workmanlike manner.
- 7.2 All materials provided under the contract must bear the UL label where normally available. Note that this requirement may be repeated under equipment specifications. In general, such devices as will void the label should be provided in separate enclosures and wired to the labeled unit in proper manner.

## ARTICLE 8 SHOP DRAWINGS AND SUBMITTALS

- 8.1 Submit shop drawings and all data in accordance with Division 1 of these specifications and as noted below for all equipment provided under this Division.

- 8.2 Shop drawings submittals demonstrate to the Owner that the Contractor understands the design concept. The Contractor demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals is processed, notify the Owner immediately.
- 8.3 Manufacturer's data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.
- 8.4 Index all submittals and reference them to these specifications. All submittal items shall be assembled and submitted, one for each specification section. (Multiple specification sections may be grouped together in one common submittal binder, as long as each individual section is clearly identified.) Partial or incomplete submittal sections will not be reviewed.

#### ARTICLE 9 EQUIPMENT PURCHASES

- 9.1 Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.
- 9.2 Provide all materials of similar class or service by one manufacturer.

#### ARTICLE 10 COOPERATIVE WORK

- 10.1 Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.
- 10.2 Cooperative work includes: General supervision and responsibility for proper location and size of work related to this Division, but provided under the other sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this Division.

#### ARTICLE 11 VERIFICATION OF DIMENSIONS

- 11.1 Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- 11.2 Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clear, and maintain proper clearances.

#### ARTICLE 12 CUTTING AND PATCHING

12.1 All cutting and patching shall be in accordance with Division 1 of these specifications and as noted below.

12.2 Cut existing work and patch as necessary to properly install new work. As the work progresses, leave necessary openings, holes, chases, etc., in their correct location. If the required openings, holes, chases, etc., are not in their correct locations, make the necessary corrections at no cost to the Owner. Avoid excessive cutting and do not cut structural members including wall framing without the consent of the Owner.

#### ARTICLE 13 CLOSING-IN OF UNINSPECTED WORK

13.1 Cover no work until inspected, tested, and approved by the Owner. Where work is covered before inspection and test, uncover it and when inspected, tested, and approved, restore all work to original proper condition at no additional cost to Owner.

#### ARTICLE 14 EXCAVATION AND BACKFILL

14.1 All excavation and backfill shall be in accordance with Division 1 of these specifications and as noted below.

14.2 Perform all necessary excavation, shoring, and backfilling required for the proper laying of all conduits inside the building and premises, and outside as may be necessary.

14.3 Excavate all trenches open cut, keep trench banks as nearly vertical as practicable, and sheet and brace trenches where required for stability and safety. Excavate trenches true to line and make bottoms no wider than necessary to provide ample work room. Grade trench bottoms accurately. Machine grade only to the top line of the conduits, doing the remainder by hand. Do not cut any trench near or under footings without first consulting the Owner. All trenches shall be done in accordance with OSHA standards and regulations.

14.4 Backfilling shall be done with each layer compacted before another layer is added. No stones or coarse lumps shall be laid directly on a conduit or conduits.

14.5 Trenches shall be filled with the specified material. Sod, if any, shall be removed in cut sections and replaced in same manners.

14.6 Provide pumps and drainage of all open trenches for purposes of installing electrical duct and wiring.

14.7 Perform all backfilling in accordance with the requirements of and under the direction of a Geotechnical Engineer.

14.8 Where new underground trenching is required on sites or in any area where existing underground utilities exist, the Contractor shall provide an independent professional utility locating service to locate exact vertical and horizontal locations of all existing utilities. Where existing utilities are found the Contractor shall hand dig those areas to avoid any disruptions. The Contractor shall be responsible for immediate repairs to existing underground utilities damaged during construction. The Contractor shall repair all existing asphalt, concrete and landscape surfaces damaged or removed during construction to match their original conditions. Where trenching extends through public streets or roadways, the Contractor shall notify underground service alert in addition to the

independent locating service 48 hours before start of construction to determine location of existing utilities by calling (800) 422-4133.

## ARTICLE 15 CONCRETE

- 15.1 Where used for structures to be provided under the contract such as bases, etc., concrete work, and associated reinforcing shall be as specified under Division 3 of these specifications.
- 15.2 See other sections for additional requirements for underground vaults, cable ducts, etc.

## ARTICLE 16 ACCESSIBILITY

- 16.1 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.
- 16.2 All required access doors or panels in walls and ceilings are to be furnished and installed as part of the work under this Section. Refer to Division 1 of these specifications and as noted below.
- 16.3 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.
- 16.4 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

## ARTICLE 17 IDENTIFICATION OF EQUIPMENT

- 17.1 All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedules:
  - 17.1.1 General:
    - 17.1.1.1 In general, the installed laminated nameplates as hereinafter called for shall also clearly indicate its use, areas served, circuit identification, voltage and any other useful data.
  - 17.1.2 Panelboards:
    - 17.1.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8" high.
    - 17.1.2.2 Circuit directory shall be two column typewritten card set under glass or glass equivalent. Each circuit shall be identified by the room number and/or number of unit and other pertinent data as required.
  - 17.1.3 Distribution Switchboards and Feeders Sections:
    - 17.1.3.1 Identification shall be with 1" x 4" laminated white micarta nameplates with black lettering on each major component, each with

name and/or number of unit and other pertinent data as required. Letters shall be no less than 3/8" high.

17.1.3.2 Circuit breakers and switches shall be identified by number and name with 3/8" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to or on circuit breaker or switch.

17.1.4 Disconnect Switches, Motor Starters and Transformers:

17.1.4.1 Identification shall be with white micarta laminated labels and 3/8" high black lettering.

## ARTICLE 18 CONSTRUCTION FACILITIES

18.1 Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.

18.2 Temporary power and lighting for construction purposes shall be provided under this Section. All work shall be in accordance with Division 1 of these specifications.

## ARTICLE 19 GUARANTEE

19.1 Guarantee all material, equipment and workmanship for all sections under this Division in writing to be free from defect of material and workmanship for one year from date of final acceptance, as outlined in the general conditions. Replace without charge any material or equipment proven defective during this period. The guarantee shall include performance of equipment under all site conditions, conditions of load, installing any additional items of control and/or protective devices, as required.

## ARTICLE 20 PATENTS

20.1 Refer to the General Conditions for Contractor's responsibilities regarding patents.

## ARTICLE 21 PLUMBING (DIVISION 22) / ELECTRICAL – COORDINATION REQUIREMENTS

21.1 All electrical work performed for this project shall conform to the California Electrical Code, to Local Building Codes and in conformance with Division 22 and 26 of these specifications, whether the work is provided under the "Plumbing" or the "Electrical" Division of these specifications. Where the Division 22 Contractor is required to provide electrical work, he shall arrange for the work to be done by a licensed Division 26 Contractor, using qualified electricians. The Division 22 Contractor shall be solely and completely responsible for the correct functioning of all equipment regardless of who provided the electrical work.

21.2 The work under Division 22 shall include the following:

21.2.1 All motors required by equipment.

21.2.2 All starters for equipment which are not provided under the electrical division as part of a motor control center or otherwise indicated on the electrical drawings.

- 21.2.3 All wiring interior to packaged equipment furnished as an integral part of the equipment.
- 21.2.4 All control **wiring and conduit** for control systems.
- 21.3 The work under Division 26 shall include the following:
- 21.3.1 All power wiring and conduit.
- 21.3.2 Electrical disconnects as shown on the electrical drawings.
- 21.4 All power wiring and conduit to equipment shall be provided under Division 26. Control wiring and conduit, whether line voltage or low voltage, shall be provided under the division which furnishes the equipment.
- 21.5 Power wiring shall be defined as all wiring between the panelboard switchboard overcurrent device, motor control center starter or switch, and the safety disconnect switch or control panel serving the equipment. Also, the power wiring between safety disconnect switch and the equipment line terminals.
- 21.6 Control wiring shall be defined as all wiring, either line voltage or low voltage, required for the control and interlocking of equipment, including but not limited to wiring to motor control stations, solenoid valves, pressure switches, limit switches, flow switches, thermostats, humidistats, safety devices and other components required for the proper operation of the equipment.
- 21.7 All motor starters which are not part of motor control centers and which are required for equipment furnished under this Division shall be furnished and installed by the Division furnishing the equipment and power wiring connected under Division 26.
- 21.8 Division 26 Contractor shall make all final connections of power wiring to equipment furnished under this Division.
- 21.9 Wiring diagrams complete with all connection details shall be furnished under each respective Section.
- 21.10 Motor starters supplied by Plumbing shall be fused combination type minimum NEMA Size 1, and conform to appropriate NEMA standards for the service required. Provide NEMA type 3R/12 gasketed enclosures in wet locations. Provide all starters with appropriately sized overload protection and heater strips provided in each phase, hand/off auto switches, a minimum of 2 NO and NC auxiliary contacts as required, and an integral disconnecting means. For ½ horsepower motors and below, when control requirements do not dictate the use of a starter, a manual motor starter switch with overload protection in each phase may be provided. Acceptable manufacturers are Allen Bradley, General Electric, Square D, Furnas and Cutler Hammer.

## ARTICLE 22 EQUIPMENT ROUGH-IN

- 22.1 Rough-in all equipment, fixtures, etc. as designed on the drawings and as specified herein. The drawings indicate only the approximate location of rough-ins. Mounting heights of all switches, receptacles, wall mounted fixtures and such equipment must be coordinated with the Electrical Designs. The Contractor shall obtain all rough-in information before progressing with any work for rough-in connections. Minor changes in



the contract drawings shall be anticipated and provided for under this Division of the specifications to comply with rough-in requirements.

ARTICLE 23 OWNER FURNISHED AND OTHER EQUIPMENT

- 23.1 Rough-in and make final connections to all Owner furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.

ARTICLE 24 EQUIPMENT FINAL CONNECTIONS

- 24.1 Provide all final connections for the following:

24.1.1 All equipment furnished under this Division.

24.1.2 Electrical equipment furnished under other sections of the specification.

24.1.3 Owner furnished equipment as specified under this Division.

ARTICLE 25 INSERTS, ANCHORS, AND MOUNTING SLEEVES

- 25.1 Inserts and anchors must be:

25.1.1 Furnished and installed for support of work under this Division.

25.1.2 Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.

25.1.3 Furnish and install all sleeves as required for the installation of all work under all Sections of this Division and for all communication systems including any communication systems described in this Section which are bid to the General Contractor. Sleeves through floors, roof, and walls shall be as described in "Conduit and Fittings" Section 26 05 33.

ARTICLE 26 SEISMIC ANCHORING

- 26.1 All switchgear and other free standing electrical equipment or enclosures shall be anchored to the floor and braced at the top of the equipment to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 1632A and Table 16-A0. The Contractor shall submit drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.

- 26.2 All sound systems, communication, signal or data networking equipment or enclosures shall be anchored to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 1632A and Table 16-A0. The Contractor shall submit drawings signed by the Contractors registered Structural Engineer indicating method of compliance prior to installation.

ARTICLE 27 RUST PROOFING

27.1 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.

27.1.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.

27.1.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

#### ARTICLE 28 GENERAL WIRING

28.1 Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.

28.2 In those instances where outlet boxes, recessed terminal boxes, or recessed equipment enclosures are installed in a fire rated assembly, provide "Flamesafe FSD 1077" fire stopping pads or approved equal, over the outlet or box.

28.3 Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Owner as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.

#### ARTICLE 29 SEPARATE CONDUIT SYSTEMS

29.1 Each electrical and signal system shall be contained in a separate conduit system as shown on the drawings and as specified herein. This includes each power system, each lighting system, each signal system of whatever nature, telephone, standby system, sound system, control system, fire alarm system, etc.

29.2 Further, each item of building equipment must have its own run of power wiring. Control wiring may be included in properly sized conduit for equipment feeders of #6 AWG and smaller, having separate conduit for larger sizes.

#### ARTICLE 30 CLEANUP

30.1 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.

30.2 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.

30.3 During the progress of the work, keep the premises clean and free of debris.

#### ARTICLE 31 UTILITY SERVICES

31.1 The Division 26 Contractor shall contact the serving utility companies; notify the serving power, telephone and cable TV utilities of the following:

- 31.1.1 Name and address of Contractor.
  - 31.1.2 Estimated times of construction start, completion and required service connections.
  - 31.1.3 Project service voltage, phase load, and service size.
  - 31.1.4 Provide to the Owner written verification from each utility company indicating their concurrence with the contract documents.
  - 31.2 Contractor shall notify underground service alert 48 hours before start of construction to determine location of existing utilities by calling (800) 422-4133. All work shall be in accordance with these specifications.
  - 31.3 All utility company requirements shall be complied with and approval shall be obtained from the utility company for service equipment. Such as, verification of a field test of the ground fault protection on the main service equipment, panic hardware and etc.
- ARTICLE 32 TEST AND INSPECTION PROCEDURES – EXISTING MEDIUM VOLTAGE, AIR INSULATED, CIRCUIT BREAKER TESTS
- 32.1 Tests shall be done in accordance with ANSI/NETA Standards and by a contractor certified in medium voltage testing and procedures. Contractor qualifications shall be submitted to the electrical engineer of record for approval.
  - 32.2 Testing shall not be done or scheduled until the outage is scheduled and approved by the owner. Outage shall not exceed 24 hours unless approved by the owner and coordinated with the CM and Owner.
  - 32.3 Visual and Mechanical Inspection
    - 32.3.1 Inspect physical and mechanical condition.
    - 32.3.2 Inspect anchorage, alignment, and grounding.
    - 32.3.3 Verify that all maintenance devices are available for servicing and operating the breaker.
    - 32.3.4 Clean the Unit.
    - 32.3.5 Inspect arc chutes.
    - 32.3.6 Inspect moving and stationary contacts for condition, wear, and alignment.
    - 32.3.7 Close/open breaker and check for binding, friction, contact alignment, contact sequence, and penetration.
    - 32.3.8 Perform all mechanical operation tests on the operating mechanism in accordance with manufacturer's published data.
    - 32.3.9 Inspect bolted electrical connections for high resistance using one of the following methods:
      - 32.3.9.1 Use of a low-resistance ohmmeter in accordance with Section 33.4.

- 32.3.9.2 Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data.
- 32.3.9.3 Perform a thermographic survey in accordance with NETA standards.
- 32.3.10 Verify cell fit and element alignment.
- 32.3.11 Verify racking mechanism operation.
- 32.3.12 Inspect puffer operation.
- 32.3.13 Use appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
- 32.3.14 Record as-found and as-left operation-counter readings.
- 32.4 Electrical Tests
  - 32.4.1 Perform resistance measurements through bolted connections with a low-resistance ohmmeter, if applicable. See Section 33.3.
  - 32.4.2 Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with the circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data.
  - 32.4.3 Perform a contact/pole-resistance test.
  - 32.4.4 With the breaker in a test position, perform the following tests:
    - 32.4.4.1 Trip and close breaker with the control switch.
    - 32.4.4.2 Trip breaker by operating each of its protective relays. Recalibrate and adjust relay settings based on time current study to be done for the project.
    - 32.4.4.3 Verify mechanism charge, trip-free, and antipump functions.
    - 32.4.4.4 Verify blowout coil circuit continuity.
    - 32.4.4.5 Verify operation of heaters, if applicable.
    - 32.4.4.6 Test instrument transformers in accordance with NETA standards.
- 32.5 Test Values
  - 32.5.1 Test Values – Visual and Mechanical
    - 32.5.1.1 Bolt-torque levels should be in accordance with manufacturer's published data.

32.5.1.2 Results of the thermographic survey shall be in accordance with NETA standards.

32.5.1.3 Compare travel and velocity values to manufacturer's published data.

#### 32.5.2 Test Values – Electrical

32.5.2.1 Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.

32.5.2.2 Circuit breaker insulation resistance should be in accordance with manufacturer's published standards.

32.5.2.3 Insulation-resistance values of circuit breakers should be in accordance with manufacturer's published data. Values of insulation resistance less than manufacturer's recommendations should be investigated.

32.5.2.4 Microhm or dc millivolt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's data is not available, investigate values that deviate from adjacent poles or similar breakers by more than 50 percent of the lowest value.

32.5.2.5 Breaker mechanism charge, close, open, trip, trip-free, and antipump features shall function as designed.

32.5.2.6 Minimum pickup for trip and close coils shall be in accordance with manufacturer's published data.

32.5.2.7 Power-factor or dissipation-factor and capacitance values should be within ten percent of nameplate rating for bushings. Hot collar tests are evaluated on a milliampere/milliwatt loss basis, and the results should be compared to values of similar bushings.

32.5.2.8 If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the over potential test, the circuit breaker is considered to have passed the test.

32.5.2.9 The blowout coil circuit should exhibit continuity.

32.5.2.10 Heaters should be operational.

32.5.2.11 The results of instrument transformer tests shall be in accordance with manufacturer's standards.

### ARTICLE 33 PAINTING

33.1 Paint all unfinished metal as required in accordance with Division 1 of these specifications. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)

ARTICLE 34 GENERAL REQUIREMENTS FOR DEMOLITION AND EXISTING CONDITIONS

- 34.1 Remove existing work and items which are required to be removed in such manner that minimum damage and disturbance is caused to adjacent and connection work scheduled to remain. Repair or replace existing work schedule.
- 34.2 Include preparation of existing areas to receive new materials and removal of materials and equipment to alter or repair the existing building as indicated and as specified.
- 34.3 Perform demolition exercising proper care to prevent injury to the public, workmen and adjoining property.
- 34.4 Perform the removal, cutting, drilling of existing work with extreme care and use small tools in order not to jeopardize the structural integrity of the building.
- 34.5 Rebuild to existing condition or better, existing work which has to be removed to allow the installation of new work as required.
- 34.6 Remove, protect and reinstall existing items as indicated. Replace materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused, with equal quality material, and installation.
- 34.7 Do not reuse in this project materials and items removed from existing site or building, except with specific written approval by the Owner in each case, unless such removed material or item is specifically indicated or specified to be reused.
- 34.8 Patch areas requiring patching, including damage caused by removing, relocating or adding fixtures and equipment, damages caused by demolition at adjacent materials.
- 34.9 Do not stockpile debris in the existing building or site, without the approval of the Owner. Remove debris as it accumulates from removal operations to a legal disposal area.

ARTICLE 35 PROJECT CLOSEOUT

- 35.1 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this Division.
- 35.2 Equipment Lists and Maintenance Manuals:
  - 35.2.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this Section of the specifications:
    - 35.2.1.1 Name, model, and manufacturer.
    - 35.2.1.2 Complete parts drawings and lists.
    - 35.2.1.3 Local supply for parts and replacement and telephone number.
    - 35.2.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.

- 35.3 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Owner for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

#### ARTICLE 36 RECORD DRAWINGS

- 36.1 The Division 26 Contractor shall maintain record drawings as specified and as noted below.
- 36.2 Drawings shall show locations of all concealed and exposed conduit runs, giving the number and size of conduit wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all the actual changes made.
- 36.3 One set of record drawings shall be delivered to the Owner.

#### ARTICLE 37 ELECTRONIC FILES

- 37.1 The Contractor shall make a **written** request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:
- 37.1.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).
- 37.1.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.
- 37.1.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.
- 37.2 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, **will not be made available to the Contractor.**
- 37.3 Files will only be provided in the AutoCAD format in which they were created.
- 37.4 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use.
- 37.5 CAD files will be made available via e-mail or on disk, depending on the quantity of files requested. The Contractor requesting the files will be required to pay \$50.00 per drawing plan, or \$300.00 maximum, whichever is **less.**

END OF SECTION

SECTION 26 05 19  
POWER CONDUCTORS

PART 1 – GENERAL

- 1.1 Furnish and install wire and cable for branch circuits and feeders specified herein and as shown on the electrical drawings.
- 1.2 Submittals: Submit manufacturers' data for the following items:
  - 1.2.1 All cables and terminations
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Wire and cable Rated 120 volt to 600 volt.
  - 2.1.1 All wire and cable shall be new, 600 volt insulated copper, of types specified below for each application. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages. Wire insulation shall be the color as specified herein and shall be type THWN-2. Insulated conductors shall be installed in all exterior exposed raceways. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load. Circuit home-runs indicated to be larger than No. 12 must be increased the entire length of the circuit, including equipment grounding conductor. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.
  - 2.1.2 Aluminum conductors will be permitted (only where specifically identified on the drawings. See "600 Volt Feeder Schedule") in sizes 2/0 or larger. Conductors shall be listed by Underwriters Laboratories (UL) and suitable for operation at 600 volts or less, at a maximum operating temperature of 90° C maximum in wet or dry locations. Conductors shall be marked "SUN-RES". Aluminum alloy conductors shall be compact stranded conductors of STABILOY® (AA-8030) as



manufactured by Alcan Cable or Listed equal. AA-8000 Series aluminum alloy conductor material shall be recognized by The Aluminum Association.

2.2 Wire and cable for systems below 120 volts.

2.2.1 All low voltage and communications systems cables routed underground shall be provided with a moisture resistant outer jacket, West Penn "Aquaseal" or equal, unless otherwise specified.

PART 3 - EXECUTION

3.1 Wire and cable shall be pulled into conduits without strain using powdered soapstone, mineralac, or other approved lubricant. In no case shall wire be repulled if same has been pulled out of a conduit run for any purpose. No conductor shall be pulled into conduit until conduit system is complete, including junction boxes, pull boxes, etc.

3.2 All connections of wires shall be made as noted below:

3.2.1 Connections to outlets and switches: Wire formed around binding post of screw.

3.2.2 No. 10 wire and smaller: Circuit wiring connections to lighting fixtures and other hard wired equipment shall be made with pressure type solderless connectors, Buchanan, Scotchlock, Wing Nut, or approved equal. Alternate "WAGO" #773 series or "IDEAL" #32, 33, 34 and 39 series push wire style connectors are also acceptable.

3.3 All wiring shall be continuous without splicing unless where specifically noted on the drawings or where permitted below.

3.3.1 No. 10 wire and smaller above grade: Quantities as needed, connection made with pressure type solderless connectors, Scotchlock or equal.

3.3.2 No. 10 wire and smaller below grade: Quantities as needed, connection made with 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate projects must be UL listed for direct burial/submersible and rated to (1000V).

3.3.3 No. 8 wire and larger above grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate projects must be UL listed for direct burial/submersible and rated to (1000V).

3.3.4 No. 8 wire and larger below grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate projects must be UL listed for direct burial/submersible and rated to (1000V).

3.4 All wiring throughout shall be color coded as follows:

480 volt system

208 or 240 volt system

A Phase	Brown	Black
B Phase	Orange	Red
C Phase	Yellow	Blue
Neutral	Grey	White
Ground	Green	Green

- 3.5 Wiring must be color coded throughout its entire length, except feeders may have color coded plastic tape at both ends and any other accessible point.
- 3.6 All control wiring in a circuit shall be color coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.
- 3.7 At all terminations of control wiring, the wiring shall have a numbered T&B or Brady plastic wire marker.
- 3.8 Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.
- 3.9 All conductors to be installed into a common raceway, shall be pulled into the raceway at the same time.
- 3.10 All conductors shall be installed in such a manner as to not exceed the manufacturers recommended pulling tension and bending radius. The equipment used for pulling must be specifically designed for the purpose. Motorized vehicles such as pickup trucks, are not acceptable.

END OF SECTION

SECTION 26 05 33  
CONDUIT AND FITTINGS

PART 1 – GENERAL

- 1.1 Furnish and install conduit and fittings as shown on the drawings and as specified herein.
- 1.2 Submit Manufacturer's data on the following:
  - 1.2.1 Conduit.
  - 1.2.2 Fittings
  - 1.2.3 Fire stopping Material.
  - 1.2.4 Surface Raceways.
  - 1.2.5 Type MC cable, provide construction details and UL "E" number.
- 1.3 **Common submittal mistakes which will resulting in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Rigid steel conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT) and flexible metallic conduit shall be steel, hot dipped galvanized after fabrication.
- 2.2 PVC conduit shall be Carlon or approved equal.
- 2.3 Liquid tight flexible metal conduit shall be Anaconda Sealtite type UA or approved equal. Fittings shall be Appleton, Crouse-Hinds, Steel City, T&B, or equivalent.
- 2.4 MC type armored cable, when utilized, shall be provided with the following:
  - 2.4.1 Comply with UL 1479 and CEC 330-22(c).
  - 2.4.2 90°C, copper, THHN conductors.
  - 2.4.3 Minimum #12 insulated grounding conductor.

- 2.4.4 Conductors sized No. 10 and smaller shall be solid, No. 8 and larger shall be stranded.
- 2.4.5 Oversized (150%) neutrals or separate neutrals shall be provided.
- 2.4.6 Increase phase conductors to No. 10 AWG for 120 volt circuits greater than 100 feet from panel to load and for 277 volt circuits greater than 200 feet from panel to load. Where required increase conductor sizes for entire length of circuit.
- 2.4.7 Interlocked armored aluminum sheath.
- 2.4.8 AC or BX type armored cable shall not be substituted in lieu of MC type cable.
- 2.4.9 Color code cable according to cable type and configuration.
- 2.4.10 Acceptable manufacturers are AFC and Alflex.
- 2.5 Fire stopping material shall provide an effective seal against fire, heat, smoke and fire gases. Fire stopping material shall be tested to comply with ASTM E 814 and UL 1479. The submittal for this product shall include the UL listed system number and installation requirements for each type of penetration seal required for this project.
- 2.6 Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the UL label.
- 2.7 All plastic conduit shall be rigid, schedule 40, heavy wall PVC. All PVC conduit shall be UL listed. Underground utility company conduits shall comply with local utility co. requirements.
- 2.8 Plastic conduit shall be stored on a flat surface, and protected from the direct rays of the sun.
- 2.9 Where branch circuit or communication raceways cannot be concealed in ceilings or walls and are required to be exposed in interior spaces, provide nonmetallic surface raceway system sized per the manufacturer capacity requirements. A full complement of nonmetallic fittings must be available and matching device boxes and cover plates must be provided. The color of the raceway system, components and boxes shall be (white). Where data networking cabling is to be installed, all raceway fittings shall meet Category 5 radius requirements. Where specific raceway types have been noted on the drawings they shall be as follows:

2.9.1	System 'SR'	Hubbell Wiremold Panduit Hellerman-Tyton	WALLTRAK 1 series ECLIPSE PN05series LD5 series TSR2 series
2.9.2	System 'SR2'	Hubbell Wiremold Panduit Hellerman-Tyton	WALTRAK 22 CLIPSE 2-#PN20A08 Series D2P10 TSR3 series
2.9.3	System 'SR3'	Hubbell Wiremold	BASETRAK series 5400 - #40N380 series

Panduit                                70 series  
Hellerman-Tyton                    MCR Infostream" series

Provide with offset boxes, inline boxes may only be used where specifically shown on the drawings.

### PART 3 – FITTINGS

- 3.1 All metallic fittings, including those for EMT, flexible conduit, or malleable iron. Die cast fittings of any other material are not permitted.
- 3.2 Locknuts shall be steel or malleable iron with sharp clean cut threads.
- 3.3 Entrance seals shall be O.Z. type FSK or equivalent.
- 3.4 Bushings and locknuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by locknuts on the outside, and a lock nut and plastic bushing on the inside of the box. All conduits shall enter the box squarely.
- 3.5 Furnish and install insulated bushings as per CEC article No. 300 - 4 (F) on all conduits. The use of insulated bushings does not exclude the use of double locknuts to fasten conduit to the box.
- 3.6 Transition from plastic to steel conduits shall be with PVC female threaded adaptors.
- 3.7 Couplings and connectors for rigid steel or IMC conduit must be threaded, or compression type (set screw fittings are not permitted).
- 3.8 Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.
- 3.9 MC type armored cable shall be provided with listed clamp type die cast zinc set screw connectors. Anti-short bushings shall be provided at all cable ends.
- 3.10 Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body. For sizes up to ¾" a screw-in, "Jake type," fitting may be used.
- 3.11 Install approved expansion fittings, or liquid tight flex conduit with a minimum 6" slack for conduits passing through all expansion and seismic joints.

### PART 4 - EXECUTION

- 4.1 All branch circuits shall be installed concealed in walls or above ceilings or in concrete floor slabs. PVC conduits installed in concrete floor slabs shall transition to PVC coated rigid steel where conduits penetrate above finished grade or finished floor.
- 4.2 Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than ½" for power wiring and ¾" for communications and fire alarm systems unless otherwise noted. Conduit in slab or below grade shall be ¾" minimum trade size, unless otherwise identified.
- 4.3 Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to

facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the CEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.

- 4.4 The Contractor shall be entirely responsible for the proper protection of this work from the other trades on the job. When conduit becomes bent or holes are punched through same, or outlets moved after being roughed-in, the Contractor shall replace same, without additional cost to the Owner.
- 4.5 Rigid steel conduit or IMC shall be used as follows:
  - 4.5.1 Exposed exterior locations.
  - 4.5.2 Exposed interior locations below eight feet above floor, except in electrical rooms and closets.
  - 4.5.3 In hazardous or classified areas as required by CEC.
- 4.6 EMT conduit shall be used for areas as follows:
  - 4.6.1 All interior communications, signal, and data networking systems.
  - 4.6.2 All interior power wiring systems where not required to be in rigid steel, IMC or flexible conduit.
- 4.7 Flexible conduit shall be used for areas as follows:
  - 4.7.1 To connect motors, transformers, and other equipment subjected to vibration or where specifically detailed on the drawings.
  - 4.7.2 Flexible conduit shall not be used to replace EMT in other locations where the conduit will be exposed.
  - 4.7.3 Flexible metal conduit shall be ferrous. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.
  - 4.7.4 Liquid tight flexible conduit shall be used in conformance with CEC in lengths not to exceed 4'. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible conduit for all equipment connections exposed in possible wet, corrosive or oil contaminated areas, e.g., shops and outside areas.
- 4.8 MC armored cable may be used as follows:
  - 4.8.1 All branch circuit wiring for lighting and power circuits where permitted and installed in compliance with UL 1569 and CEC 330.
- 4.9 MC armored cable shall **not** be used for the following areas:
  - 4.9.1 Any exterior, underground or buried in concrete circuits.

- 4.9.2 Any circuits feeding HVAC equipment or pumps or any circuit with 30 AMPs or greater overcurrent protection.
- 4.9.3 Any exposed interior locations except in electrical, communication or mechanical equipment rooms.
- 4.9.4 Any exposed interior damp/wet locations, kitchens, science classrooms, shop areas, or concealed in science classroom casework, unless provided with approved PVC jacket.
- 4.9.5 Any hazardous rated area.
- 4.10 Plastic conduit shall be used for all exterior underground, in slab, and below slab on grade conduit installations. Install bell ends at all conduit terminations in manholes and pull boxes. Where plastic conduit transitions from below grade to above grade, no plastic conduit shall extend above finished exterior grade, or above interior finished floor level.
- 4.11 Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.
- 4.12 All underground conduit depths shall be as detailed on the drawings or a minimum of 30" below finished grade (when not specifically detailed otherwise), for all exterior underground conduits. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.13 All underground conduits for power systems (600v and higher), shall be concrete encased and a minimum of 48" below grade or as detailed on the drawings. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.14 Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.
- 4.15 All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, electrical closets, and in existing or unfinished spaces. No conduit shall be run exposed in finished areas without the specific approval of the Owner.
- 4.16 All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Wire shall not be used to support conduit.
- 4.17 It shall be the responsibility of the Contractor to consult the other trades before installing conduit and boxes. Any conflict between the location of conduit and boxes, piping, duct work, or structural steel supports, shall be adjusted before installation. In general, large pipe mains, waste, drain, and steam lines shall be given priority.

- 4.18 Conduits above lay-in grid type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical.
- 4.18.1 Water and waste piping not less than 3".
  - 4.18.2 Steam and steam condensate lines not less than 12".
  - 4.18.3 Radiation and reheat lines not less than 6".
- 4.19 Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Owner.
- 4.20 All empty conduits and surface mounted raceways shall be provided with a ¼" polypropylene plastic pull cord and threaded plastic or metal plugs over the ends. Fasten plastic "Dymo" tape label to exposed spare conduit to identify "power" or "communication" system, and to where it goes.
- 4.21 The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.
- 4.22 Bending: Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than CEC requirements.
- 4.22.1 For power conduits for conductors (600v and below), provide minimum 36" radius (vertical) and 72" radius (horizontal) bends.
  - 4.22.2 For power conduits for conductors (greater than 600v), provide minimum 72" radius (vertical) and 72" radius (horizontal) bends.
- 4.23 Supports: Conduit shall be supported at intervals as required by the California Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. **[No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers.]** Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.
- 4.24 Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel ¾" diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.



- 4.25 All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.
- 4.26 Openings through fire rated floors/walls and/or smoke walls through which conduits pass shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. Sleeves shall be provided for power or communication system cables which are not installed in conduits, and shall be sealed inside and out to comply with manufacturers UL system design details. Where multiple conduits and/or cable tray systems pass thru fire-rated walls at one location, the Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.
- 4.27 Provide cap or other sealing type fitting on all spare conduits. Conduits stubbed into buildings from underground where cable only extends to equipment, the conduit/cable end shall be sealed to prevent moisture from entering the room or space.
- 4.28 All conduits which are part of a paralleled feeder or branch circuit shall be installed underground.
- 4.29 All conduits which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
  - 4.29.1 The Contractor shall coordinate all conduit requirements with each system supplier prior to bid to determine special conduit system requirements.
  - 4.29.2 The Contractor shall provide a pull rope in all conduits for these systems.
  - 4.29.3 The Contractor shall provide conduit sleeves for all open cable installations thru rated walls or block walls. Provide conduit from each building main termination cabinet or backboard to the nearest accessible ceiling for access into all electrical or communications rooms.
- 4.30 In addition to the above requirements, the following requirements shall apply to all data networking conduits:
  - 4.30.1 Flexible metal conduit may only be used where required at building seismic and/or expansion joints.
  - 4.30.2 All underground conduits shall be provided with minimum 24" radius elbows (vertical) and 60" (horizontal).
  - 4.30.3 No length of conduit above grade shall be installed to exceed 150 feet between pull boxes, or points of connection, unless where specifically detailed on the drawings.
  - 4.30.4 No length of conduit shall be installed to exceed two 90 degree bends between pull boxes, or points of connection, unless where specifically detailed on the drawings.
- 4.31 Where surface raceways are installed in interior spaces, the Contractor shall take care to route in straight lines at right angles to or parallel with walls, beams, or columns. All

raceways and device boxes shall be securely screwed to the finish surface with zinc screw "Auger" anchors Stk #ZSA1K by Gray Bar Electric or equal. Tape adhesive application will not be permitted.

- 4.32 The Contractor who installs surface raceway systems shall provide and install complete with wire retention clips, one for every (8) vertical feet or (5) horizontal feet or portion thereof. This Contractor shall also provide each raceway channel with pull strings.
- 4.33 It shall be the responsibility of the Contractor installing the raceway to coordinate the installation of raceway device plates and inserts with the communications or data contractors.
- 4.34 MC cable shall be cut using a specific metallic sheath armor stripping tool. The use of hacksaws, dikes or any other tools not specifically designed to remove the armor sheath will not be permitted.
- 4.35 MC cables installed in attic spaces or above lay-in ceilings shall be installed to be protected from physical damage. The cable shall be mounted along the sides or bottom of joists, rafters or studs.
- 4.36 Support wires used for supporting ceilings, lighting fixtures or other equipment items shall not be used to support MC cables. Conduits, duct work, piping or any other equipment shall not be used to support or mount MC cables.
- 4.37 MC cable supports, fasteners and clips shall be designed specifically for use with MC cables. Standard conduit supports, fasteners and clips, nails or other items are not permitted for installing MC cables.

END OF SECTION

## SECTION 26 05 34

### OUTLET AND JUNCTION BOXES

#### PART 1 – GENERAL

- 1.1 Furnish and install electrical wiring boxes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 **Common submittal mistakes which will resulting in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

#### PART 2 – PRODUCTS

- 2.1 Boxes shall be as manufactured by Steel City, Appleton, Raco, or approved equal.
- 2.2 All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box. Minimum box size shall be 4" square x 1-½" deep.
- 2.3 Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast ferrous and shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Conduit bodies shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Conduit bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.
- 2.4 Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster. Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the placing of conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.
- 2.5 All light, switch, receptacle, and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.

- 2.6 Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend  $\frac{3}{4}$ " past boxes all around. Covers for 4" square boxes shall extend  $\frac{1}{4}$ " past box all around.
- 2.7 Recessed boxes installed in fire rated floors/walls and /or smoke walls shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. The Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

### PART 3 – EXECUTION

- 3.1 Boxes shall be installed where required to pull cable or wire, but in finished areas only by approval of the Owner. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.
- 3.2 Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.
- 3.3 Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.
- 3.4 All cabinets and boxes shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.
- 3.5 Boxes with unused punched-out openings shall have the openings filled with factory-made knockout seals.
- 3.6 Where standby power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.
- 3.7 All outlet boxes and junction boxes for fire alarm system shall be painted red.

END OF SECTION

## SECTION 26 05 43

### UNDERGROUND PULL BOXES AND MANHOLES

#### PART 1 – GENERAL

- 1.1 Furnish and install electrical underground pullboxes and manholes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

#### PART 2 – PRODUCTS

- 2.1 The concrete for pull boxes and manholes shall be class 5500 psi or as noted on the drawings. All pullboxes and manholes and covers located in parking lots, driveways, roads, or any other driveable areas shall be traffic rated.
- 2.2 Each manhole shall be provided with a fiberglass ladder and ground rod. Ground rods shall be copper or a copper-clad steel 3/4" diameter by 10-feet long. All non-current carrying metallic components shall be grounded to the ground rods with minimum #6 copper wire.
- 2.3 All underground pullboxes shall be provided with steel bolt down type covers. Bolts shall be bronze or brass. All communication or signal system pullboxes shall be sized to comply with CEC Article 370 unless where other sizes are specifically noted on the drawings.
- 2.4 All underground pullbox and manhole covers shall be provided with either "electrical" or "telephone" or "fire alarm" markings. The telephone marking shall be used to identify telephone, T.V., clock or any other types of communication systems.
- 2.5 All power and communication systems shall be provided with separate pullboxes or manholes. Fire alarm circuits shall also be provided with separate pullboxes from any other type of communication systems.

#### PART 3 – INSTALLATION

- 3.1 Shoring of the excavation shall be in accordance with all federal, state and local regulations.

- 3.2 Provide sealing material for the joints between sections per manufacturer's instructions.
- 3.3 The contractor shall make the top and access assembly or lid flush with surrounding areas where installed in driveable or normal walking areas.

END OF SECTION

## SECTION 26 22 13

### DRY TYPE TRANSFORMERS

#### PART 1 – GENERAL

- 1.1 Furnish and install where indicated on the drawings dry type transformers with voltage and phase as shown on the drawings. The transformers shall be 60 Hz with KVA rating as shown on the drawings.
- 1.2 Submit shop drawings and manufacturer's data for each transformer including:
  - 1.2.1 Incident energy level calculations
- 1.3 **Common submittal mistakes which will result in the submittal being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

#### PART 2 – PRODUCTS

- 2.1 Acceptable manufacturers are Square D, Eaton-Cutler Hammer, Siemens or General Electric.
- 2.2 Equipment manufactured by any other manufacturers not specifically listed in Section 2.1 are not considered equal, or approved for use on this project.
- 2.3 Energy efficient transformers shall be provided in compliance with NEMA TP-1 and requirements as outlined in the California Code of Regulations, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1609: Appliance Efficiency Regulations and California Code of Regulations, Title 24: part 6, Subchapter 2, Sections 110-11: Building Standards. Transformers shall also meet the Class 1 Efficiency levels for distribution transformers specified in Table 4-2 of the National Electrical Association (NEMA) TP-102002, Guide for Determining Energy Efficiency for Distribution Transformers" The TP-1 efficiency rating will apply to both conventional transformers and K-rated transformers.
- 2.4 Transformers shall comply with the latest NEMA and ANSI standards.
- 2.5 Transformers shall be encased in a sheet steel enclosure. Ten (10) KVA and smaller shall be non-ventilated, and above 10 KVA shall be ventilated, self-cooled. The core and coil assembly shall be completely isolated from the enclosure by means of neoprene rubber isolation pads or other acceptable vibration isolators. Transformers installed outdoors shall be provided with suitable rain shields and shall be UL listed for outdoor installation.

- 2.5.1 Fan cooled transformers will not be accepted.
- 2.6 Transformers shall have a 185°C insulation system and shall not exceed 115°C rise above a 40°C ambient under full load conditions.
- 2.7 Transformers shall be capable of operating at 100 PCT. for taps below normal. Transformers rated 30 KVA and larger shall be 6 - 2-1/2 PCT., four below, and two above normal.
- 2.8 Transformer cable termination compartment shall be rated at not more than 75 degrees C.
- 2.9 Transformers shall have aluminum windings.
- 2.10 Sound outputs of transformers shall not exceed the following levels, based on NEMA standard testing procedures:

<u>KVA Rating</u>	<u>Decibel Sound Output</u>
0 - 9	40
10 - 50	45
51 - 150	50
151 - 300	55
301 - 500	60

**PART 3 – EXECUTION**

- 3.1 Dry type transformers larger than 112.5KVA rating shall have a minimum of twelve inches clearance between transformer ventilation openings and adjacent structure. Transformer connections shall be made with flexible conduit.
- 3.2 All lugs shall be torque tested in the presence of the inspector of record.
- 3.3 Transformers shall be anchored to the structure to resist seismic activity in accordance with Zone 4 requirements. Provide a minimum of four (4) ½-inch diameter anchor bolts for floor or roof mounted transformers.
- 3.4 Transformers mounted on roofs shall be installed on a roof curb. All conduits shall enter the transformer enclosure within the curbed area.
- 3.5 Arc Flash and Shock Hazard
  - 3.5.1 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.
  - 3.5.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
  - 3.5.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.



3.5.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

END OF SECTION

## SECTION 26 24 16

### PANELBOARDS

#### PART 1 – GENERAL

- 1.1 Furnish and install branch circuit panelboards as specified herein and as indicated on the drawings. Submit manufacturers' data on all items.
- 1.2 Submit manufacturers' data on all panelboards and components including:
  - 1.2.1 Enclosures and covers
  - 1.2.2 Breakers
  - 1.2.3 SPD equipment
  - 1.2.4 Incident energy level calculations
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not arranging the circuit breakers in panels to match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.
  - 1.3.2 Not including all items listed in the above itemized description.
  - 1.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.4 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

#### PART 2 – PRODUCTS

- 2.1 The interrupting rating of circuit breakers shall be 10,000 amps for the 120/208 system and 14,000 amp for 277/480 volt systems. Refer to drawings for higher interrupting rating requirements. All components and equipment enclosures shall be manufactured by the same manufacturer. Circuit breakers shall be permitted to be series rated to limit the available fault current to no more than the above ratings.
- 2.2 All panels shall be fully bussed. Recessed panel enclosures shall be a maximum of 20" wide and 5-3/4" deep for all panels 600 amp rated and less.
- 2.3 All busses shall be tin-plated aluminum and shall be located in the rear of the panelboard cabinet. Individual circuit breakers shall be bolt on type and removable from the cabinet without disturbing the bussing in any way. All panelboards shall contain ground busses.

- 2.4 Panel covers shall be door in door style, with one lock. Door lock shall allow access to breakers only. Access to wireways without removal of cover shall be permitted by (non removable) screws behind the locked door. Panel cover shall be provided with full length piano hinge. All locks for all panels provided in this project shall be keyed alike.
- 2.5 Each panel shall have a two-column circuit index card set under glass or glass equivalent on inside of the door. Each circuit shall be identified as to use and room or area. Areas shall be designated by room numbers. Room numbers shown on the drawings may change and contractor shall verify final room numbers with the owner prior to project completion.
- 2.6 Tandem mounted or wafer type breakers are not acceptable.
- 2.7 Multiple breakers shall have one common trip handle or be internally connected. Handle ties are not acceptable.
- 2.8 Breaker arrangements shown in the drawings shall be maintained. The circuit breakers in panels must match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.
- 2.9 Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the panelboard manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.
- 2.10 Acceptable manufacturers are Square D, Eaton, Siemens or General Electric.
- 2.11 Equipment manufactured by any other manufacturers not specifically listed in Section 2.10 are not considered equal, or approved for use on this project.
- 2.12 Surge Protective Device (SPD) panelboards, shall be provided with an integrated circuit breaker panelboard and parallel connected suppression / filter system in a single enclosure. The SPD panelboard shall meet the following parameters.
  - 2.12.1 Safety-ground bus and Isolated ground bus.
  - 2.12.2 Single pulse surge current capacity per phase of 160,000 amps
  - 2.12.3 Capacity per mode (line-neutral, line-ground, line-line, neutral-ground) of 80,000 amps
  - 2.12.4 Surge life tested @ 1.2 x 50 microseconds 20kv open circuit voltage, 8 x 20 microseconds 10 ka short circuit category C3 biwave, per ANSI / IEEE C62.41 & ANSI / IEEE C62.45 at greater than 2500 impulses.
  - 2.12.5 10 modes of protection
  - 2.12.6 Suppression/filter shall be matched arrays of non-linear voltage, dependent metal oxide varistors.
- 2.13 UL listed per latest edition of UL 1449, UL 1283, UL 67, and UL 50.

- 2.13.1 Suppression voltage ratings of (line-neutral) 330/500, (line-ground) 330-500, (line-line) 800/1000 and (neutral-ground) 330/400, for a 120/208 volt, single phase and three phase panelboard.
- 2.13.2 EMI/RFI high frequency noise power filter with the following characteristics: 100KHZ @ (34db), 100MHZ @ (51db), 10MHZ @ (54db), 100MHZ @ (48db).
- 2.13.3 Maximum continuous operating voltage of 115 % of nominal

### PART 3 – EXECUTION

- 3.1 Painting of panelboard covers in finished areas shall be done by the general contractor.
- 3.2 Provide a spare 3/4" conduit stubbed to an accessible area for each of every three (3) spares or spaces provided in recessed panelboards.
- 3.3 All lugs shall be torque tested in the presence of the inspector of record.
- 3.4 Arc Flash and Shock Hazard
  - 3.4.1 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.
  - 3.4.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16 Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
  - 3.4.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
  - 3.4.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

END OF SECTION

SECTION 26 32 13

EMERGENCY STAND-BY GENERATOR AND TRANSFER SWITCH

PART 1 – GENERAL

- 1.1 Furnish and install a complete system of emergency power consisting of one diesel engine-driven generator set with sound attenuated weatherproof enclosure, automatic controls, automatic transfer controls, remote communication, and all accessory items as hereinafter specified and detailed on the drawings. The engine generator set shall be a published and catalogued product of one company. That company shall have sole responsibility for the performance and service of the diesel engine generator set and the accessories. The unit shall be factory assembled and tested, submittals created final inspection of installation, and issuing of manufacture warranties by the factory. No Exceptions.
- 1.2 Project design is based upon the Kohler product listed. Use of equipment manufactured by the alternate manufacture listed in paragraph 1.3 may require redesign and review. The added cost of alternate manufacture shall be borne by the Contractor. Equipment by manufacturers not specifically listed in Section 1.3 are not considered equal nor approved for use on this project.
- 1.3 Equipment shall be manufactured by Kohler, Caterpillar, Detroit Diesel, Cummins or equal. When alternate products are used the contractor shall provide information on how the substitution may impact the project schedule, including extra time required to review submittals. The contractor shall also provide a detailed analysis of all the differences between the proposed alternant and the listed products. The contractor shall be required to pay the cost of the design team to review the proposed substitution. Reference the project general conditions for additional substitution requirements.
- 1.4 The installing Contractor shall have a current California C-10 Electrical Contractor's license, and all individuals working on tis project shall have passed the Department of Industrial Relations Division of Apprenticeship Standards – "Electrician Certification Program." This Contractor shall coordinate the purchase and installation of the generator with a factory authorized distributor.

**Applicable Documents**

- 1.5 The equipment supplied and the installation shall meet the applicable requirements of the latest editions of the following codes and regulations:
  - 1.5.1 California Administration Code (CAC):
    - 1.5.1.1 CAC Title 24 State of California Administration Code, Title 24, Building Standards.
    - 1.5.1.2 CAC Title 19 State of California Administration Code, Title 19, Public Safety.
  - 1.5.2 Code of Federal Regulations (CFR): CFR 1910 Occupational Safety and Health Standards.
  - 1.5.3 Electrical Generating Systems Association (EGSA):

- 1.5.3.1 EGSA 100B Performance Standard for Engine Cranking Batteries Used with Engine Generator Sets.
- 1.5.3.2 EGSA 100C Performance Standard for Battery Chargers for Engine Starting Batteries and Control Batteries.
- 1.5.3.3 EGSA 100D Performance Standard for Generator Overcurrent Protection 600 Volts and Below.
- 1.5.3.4 EGSA 100E Performance Standard for Governors on Engine Generator Sets.
- 1.5.3.5 EGSA 100F Performance Standard for Engine Protection Systems.
- 1.5.3.6 EGSA 100G Performance Standard for Generator Set Instrumentation, Control and Auxiliary Equipment.
- 1.5.3.7 EGSA 100M Performance Standard for Multiple Engine Generator Set Control Systems.
- 1.5.3.8 EGSA 100S Performance Standard for Transfer Switches for Use with Engine Generator Sets.
- 1.5.3.9 EGSA 100T Diesel Fuel Systems for Engine Generator Sets with Above Ground Steel Tanks.
- 1.5.4 International Conference of Building Officials (ICBO): ICBO UBC (1997) Uniform Building Code.
- 1.5.5 Institute of Electrical and Electronics Engineers, Inc. (IEEE):
  - 1.5.5.1 IEEE 115 Synchronous Machines.
  - 1.5.5.2 IEEE 126 Speed Governing of Internal Combustion Engine-Generator Units.
  - 1.5.5.3 IEEE 421.1 Definitions for Excitation Systems for Synchronous Machines.
  - 1.5.5.4 IEEE C37.2 Electrical Power System Device.
- 1.5.6 National Electrical Manufacturers Association (NEMA):
  - 1.5.6.1 NEMA 250 Enclosures for Electrical Equipment (1000 volts Maximum).
  - 1.5.6.2 NEMA AB 1 Molded Case Circuit Breakers and Molded Case Switches.
  - 1.5.6.3 NEMA MG 1 Motors and Generators.
  - 1.5.6.4 NEMA PB 2 Deadfront Distribution Switchboards.

- 1.5.6.5 NEMA/ICS 1 Industrial Control and Systems.
- 1.5.6.6 NEMA/ICS 2 Controllers, Contactors and Overload Relays, Rated not more than 2000 Volts AC or 750 Volts DC.
- 1.5.6.7 NEMA/ICS 2-447 Standard for Automatic Transfer Switches.
- 1.5.6.8 NEMA/ICS 6 Industrial Control and Systems Enclosures.
- 1.5.7 National Fire Protection Association (NFPA):
  - 1.5.7.1 NFPA 30 Flammable and Combustible Liquids Code.
  - 1.5.7.2 NFPA 37 Installation and Use of Stationary Combustion Engines and Gas Turbines.
  - 1.5.7.3 NFPA 70 National Electrical Code.
  - 1.5.7.4 NFPA 70B Electrical Equipment Maintenance.
  - 1.5.7.5 NFPA 101 Life Safety Code.
  - 1.5.7.6 NFPA 110 Emergency and Standby Power Systems.
- 1.5.8 Underwriters Laboratories Inc. (UL):
  - 1.5.8.1 UL 142 Steel Above Ground Tanks.
  - 1.5.8.2 UL 429 Electrically Operated Valves.
  - 1.5.8.3 UL 489 Molded-Case Circuit Breakers and Circuit-Breaker Enclosures.
  - 1.5.8.4 UL 1008 Automatic Transfer Switches.
  - 1.5.8.5 UL 1236 Battery Chargers for Charging Engine-Starter Batteries.
  - 1.5.8.6 UL 2200 Stationary Engine Generator Assemblies.
- 1.5.9 Regional Codes and Regulations: Local Air Quality Management District, as determined by site location. Local air pollution control regulations. Equip engine with suitable emission control equipment, including crankcase emission filter and exhaust particulate filter, to ensure that gaseous exhaust emissions conform with all local, State, and Federal Air Pollution Standards for diesel engines. Factory authorized distributor shall process and pay for the permitting of the system through the air pollution control agencies which have jurisdiction. The generator set shall be certified by the Environmental Protection Agency (EPA) to conform to current Tier non-road emissions regulations.
- 1.6 All equipment shall be new, of current domestic production of a national firm which manufacturers the engine-generator set as a matched unit, and whose quality control program complies with ISO Standards and that is certified to ISO-9001. The manufacturer together with its factory authorized distributor shall have full responsibility

for the performance of the generator set and its accessories. Unit shall be designed for **outdoor** installation.

- 1.7 Factory authorized distributor shall maintain a parts and service facility within 75 miles of the installation site, employ factory trained technicians, and offer 24-hour emergency service. Factory authorized distributor shall be the authorized dealer of a manufacturer offering standard production equipment built and prototype tested in accordance with NFPA 110, and shall be authorized to administer the warranty for all components of the emergency generator system specified herein.

#### **Submittals**

- 1.8 Submittals shall be provided in sufficient detail to demonstrate compliance with these specifications. As a minimum, the submittal shall be bound, provided with an index to cross-reference the submittal item and page location, marked to indicate the specific item to be provided, and include the following data.
  - 1.8.1 Bill of Material, covering all equipment submitted.
  - 1.8.2 Qualifications of the engine-generator manufacturer and of the factory authorized distributor. ISO-9001 certification. UL 2200 Compliance. 24-Hour emergency service capability.
  - 1.8.3 Manufacturer's published rating sheet. NFPA-110 prototype test and voltage regulation. Cooling system capability. Full rated load pickup capability.
  - 1.8.4 Installation requirements: radiator airflow and back pressure capacity, combustion air requirement, fuel consumption, fuel circulation, heat rejection, exhaust flow, exhaust back-pressure calculations, battery requirements. Floor layout dimensional data with provision for cable entry and termination.
  - 1.8.5 Engine performance data. Configuration, cubic inch displacement, rated RPM, type of aspiration, voltage of electrical system, oil and coolant capacities, exhaust volume and temperature.
  - 1.8.6 Exhaust emission data provided on the current application form for the air quality agency having jurisdiction. Exhaust and crankcase emission control equipment devices. Particulate filter.
  - 1.8.7 Battery set and battery charger.
  - 1.8.8 Generator performance data. Motor and load starting capability verification. Temperature rise and insulation classification. Short circuit sustaining capability. Over-voltage safety shutdown. Decrement curve for specific voltage specified.
  - 1.8.9 Output circuit breaker size, manufacturer, model, and trip curve for ten-second short-circuit capability.
  - 1.8.10 Control panel features and performance. Meters and gauges. Safety alarm and shutdown devices. Cranking control. Indicator lamps and horn. Control switches. Rodent protection.



- 1.8.11 Exhaust silencer attenuation rating. Particulate filter specifications and dimensions where specified.
- 1.8.12 Jacket water heater system.
- 1.8.13 Fuel system. Alarm and indicator devices. Dimensional data. Shutoff valves, fuel strainer, and flexible hose. Fuel purifier.
- 1.8.14 Fuel storage system. Fuel, oil and anti-freeze provided. Compliance with UL 142. Alarm and indicator devices. Dimensional data. Fuel capacity and hours of operation possible. Seismic restraint devices and calculations for fuel tank.
- 1.8.15 Remote annunciator panel. Dimensional data.
- 1.8.16 Remote communication components and software.
- 1.8.17 Seismic restraint devices. Agency pre-qualification. Dimensional data. Seismic restraint calculations stamped and signed by a qualified, California registered Engineer.
- 1.8.18 Generator set enclosure. Material and construction details. Dimensional data. Sound attenuation data when specified. Compatibility with cooling requirements of generator set at rated load and specified ambient conditions.
- 1.8.19 Automatic transfer switch performance data. Agency acceptance. Withstand current rating. Standard and optional features included. Dimensional data.
- 1.8.20 Schematic and wiring diagrams for all major components. Interconnection diagram for all major components.
- 1.8.21 Testing procedure and field test results.
- 1.8.22 Warranty certificate and administration authorization.
- 1.8.23 Maintenance contract proposal.

1.9 **Common submittal mistakes which will result in submittals being rejected:**

- 1.9.1 Not including all items listed in the above itemized description.
- 1.9.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
- 1.9.3 Not including actual manufacturer's catalog information of proposed products.
- 1.9.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

**Rating**

- 2.1 Unit shall be rated as shown on the drawings for continuous standby operation during any utility power failure. Rating shall be verified by published specification sheets of its nationally recognized manufacturer. Generator set shall be capable of accepting rated load in one step in accordance with NFPA-110 Para. 3-5.3.1. Systems voltage and full load current capacity shall be as shown on the drawings.
- 2.2 System voltage and full load current capacity shall be as shown on the drawings. Generator shall be 12 lead type for future voltage changes.

### **Engine**

- 2.3 The engine shall be four-cycle, direct connected to the generator by a semi-flexible coupling, and both shall be mounted on a common sub-base. The engine shall have sufficient power to produce the specified rating when operating at generator synchronous speed with all accessories required for normal operation including exhaust, fuel, cooling, and battery charging systems. Maximum engine speed shall be 1800 RPM. The engine shall have a pressure lubrication system and replaceable element oil filter. The engine oil drain shall be piped to the outside of the skid base and provided with a stainless steel ball-valve to facilitate draining.
- 2.4 The engine shall be equipped with a fuel system suitable for operation on DF-2 diesel fuel with a sulfur content not to exceed 0.05 percent by weight. Fuel system shall include an engine driven transfer pump, replaceable filter, fuel purifier, and flexible fuel lines. Fuel system shall comply with the requirements of NFPA-37 and NFPA-110 Paragraph 5-9.
  - 2.4.1 Diesel fuel purifier system shall be the heavy-duty centrifugally driven type and shall be furnished in addition to the filtration system furnished by the engine manufacturer. The purifier system shall be designed to help prevent the formation of rust in the fuel. The unit shall be rated to remove particles of (7) microns and be capable of removing a minimum of 99.5 percent of all water and 95 percent of solid type contaminants in the fuel. The unit furnished shall be located in the fuel system as the first protective device after the fuel leaves the fuel tank. The system furnished shall not require the replacement of any type of filter element or any other internal parts. System shall be RCI diesel fuel purifier, or equal.
  - 2.4.2 Provide flexible fuel lines rated for duty at 300 degrees Fahrenheit and 100 psi.
  - 2.4.3 The engine cooling system shall be designed to provide adequate cooling at rated load, within the specified enclosure, in ambient temperatures up to 122 degrees Fahrenheit. The system shall include a unit mounted radiator, blower fan, water pump, and thermostat. Cooling system shall meet the performance requirements of NFPA-110 Para. 5-8.1. Provide a low water level shutdown device.
- 2.5 The engine governor shall maintain frequency within a +/-0.25 percent band under steady state conditions and isochronous from no-load to full load. Regulation shall be as defined by IEEE Std 126-1959/83. Governor performance shall comply with EGSA 100E.
- 2.6 Starting shall be by means of a solenoid operated positive engagement gear driven electric starter for operation on 12-volt or 24-volt DC. Note the cycle-crank requirement

specified within the generator control panel. Provide a primary and a secondary means of cranking termination in accordance with NFPA-110 Para. 3-5.4.2.

- 2.7 Engine protective devices shall meet the performance requirements of EGSA 100F and shall include the following:
  - 2.7.1 Overcrank - lockout.
  - 2.7.2 Low oil pressure - preliminary alarm.
  - 2.7.3 Low oil pressure - shutdown.
  - 2.7.4 High water temperature - preliminary alarm.
  - 2.7.5 High water temperature - shutdown.
  - 2.7.6 Low water temperature - alarm.
  - 2.7.7 Low water level - shutdown.
  - 2.7.8 Over-speed - shutdown.
  - 2.7.9 Low fuel level - alarm.
- 2.8 Provide vibration isolators, of the type specified herein, installed between the engine generator and base tank assembly.
- 2.9 Engine crankcase emissions shall be filtered to prevent oil mist from contaminating the engine space and to comply with Air Pollution Control District requirements for visible emissions. Filters shall be of the closed cycle type. Filter device shall consist of a replaceable filter element and a removable reservoir for collected fluids. Filter shall be sized for the allowable crankcase back-pressure established by the engine manufacturer.

#### **Battery Set**

- 2.10 A lead acid battery set shall be provided and installed on the generator base with seismic restraints. System voltage shall match that of the starter. Cold-cranking amperage capacity shall conform with the requirements of SAE Standard J-537 for zero degrees Fahrenheit. Performance of the battery system shall comply with EGSA 100B.

#### **Battery Charger**

- 2.11 An automatic float/equalize type battery charger shall be provided, installed with vibration isolators, and wired on the generator set. Connections to the battery shall be solid wired (clip-on type clamps not acceptable). Input voltage shall be 120 volts AC. Charger shall be UL listed. Output capacity shall be a minimum of 10 amps. Battery charger shall meet the performance requirements of EGSA 100C, and shall include the characteristics required by NFPA-110 Para. 3-5.4.6. DC voltage regulation shall be within +/-1 percent from no load to full load and over an AC input line voltage variation of +/-10 percent.
- 2.12 Features shall include the following:
  - 2.12.1 Automatic "float-to-equalize" operation, with individual potentiometer adjustments.

- 2.12.2 "Power on" lamp to indicate when charger is operating.
  - 2.12.3 DC voltmeter and DC ammeter, five-percent full scale accuracy.
  - 2.12.4 Reverse polarity protection.
  - 2.12.5 AC input and DC output fuse protection.
  - 2.12.6 Automatic current limiting protection.
  - 2.12.7 Battery charger failure alarm contacts, set to close if AC power is lost to charger.
  - 2.12.8 Low and high battery voltage alarm contacts, set to close if battery voltage drops below 90-percent or rises above 110-percent of rated.
- 2.13 Battery charger enclosure shall be NEMA I Construction and arranged for convection cooling.

#### **Generator**

- 2.14 The generator shall be four-pole, revolving field, with rotating brushless or static exciter. It shall have a solid state voltage regulator capable of maintaining voltage within + 2 percent at constant load from 0-100 percent of rating. Voltage regulator shall be of the volts-per-hertz type and NFPA-110 requirement for 100 percent load pickup shall be met. The regulator shall be sealed from the environment and isolated from the load to prevent tracking when connected to SCR loads. Voltage regulator shall meet the performance standards of EGSA 100R.
- 2.15 Generator shall be self-ventilated of drip-proof construction with amortisseur rotor winding and skewed for smooth voltage waveform. The insulation material shall meet the NEMA standard (MG1-22.40 and 16.40) for Class H and be vacuum impregnated with epoxy varnish to be fungus resistant per MIL I-24092. Temperature rise of the rotor and stator shall be limited to 130 degrees C in accordance with NEMA standard (MG1-22.40 and 22.85).
- 2.16 On application of any load up to 100 percent of the rated load, the instantaneous voltage dip shall not exceed 20 percent and shall recover to + 2 percent rated voltage within eight seconds. The generator shall be capable of sustaining at least 300 percent of rated current for at least ten seconds under a three-phase symmetrical short by inherent design or by the addition of an optional current boost system. The generator, having a single maintenance free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel. Peak motor starting capacity of the alternator shall be tested at 35% voltage dip at rated voltage.
- 2.17 A resettable line current sensing circuit breaker with inverse time versus current response shall be furnished and shall not automatically reset preventing restoration of voltage if maintenance is being performed. This breaker shall be sized as shown on the drawings and shall protect the generator from damage due to its own high current capability and shall not trip within the 10 seconds specified above to allow selective tripping of downstream fuses or circuit breakers under a fault condition. Circuit breaker shall be installed in the generator terminal box and be easily operable when the operator is at the control

panel. Circuit breaker shall include provision for a lock out device in the de-energized position to comply with NFPA 70E.

- 2.18 Provide generator over-voltage protection for sensitive loads that will shut the unit down when voltage exceeds 115 percent of rated for longer than one second.

### **Generator Controller**

- 2.19 A solid state micro-processor controller shall be vibration isolated above the generator. The microprocessor control board shall be moisture proof and capable of operation from – 40°C to 85°C. Relays will only be acceptable in high current circuits. Generator set instrumentation, control, and auxiliary equipment shall meet the performance standards of EGSA 100G. The controller shall be listed under UL-508. Controller shall be capable of control and operation from a remote PC over telephone lines using Modbus/Ethernet industry standard open communication protocol.

- 2.20 Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include:

- 2.20.1 Fused DC circuits.

- 2.20.2 Complete two-wire start/stop control which shall operate on closure of a remote contact.

- 2.20.3 Speed sensing and a second independent starter motor disengagement systems shall protect against the starter engaging with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.

- 2.20.4 The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then re-engage the starter. Automatic restart feature shall initiate the start routine and re-crank if the generator slows to less than 390 rpm after exceeding crank disconnect speed.

- 2.20.5 Cranking cyler shall be programmable. One to six cranking cycles and cranking time of 1-60 seconds shall be possible. Set for initial operation with three cranking cycles of 15-seconds each with 15-second rest periods.

- 2.20.6 Overcrank protection designed to open the cranking circuit after 75 seconds if the engine fails to start.

- 2.20.7 Engine cool down timer factory set at five minutes to permit unloaded running of the standby set after transfer of the load to normal. Controller shall operate the engine at idle speed during the cool down period.

- 2.20.8 Three-position (Automatic - OFF - TEST) selector switch. In the test position, the engine shall start and run regardless of the position of the remote starting contacts. In the automatic position, the engine shall start when contacts in the remote control circuit close and stop five minutes after those contacts open. In the off position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in case of an

emergency. Reset of any fault lamp shall also be accomplished by putting the switch to the off /reset position.

2.20.9 Time delay on engine starting (adjustable 0-6 seconds) and time delay transfer to emergency (adjustable 0-5 minutes). These time delays may be provided as part of the automatic transfer switch specified in Section 2.33.

2.21 An engine and generator instrument panel shall be installed on the unit with vibration isolators, and include the following:

2.21.1 Instruments:

2.21.1.1 AC Voltmeter (L-L and L-N for all phases), digital, +/-0.25% accuracy

2.21.1.2 AC Ammeter (L1, L2, L3), digital, +/-0.25% accuracy

2.21.1.3 Wattmeter (total per phase), digital, +/-0.5% accuracy

2.21.1.4 KVA (total per phase), digital, +/-0.5% accuracy

2.21.1.5 Frequency meter, digital, +/-0.5 percent accuracy

2.21.1.6 Percent alternator duty level, Actual kW/kW rating.

2.21.1.7 Power factor per phase, leading/absorbing

2.21.1.8 Battery voltmeter, digital, 1% accuracy

2.21.1.9 Engine coolant temperature, digital, 1% accuracy

2.21.1.10 Engine oil pressure, digital, 1% accuracy.

2.21.1.11 Running time meter.

2.21.1.12 Ambient temperature, digital, 1% accuracy

2.21.2 Shutdown and warning text messages:

2.21.2.1 Overcrank lockout

2.21.2.2 High coolant temperature – preliminary alarm

2.21.2.3 High coolant temperature – shutdown

2.21.2.4 Low coolant temperature – alarm

2.21.2.5 Low coolant level - shutdown

2.21.2.6 Low oil pressure – preliminary alarm

2.21.2.7 Low oil pressure - shutdown

- 2.21.2.8 Overspeed - shutdown
- 2.21.2.9 Low fuel level - alarm
- 2.21.2.10 Water in fuel purifier - alarm
- 2.21.2.11 Generator over-voltage – shutdown
- 2.21.2.12 Generator under-voltage – shutdown
- 2.21.2.13 Generator over-frequency – shutdown
- 2.21.2.14 Generator under-frequency – shutdown
- 2.21.2.15 Generator over-current – alarm
- 2.21.2.16 Generator running - alarm
- 2.21.2.17 High battery voltage - alarm
- 2.21.2.18 Low battery voltage - alarm
- 2.21.3 Control functions:
  - 2.21.3.1 AC output voltage adjustment, 5% of L-L output voltage
  - 2.21.3.2 Alternator protection, overload and short circuit matched to rated voltage and current output
  - 2.21.3.3 Automatic restart
  - 2.21.3.4 Clock and calendar, real-time clock and calendar to time stamp shutdowns for local display and remote monitoring
  - 2.21.3.5 Digital voltage regulator, to provide +/-0.25% voltage regulation
  - 2.21.3.6 Display power shutdown, set at 5 minutes
  - 2.21.3.7 Fault shutdown override switch, to provide the ability to override the normal fault shutdowns except emergency stop and overspeed, in emergency situations and during diagnostic operation
  - 2.21.3.8 Record and display the number of generator starts
  - 2.21.3.9 Idle speed function, to permit operation at idle speed for a selectable time period.
  - 2.21.3.10 Modbus interface
  - 2.21.3.11 Password protected programming access
  - 2.21.3.12 Programmable run function for user selectable time for exercising the generator set

- 2.21.3.13 Remote reset capability, initiated via the remote communication package
- 2.21.3.14 Running time hourmeter, to record real time loaded and unloaded run time
- 2.21.3.15 Time delay engine cooldown, for user selectable time delay before the generator set shuts down
- 2.21.3.16 Time delay engine start, for user selectable time delay before the generator set starts.
- 2.21.4 Alarm horn, with silence switch, to meet the requirements of NFPA 110. Note: Silencing this horn after one fault, i.e. low fuel, shall not prevent it from sounding again should a different fault condition occur.
- 2.21.5 Complete control panel shall be "rodent proofed" to prevent damage to components by small rodents.

#### **Exhaust System**

- 2.22 A critical degree silencer shall be provided and installed inside the generator set enclosure. Factory authorized distributor shall furnish back pressure calculations for the installation verifying that engine limitation is not exceeded. Silencer shall be arranged for horizontal mounting with bottom (side) inlet and end outlet. Provide a stainless steel bellows type flexible exhaust connector at the engine exhaust outlet. Provide a long radius type elbow to discharge exhaust gases vertically, or discharge the exhaust directly above the radiator air discharge duct. Provide suitable raincap as necessary. Exhaust silencer performance shall be sufficient to comply with the sound limitation specified in the sound attenuated enclosure paragraph.
- 2.23 Provide and install a diesel particulate filter inside the generator set enclosure. The filter shall be verified by the California Air Resources Board for emergency standby and prime stationary diesel engines. Device shall be verified as a Level 3 device capable of reducing PM by at least 85 percent for engines with a particulate emission rating of 0.4 g/bhp-hr or less. Filter shall be sized by the engine generator factory authorized distributor to not exceed engine backpressure limitations and shall have no negative impact on the generator system warranty. The filter enclosure shall be constructed of stainless steel and contain separate bulkheads for the catalyst modules and the filter module. The filter shall be capable of regeneration at a minimum temperature of 465 degrees F. Provide easy access doors for removal of the catalyst modules. Performance of the filter shall provide the following minimum reductions:
  - 2.23.1 PM by a minimum of 85 percent
  - 2.23.2 Carbon Monoxide (CO) by 80 percent
  - 2.23.3 Hydrocarbons (HC) by 70 percent.



### **Jacket Water Heater**

- 2.24 A jacket water heater, thermostatically controlled, shall be installed on the engine. Heater shall be 1800 watts, 120 VAC input. Heater shall be mounted on the generator base rails and provided with flexible hoses to the engine. Flexible hoses shall be rated at 300 degrees F and 100 psi. Provision shall be made for isolation of the jacket water heater with 3/4 inch NPT ball-valves installed at the engine side of the flexible hoses. Provide a disconnect safety switch, or disconnect plug, to isolate the heating element from the electrical source for maintenance purposes.

### **Fuel Storage System and Sound Attenuated Weather Enclosure**

- 2.25 Provide a sub-base mounted fuel storage tank capable of supporting the generator set at rated load for [ 24 ] hours. Overall dimensions of the tank shall not exceed those of the generator enclosure. Tank shall not extend within 16 inches of the generator end to provide access for electrical conduit from below. Tank shall be built and labeled in accordance with UL-142. Mounting feet shall provide clearance between bottom of tank and foundation. Capacity of the fuel tank shall be based upon filling to a maximum of 90 percent and disregarding unusable fuel below the dip tube.
- 2.26 Tank features shall include:
- 2.26.1 Two-inch filler neck and locking cap.
  - 2.26.2 Engine supply and return openings and draw tubes.
  - 2.26.3 Emergency vents per UL for both primary and secondary containment with approved caps.
  - 2.26.4 Tank leak port.
  - 2.26.5 Fuel level indicator gauge, direct reading type.
  - 2.26.6 Low fuel level alarm switch, set at 4 remaining hours capacity.
  - 2.26.7 Secondary containment, totally closed design, by double wall construction. Provide alarm contact for "liquid in containment basin." Wire contact to alarm light in the generator control panel.
  - 2.26.8 Design tank for direct anchoring to concrete base and support of rubber-in-shear isolators between the generator set and mounting rails.
- 2.27 Provide a sound attenuated, weather-protective enclosure with hinged and removable side panels to allow inspection and maintenance. Enclosure material shall be 18 gauge G60 galvanized high strength steel with 14 gauge structural members. Galvanized steel shall be prime painted with a urethane base coat and finish coats of BASF system paint. Enclosure shall have successfully completed a 500-hour salt spray test done in compliance with ASTB-117. Hinges and locks shall be cadmium plated to prevent corrosion. The roof shall be peaked to prevent collection of moisture. Provide automatic door holders. Ventilation louvers shall be adequate to permit operation of the generator set at full load at the high ambient temperature specified without opening any doors.

- 2.27.1 Sound attenuation shall limit noise level to a maximum of 75 (A) at 23 feet in any horizontal direction, when generator set is operating at full rated load. Acoustic insulation shall meet UL 94 HF1 flammability classification. Enclosure design shall not require any duration of the generator set cooling system.
- 2.27.2 Openings in the enclosure shall be screened to prevent entry of birds and rodents.
- 2.27.3 Provide a **FACTORY INSTALLED** 60 amp single phase load center for 120/208 VAC, with 60 amp main and eight (8) branch circuits for lighting, convenience receptacles, jacket water heater and battery charger. Provide two (2) 120 volt vapor tight lights within the enclosure with a light switch located near the generator control panel. Provide two (2) duplex GFI receptacles. All branch circuit wiring within the enclosure shall be prewired at the factory.

**Remote Emergency Stop Switch**

- 2.28 Provide and install an emergency stop switch, of the “break glass” type, to permit the immediate stoppage of the generator system from the location shown on the Drawings.

**Remote Annunciator Panel**

- 2.29 Provide and install a remote alarm/status panel as shown on the Drawings. Panel shall meet the requirements of NFPA 110 for critical facilities and utilize Modbus RTU industry standard open communication protocol. Include the following features:
  - 2.29.1 Alarm indicators for:
    - 2.29.1.1 Pre-alarm high engine temperature.
    - 2.29.1.2 Pre-alarm low oil pressure.
    - 2.29.1.3 Low water temperature.
    - 2.29.1.4 Battery charger fault.
    - 2.29.1.5 Low battery voltage.
    - 2.29.1.6 Low fuel
    - 2.29.1.7 (3) User input options
  - 2.29.2 Shutdown indicators for:
    - 2.29.2.1 High engine temperature.
    - 2.29.2.2 Low oil pressure.
    - 2.29.2.3 Emergency stop.
    - 2.29.2.4 Over-speed.
    - 2.29.2.5 Over-crank.
  - 2.29.3 Status indicators for:
    - 2.29.3.1 Line power.
    - 2.29.3.2 Generator power.
    - 2.29.3.3 System ready.

- 2.29.3.4 Generator switch not in "auto".
- 2.29.3.5 Lamp test switch.

2.29.4 Alarm horn, with "Silence/Normal" switch.

2.30 Annunciator panel shall be arranged for flush mounting as shown on the Drawings.

### **Seismic Restraint**

2.31 The generator set shall be provided with vibration isolators installed between the engine-generator and the steel base tank assembly. Anchor the base tank to the foundation as follows:

- 2.31.1 Provide expansion anchor bolts, Hilti Qwik-Bolt, or equal, to secure the base fuel tank to the concrete foundation. Provide seismic restraint calculations, signed by an engineer registered in the State of California, with verification of the selection of the anchor bolts.

### **Automatic Transfer Switch**

2.32 Provide an automatic transfer switch, compatible with the engine generator control system as shown on the drawings. Switches shall be rated for continuous duty, as shown on the drawings. Voltage and ampere ratings identified on the drawings, or oversized as necessary to meet the AIC rating specified. Switches shall contain 4 poles with switched neutral, and shall be mounted in a NEMA gasketed [ **3R** ] enclosure for outdoor wall mounting. Automatic transfer switch shall be Kohler Company, or approved equal by Russelectric or Zenith.

2.32.1 Automatic transfer switch shall conform to the requirements of:

- 2.32.1.1 UL 1008--Standard for Automatic Transfer Switches
- 2.32.1.2 NFPA 70--National Electrical Code, including use in emergency and standby systems in accordance with Articles 517, 700.
- 2.32.1.3 NFPA 99--Essential Electrical Systems for Health Care Facilities
- 2.32.1.4 NFPA 110--Standard for Emergency and Standby Power Systems
- 2.32.1.5 IEEE Standard 446--Recommended Practice for Emergency and Standby Power Systems (Orange Book)
- 2.32.1.6 IEEE Standard 241--Recommended Practice for Electric Power Systems In Commercial Buildings (Gray Book)
- 2.32.1.7 NEMA Standard IC10 (formerly ICS 2-447) Automatic Transfer Switches.
- 2.32.1.8 UL 508 – Standard for industrial Control Equipment
- 2.32.1.9 EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)

2.32.1.10 EN61000-4-4 Fast Transient Immunity Severity Level 4

2.32.1.11 IEC Specifications for EMI/EMC Immunity as follows:

- 2.32.1.11.1 CISPR 1 Radiated Emissions
- 2.32.1.11.2 IEC 1000-4-2, Electrostatic Discharge
- 2.32.1.11.3 IEC1000-4-3, Radiated Electromagnetic Fields
- 2.32.1.11.4 IEC 1000-4-4, Electrical Fast Transient (Bursts)
- 2.32.1.11.5 IEC 1000-4-5, Surge Voltage
- 2.32.1.11.6 IEC 1000-4-6, Conducted RF Disturbances
- 2.32.1.11.7 IEC 1000-4-8, Magnetic Fields
- 2.32.1.11.8 IEC 1000-4-11, Voltage Variations and Interruptions

## 2.32.2 Electrical Requirements

2.32.2.1 Automatic transfer switches not intended for continuous duty repetitive load transfer switching are not acceptable.

2.32.2.2 The automatic transfer switch shall be rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric heating, and tungsten-filament lamp load. Switches rated 400 amperes and below shall be suitable for 100% tungsten-filament lamp load. Switches rated above 400 amperes shall be suitable for 30% tungsten-filament load.

2.32.2.3 Withstand current rating of the switch, when used with the specific protective devices shown on the drawings, and as defined by UL-1008, shall not be less than [ 65,000 ] RMS symmetrical amperes.

2.32.2.4 The automatic transfer switch shall be 600 volt class.

## 2.32.3 Mechanical Requirements

2.32.3.1 All main contacts shall be of silver composition. The main contacts shall be protected by arcing contacts in sizes 400 amperes and above. The main contacts shall be of the blow-on configuration and of segmented construction in ratings 600 amperes and above.

2.32.3.2 All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.

2.32.3.3 The contact transfer time shall not exceed one-sixth of a second.

2.32.3.4 All moveable parts of the operating mechanism shall remain in positive mechanical contact with the main contacts during the transfer operation without the use of separate mechanical interlocks.

2.32.3.5 All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.

2.32.3.6 Cabinet size shall not exceed 48 inches tall x 22 inches wide x 14.3 inches deep.

2.32.4 Transfer Switch Control System

2.32.4.1 The control module shall direct the operation of the transfer switch. The module's sensing and logic shall be a built-in microprocessor-based system for maximum reliability, minimum maintenance, and inherent digital communications capability. The control settings shall be stored in nonvolatile EEPROM. The module shall contain an integral battery-backed programmable clock and calendar. The control module shall have a keyed disconnect plug to enable the control module to be disconnected from the transfer mechanism for routine maintenance.

2.32.4.2 The control module shall be mounted separately from the transfer mechanism unit for safety and ease of maintenance. Interfacing relays shall be industrial control grade plug-in type with dust cover.

2.32.4.3 The control module shall include a user interface keypad with tactile feedback pushbuttons and light-emitting diode status indication. These features shall be user accessible when the enclosure door is closed:

2.32.4.3.1 Keypad pushbuttons:

- (1) Start / end system test
- (2) Set end exercise
- (3) End time delay

2.32.4.3.2 Lamp test / service reset

2.32.4.3.3 Light-emitting diode status indicators:

- (1) Contractor Position: Normal, Off, Emergency
- (2) Source Available: Normal, Emergency
- (3) Service required: immediate, maintenance
- (4) Not in automatic mode
- (5) Four stage time delay remaining
- (6) Exercise: load, no load, set/disabled
- (7) Test: load, no load
- (8) Load control active: peak shave, load shed, post-transfer signal
- (9) In-Phase monitor active

2.32.5 Outputs:

2.32.5.1 Generator engine start gold flashed contact rated 2 amps @ 30 VDC/250VAC.

2.32.5.2 Pre-transfer load control, one normally open contact rated 10 amps @ 30 VDC/250 VAC

2.32.5.3 One Programmable output, factory – set to load bank control rated 2 amps @ 30 VDC / 250 VAC.

2.32.6 Operation

2.32.6.1 All phases of normal and all phases of emergency shall be monitored for over and under voltage and single phase of normal and emergency for over – and under – frequency. In addition, the controller shall use anti-single phasing protection that detects regenerative voltage (using the phase angle of the source) to determine a failed source condition.

2.32.6.2 Voltage and frequency sensing:

2.32.6.2.1 Under-voltage pick-up set at 90% of nominal voltage, adjustable 85% - 100% of nominal voltage.

2.32.6.2.2 Under-voltage dropout set at 90% of pickup voltage, adjustable 75% - 98% of pickup voltage.

2.32.6.2.3 Over-voltage dropout set at 110% of nominal voltage, adjustable 105% - 135% of nominal voltage.

2.32.6.2.4 Over-voltage pick-up set at 95% of dropout voltage, adjustable 85% - 100% of nominal voltage.

2.32.6.2.5 Voltage dropout time set at 0.5 seconds adjustable 0.1 – 9.9 seconds.

2.32.6.2.6 Voltage accuracy: 2%.

2.32.6.2.7 Under frequency pick-up set at 90% of nominal frequency, adjustable 85% - 95% of nominal frequency.

2.32.6.2.8 Under frequency dropout set at 99% of pick-up frequency, adjustable 95% - 99% of pick-up frequency.

2.32.6.2.9 Over frequency dropout set at 101% of pick-up frequency, adjustable 101% - 105% of nominal frequency.

2.32.6.2.10 Over frequency pick-up set at 110% of nominal frequency, adjustable 105% - 120% of nominal frequency.

2.32.6.2.11 Frequency accuracy: 1%

2.32.6.3 Time Delays:

2.32.6.3.1 Time delay for engine start to delay initiation of transfer for momentary source outages: Range 0-6 seconds. Factory set at 3 seconds.

- 2.32.6.3.2 Time delay for transfer to standby: Range 0-60 minutes. Factory set at 1 second.
- 2.32.6.3.3 Time delay for transfer back to normal: Range 0-60 minutes. Factory set at 15 minutes.
- 2.32.6.3.4 Time delay for engine cool down: Range 0-60 minutes. Factory set at 0 minutes.
- 2.32.6.3.5 Failure to acquire standby source: Range 0-60 minutes. Factory set at 1 minute.
- 2.32.6.3.6 Pre-transfer to normal signal: Range 0-60 minutes. Factory set at 3 second.
- 2.32.6.3.7 Pre-transfer to standby signal: Range 0-60 minutes. Factory set at 3 second.
- 2.32.6.3.8 Post-transfer to normal signal: Range 0-60 minutes. Factory set at 0 minute.
- 2.32.6.3.9 Post-transfer to standby signal: Range 0-60 minutes. Factory set at 0 minute.
- 2.32.6.4 User terminals shall be available to connect a normally open contact that, when closed, signals the control module to start and transfer load to the engine-generator. Opening these contacts shall initiate a retransfer and engine cool down sequence. The load shall be transferred to an available utility source immediately if the generator source should fail.
- 2.32.6.5 The following features shall be built into the control module logic. These features shall be enabled at the factory or in the field:
  - 2.32.6.5.1 Phase rotation sensing programmable ABC or CBA
  - 2.32.6.5.2 In-phase monitoring shall continuously monitor the contactor transfer times, source voltage, frequency and phase angle to provide a self-adjusting, zero crossing contactor transfer signal. A flashing LED on the user interface panel shall indicate active in-phase monitoring.
  - 2.32.6.5.3 Plant Exerciser: Programmable seven-day or fourteen-day exerciser with user selectable load or no-load operation. An LED, on the user interface, shall indicate the type of exercise (load or no load). The time remaining on the exercise shall be indicated. The exercise time may be reset at any time with a single keystroke. The engine shall be allowed to run when the exercise period is terminated. The exerciser may be disabled for maintenance purposes. An amber LED shall flash on the user interface if the exerciser has been disabled. The exerciser shall have the capability of

being programmed, using up to twenty-one (21) event for a calendar mode.

2.32.6.5.4 The controller shall have provisions for disconnecting a load bank (during exercise) if there is a loss of normal power.

2.32.6.5.5 The control module must be upgradeable with four programmable input/output (I/O) modules with two inputs and six outputs each rated 2 amps @ 30 VDC/250 VAC.

2.32.6.6 Monitoring, Programming and Communications:

2.32.6.6.1 Modbus® link: Industry standard Modbus® RTU communication shall be available with network and setup connections. A Modbus® master will be able to:

- (1) Monitor controller data.
- (2) Alter parameters
- (3) Start and stop the generator

2.32.6.6.2 The manufacturer shall provide a Modbus® communications protocol manual to facilitate communications with a Modbus® master by a third party developer. The Modbus® network shall communicate to the controller using a twisted pair of wire. Personal Computer Set-up/monitoring Software: The controller must have the capability to communicate to a personal computer (IBM or compatible) running Windows 9X or Windows NT through an RS-232 communication format (in addition to the Modbus® connection). The software shall be Windows® based and the programming capability shall be password protected. It shall be possible to start the generator and transfer the loads to the generator. Event monitoring shall be accessible using either a personal computer with the personal computer software or Modbus® link to view the following:

- (1) Historical data (total and resettable)
- (2) Days in operation
- (3) Hours in standby
- (4) Hours not in preferred
- (5) Switch transfers
- (6) Failure to transfer
- (7) Transfers due to loss of preferred
- (8) Start up date
- (9) Last Maintenance date
- (10) Switch transfer count since last maintenance
- (11) Transfer switch information
- (12) ATS serial number
- (13) Controller serial number
- (14) Contractor serial number
- (15) Load description



- (16) Location
- (17) Branch
- (18) Network connection ID
- (19) Baud rate
- (20) Parity bit
- (21) System events ( time and date stamped ) of  
The last 100 events which include all failures of  
the sources, transfer switch and all functions of  
the controller and contactor:
- (22) Line to line voltage
- (23) System frequency
- (24) Time delay active
- (25) Time delay remaining
- (26) System status
- (27) Source available
- (28) Contractor position
- (29) Exerciser schedule, mode and time remaining  
On active exercise.

2.32.6.7 Programmable features may be viewed, selected or adjusted as follows:

2.32.6.7.1 System voltage

2.32.6.7.2 System Frequency

2.32.6.7.3 Single/three-phase operation

2.32.6.7.4 Open/closed-transition operation

2.32.6.7.5 ABC or CBA phase rotation

2.32.6.7.6 In-phase monitor

2.32.6.7.7 Commit/no commit transfer mode

2.32.6.7.8 User defined password

2.32.6.8 Programmable inputs shall be defined using either a personal computer with the personal computer software or Modbus® link:

2.32.6.8.1 End time delay input

2.32.6.8.2 Inhibit transfer

2.32.6.8.3 Low external battery fault

2.32.6.8.4 Peak shave/area protection input

2.32.6.8.5 Remote common fault

2.32.6.8.6 Remote test

- 2.32.6.9 Programmable outputs shall be defined using either a personal computer with the personal computer software or Modbus® link:
  - 2.32.6.9.1 Auxiliary switch fault
  - 2.32.6.9.2 Common fault
  - 2.32.6.9.3 Contactor position
  - 2.32.6.9.4 Exercise active
  - 2.32.6.9.5 Failure to acquire standby source
  - 2.32.6.9.6 Failure to transfer fault
  - 2.32.6.9.7 Generator engine start
  - 2.32.6.9.8 Load bank control
  - 2.32.6.9.9 Loss of phase fault
  - 2.32.6.9.10 Low backup battery
  - 2.32.6.9.11 Not in automatic mode
  - 2.32.6.9.12 Non-emergency transfer
  - 2.32.6.9.13 Over and undervoltage faults
  - 2.32.6.9.14 Over and under frequency faults
  - 2.32.6.9.15 Peak shave/area protection active
  - 2.32.6.9.16 Phase rotation error
  - 2.32.6.9.17 Modbus®-controlled relay outputs
  - 2.32.6.9.18 Source available
  - 2.32.6.9.19 Test active

**Extra Material**

- 2.33 Paint: Furnish one 12 fluid ounce spray can of identical paint used on the engine generator assembly in the paint manufacturer's sealed containers with each engine-generator set.
- 2.34 Filters: Furnish two spare replacement elements in their original containers for each filter with each unit.
- 2.35 Provide operating instructions laminated between matte-surface thermoplastic sheets and install inside generator set enclosure.

- 2.36 **At the time of generator installation the contractor shall completely fill fuel tank and top-off fuel tank upon completion of all testing. Contractor shall also provide all other required fluids.**

#### Remote Communication

- 2.37 Provide a single software package that will create screens containing data windows that display system information, controller settings, and operating status for the generator set and automatic transfer switch specified above. The software program shall be compatible with a Windows based graphical user interface on a personal computer. The user shall be able to view the status of all devices on one site overview screen. It shall be password-protected for data access with security categories for "guest," "user," and "supervisor." The user shall be able to monitor and control systems over a local area network, remotely via a modem connection, or through an Ethernet connection. Software shall accommodate up to 247 controller devices on a local area network. It shall enable the user to start and stop the generator set from a personal computer, read and adjust trip points, time delays, and system parameter settings, review system run time history, and view up to 100 recent events including engine starts, faults, shutdowns, and warnings.
- 2.38 Provide a single converter for use with the engine generator and automatic transfer switch to convert Modbus RTU protocol to Modbus TCP/IP for communication via an Ethernet network. Converter shall be FCC Class A compliant and be provided with a universal AC power adapter. LED's shall indicate status of "power," "data received," and "data transmitted." Provide a standard RJ45 jack for Ethernet connection and a terminal block for RS-485 Modbus connection. Baud rate shall be selectable for 9600 and 19.2k on Modbus RTU side, and standard 10/100 Ethernet. Converter shall be SNMP compliant to allow initiation of outgoing data from the equipment controllers.

### PART 3 — EXECUTION

#### Testing

- 3.1 Design Prototype Test: Components of the emergency system, such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype test since the tests are potentially damaging. Rather, similar design prototypes and reliability pre-production models, which will not be sold, shall be used for these tests. Upon request, the following certified test records shall be made available:
- 3.1.1 Maximum power (Kw).
  - 3.1.2 Maximum starting (kVA) at 30 percent instantaneous voltage dip.
  - 3.1.3 Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
  - 3.1.4 Governor speed regulation under steady-state and transient conditions.
  - 3.1.5 Voltage regulation and generator transient response.
  - 3.1.6 Fuel consumption at no load, 1/4, 1/2, 3/4, and full load.
  - 3.1.7 Harmonic analysis, voltage waveform deviation, and telephone influence factor.

- 3.1.8 Three-phase line-to-line short circuit test.
- 3.1.9 Alternator cooling air flow.
- 3.1.10 Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
- 3.1.11 Endurance testing.
- 3.2 Final production tests: Each generator set shall be factory tested under varying loads with guards and exhaust system in place. Upon request, arrangements to witness this test will be made or a certified test record will be sent prior to shipment. Tests shall include:
  - 3.2.1 Single-step load pickup.
  - 3.2.2 Transient and steady-state governing.
  - 3.2.3 Safety shutdown.
  - 3.2.4 Voltage regulation.
  - 3.2.5 Rated power.
  - 3.2.6 Maximum power.
- 3.3 Site tests: An installation check, start-up and rated load test shall be performed by the manufacturer's local representative. The Engineer, APCD, regular operators, and the maintenance staff shall be notified of the time and date of the site test. Coordinate test date with APCD inspection to allow APCD observation of full test load. The test shall include:
  - 3.3.1 The initial startup of the engine-generator set shall be performed by a factory trained certified representative of the engine generator set manufacturer. The factory authorized distributor of the engine-generator must provide to the engineer, with the bid, certification that they are an authorized distributor for the engine generator system. {} Failure to do supply this certification will be considered noncompliance with the bid requirements. The engine-generator factory authorized distributor must have been in the business of selling and servicing as an authorized manufactures distributor for at least 15 years. He shall furnish and install the recommended engine lubricants and fill the cooling system with a 50 percent solution of ethylene glycol antifreeze in accordance with the engine manufacturer's recommendations. He shall be present during the load test specified, and at the conclusion of the test shall supply the Owner's representative with five (5) complete sets of operation, maintenance, and parts manuals for all equipment. Under this Section of the Specifications, he shall instruct the Owner's personnel in the proper operating and maintenance procedures for all components of the standby power system.
  - 3.3.2 Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. This shall include: engine heaters, battery charger, etc.

- 3.3.3 Start-up under test mode to check for exhaust leaks, path of exhaust gases, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation.
- 3.3.4 Automatic start-up by means of simulated power outage to test remote automatic starting, transfer of load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper systems coordination. Engine temperature, oil pressure and battery charger level along with generator voltage, amperes, and frequency shall be monitored throughout the test.
- 3.3.5 Load test system, utilizing factory authorized distributor-furnished resistive load bank, as follows:
  - 3.3.5.1 1/2 hour at 1/2 load.
  - 3.3.5.2 1/2 hour at 3/4 load.
  - 3.3.5.3 Two hours at rated load.
- 3.3.6 Measure and record the transient frequency and voltage dip, and recovery time to steady state conditions, for the single step application of rated load. Verify compliance with the governor and voltage regulator performance specified. Recording instrument to be of the light beam or direct thermal array type (ink chart type not permitted).
- 3.3.7 When an Uninterrupted Power Supply (UPS) is part of this design the generator factory authorized distributor shall be responsible for coordination with factory technician from the UPS manufacturer to insure optimum operation of UPS/Generator system. Provide all adjustments to transfer switch settings.
- 3.3.8 Provide four (4) certified copies of site test report showing compliance with Specifications and approval of the installation for warranty purposes, to the owner within two weeks of the tests.

### **Warranty**

- 3.4 The equipment supplied under this Section shall be covered by a single warranty against defects in material and workmanship for a period of five (5) years or 3000 hours of operation after acceptance by the Owner. Warranty shall provide for free replacement or repair of parts for the 5 year (3000 hour) period, and free labor for the first two years. A warranty statement including these features shall be provided as part of the owner's manuals. Warranty shall be administered by the factory authorized distributor that supplied the equipment.

### **Manufacturer's Field Services**

- 3.5 Furnish the services of one factory authorized distributor, experienced in the installation and operation of the type of systems being provided, to perform the testing, adjustment of the system, and to instruct (4 hours minimum) Owner's personnel on the testing, maintenance, and supervision of the emergency generator system.

### **Seismic**

- 3.6 Seismic anchorage for all equipment shall conform to the details on the Contract drawings per local authority.

## Maintenance

- 3.7 The factory authorized distributor shall furnish at least five (5) copies of operating and maintenance manuals covering the engine generator and auxiliary equipment that may require special operating instructions or periodic maintenance.

## System Service Contracts

- 3.8 The factory authorized distributor of the standby power system must provide a copy of and make available to the Owner his standard service contract which, at the Owner's option, may be accepted or refused. This contract will accompany any documents, catalog cuts, specification sheets, wiring or outline drawings, etc., submitted for approval to the designing engineer. The contract shall be for the complete services rendered over a period of one year and include the services listed below.

3.8.1 Furnish service and maintenance of engine generator for three years from Date of Substantial Completion.

3.8.2 Generator factory authorized distributor shall perform the following reliability inspections and maintenance services during regular business hours four (4) times per year during the term that this agreement remains in effect. Services shall be provided at no additional charge to owner for the first year beginning with final acceptance of the installation. Extension of the agreement for additional years shall be offered by the generator set factory authorized distributor and shall be at the option of owner.

3.8.3 Quarterly reliability inspections will include:

3.8.3.1 Inspect overall appearance and condition of the generator set installation, enclosure etc.

3.8.3.2 Batteries will be cleaned, electrolyte levels and specific gravity will be checked, and reports made of any action necessary for recharging or replacing.

3.8.3.3 Trailer and fuel tank and lines will be inspected for defects. Critical fuel levels will be noted and recommendations for refueling will be made when necessary.

3.8.3.4 Fuel will be tested for evidence of water contamination. Fuel will be treated every 6 months to help prevent contamination. See "Additional Services for Annual Laboratory Fuel Analysis."

3.8.3.5 Equipment will be checked for fuel, oil or coolant leaks.

3.8.3.6 Fuel and governor system will be checked for proper operation.

3.8.3.7 All fluid levels will be checked and topped-off as necessary. (Fuel not included).

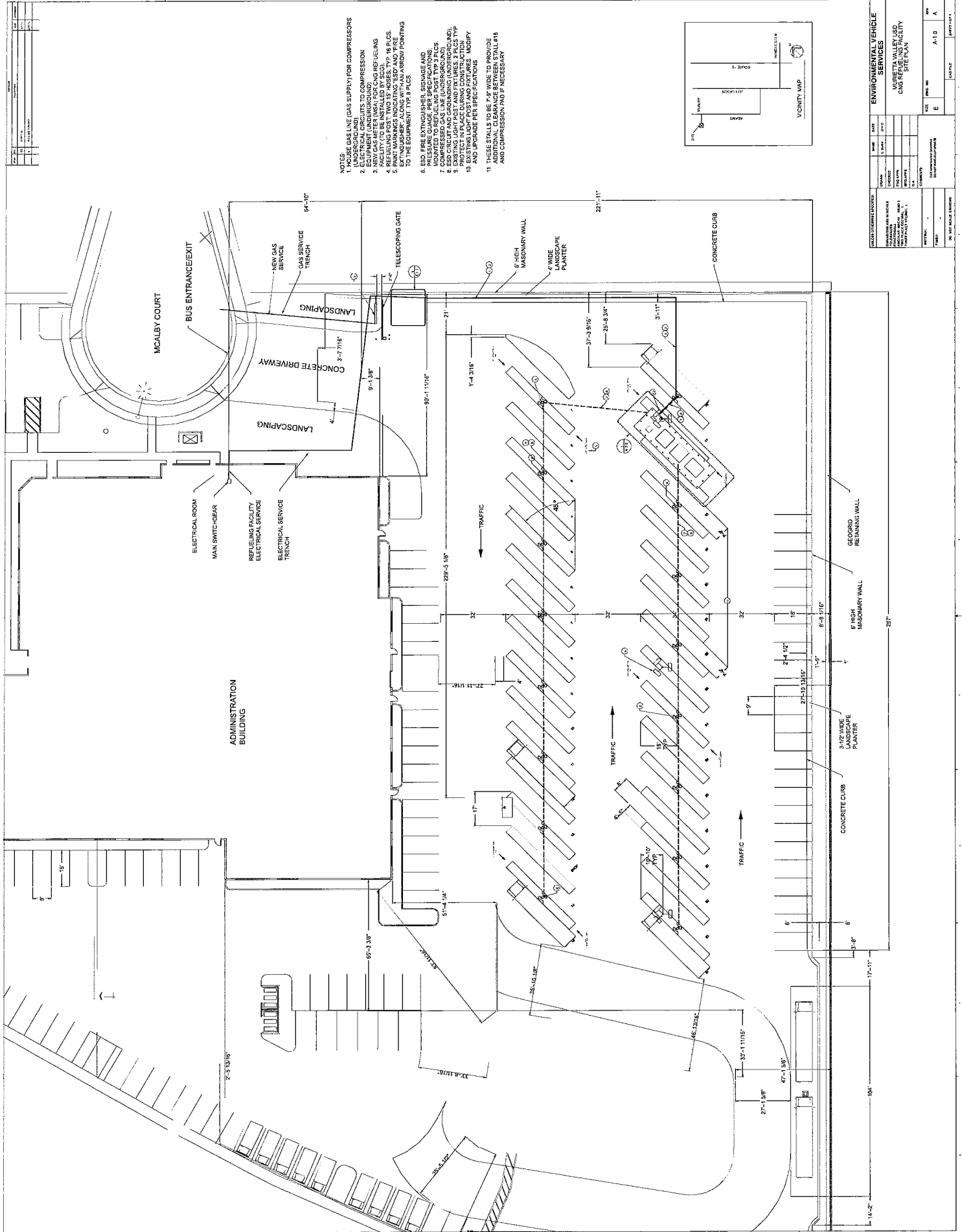
3.8.3.8 Air cleaners will be checked and if necessary recommendations made for replacement.

- 3.8.3.9 Coolant test will be performed and customer advised of any problems with the cooling system.
- 3.8.3.10 Owners/operators present will be instructed on operating and upkeep procedures to follow between regular calls by service personnel.
- 3.8.3.11 Engine block heater and associated plumbing will be checked for proper operation.
- 3.8.3.12 All belts and cooling system hoses will be checked. Owner will be advised of their condition.
- 3.8.3.13 Check electrical connections and wiring for any abrasion or chaffing.
- 3.8.4 After all of the above has been completed; service personnel will run equipment, record all operational gauges, check voltage and frequency outputs and engine electrical and mechanical shutdowns.
  - 3.8.4.1 All instruments will be checked for proper operation.
  - 3.8.4.2 Equipment will be checked for abnormal vibration and noises.
  - 3.8.4.3 Service personnel will conduct test under building load, simulating a commercial power failure, providing owner makes such load available and it is practical to run the test concerned.
  - 3.8.4.4 Automatic transfer switches will be inspected, all moving parts will be checked and cleaned if possible. Note: Automatic transfer switches are to be serviced annually. (See "Additional Services")
- 3.8.5 Technician will clean equipment and paint, if necessary, to prevent corrosion and preserve reasonable overall appearance.
- 3.8.6 Report condition of system and, if discrepancies are found, provide a proposal for repairs to insure the stand-by reliability of the equipment.
- 3.8.7 Annual Maintenance Services (once per year) will include the following:
  - 3.8.7.1 Perform reliability inspections as noted above.
  - 3.8.7.2 Change engine lubricating oil and oil filters.
  - 3.8.7.3 Change engine fuel filters.
  - 3.8.7.4 Change air cleaner element.
  - 3.8.7.5 Change water filters when used.
  - 3.8.7.6 Take oil sample and coolant sample for analysis by fluid testing laboratories.
  - 3.8.7.7 Perform a 4-hour resistive load bank test at 100% rated load.

- 3.8.7.8 Polish fuel in 196 gallon fuel tank.
- 3.8.7.9 Dispose of hazardous waste from service.
- 3.8.8 If there are any problems encountered during the planned maintenance service visit they will be brought to the attention of the owner/operator. Repairs will only be made after proper authorization from owner/operator is given to the technician. Labor will be billed at reduced special contract labor rates depending upon when the service is to be performed.
- 3.9 Install engine generator and switchgear on 4" concrete housekeeping pads. Coordinate with Division 3 and the Structural drawings. Pads and anchor bolts are provided under Division 3. The Electrical Contractor shall be responsible to coordinate pad dimensions and anchor bolt locations with the General Contractor prior to pad installation. The Electrical Contractor shall provide all anchor bolts, nuts, washers and lock washers for equipment anchorage.
- 3.10 Arc Flash and Shock Hazard
  - 3.10.1 The contractor is to provide by a third party testing company such as Emerson, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.
  - 3.10.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
  - 3.10.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
  - 3.10.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed and in no case more than 8 cal./cm<sup>2</sup>.

END OF SECTION





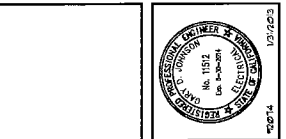
- NOTES:**
1. PROVIDE GAS LINE (GAS SUPPLY) FOR COMPRESSORS.
  2. ELECTRICAL CIRCUITS TO COMPRESSION FACILITY (TO BE INSTALLED BY SCO).
  3. NEW GAS METER (USA) FOR GAS REFUELING FACILITY (TO BE INSTALLED BY SCO).
  4. 15' GAS SERVICE TRENCH (TO BE INSTALLED BY SCO).
  5. PUMP MARKINGS INDICATING "E" AND "T" EXTINGUISHER, ALONG WITH AN ARROW POINTING TO THE EQUIPMENT, TYP PLCS.
  6. 8SD FIRE EXTINGUISHER, SIGNAGE AND MOUNTING TO BE PROVIDED BY SCO.
  7. COMPRESSED GAS (LPG) UNDERGROUND EXISTING LIGHT FOOT AND EXISTING 2 PLCS TYP TO BE MAINTAINED AND REPAIRS AS NECESSARY AND UPGRADE PER SPECIFICATIONS.
  8. EXISTING LIGHT FOOT AND EXISTING 2 PLCS TYP TO BE MAINTAINED AND REPAIRS AS NECESSARY AND UPGRADE PER SPECIFICATIONS.
  9. EXISTING LIGHT FOOT AND EXISTING 2 PLCS TYP TO BE MAINTAINED AND REPAIRS AS NECESSARY AND UPGRADE PER SPECIFICATIONS.
  10. EXISTING LIGHT FOOT AND EXISTING 2 PLCS TYP TO BE MAINTAINED AND REPAIRS AS NECESSARY AND UPGRADE PER SPECIFICATIONS.
  11. THESE STALLS TO BE 7'-9" WIDE TO PROVIDE ADDITIONAL CLEARANCE BETWEEN STALL #18 AND COMPRESSOR #10 IF NECESSARY.

NO.	DATE	BY	REVISION
1	11/11/10	JK	ISSUED FOR PERMIT
2	11/11/10	JK	ISSUED FOR PERMIT
3	11/11/10	JK	ISSUED FOR PERMIT
4	11/11/10	JK	ISSUED FOR PERMIT
5	11/11/10	JK	ISSUED FOR PERMIT
6	11/11/10	JK	ISSUED FOR PERMIT
7	11/11/10	JK	ISSUED FOR PERMIT
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31	11/11/10	JK	ISSUED FOR PERMIT
32	11/11/10	JK	ISSUED FOR PERMIT
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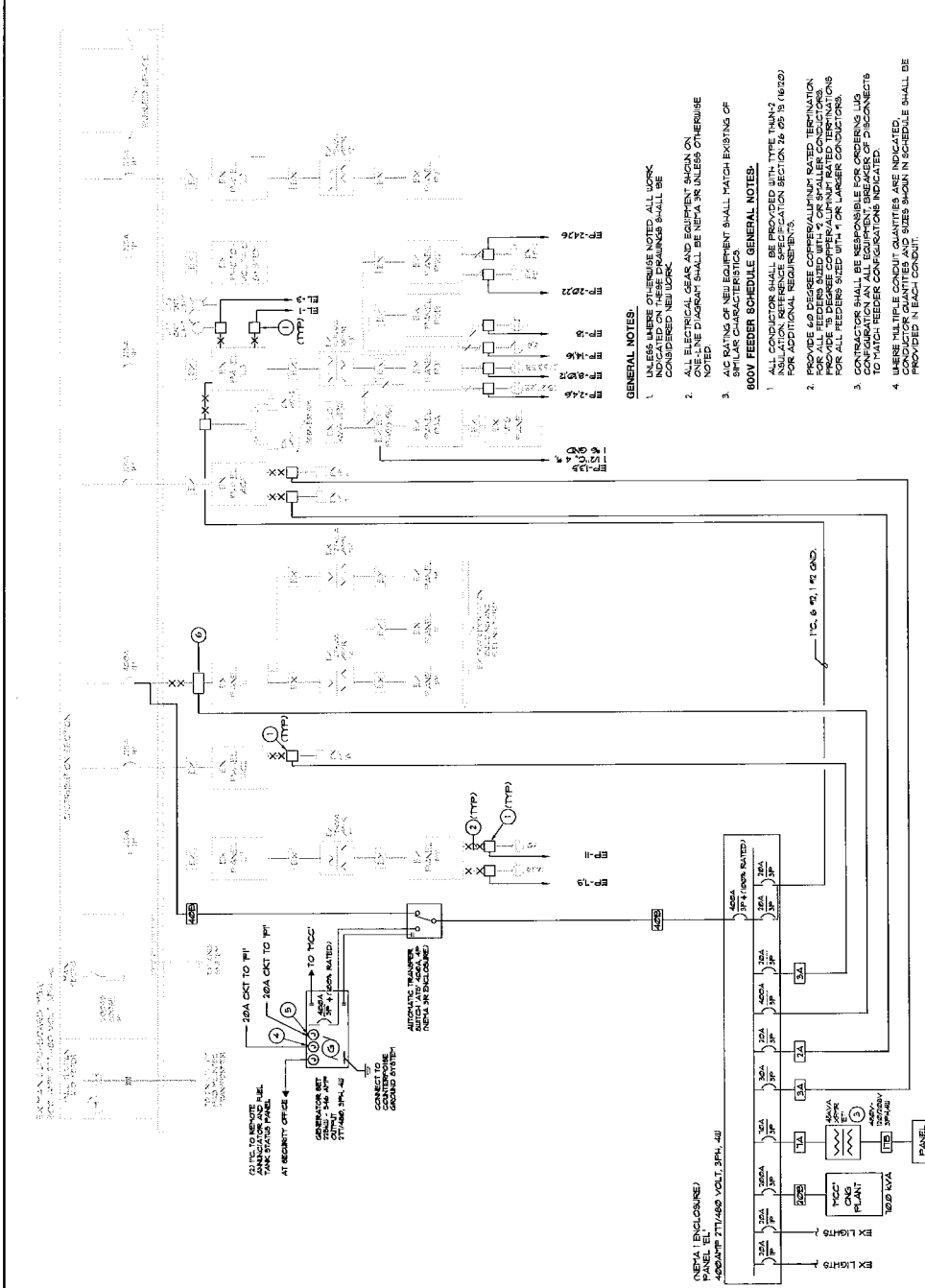
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JOHNSON CONSULTING ENGINEERS, INC. Project: Lighting, Heating, Cooling, and Mechanical Communications Data. 1028 West Professor Road, Suite 500, Pasadena, CA 92265. P 858.979.4301 F 858.933.0559 www.jce-inc.com



600Volt Feeder Schedule table with columns: ID, Type, Ampacity, Conductor, Protection, Comments, Allowance, and Connections.



GENERAL NOTES:  
1. UNLESS OTHERWISE NOTED, ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE (NEC) AND THE NATIONAL FIRE ALARMS CODE (NFPA 70B).  
2. ALL ELECTRICAL GEAR AND EQUIPMENT SHALL BE LISTED AND APPROVED BY THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) OR THE INTERNATIONAL ELECTRICIANS ASSOCIATION (IEE) AND SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE (NEC) AND THE NATIONAL FIRE ALARMS CODE (NFPA 70B).  
3. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITIES HAVING JURISDICTION.  
4. WHERE MULTIPLE CIRCUIT QUANTITIES ARE INDICATED, THE QUANTITIES SHALL BE THE TOTAL QUANTITIES FOR ALL CIRCUITS PROVIDED IN EACH CONDUIT.

ABBREVIATIONS table listing symbols for various electrical components such as alternators, busbars, buildings, breakers, conductors, control panels, etc.

ELECTRICAL SYMBOL LEGEND:  
LIGHTING: O CH LIGHTING FIXTURE, CEILING OR WALL MOUNTED AS SHOWN  
S<sub>1</sub> CONTINUOUS 50% FACTOR (ULON)  
S<sub>2</sub> WEATHER PROOF SWITCH-48" AFF. (ULON)-HEIGHT  
DISTRIBUTION EQUIPMENT: □ POWER TRANSFORMER, RATING AS NOTED; □ AUTOMATIC TRANSFER SWITCH SEE SCHEDULE; □ CIRCUIT BREAKER, RATING AS NOTED; □ 300 AMP 1P/2P 3 POLE; □ 3 POLE

ELECTRICAL LOAD ANALYSIS FOR EX-153A table with columns: SERVICE VOLTAGE, CONNECTED LOAD, KVA, AMPERES.

ELECTRICAL LOAD ANALYSIS FOR GENERATOR table with columns: SERVICE VOLTAGE, CONNECTED LOAD, KVA, AMPERES.

KEY NOTES:  
1. EXISTING CONDUIT AND BRACKET CIRCUIT SHALL BE REMOVED AND CONDUIT TO NEW PANEL AS INDICATED.  
2. DISCONNECT EXISTING WIRES FROM CIRCUIT BREAKERS.  
3. NEMA 1 RATED TRANSFORMER FOR JACKET HEATER.  
4. FOR BATTERY CHARGER.  
5. EX PANEL 1 (TRANSPORTATION BLDG) AND EXISTING TO NEW PANEL 1 AND BATTERY CHARGER.  
6. EX PANEL 2 (TRANSPORTATION BLDG) AND EXISTING TO NEW PANEL 2 AND BATTERY CHARGER.  
7. EXISTING NEW 1000KVA 3PH, 480V/270V BUS PANEL (BOARDED WITH A T3A MAIN PANEL) TO BE REMOVED AND REPLACED WITH 1000A 3P CB AND (17) 200A 1P CB'S.

ELECTRICAL ONE-LINE DIAGRAM  
NO SCALE

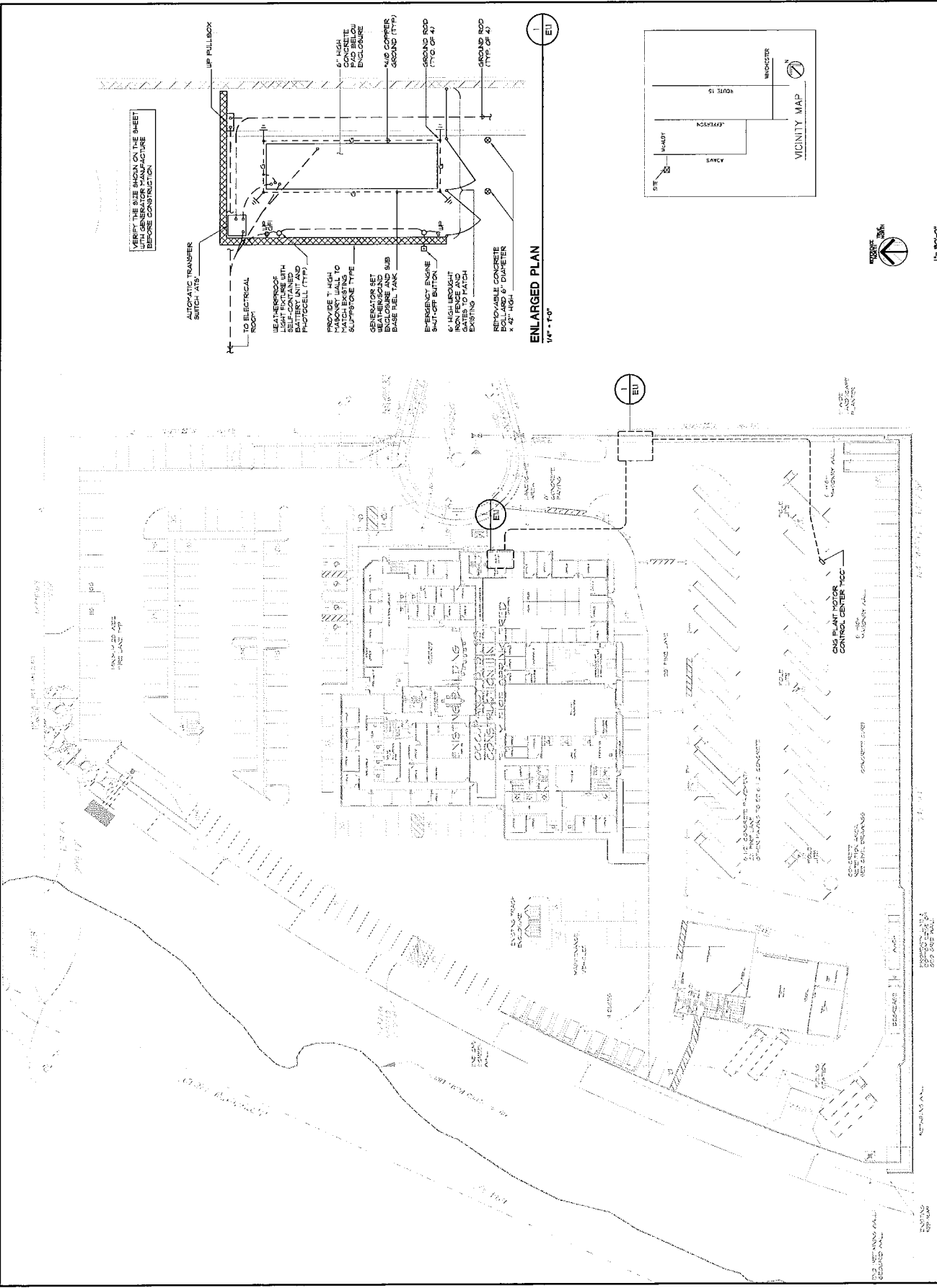
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**JOHNSON**  
 CONSULTING ENGINEERS, INC.  
 Power, Lighting, Networks  
 Communications & Data Networks  
 12575 Brockleberry Place, Suite 200  
 Poway, CA 92064  
 P 658.679.4001 F 658.930.559  
 www.jeb-inc.com



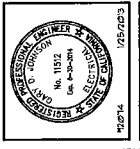
**MUSD ADMINISTRATIVE FACILITY**  
 41870 McALBY COURT  
 MURRIETA, CA  
 SITE PLAN

DATE: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 CHECKED BY: G. JOHNSON  
 JOB NO: 08-10  
 SHEET NO: E1.1



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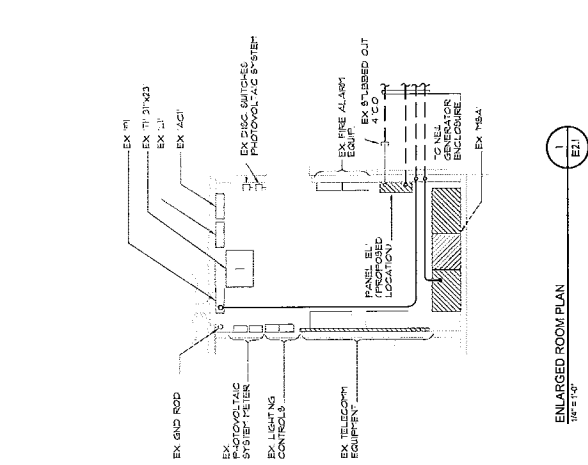
**JOHNSON**  
**Consulting Engineers, Inc.**  
 10279 (P.O. Box) 27th Street, Suite 200  
 Poway, CA 92084  
 F 658 979 4001 F 658 510 0559  
 www.je-inc.com



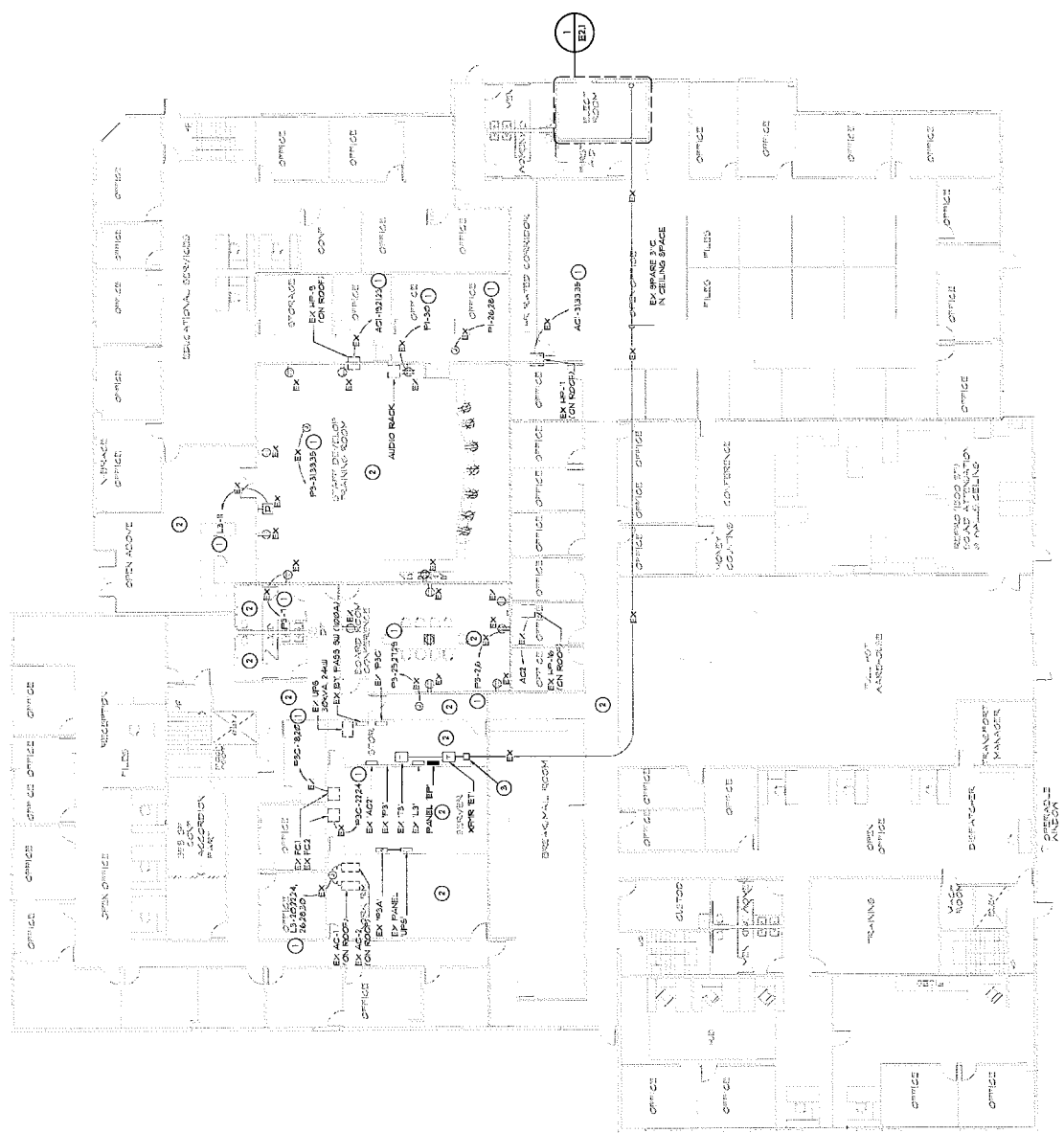
**MUSD ADMINISTRATIVE FACILITY**  
 41870 McALBY COURT  
 MURRIETA, CA  
 ADMIN BUILDING

DATE	
DRAWN BY	G. JOHNSON
CHECKED BY	
JOB NO.	
SHEET NUMBER	E2.1

- GENERAL NOTES:**  
 1. FIELD VERIFY ALL EXISTING CONDITIONS SHOWN ON PLAN AND KEY NOTES.
- KEY NOTES:**  
 ① INTERCEPT EXISTING CONDUIT AND BRANCH CIRCUIT WIRING ABOVE CEILING AND CONNECT TO NEW CONDUIT ABOVE PANEL. REFER TO ELECTRICAL SCHEDULE FOR PANEL. REFER TO ELECTRICAL SCHEDULE FOR PANEL.  
 ② CONNECT ALL EXISTING LIGHTING FIXTURES WITHIN THIS ROOM TO EMERGENCY POWER PANEL BEL. INTERCEPT CONDUIT AND WIRES IN (CIRCUITS 1) AND (2) BY PANEL L3.  
 ③ INTERCEPT EXISTING SPARE CONDUIT IN CEILING SPACE AND EXTEND TO NEW TRANSFORMER.

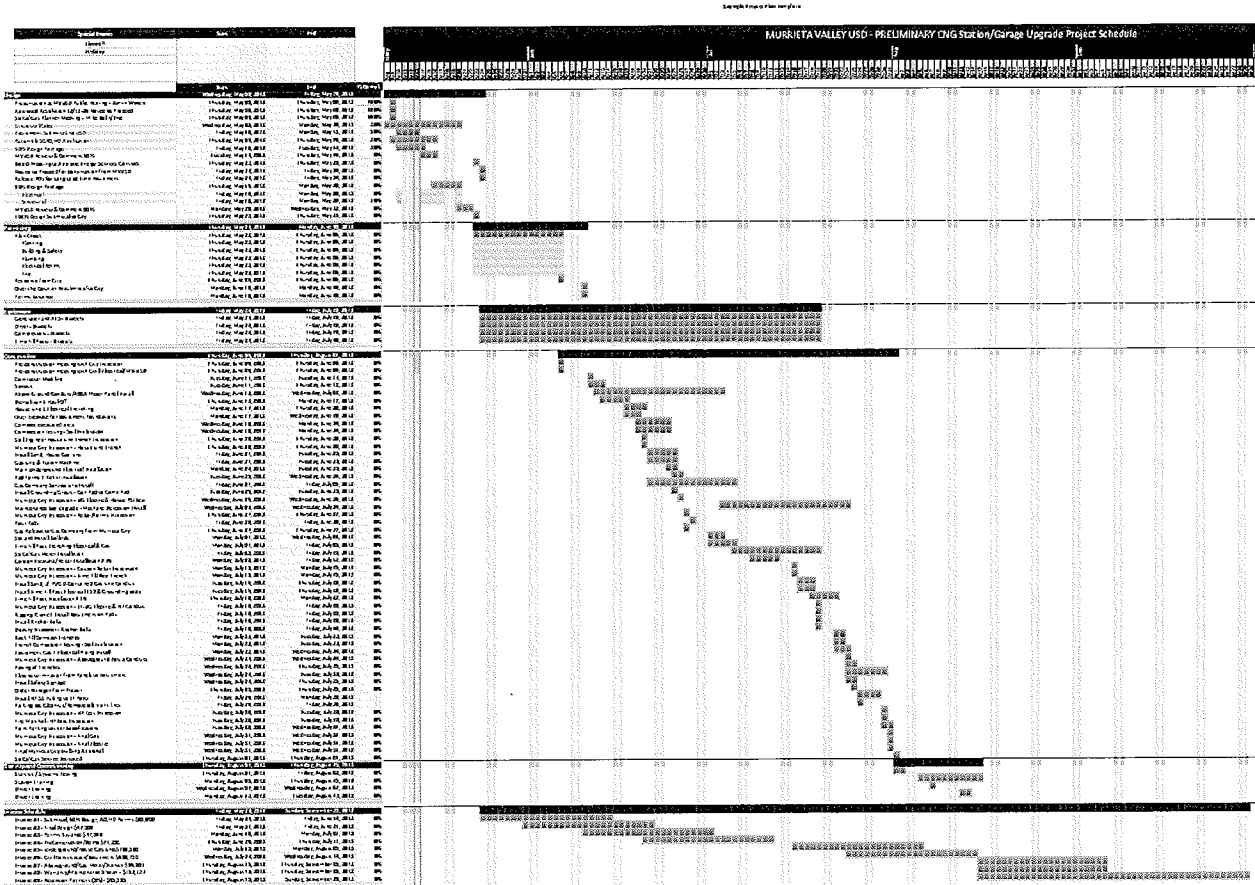


ENLARGED ROOM PLAN  
 1/8" = 1'-0"



9/25/18 1:00

# Exhibit B Project Schedule



**PREVAILING WAGE CERTIFICATION**

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project.

Date: \_\_\_\_\_

Name of Design-Builder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

**WORKERS' COMPENSATION CERTIFICATION**

Labor Code section 3700 in relevant part provides:

Every employer except the State shall secure the payment of compensation in one or more of the following ways:

- a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state.
  
- b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work of this Agreement.

Date: \_\_\_\_\_

Name of Design-Builder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

(In accordance with Article 5 - commencing at section 1860, chapter 1, part 7, division 2 of the Labor Code, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)



**ASBESTOS & OTHER HAZARDOUS MATERIALS CERTIFICATION**

Design-Builder hereby certifies that no Asbestos, or Asbestos-Containing Materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations "New Material Hazardous", shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Design-Builder's work on the Project for District.

Design-Builder further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.

Asbestos and/or asbestos-containing material shall be defined as all items containing but not limited to chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite. Any or all material containing greater than one-tenth of one percent (.1%) asbestos shall be defined as asbestos-containing material.

Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the District's determination. The costs of any such tests shall be paid by Design-Builder if the material is found to be New Hazardous Material.

All Work or materials found to be New Hazardous Material or Work or material installed with "New Hazardous Material" containing equipment will be immediately rejected and this Work will be removed at Design-Builder's expense at no additional cost to the District.

Design-Builder has read and understood the document Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein.

Date: \_\_\_\_\_

Name of Design-Builder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

## **LEAD-PRODUCT(S) CERTIFICATION**

California Occupational Safety and Health Administration (CalOSHA), Environmental Protection Agency (EPA), California Department of Health Services (DHS), California Department of Education (CDE), and the Consumer Product Safety Commission (CPSC) regulate lead-containing paint and lead products.

Because the Design-Builder and its employees will be providing services for the District, and because the Design-Builder's work may disturb lead-containing building materials, **DESIGN-BUILDER IS HEREBY NOTIFIED** of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1993 are presumed to contain some lead-based paint until sampling proves otherwise.

The CDE mandates that school districts utilize DHS lead-certified personnel when a lead-based hazard is identified. Examples of lead-certified personnel include: project designers, inspectors, and abatement workers. Furthermore, since it is assumed by the district that all painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that the Design-Builder, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (**Including Title 8, California Code of Regulations, Section 1532.1**). Any and all Work which may result in the disturbance of lead-containing building materials must be coordinated through the District.

The California Education Code also prohibits the use or import of lead-containing paint, lead plumbing and solders, or other potential sources of lead contamination in the construction of any new school facility or in the modernization or renovation of any existing school facility. Design-Builder shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Design-Builder.

All contractors who disturb lead-based paint in a six-square-foot area or greater indoors or a 20-square-foot area outdoors shall comply with the Renovation, Repair and Painting Rule, shall receive training from a U.S. EPA-accredited training provider, and shall be certified by the U.S. EPA. Design-Builder, its workers and subcontractors must fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

If failure to comply with these laws, rules, and regulations results in a site or worker contamination, Design-Builder will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify and hold harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom. If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses and training shall conduct this Work.

It shall be the responsibility of the Design-Builder to properly dispose of any and all waste products, including but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of Design-Builder to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the District.

The undersigned hereby acknowledges, under penalty of perjury, that he or she has received notification of potential lead-based materials on the owner's property, as well as the existence of applicable laws, rules and regulations governing work with, and disposal of, such materials with which it must comply. The undersigned also warrants that he or she has the authority to sign on behalf of and bind the design-builder.

Date: \_\_\_\_\_

Name of Design-Builder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

**PERFORMANCE BOND**  
**(100% of Contract Price)**

**(Note: Respondents must use this form, NOT a surety company form.)**

KNOW ALL PERSONS BY THESE PRESENTS:

That WHEREAS, the governing board ("Board") of the Murrieta Valley Unified School District, ("District") and \_\_\_\_\_, ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

\_\_\_\_\_ (Project Name)

("Project" or "Contract") which Contract dated \_\_\_\_\_, 20\_\_\_\_, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof, and

And WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract;

NOW, THEREFORE, the Principal and \_\_\_\_\_ ("Surety") are held and firmly bound unto the Board of the District in the penal sum of \_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Perform all the work required to complete the Project; and
- Pay to the District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

The condition of the obligation is such that, if the above bounden Principal, his or its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration thereof made as therein provided, on his or its part to be kept and performed at the time and in the intent and meaning, including all contractual guarantees and warranties of materials and workmanship, and shall indemnify and save harmless the District, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the District may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

Surety shall not utilize Principal in completing the Project nor shall Surety accept a Bid from Principal for completion of the Work if the District, when declaring the Principal in default, notifies Surety of the District's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period ending one year after the date of Final Completion during which time Surety's obligation shall continue if Design-Builder shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage resulting from or caused by defective materials or faulty workmanship. The above obligation is separate from and does not affect to the obligations under the Performance Guarantee, the Maintenance Services Agreement, or any warranty obligations that are effective for any period longer than one year following the Final Completion date.

Nothing herein shall limit the District's rights or the Design-Builder or Surety's obligations under the Contract, law or equity, including, but not limited to, the District's rights against Design-Builder under California Code of Civil Procedure section 337.15

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

(Affix Corporate Seal)

\_\_\_\_\_  
Principal

\_\_\_\_\_  
By

\_\_\_\_\_  
Surety

\_\_\_\_\_  
By

\_\_\_\_\_  
Name of California Agent of Surety

\_\_\_\_\_  
Address of California Agent of Surety

\_\_\_\_\_  
Telephone Number of California Agent of Surety

**Successful Respondent must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.**

**PAYMENT BOND**  
**Contractor's Labor & Material Bond**  
**(100% of Contract Price)**

**(Note: Respondents must use this form, NOT a surety company form.)**

KNOW ALL PERSONS BY THESE PRESENTS:

That WHEREAS, the governing board ("Board") of the Murrieta Valley Unified School District, (or "District") and \_\_\_\_\_, ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

\_\_\_\_\_ (Project Name)

("Project" or "Contract") which Contract dated \_\_\_\_\_, 20\_\_\_\_, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof, and

WHEREAS, pursuant to law and the Contract, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by which the Contract is awarded in an amount equal to one hundred percent (100%) of the Contract price, to secure the claims to which reference is made in sections 9000 through 9510 and 9550 through 9566 of the Civil Code, and division 2, part 7, of the Labor Code.

NOW, THEREFORE, the Principal and \_\_\_\_\_, ("Surety") are held and firmly bound unto all laborers, material men, and other persons referred to in said statutes in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), lawful money of the United States, being a sum not less than the total amount payable by the terms of Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the Principal or any of his or its subcontractors, of the heirs, executors, administrators, successors, or assigns of any, all, or either of them shall fail to pay for any labor, materials, provisions, provender, or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, that the Surety will pay the same in an amount not exceeding the amount herein above set forth, and also in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the Court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under section 9100 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void; otherwise it shall be and remain in full force and affect.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of Contract or the specifications accompanying

the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

(Affix Corporate Seal)

\_\_\_\_\_  
Principal

\_\_\_\_\_  
By

\_\_\_\_\_  
Surety

\_\_\_\_\_  
By

\_\_\_\_\_  
Name of California Agent of Surety

\_\_\_\_\_  
Address of California Agent of Surety

\_\_\_\_\_  
Telephone Number of California Agent of Surety

**Successful Respondent must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.**



Murrieta Valley USD  
CNG Refueling Facility, Maintenance Facility and Generator  
Annual Maintenance Program

**“5–Year Preventative Maintenance and Complete Coverage Agreement”**

This CNG Refueling Facility, Maintenance Facility and Generator Maintenance Program is made effective as of August 2, 2013, by and between, Murrieta Valley Unified School District (hereinafter referred to as “Client” or “MVUSD”), whose address for service is 41870 McAlby Court, Murrieta, CA 92562 and Go Natural Gas 1644 N. El Camino Real, San Clemente, CA 92672 (hereinafter referred to as “Contractor”) (“Agreement”).

1. **Description of Services:** Beginning on August 2, 2013 extended through August 1, 2018, Contractor will provide Client the following preventative maintenance and complete coverage services for the CNG Time Fill Fueling Facility, Maintenance Facility and Generator located at 41870 McAlby Court, Murrieta, CA 92562 (“Services”). These services shall include:
  - a. All Manufacturer-recommended or required service, maintenance and repair for the equipment Contractor installed at the CNG Time Fill Refueling Facility, Maintenance Facility and Generator, including but not limited to Manufacturer’s warranties, updates, technical service bulletins or recalls.
  - b. Any service, maintenance, and repair, including parts replacement, required to keep the CNG Time Fill Refueling Facility, Maintenance Facility and Generator operating as specified and in a safe and efficient manner.
  - c. Any service, maintenance, and repair, including parts replacement, required to keep the CNG Time Fill Refueling Facility, Maintenance Facility and Generator operating to Manufacturer’s specifications.
  - d. Any service, maintenance, and repair to keep the CNG Time Fill Refueling Facility, Maintenance Facility and Generator in compliance with all applicable local, state, and national codes and regulations and all applicable industry standards and specifications, including but not limited to Pressure Relief Valve and Pressure Relief Device re-certification.
  - e. An on-site inspection of the facilities twice a month and submit the findings in a report to Client. The inspection shall determine if a facility is operating within specifications and in a safe and efficient manner. The monthly Equipment Maintenance Service Report shall be compiled at the conclusion of each of the “semi-monthly” (twice monthly) field service visits detailing the services performed, recording of all pertinent operating conditions and notes made for upcoming scheduled services.
  - f. Removal and disposal of any waste materials under Client’s hazardous generator number.



- g. Alert the Client immediately upon the finding of any necessary or impeding repairs, faults, failures, or deficiencies, especially those regarding safety.
- h. The Preventative Maintenance Service Report prepared by Contractor personnel shall be presented to appropriate MVUSD Personnel for review of services provided and signature confirming site services were completed. MVUSD shall identify site personnel that will be responsible for daily operation of CNG Refueling Station.
- i. An onsite CNG Refueling Facility, Maintenance Facility and Generator Equipment Binder shall be left on site for record reference of each and every service visit allowing for ability to assist in Facility Equipment Audits and general reference for Client and Contractor.

These services shall exclude facility damage or faults due to abuse or misuse by the Client's staff, vandalism, or natural disasters.

All maintenance and service shall be performed according to Manufacturer's recommended and required procedures and using Manufacturer's recommended and required parts and materials. Any conflicts between the procedures, parts, and materials with applicable codes shall be brought to the immediate attention of the Client.

Upon notification of a facility issue (fault, malfunction, or suspected malfunction), service personnel will:

- a. Contact MVUSD personnel within 24 hours of notification to coordinate a site visit.
- b. Respond to the equipment site within 24 hours of notification unless a later time is acceptable to Client or the malfunction is remedied to the Client's satisfaction through remote means.
- c. Any services or repairs necessary to return a facility to at least 50% capacity and normal and safe operating parameters shall be performed within 24 hours of notification.
- d. Any services or repairs necessary to return a facility to full capacity and normal and safe operating parameters shall be performed within 3 business days thereafter.

Services are further detailed in "Exhibit A," which is attached and made a part hereof.

- 2. Term:** This Maintenance Contract will commence upon the date stated above and will terminate automatically upon the completion by the Contractor of the Services being provided at the end of the forty-eighth month. (August 2, 2014 thru August 1, 2018).

- 3. Compensation:** As compensation for the Services provided, the Client shall pay to the Contractor \$152,127 (Total Contract Price). Such amount shall not be increased without express approval of the Board.
- 4. Equipment, Tools, Materials and Supplies:** Contractor, at Contractor's expense, shall furnish all equipment, tools and materials/supplies necessary to perform the contractual services pursuant to this Agreement.
- 5. Independent Contractor:** Contractor shall be an "independent contractor" and understands and agrees that he/she and all of his/her employees shall not be considered officers, employees, agents, partner, or joint venture of the Client, and are not entitled to benefits of any kind of nature normally provided employees of the Client and/or to which Clients employees are normally entitled, including, but not limited to, State Unemployment Compensation or Workers Compensation. Contractor shall assume full responsibility of federal, state and local taxes or contributions, including unemployment insurance, social security and income taxes with respect to Contractors employees.
- 6. Safety and Security:** Contractor is responsible for maintaining safety in the performance of this Agreement. Contractor shall be responsible to ascertain from the Client the rules and regulations pertaining to safety, security and driving on Facility grounds, particularly when children are present.
- 7. Clean Up:** All maintenance materials, including waste lubricants, shall be removed from the premises and disposed of properly. The CNG Compound Area shall be kept in order during performance of services and picked up after services have been rendered.
- 8. Indemnification:** The Contractor irrevocably agrees to hold, defend and indemnify the Client harmless from and against any and all losses, claims, suits, costs, demands, damages and liabilities arising out of the Contractor's negligence and misconduct. The Client irrevocably agrees to hold, defend, and indemnify the Contractor harmless from and against any and all losses, claims, suits, costs, demands, damages and liabilities arising out of the Client's negligence and misconduct.
- 9. Confidentiality, Mutually Inclusive:** Contractor and its employees, agents or representatives will not at any time or in any manner, either directly or indirectly, use for the personal benefit of Contractor, of divulge, disclose or communicate in any manner, any information that is proprietary to Client, Contractor and its employees, agents and representatives will protect such information and treat it as strictly confidential. This provision will continue to be effective after the termination of this contract.

**10. Insurance:** The Contractor shall procure and maintain at all times during contract the following insurance:

- a. **General Liability.** One Million Dollars (\$1,000,000) combined single limit per occurrence for bodily injury, personal injury and property damage in the form of Comprehensive General Liability and Contractual Liability. If Commercial General Liability or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to each project/location or the general aggregate limit shall be twice the required occurrence limit.
- b. **Automobile Liability Insurance.** One Million Dollars (\$1,000,000) combined single limit per occurrence for any automobile that shall protect the Contractor and the Customer from all claims of bodily injury, property damage, personal injury, death, and medical payments arising performing any portion of the Services by Contractor.
- c. **Worker's Compensation and Employers' Liability Insurance.** For all of the Contractor's employees who are subject to this Contract and to the extent required by the applicable state or federal law, Contractor shall keep in full force and effect, a Workers' Compensation policy. That policy shall provide employers' liability coverage with minimum liability coverage of One Million Dollars (\$1,000,000) per accident for bodily injury or disease. Contractor shall provide an endorsement that the insurer waives the right of subrogation against the Customer and its respective elected officials, officers, employees, agents, representatives, consultants, trustees, and volunteers.
- d. The policies are to contain, or be endorsed to contain, the following provisions:
  - (i) For the general liability and automobile liability policies:
    - (1) Customer, its representatives, consultants, trustees, officers, officials, employees, agents, and volunteers ("Additional Insureds") are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of Contractor; instruments of Service and completed operations of the Contractor; premises owned, occupied or used by Contractor; or automobiles owned, leased, hired or borrowed by Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Additional Insureds.
    - (2) For any claims related to the projects, Contractor's insurance coverage shall be primary insurance as respects the Additional Insureds. Any insurance or self-insurance maintained by the Additional Insureds shall be in excess of the Contractor's insurance and shall not contribute with it.



- (ii) Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
  - (iii) Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Client.
  - (iv) Contractor shall furnish the Client with Certificates of Insurance showing maintenance of the required insurance coverage and original endorsements affecting coverage. The endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All endorsements are to be received and approved by the Client before any work commences.
- e. Acceptability of Insurers.** Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII, unless otherwise acceptable to the Client.

**11. Limitation of District Liability:** Other than as provided in this Contract, Client's financial obligations under this Agreement shall be limited to the payment of compensation provided within this contract. Notwithstanding any other provision of this contract, in no event, shall Client be liable, regardless of whether any claim is based on contract or tort, for any special, consequential, indirect or incidental damages, including, but not limited to, lost profits or revenue, arising out of or in connection with this contract for the services performed in connection with this contract.

**12. Remedies:** In addition to any and all other rights a party may have available according to law, if a party defaults by failing to substantially perform any provision, term or condition of the Contract, the other party may commence to terminate the Contract by first providing written notice to the defaulting party. This notice shall describe with sufficient detail the nature of the default. The party receiving such notice shall have thirty (30) days from the date of receipt by the other party of such notice within which to cure the default(s). Unless waived by the party providing such notice, the failure to cure the default(s) within such time period shall result in automatic termination of this Contract. The foregoing notwithstanding, payment having been made by Client for equipment and services pursuant to paragraph two (2) hereof, the Contractor shall compensate the Client for any uncompleted work to date as a pro-rata amount of the full fees, cost and expenses. The Contractor shall compensate the Client for any uncompleted work to date as a pro-rata amount of the full fees, cost and expenses within 45 days of the written notice of cancellation, without further notice.

**13. Severability:** If any provision of this contract will be held invalid or unenforceable for any reason, the remaining provisions will continue to be valid and enforceable. If a Court finds that any provision of this Contract is invalid or unenforceable, but that by limiting such

provision it would become valid and enforceable, then such provision will be deemed to be written, construed and enforced as limited.

- 14. Amendment:** This contract may be modified or amended only in writing signed by the parties hereto; no subsequent oral or other agreement is binding on the parties hereto.
- 15. Governing law:** The Contract will be construed in accordance with the laws of California.
- 16. Labor Code Requirements.** Contractor shall comply with all applicable provisions of the California Labor Code, Division 3, Part 7, Chapter 1, Articles 1-5, including, without limitation, the payment of the general prevailing per diem wage rates for public work projects of more than one thousand dollars (\$1,000). In addition, the Contractor and each subcontractor shall comply with Chapter 1 of Division 2, Part 7 of the California Labor Code, beginning with Section 1720, and including Section 1735, 1777.5 and 1777.6, forbidding discrimination, and Sections 1776, 1777.5 and 1777.6 concerning the employment of apprentices by Contractor or subcontractors.
- 17. Attorney's Fees:** In the event that at any time during the term of this contract either Client or Contractor shall institute any action or proceeding against the other relating to the provisions of this Contract, or any default hereunder, the unsuccessful party in such action or proceeding shall reimburse the successful party for reasonable attorney's fees and other costs and expenses incurred therein by the successful party, including fees and costs incurred in any appellate proceeding.
- 18. Notice:** Any notice or communication required or permitted under this Contract shall be sufficiently given if delivered in person or by certified mail, return receipt required, or sent by overnight delivery service, facsimile transmission, or electronic mail addressed as follows:

**District**

Murrieta Valley Unified School District  
41870 McAlby Court  
Murrieta, CA 92562  
ATTN: Director of Maintenance  
TEL: (951) 696-1600 ext 1130  
FAX: (951) 304-1530  
EML: [cekstrom@murrietta.k12.ca.us](mailto:cekstrom@murrietta.k12.ca.us)

**Design-Builder**

Go Natural Gas  
1644 N. El Camino Real  
San Clemente, CA 92672  
ATTN: Tony Dispoto  
CEL: (626) 636-1349  
TEL: (949) 340-7702  
FAX: (949) 315-3844  
EML: [tony@gonaturalgas.com](mailto:tony@gonaturalgas.com)

Any notice personally given or sent by facsimile transmission or electronic mail shall be effective upon receipt. Any notice sent by overnight delivery service shall be effective the business day next following delivery thereof to the overnight delivery service. Any

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notice given by mail shall be effective three (3) days after deposit in the United States mail.

**19. Assignment:** Neither party may assign or transfer this contract without the prior written consent of the non-assigning party.

**20. Entire Agreement:** This Contract contains the entire agreement of the parties and there are no other promises or conditions in any other agreement whether oral or written concerning the subject matter of this Contract. This Contract supersedes any prior written or oral agreement between parties.

**“Client”**

**“Contractor”**

**By:** \_\_\_\_\_

**By:** \_\_\_\_\_

**Print Name:** \_\_\_\_\_

**Print Name:** \_\_\_\_\_

**Murrieta Valley Unified School District  
41870 McAlby Court  
Murrieta, CA 92562**

**Go Natural Gas Inc.  
1644 N El Camino Real  
San Clemente, CA 92672**







## MURRIETA VALLEY USD

41870 McALBY CT, MURRIETA CA

### EXHIBIT "A" - CNG Refueling Facility, Maintenance Facility, and Generator Scope of Supply and Services

#### Detail Summary - Years #1 thru #5

#### CNG SUCTION DRYER

- Semi Monthly Jobsite Equipment Inspection
  1. Drain Pre-Filter
  2. Check Differential Pressure across Pre & After-filter Delta P Gauges. Elements require replacement when gauge is within red dial spectrum.
  3. Check Dew Point Display reading, insure readout is below -40°F. If above dryer requires regeneration.
  4. Check and Maintain operating conditions: pressure, flow, temperature for comparison to previous readings and manufacturers design parameters.
  
- Six Month Interval Jobsite Equipment Inspection
  1. Recalibration / check span of moisture analyzer.
  2. Replace pre-filter, after-filter and separator elements.
  
- Nine Month Interval Jobsite Equipment Inspection
  1. Regeneration of desiccant bed.

#### CNG DUPLEX COMPRESSOR SKID

- Semi Monthly Jobsite Equipment Inspection
  1. Site & Equipment Condition Report – completion of “log sheet” (attached) for comparison to normal operating conditions, alerting Service Professional of inconsistent operation.
  2. Oil Level Check adding approved lubricants as required.
  3. Visual & Audible check of operating unit for signs of either oil or gas leaks on suction and discharge lines. Gas leak detection with the use of a “methane detection” meter.
  4. Vapor recovery vessel, Drain off all accumulated oil residue and log to track oil bypass rates.
  5. Check all joints for leaks.



Exhibit A: 5-Yr Maintenance and Complete Coverage Scope  
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6. Check for proper tension and any abnormal wear of drive belt set.
  7. Check compressor cooler and cooling fan for unobstructed flow. Clean as required.
  8. Check all valve retainers for proper tightness.
  9. Check ESD function for correct activation.
  10. General clean up of compressor area (e.g. sweep and/or clean any residual oil)
- Quarterly or 500 Hours Jobsite Equipment Inspection.

In addition to “semimonthly” inspections.

1. Check all joints for leaks.
  2. Check the cooling fan for proper belt tension and fan blade condition.
  3. Clean all outside surfaces of compressor to remove any traces of oil/dirt from the heat radiating surfaces of the cylinders and intercoolers.
  4. Check all external fasteners and pipe fittings for proper tightness.
  5. Test and record shut off pressure along with ambient temperature.
- Annual or “every 1000 Hours of Operations” Jobsite Equipment Inspection.

In addition to “semimonthly & quarterly” inspections.

1. Compressor Oil & Filter Change Service
  2. Restart compressor and insure no leaks are present and unit is operating within the proper oil pressure range.
  3. Valve Inspection Service all stages.
    - Remove each valve for examination and cleaning.
    - Replace all o-rings.
    - During valve cleaning and examination – replace worn components as required.
    - Refit all serviced valves, torqueing all fasteners per factory specifications.
  4. Restart Compressor check for oil or gas leaks and once to operating temperature and pressure record all inter-stage pressures and temperatures to insure operation is within manufactures recommended ranges.
- Cylinder Inspection Service - 6000 Hours of Operation

In addition to the previously summarized monthly, quarterly & annual inspections it is the Manufacturers recommended cylinder servicing.

1. Drain oil and remove crankcase inspection covers for thorough crankcase wipe down.
2. Inspection of pistons & cylinders on all stages.
3. Replacement of rider & pressure rings on 1<sup>st</sup> stage, oil wiper and pressure rings on 2<sup>nd</sup> stage and pressure rings on 3<sup>rd</sup> & 4<sup>th</sup> stages.
4. Inspection of journal half shell bearings for wear / replace as required.
5. Inspection of rod grudgeon pins (wrist pin) for wear / excessive clearance and replace as required.
6. Reassembly of all stages with new components as fitted.

Exhibit A: 5-Yr Maintenance and Complete Coverage Scope  
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7. All new sealing components shall be used during reassembly insuring proper lubrication during reassembly.

**CNG TIME FILL HOSE ASSEMBLYS**

- Semi Monthly Jobsite Equipment Inspection
  1. Visual Inspection of hoses and coupler for any signs of excessive wear and tear in comparison to normal operating conditions, alerting Service Professional of inconsistent operation.
  2. Check for Gas leak detection with the use of a “methane detection” meter at all hose joints.
  3. Check operation of hose retraction reel, adjust and service as required.
- Semi Annual Service
  1. Clean, lube, and wipe nozzles

**PRESSURE RELIEF VALVES (PRVs):**

- Testing of PRVs shall be performed every three years (as required by NFPA 52 Sect 8.10.2)

**MAINTENANCE FACILITY:**

- Quarterly Services and Inspections
  1. Test and recalibrate methane detectors.
  2. Verify operation of ESD system.
  3. Verify operation of ventilation fans.

**GENERATOR:**

**SERVICE SCHEDULE YEAR #1**

Contractor will perform the following Reliability Inspections & Maintenance Services, **to include transportation, labor, and materials** for work performed during regular business hours, Monday through Friday between the hours of 7am and 5pm **(4) four times per year** from acceptance of contract as follow:

**VISIT # 1 - PM INSPECTION PERFORMED 3 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
4. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
5. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
6. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
7. Inspect block heaters for proper operation.
8. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
9. Inspect the fuel injection pump, transfer pump and governor system for defects.
10. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
11. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
12. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
13. Check turbo charger for tolerance and freedom of movement.
14. Inspect the generator main circuit breaker for loose connections and heat marks.
15. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
16. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
17. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
18. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.



Exhibit A: 5-Yr Maintenance and Complete Coverage Scope  
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19. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
20. Check battery charging alternator for proper DC voltage. Adjust if necessary.
21. Check fuel and governor system for proper operation. Adjust governor if necessary.
22. Check equipment for abnormal vibrations and noises. Document any such findings.
23. If practical and upon owners permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
24. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
25. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 2 - PM INSPECTION AND FUEL TREATMENT PERFORMED 6 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Fuel will be tested for evidence of water contamination. Fuel will be treated to help prevent contamination.
4. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
5. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
6. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
7. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
8. Inspect block heaters for proper operation.
9. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
10. Inspect the fuel injection pump, transfer pump and governor system for defects.

Exhibit A: 5-Yr Maintenance and Complete Coverage Scope  
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11. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
12. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
13. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
14. Check turbo charger for tolerance and freedom of movement.
15. Inspect the generator main circuit breaker for loose connections and heat marks.
16. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
17. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
18. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
19. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
20. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
21. Check battery charging alternator for proper DC voltage. Adjust if necessary.
22. Check fuel and governor system for proper operation. Adjust governor if necessary.
23. Check equipment for abnormal vibrations and noises. Document any such findings.
24. If practical and upon owner's permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
25. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
26. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 3 - PM INSPECTION PERFORMED 9 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
4. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
5. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
6. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
7. Inspect block heaters for proper operation.
8. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
9. Inspect the fuel injection pump, transfer pump and governor system for defects.
10. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
11. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
12. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
13. Check turbo charger for tolerance and freedom of movement.
14. Inspect the generator main circuit breaker for loose connections and heat marks.
15. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
16. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
17. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
18. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.



Exhibit A: 5-Yr Maintenance and Complete Coverage Scope  
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19. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
20. Check battery charging alternator for proper DC voltage. Adjust if necessary.
21. Check fuel and governor system for proper operation. Adjust governor if necessary.
22. Check equipment for abnormal vibrations and noises. Document any such findings.
23. If practical and upon owners permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
24. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
25. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 4 – MAJOR SERVICE, FUEL TREATMENT, 4 HOUR LOAD BANK TEST,  
AUTOMATIC TRANSFER SWITCH MAJOR SERVICE AND FUEL POLISHING PERFORMED  
12 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Polish diesel fuel to remove water and sediment from tank.
4. Fuel will be tested for evidence of water contamination. Fuel will be treated to help prevent contamination.
5. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
6. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
7. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
8. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
9. Inspect block heaters for proper operation.

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10. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
11. Inspect the fuel injection pump, transfer pump and governor system for defects.
12. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
13. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
14. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
15. Check turbo charger for tolerance and freedom of movement.
16. Inspect the generator main circuit breaker for loose connections and heat marks.
17. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
18. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
19. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
20. Perform a major service on the automatic transfer switch.
21. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
22. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
23. Check battery charging alternator for proper DC voltage. Adjust if necessary.
24. Check fuel and governor system for proper operation. Adjust governor if necessary.
25. Check equipment for abnormal vibrations and noises. Document any such findings.
26. If practical and upon owner's permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
27. Perform a four (4) hour load bank test.



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28. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
29. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.
30. Change engine lubricating oil and filters as per manufacturer's specifications.
31. Change the air cleaner filter as per manufacturer's specifications.
32. Replace diesel fuel filter as per manufacturer's specifications.
33. Test oil for contaminations and abnormal engine wear. Test antifreeze for proper concentrations. Test report to be provided to end user.
34. Dispose of hazardous waste from service in accordance with California state laws.
35. In between services it is the owners/operators responsibility to check the general conditions and fluid levels of the equipment. If you are ever in doubt call Contractor for advice.

**SERVICE SCHEDULE YEAR #2 and #4**

Contractor will perform the following Reliability Inspections & Maintenance Services, **to include transportation, labor, and materials** for work performed during regular business hours, Monday through Friday between the hours of 7am and 5pm **(4) four times per year** from acceptance of contract as follow:

**VISIT # 1 - PM INSPECTION PERFORMED 15 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
4. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
5. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
6. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
7. Inspect block heaters for proper operation.

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8. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
9. Inspect the fuel injection pump, transfer pump and governor system for defects.
10. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
11. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
12. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
13. Check turbo charger for tolerance and freedom of movement.
14. Inspect the generator main circuit breaker for loose connections and heat marks.
15. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
16. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
17. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
18. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
19. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
20. Check battery charging alternator for proper DC voltage. Adjust if necessary.
21. Check fuel and governor system for proper operation. Adjust governor if necessary.
22. Check equipment for abnormal vibrations and noises. Document any such findings.
23. If practical and upon owners permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
24. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.

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25. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 2 - PM INSPECTION AND FUEL TREATMENT PERFORMED 18 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Fuel will be tested for evidence of water contamination. Fuel will be treated to help prevent contamination.
4. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
5. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
6. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
7. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
8. Inspect block heaters for proper operation.
9. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
10. Inspect the fuel injection pump, transfer pump and governor system for defects.
11. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
12. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
13. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
14. Check turbo charger for tolerance and freedom of movement.
15. Inspect the generator main circuit breaker for loose connections and heat marks.
16. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
17. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.



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18. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
19. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
20. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
21. Check battery charging alternator for proper DC voltage. Adjust if necessary.
22. Check fuel and governor system for proper operation. Adjust governor if necessary.
23. Check equipment for abnormal vibrations and noises. Document any such findings.
24. If practical and upon owner's permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
25. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
26. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 3 - PM INSPECTION PERFORMED 21 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
4. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
5. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
6. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.

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7. Inspect block heaters for proper operation.
8. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
9. Inspect the fuel injection pump, transfer pump and governor system for defects.
10. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
11. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
12. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
13. Check turbo charger for tolerance and freedom of movement.
14. Inspect the generator main circuit breaker for loose connections and heat marks.
15. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
16. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
17. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
18. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
19. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
20. Check battery charging alternator for proper DC voltage. Adjust if necessary.
21. Check fuel and governor system for proper operation. Adjust governor if necessary.
22. Check equipment for abnormal vibrations and noises. Document any such findings.
23. If practical and upon owners permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
24. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.

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25. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 4 – MAJOR SERVICE, FUEL TREATMENT, 4 HOUR LOAD BANK TEST;  
AUTOMATIC TRANSFER SWITCH MAJOR SERVICE AND FUEL POLISHING PERFORMED  
24 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Polish diesel fuel to remove water and sediment from tank.
4. Fuel will be tested for evidence of water contamination. Fuel will be treated to help prevent contamination.
5. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
6. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
7. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
8. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
9. Inspect block heaters for proper operation.
10. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
11. Inspect the fuel injection pump, transfer pump and governor system for defects.
12. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
13. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
14. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
15. Check turbo charger for tolerance and freedom of movement.
16. Inspect the generator main circuit breaker for loose connections and heat marks.
17. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.



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18. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
19. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
20. Perform a major service on the automatic transfer switch.
21. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
22. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
23. Check battery charging alternator for proper DC voltage. Adjust if necessary.
24. Check fuel and governor system for proper operation. Adjust governor if necessary.
25. Check equipment for abnormal vibrations and noises. Document any such findings.
26. If practical and upon owner's permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
27. Perform a four (4) hour load bank test.
28. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
29. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.
30. Change engine lubricating oil and filters as per manufacturer's specifications.
31. Change the air cleaner filter as per manufacturer's specifications.
32. Replace diesel fuel filter as per manufacturer's specifications.
33. Test oil for contaminations and abnormal engine wear. Test antifreeze for proper concentrations. Test report to be provided to end user.
34. Dispose of hazardous waste from service in accordance with California state law.

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In between services it is the owners/operators responsibility to check the general conditions and fluid levels of the equipment. If you are ever in doubt call Contractor for advice.

**SERVICE SCHEDULE YEAR #3 and #5**

Contractor will perform the following Reliability Inspections & Maintenance Services, **to include transportation, labor, and materials** for work performed during regular business hours, Monday through Friday between the hours of 7am and 5pm **(4) four times per year** from acceptance of contract as follow:

**VISIT # 1 - PM INSPECTION PERFORMED 27 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
4. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
5. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
6. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
7. Inspect block heaters for proper operation.
8. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
9. Inspect the fuel injection pump, transfer pump and governor system for defects.
10. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
11. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
12. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
13. Check turbo charger for tolerance and freedom of movement.
14. Inspect the generator main circuit breaker for loose connections and heat marks.



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15. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
16. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
17. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
18. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
19. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
20. Check battery charging alternator for proper DC voltage. Adjust if necessary.
21. Check fuel and governor system for proper operation. Adjust governor if necessary.
22. Check equipment for abnormal vibrations and noises. Document any such findings.
23. If practical and upon owners permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
24. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
25. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 2 - PM INSPECTION AND FUEL TREATMENT PERFORMED 30 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Fuel will be tested for evidence of water contamination. Fuel will be treated to help prevent contamination.

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4. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
5. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
6. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
7. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
8. Inspect block heaters for proper operation.
9. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
10. Inspect the fuel injection pump, transfer pump and governor system for defects.
11. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
12. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
13. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
14. Check turbo charger for tolerance and freedom of movement.
15. Inspect the generator main circuit breaker for loose connections and heat marks.
16. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
17. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
18. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
19. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
20. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
21. Check battery charging alternator for proper DC voltage. Adjust if necessary.
22. Check fuel and governor system for proper operation. Adjust governor if necessary.

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23. Check equipment for abnormal vibrations and noises. Document any such findings.
24. If practical and upon owner's permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
25. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
26. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 3 - PM INSPECTION PERFORMED 33 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**
3. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
4. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
5. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
6. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
7. Inspect block heaters for proper operation.
8. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
9. Inspect the fuel injection pump, transfer pump and governor system for defects.
10. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
11. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
12. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
13. Check turbo charger for tolerance and freedom of movement.



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14. Inspect the generator main circuit breaker for loose connections and heat marks.
15. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
16. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
17. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
18. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.
19. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
20. Check battery charging alternator for proper DC voltage. Adjust if necessary.
21. Check fuel and governor system for proper operation. Adjust governor if necessary.
22. Check equipment for abnormal vibrations and noises. Document any such findings.
23. If practical and upon owners permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
24. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
25. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.

**VISIT # 4 – MAJOR SERVICE, FUEL TREATMENT, 4 HOUR LOAD BANK TEST,  
AUTOMATIC TRANSFER SWITCH MAJOR SERVICE AND FUEL POLISHING PERFORMED  
36 MONTHS FROM THE START AND TEST DATE**

1. Inspection of engine/generator controller for defects. Clean controller and check connections.
2. Check all fluid levels and top off as necessary. **(Fuel is Excluded)**

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3. Polish diesel fuel to remove water and sediment from tank.
4. Fuel will be tested for evidence of water contamination. Fuel will be treated to help prevent contamination.
5. Inspect diesel fuel tank, day tank, fuel lines and fittings for defects. Repair if minor.
6. Check equipment for any fuel, coolant, and or oil leaks. Tighten fittings as necessary.
7. Inspect all engine drive belts, pulleys and hoses for defects. Adjust belts if necessary.
8. Inspect the radiator fan, shroud, and radiator core fins for restrictions, cleanliness and or defects.
9. Inspect block heaters for proper operation.
10. Inspect the exhaust system for any cracked or broken parts. Tighten all mounting as necessary.
11. Inspect the fuel injection pump, transfer pump and governor system for defects.
12. Check and clean batteries to include terminals. Check electrolyte and specific gravity levels. Apply terminal preservative. Check battery cables and connections.
13. Inspect auxiliary battery charger for proper operation. Adjust as necessary.
14. Check air cleaners and filters for any restrictions or defects. Clean as necessary.
15. Check turbo charger for tolerance and freedom of movement.
16. Inspect the generator main circuit breaker for loose connections and heat marks.
17. Inspect generator alternator for heat and wear. Blow dust out of stator. Inspect bearing if possible.
18. Check electrical wiring for signs of abrasion, chaffing, and or corrosion at connectors.
19. Inspect the transfer switch for any defects. Use infrared temp gun check for hot connections. Ensure the exercise clock is operational and is set to the customer specific time for exercise. Lubricate mechanical parts if possible.
20. Perform a major service on the automatic transfer switch.
21. Upon completion of items 1 – 17 start and run the equipment. Record all gauge readings. Test engine safety shut down devices to ensure proper safety operation. Check voltage and frequency outputs at the ATS emergency input terminals. Make adjustments if necessary.

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22. While the unit is operating check for any fuel, oil, or coolant leaks. Repair minor leaks if possible.
23. Check battery charging alternator for proper DC voltage. Adjust if necessary.
24. Check fuel and governor system for proper operation. Adjust governor if necessary.
25. Check equipment for abnormal vibrations and noises. Document any such findings.
26. If practical and upon owner's permission, simulate an under load power failure to ensure the proper operation of the emergency backup system. Owner must make loads available, and it must be practical for the end users of the electrical systems for such testing to be performed.
27. Perform a four (4) hour load bank test.
28. Check, clean and spot paint, equipment, if necessary to prevent corrosion and preserve the overall appearance of the piece of equipment.
29. Provide a written report of the condition of the equipment to the end user responsible for the equipment. Note all discrepancies found. A formal proposal will be submitted to the end user within (3) working days for the cost of the repair. If the unit is out of service a proposal will be provided immediately.
30. Change engine lubricating oil and filters as per manufacturer's specifications.
31. Change the air cleaner filter as per manufacturer's specifications.
32. Replace diesel fuel filter as per manufacturer's specifications.
33. Test oil for contaminations and abnormal engine wear. Test antifreeze for proper concentrations. Test report to be provided to end user.
34. Dispose of hazardous waste from service in accordance with California state law.

In between services it is the owners/operators responsibility to check the general conditions and fluid levels of the equipment. If you are ever in doubt call Contractor for advice.

**Public Hearing regarding the adoption of Resolution No. 12/13-28 De-Annexing certain property from Improvement Area B and Annexing to Improvement Area C of Community Facilities District No. 2006-1**

Action: \_\_\_\_\_  
Consent: \_\_\_\_\_  
Information:   X    
Presentation: \_\_\_\_\_

Agenda Item: C-2  
May 23, 2013  
Page 1 of 1  
Attachment: 3 Pages

Prepared by: Bill Olien, Assistant Superintendent, Facilities/Operational Services

**Background Information**

Resolution No. 12/13-28 would de-annex Assessor's Parcel Number 480-090-060 from Improvement Area B of CFD No. 2006-1 and concurrently annex it into Improvement Area C of CFD No. 2006-1. Prior to the adoption of Resolution No. 12/13-28, there needs to be a public hearing on the proposed action.

**Educational Implication**

None.

**Fiscal Implication**

None.

**Recommendation**

This is a Public Hearing.

**RESOLUTION NO. 12/13-28**

**A RESOLUTION DE-ANNEXING CERTAIN PROPERTY FROM IMPROVEMENT AREA B AND ANNEXING TO IMPROVEMENT AREA C OF COMMUNITY FACILITIES DISTRICT NO. 2006-1**

WHEREAS, Community Facilities District No. 2006-1 (“CFD”) was formed by action of the Board of Education of the Murrieta Valley Unified School District (“District”) on January 18, 2007 pursuant to the Mello-Roos Community Facilities Act of 1982, as amended, Section 53311, *et seq* of the California Government Code (the “Act”); and

WHEREAS, the CFD consists of three (3) Improvement Areas; Improvement Area A, Improvement Area B, and Improvement Area C; and

WHEREAS, Assessor’s Parcel Number 480-090-060 (“Property”) is currently within Improvement Area B, of the CFD and the District and the landowners desire to annex it into Improvement Area C and de-annex it from Improvement Area B; and

WHEREAS, the Board of Education of the District took action on April 18, 2013 to adopt Resolution No. 12/13-19, a Resolution of Intention to both de-annex and annex the Property; and

WHEREAS, Resolution No. 12/13-19 set May 23, 2013 as the date for a public hearing on the annexation and de-annexation of the Property, and the Board did hold a noticed public hearing on this date; and

WHEREAS, at the public hearing all interested persons were permitted to be heard on the annexation and de-annexation of the Property, and no majority protest was filed by the registered voters or landowners within the boundaries of the Property.

**NOW, THEREFORE, IT IS HEREBY ORDERED AS FOLLOWS:**

1. The foregoing recitals are true and correct.
2. The proposed annexation and de-annexation of the Property has not been precluded by majority protest pursuant to the Act.
3. All prior proceedings taken by this Board in connection with the annexation and de-annexation of the Property within the CFD have been duly considered and are hereby found and determined to be valid and in conformance with the Act.
4. The boundary map of the proposed annexation of the Property to Improvement Area C of the CFD was recorded on April 24, 2013 as Document No. 2013-0195308, at the Book and Page of Maps and Assessment and Community Facilities Districts on file with the Clerk, and incorporated by reference.



5. The de-annexation of the Property from Improvement Area B of the CFD and the annexation of the Property into Improvement Area C of the CFD is hereby approved, subject to approval by the qualified electors as set forth in Section 6 below. Voter approval of the annexation and de-annexation of the Property are dependent on each other.

6. Pursuant to the provisions of the Act, the proposition of the annexation and de-annexation of the Property within the CFD shall be submitted to the qualified electors, being the landowner(s) of the property within the boundaries of the Property at an election as specified by a separate resolution of this Board. The proposed voting procedure shall be by mail or hand-delivered ballot, with each landowner having one vote for each acre or portion of an acre such owner owns within the Property.

7. The type of public facilities, services and equipment proposed to be financed by the special taxes levied within the Property to be annexed to Improvement Area C of the CFD consist of those items on Exhibit "A" hereto and by this reference incorporated herein.

8. This Resolution shall take effect upon its adoption.

I hereby certify that the foregoing Resolution was regularly introduced and adopted by the Board of Education of the Murrieta Valley Unified School District at a duly noticed meeting held on the 23<sup>rd</sup> day of May, 2013 by the following vote:

AYES:  
NOES:  
ABSTAIN:  
ABSENT:

---

Patrick Kelley, Secretary of the Board  
Murrieta Valley Unified School District

ATTEST:

---

Kenneth C. Dickson, Clerk of the Board  
Murrieta Valley Unified School District

## EXHIBIT A

### **Community Facilities District No. 2006-1 of the Murrieta Valley Unified School District**

#### DESCRIPTION OF FACILITIES TO BE FINANCED

The types of Facilities proposed to be financed by Community Facilities District No. 2006-1 (CFD) of the Murrieta Valley Unified School District (District) under the Mello-Roos Community Facilities Act of 1982, as amended (the Act) are as follows:

“Facilities” means those school facilities, including classrooms, on-site office space at a school, central support and administrative facilities, interim housing, furniture, equipment, technology, busses, and transportation facilities needed by District in order to serve the student population to be generated as a result of development of the property within the CFD and also includes any of the following: Eastern Municipal Water District fees and/or improvements through a JCFA.

“Facilities” shall also include the attributable costs of engineering, design, planning, materials testing, coordination, construction staking, and construction, together with the expenses related to issuance and sale of any “debt, as defined in Section 53317(d) of the Act, including underwriters’ discount, appraisals, market studies, reserve fund, capitalized interest, bond counsel, special tax consultant, bond and official statement printing, administrative expenses of the District, the CFD and bond trustee or fiscal agent related to the CFD, and any such debt and all other incidental expenses. The Facilities shall be constructed, whether or not acquired in their completed states, pursuant to plans and specifications approved by the District or other governmental entity that will own and operate the same.

The Facilities listed in this Exhibit A are representative of the types of improvements to be furnished by the CFD. Detailed scope and limits of specific projects will be determined as appropriate, consistent with the standards of the District. Addition, deletion or modification of descriptions of Facilities may be made consistent with the requirements of the Board of education of the District, the CFD and the Act.

**Adoption of Resolution No. 12/13-28 De-Annexing certain real property from Improvement Area B and Annexing to Improvement Area C of Community Facilities District No. 2006-1**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: C-3  
May 23, 2013  
Page 1 of 1  
Attachment: 3 Pages

Prepared by: Bill Olien, Assistant Superintendent, Facilities/Operational Services

**Background Information**

Approval of Resolution No. 12/13-28 would de-annex Assessor's Parcel Number 480-090-060 (the "Property") from Improvement Area B of CFD No. 2006-1 and concurrently annex the Property into Improvement Area C of CFD No. 2006-1. The Property consists of approximately 10 acres of unimproved land at this time. The annexation and de-annexation will be subject to the approval of the single landowner within the Property in a special election established by another resolution at this Board meeting.

A Public Hearing was held on May 23, 2013 prior to this agenda item.

**Educational Implication**

None.

**Fiscal Implication**

None.

**Recommendation**

It is recommended the Board of Education adopt **Resolution No. 12/13-28** de-annexing certain real property from Improvement Area B and annexing to Improvement Area C of Community Facilities District No. 2006-1.

**RESOLUTION NO. 12/13-28**

**A RESOLUTION DE-ANNEXING CERTAIN PROPERTY FROM IMPROVEMENT  
AREA B AND ANNEXING TO IMPROVEMENT AREA C OF COMMUNITY  
FACILITIES DISTRICT NO. 2006-1**

WHEREAS, Community Facilities District No. 2006-1 (“CFD”) was formed by action of the Board of Education of the Murrieta Valley Unified School District (“District”) on January 18, 2007 pursuant to the Mello-Roos Community Facilities Act of 1982, as amended, Section 53311, *et seq* of the California Government Code (the “Act”); and

WHEREAS, the CFD consists of three (3) Improvement Areas; Improvement Area A, Improvement Area B, and Improvement Area C; and

WHEREAS, Assessor’s Parcel Number 480-090-060 (“Property”) is currently within Improvement Area B, of the CFD and the District and the landowners desire to annex it into Improvement Area C and de-annex it from Improvement Area B; and

WHEREAS, the Board of Education of the District took action on April 18, 2013 to adopt Resolution No. 12/13-19, a Resolution of Intention to both de-annex and annex the Property; and

WHEREAS, Resolution No. 12/13-19 set May 23, 2013 as the date for a public hearing on the annexation and de-annexation of the Property, and the Board did hold a noticed public hearing on this date; and

WHEREAS, at the public hearing all interested persons were permitted to be heard on the annexation and de-annexation of the Property, and no majority protest was filed by the registered voters or landowners within the boundaries of the Property.

**NOW, THEREFORE, IT IS HEREBY ORDERED AS FOLLOWS:**

1. The foregoing recitals are true and correct.
2. The proposed annexation and de-annexation of the Property has not been precluded by majority protest pursuant to the Act.
3. All prior proceedings taken by this Board in connection with the annexation and de-annexation of the Property within the CFD have been duly considered and are hereby found and determined to be valid and in conformance with the Act.
4. The boundary map of the proposed annexation of the Property to Improvement Area C of the CFD was recorded on April 24, 2013 as Document No. 2013-0195308, at the Book and Page of Maps and Assessment and Community Facilities Districts on file with the Clerk, and incorporated by reference.

5. The de-annexation of the Property from Improvement Area B of the CFD and the annexation of the Property into Improvement Area C of the CFD is hereby approved, subject to approval by the qualified electors as set forth in Section 6 below. Voter approval of the annexation and de-annexation of the Property are dependent on each other.

6. Pursuant to the provisions of the Act, the proposition of the annexation and de-annexation of the Property within the CFD shall be submitted to the qualified electors, being the landowner(s) of the property within the boundaries of the Property at an election as specified by a separate resolution of this Board. The proposed voting procedure shall be by mail or hand-delivered ballot, with each landowner having one vote for each acre or portion of an acre such owner owns within the Property.

7. The type of public facilities, services and equipment proposed to be financed by the special taxes levied within the Property to be annexed to Improvement Area C of the CFD consist of those items on Exhibit "A" hereto and by this reference incorporated herein.

8. This Resolution shall take effect upon its adoption.

I hereby certify that the foregoing Resolution was regularly introduced and adopted by the Board of Education of the Murrieta Valley Unified School District at a duly noticed meeting held on the 23<sup>rd</sup> day of May, 2013 by the following vote:

AYES:  
NOES:  
ABSTAIN:  
ABSENT:

---

Patrick Kelley, Secretary of the Board  
Murrieta Valley Unified School District

ATTEST:

---

Kenneth C. Dickson, Clerk of the Board  
Murrieta Valley Unified School District

## EXHIBIT A

### **Community Facilities District No. 2006-1 of the Murrieta Valley Unified School District**

#### **DESCRIPTION OF FACILITIES TO BE FINANCED**

The types of Facilities proposed to be financed by Community Facilities District No. 2006-1 (CFD) of the Murrieta Valley Unified School District (District) under the Mello-Roos Community Facilities Act of 1982, as amended (the Act) are as follows:

“Facilities” means those school facilities, including classrooms, on-site office space at a school, central support and administrative facilities, interim housing, furniture, equipment, technology, busses, and transportation facilities needed by District in order to serve the student population to be generated as a result of development of the property within the CFD and also includes any of the following: Eastern Municipal Water District fees and/or improvements through a JCFA.

“Facilities” shall also include the attributable costs of engineering, design, planning, materials testing, coordination, construction staking, and construction, together with the expenses related to issuance and sale of any “debt, as defined in Section 53317(d) of the Act, including underwriters’ discount, appraisals, market studies, reserve fund, capitalized interest, bond counsel, special tax consultant, bond and official statement printing, administrative expenses of the District, the CFD and bond trustee or fiscal agent related to the CFD, and any such debt and all other incidental expenses. The Facilities shall be constructed, whether or not acquired in their completed states, pursuant to plans and specifications approved by the District or other governmental entity that will own and operate the same.

The Facilities listed in this Exhibit A are representative of the types of improvements to be furnished by the CFD. Detailed scope and limits of specific projects will be determined as appropriate, consistent with the standards of the District. Addition, deletion or modification of descriptions of Facilities may be made consistent with the requirements of the Board of education of the District, the CFD and the Act.

**Adoption of Resolution No. 12/13-29 Calling a Special Election for Community Facilities District No. 2006-1**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: C-4  
May 23, 2013  
Page 1 of 1  
Attachment: 5 Pages

Prepared by: Bill Olien, Assistant Superintendent, Facilities/Operational Services

**Background Information**

Adoption of Resolution No. 12/13-29 would call a special election to be held at this May 23, 2013 Board Meeting on the issue of whether Assessor's Parcel Number 480-090-060 should be de-annexed from Improvement Area B of CFD No. 2006-1 and concurrently annexed into Improvement Area C of CFD No. 2006-1. There is only one landowner within the affected area, who gets one (1) vote for each acre of land or portion thereof. The landowner has already petitioned to have the property moved from Improvement Area B into Improvement Area C, and has waived all timelines for holding the election. A mailed ballot with all the required information has been sent to the landowner, with the ballot to be opened by the Clerk of the Board tonight after the adoption of this Resolution No. 12/13-29.

**Educational Implication**

None.

**Fiscal Implication**

None.

**Recommendation**

It is recommended the Board of Education adopt **Resolution No. 12/13-29** Calling a Special Election for Community Facilities District No. 2006-1.

**RESOLUTION NO. 12/13-29**

**A RESOLUTION CALLING A SPECIAL ELECTION**

**Community Facilities District No. 2006-1 of the  
Murrieta Valley Unified School District**

**RESOLVED**, by the Board of Education (Board) of the Murrieta Valley Unified School District (District), County of Riverside, State of California, acting as the legislative body for CFD 2006-1, that:

**WHEREAS**, on this date, this Board adopted Resolution No. 12/13-28 entitled “A Resolution De-annexing Certain Property from Improvement Area B and Annexing to Improvement Area C of Community Facilities District No. 2006-1”; and

**WHEREAS**, the property to be de-annexed from Improvement Area B and annexed into Improvement Area C is Assessor’s Parcel No. 480-090-060 (the “Property”); and

**WHEREAS**, pursuant to the provisions of said Resolution, the propositions of the annexation of the Property to Improvement Area C and the concurrent de-annexation of the Property from Improvement Area B shall be submitted to the qualified electors of the Property as required by the Mello-Roos Community Facilities Act of 1982, as amended, Section 53311, *et seq.*, of the California Government Code (Act).

**NOW, THEREFORE, IT IS HEREBY ORDERED AS FOLLOWS:**

1. Pursuant to Sections 53339 – 53339.9 of the Act, the issues of the annexation of the Property to Improvement Area C of the CFD and the current de-annexation of the Property from Improvement Area B of the CFD shall be submitted to the qualified electors within the Property at an election called therefor as provided below.

2. As authorized by Section 53353.5 of the Act the propositions described in paragraph 1 above shall be combined into a single ballot measure to be designated as Measure A, the form of which is attached hereto as Exhibit "A" and by this reference incorporated herein. Said form of the ballot(s) is hereby approved.

3. This Board hereby finds that fewer than 12 persons have been registered to vote within the Property for each of the ninety (90) days preceding the close of the public hearings heretofore conducted and concluded by this Board for the purposes of these proceedings. Accordingly, and pursuant to the Act, this Board finds that for purposes of these proceedings the qualified electors are the landowners within the Property and that the vote shall be by said landowners or their authorized representatives, each having one vote for each acre or portion thereof such landowner owns in the Property as of the close of said public hearings.



4. This Board hereby calls a special election to consider the measures described in paragraph 1 above, which election shall be held in the Board meeting room on May 23, 2012, at 7:00 P.M. or as soon thereafter as is practicable. The Clerk of the Board (Clerk) is hereby designated as the official to conduct said election. The Clerk hereby consents to hold the election less than 125 days after adoption of Resolution. It is hereby acknowledged that the Clerk has on file Resolution, a certified map of the proposed boundaries of the Property to be annexed into Improvement Area C of CFD, and a sufficient description to allow the Clerk to determine the boundaries of the Property.

5. Pursuant to Section 53327 of the Act, the election shall be conducted by mailed ballot pursuant to Section 4000 of the California Elections Code. This Board hereby finds that paragraphs (a), (b), (c)(1) and (c)(3) of Section 4000 of the California Election Code are applicable to this special election.

6. This Board acknowledges that the Clerk will cause to be delivered to each of the qualified electors within the Property a ballot in the form set forth in Exhibit "A." Each ballot shall indicate the number of votes to be cast by the respective landowner to which it pertains.

Each ballot will be accompanied by all supplies and written instructions necessary for the use and return of the ballot. The envelope to be used to return the ballot will be enclosed with the ballot, have the return postage prepaid, and shall contain the following: (a) the name and address of the landowner, (b) a declaration, under penalty of perjury, stating that the voter is the owner of record or authorized representative of the landowner entitled to vote and is the person whose name appears on the envelope, (c) the printed name, signature and address of the voter, (d) the date of signing and place of execution of the declaration pursuant to clause (b) above, and (e) a notice that the envelope contains an official ballot and is to be opened only by the canvassing official.

7. The voted ballots shall be returned to the Clerk no later than 7:00 P.M. on May 23, 2013. The Clerk shall accept the ballots of the qualified electors in the meeting room of the Board, whether said ballots be personally delivered or received by mail. The Clerk shall have available ballots which may be marked at said location on the election day by said qualified electors.

8. This Resolution shall take effect upon its adoption.

*[Signatures on the following page]*

I hereby certify that the foregoing Resolution was regularly introduced and adopted by the Board of Education of the Murrieta Valley Unified School District at a duly noticed meeting held on the 23<sup>rd</sup> day of May, 2013, by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

---

Patrick Kelley, Secretary of the Board  
Murrieta Valley Unified School District

ATTEST:

---

Kenneth C. Dickson, Clerk of the Board  
Murrieta Valley Unified School District

**Community Facilities District No. 2006-1 of the  
Murrieta Valley Unified School District  
Improvement Areas B and C**

**OFFICIAL BALLOT -- MEASURE A  
SPECIAL TAX ELECTION  
(May 23, 2013)**

This ballot is for a special, landowner election. You must return this ballot in the enclosed postage paid envelope to the Clerk of the Board of the Murrieta Valley Unified School District either by mail or in person no later than 7:00 P.M. on May 23, 2013. The Clerk's office is located at 41870 McAlby Court, Murrieta, California 92562. To vote, mark a cross (X) on the voting line after the word "YES" or after the word "NO." All marks otherwise made are forbidden. All distinguishing marks are forbidden and make the ballot void. If you wrongly mark, tear, or deface this ballot, return it to the Clerk of the Board and obtain another.

BALLOT MEASURE A: Shall Assessor's Parcel No. 480-090-060 be de-annexed from Improvement Area B of CFD 2006-1 of the Murrieta Valley Unified School District and concurrently annexed to Improvement Area C of CFD 2006-1 of the Murrieta Valley Unified School District in order to finance those facilities and expenses set forth in Exhibit A to this Official Ballot and in accordance with the Rate and Method of Apportionment for Improvement Area C, a copy of which has been provided?

YES:  
\_\_\_\_\_  
  
NO:  
\_\_\_\_\_

Number of Votes: 11

Property Owned by Property Owner: 10.06 acres

Property Owner: Riverside Mitland 03 LLC

By: \_\_\_\_\_  
Owner/Authorized Representative

## **EXHIBIT A TO OFFICIAL BALLOT – MEASURE A**

### **Community Facilities District No. 2006-1 of the Murrieta Valley Unified School District**

#### **DESCRIPTION OF FACILITIES TO BE FINANCED**

The types of Facilities proposed to be financed by Community Facilities District No. 2006-1 (CFD) of the Murrieta Valley Unified School District (District) under the Mello-Roos Community Facilities Act of 1982, as amended (the Act) are as follows:

“Facilities” means those school facilities, including classrooms, on-site office space at a school, central support and administrative facilities, interim housing, furniture, equipment, technology, busses, and transportation facilities needed by District in order to serve the student population to be generated as a result of development of the property within the CFD and also includes any of the following: Eastern Municipal Water District fees and/or improvements through a JCFA.

“Facilities” shall also include the attributable costs of engineering, design, planning, materials testing, coordination, construction staking, and construction, together with the expenses related to issuance and sale of any “debt, as defined in Section 53317(d) of the Act, including underwriters’ discount, appraisals, market studies, reserve fund, capitalized interest, bond counsel, special tax consultant, bond and official statement printing, administrative expenses of the District, the CFD and bond trustee or fiscal agent related to the CFD, and any such debt and all other incidental expenses. The Facilities shall be constructed, whether or not acquired in their completed states, pursuant to plans and specifications approved by the District or other governmental entity that will own and operate the same.

The Facilities listed in this Exhibit A are representative of the types of improvements to be furnished by the CFD. Detailed scope and limits of specific projects will be determined as appropriate, consistent with the standards of the District. Addition, deletion or modification of descriptions of Facilities may be made consistent with the requirements of the Board of education of the District, the CFD and the Act.

**Adoption of Resolution No. 12/13-30 Declaring results of a Special Election and directing recording of an Amended Notice of Special Tax Lien and Notice of Cancellation of Special Tax Lien**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: C-5  
May 23, 2013  
Page 1 of 1  
Attachment: 3 Pages

Prepared by: Bill Olien, Assistant Superintendent, Facilities/Operational Services

**Background Information**

Adoption of Resolution No. 12/13-30 would declare the results of the special election called by Resolution No. 12/13-29 at this same meeting and direct the recording of a Notice of Cancellation of Special Tax Lien so that Assessor's Parcel No. 480-090-060 will no longer be subject to the special tax lien for Improvement Area B of CFD No. 2006-1 and an Amended Notice of Special Tax Lien so that Assessor's Parcel No. 480-090-060 will be subject to the special tax lien for Improvement Area C.

**Educational Implication**

None.

**Fiscal Implication**

None.

**Recommendation**

It is recommended the Board of Education adopt **Resolution No. 12/13-30** declaring results of a Special Election and directing the recording of an amended Notice of Special Tax Lien and Notice of Cancellation of Special Tax Lien.

**RESOLUTION NO. 12/13-30**

**A RESOLUTION DECLARING RESULTS OF SPECIAL ELECTION  
AND DIRECTING RECORDING OF AN AMENDED NOTICE OF SPECIAL TAX LIEN  
AND A NOTICE OF CANCELLATION OF SPECIAL TAX LIEN**

**Community Facilities District No. 2006-1 of the  
Murrieta Valley Unified School District**

**RESOLVED**, by the Board of Education (Board) of the Murrieta Valley Unified School District (District), County of Riverside, State of California, acting as the legislative body for CFD 2006-1, that:

**WHEREAS**, in proceedings heretofore conducted by this Board pursuant to the Mello-Roos Community Facilities Act of 1982, as amended, sections 53311, *et seq.*, of the California Government Code (Act), this Board on May 23, 2013, adopted Resolution No. 12/13-29 entitled "A Resolution Calling Special Election," calling a special election of the qualified electors within APN No. 480-090-060 (the "Property") of Community Facilities District No. 2006-1 ("CFD") of the District for May 23, 2013;

**WHEREAS**, pursuant to the terms of said resolution, which are by this reference incorporated herein, said special election was held on this date, and the Clerk of the Board ("Clerk") has on file a Canvass and Statement of Results of Election, a copy of which is attached hereto as Exhibit "A"; and

**WHEREAS**, this Board has reviewed said canvass and hereby approves it.

**NOW, THEREFORE, IT IS HEREBY ORDERED AS FOLLOWS:**

1. The issues presented at said special election were the annexation of the Property into Improvement Area C of the CFD and concurrently the de-annexation of the Property from Improvement Area B of the CFD.
2. Pursuant to said Canvasses on file with the Clerk, the issues presented at said special election were approved by the qualified electors within the Property of the CFD by more than two-thirds (2/3) of the votes cast at said special election.
3. Pursuant to said voter approval, the annexation of the Property into Improvement Area C of the CFD and the concurrent de-annexation of the Property from Improvement Area B of the CFD has been completed.
4. It is hereby found that all prior proceedings and actions taken by this Board with respect to the CFD were valid and in conformity with the Act.

5. The Clerk is hereby directed to execute and cause to be recorded in the office of the County Recorder of the County of Riverside: (a) an Amended Notice of Special Tax Lien to in the Property within Improvement Area C; and (b) a Notice of Cessation of Special Tax Lien to remove the Property from Improvement Area B, both in the form required by the Act, said recordings to occur no later than fifteen (15) days following adoption by the Board of this Resolution.

6. This Resolution shall take effect upon its adoption.

I hereby certify that the foregoing Resolution was regularly introduced and adopted by the Board of Education of the Murrieta Valley Unified School District at a duly noticed meeting held on the 23<sup>rd</sup> day of May, 2013, by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

---

Patrick Kelley, Secretary of the Board  
Murrieta Valley Unified School District

ATTEST:

---

Kenneth C. Dickson, Clerk of the Board  
Murrieta Valley Unified School District

**CANVASS AND STATEMENT OF RESULT OF ELECTION**

**Community Facilities District No. 2006-1 of the  
Murrieta Valley Unified School District  
Improvement Areas B and C**

I hereby certify that on May 23, 2013, I canvassed the returns of the election held on May 23, 2013, in Community Facilities District No. 2006-1 of the Murrieta Valley Unified School District, and the total number of ballots cast and the total number of votes cast for and against the measure are as follows, and the totals as shown for and against the measure are full, true and correct:

	Qualified Landowner Votes	Votes Cast	YES	NO
Community Facilities District No. 2006-1 of the Murrieta Valley Unified School District Special Tax Election May 23, 2013	_____	_____	_____	_____

BALLOT MEASURE A: Shall Assessor's Parcel No. 480-090-060 be de-annexed from Improvement Area B of CFD 2006-1 of the Murrieta Valley Unified School District and concurrently annexed to Improvement Area C of CFD 2006-1 of the Murrieta Valley Unified School District in order to finance those facilities and expenses set forth in Exhibit A to this Official Ballot and in accordance with the Rate and Method of Apportionment for Improvement Area C, a copy of which has been provided?	YES:  _____
	NO:  _____

IN WITNESS WHEREOF, I HAVE HEREUNTO SET MY HAND THIS 23<sup>rd</sup> DAY OF MAY, 2013.

By: \_\_\_\_\_  
Kenneth C. Dickson, Clerk of the Board  
Murrieta Valley Unified School District



**Approval to Award a Contract to Global CTI for the purchase of Phone Systems, Materials and Installation under CMAS Contract #3-08-70-2630A**

Action:     X      
Consent:             
Information:             
Presentation:           

Agenda Item: C-6  
May 23, 2013  
Page 1 of 1

Prepared by: Bill Olien, Assistant Superintendent, Facilities/Operational Services  
Ken Balliger, Director of Technology

**Background Information**

Staff is recommending the district replace the phone systems at most schools. The current system is outdated and replacement parts are unavailable. The new system will be manufactured by Shoretel Inc. The Shoretel system is currently being used at Rail Ranch Elementary, Dorothy McElhinney Middle and Murrieta Mesa High schools.

The first phase of replacements will be this summer at the elementary schools (except for Rail Ranch), Creekside and the District Support Center. Follow on phases for the middle and high schools (except for Dorothy McElhinney and Murrieta Mesa) will be scheduled at a later time. The first phase will cost approximately \$392,000.

The new system will include many previously unavailable features such as 911 auditing, digital voicemail and universal communication features. The new phone equipment will also integrate with other communication systems the district uses and will allow the district to eliminate the cost of some of the site-to-site trunk lines.

The CMAS contract is a competitively bid and run contract at the state level. These contracts are managed by the state and low price and quality have already been thoroughly reviewed. Approval of this contract will allow staff to replace the phone system in phases without having to bid each individual phase.

**Educational Implication**

None.

**Fiscal Implication**

Community Facilities District (CFD) funds.

**Recommendation**

It is recommended the Board approve to award a contract to Global CTI for the purchase of phone systems, materials and installation under CMAS Contract #3-08-70-2630A.

**Information regarding the Governor's May Revision Budget Proposal for Fiscal Year 2013/14**

Action: \_\_\_\_\_  
Consent: \_\_\_\_\_  
Information:   X    
Presentation:   X  

**Agenda Item: D-1  
May 23, 2013  
Page 1 of 1**

Prepared by: Stacy Coleman, Assistant Superintendent, Business Services

**Background Information**

On May 14, 2013, Governor Brown released his revised budget proposal for fiscal year 2013/14. Information will be shared outlining the major components of the proposal.

**Educational Implication**

The General Fund supports the general operations for the district.

**Fiscal Implication**

The components of the Governor's budget proposal will be included in the district's fiscal year 2013/14 Adopted Budget.

**Recommendation**

This item is provided for information only.