CITY OF SANTA FE

REQUEST FOR BID # '17/05/B
PROJECT MANUAL

CNG FUEL FACILITY UPGRADES
CIP PROJECT # 657A

<u>BIDS DUE:</u>

OCTOBER 17, 2016
2:00 P.M.
PURCHASING OFFICE
CITY OF SANTA FE
2651 SIRINGO ROAD – BUILDING "H"
SANTA FE, NEW MEXICO 87505

ARCHITECT:

HUITT-ZOLLARS, INC.
6501 AMERICAS PKWY SUITE 550
ALBUQUERQUE, NM 87110-5372
(505) 883-8114

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PRE-BID INFORMATION
(00 0100)

(00 0101) DEBARRED OR SUSPENDED CONTRACTORS

A business (contractor, subcontractor, or supplier) that has either been debarred or suspended pursuant to the requirements of City Purchasing Manual or Section 13-1-177 through 13-1-180, and 13-4-17 NMSA 1978 as amended or City Purchasing provisions, shall not be permitted to do business with the City and shall not be considered for award of Contract during the period for which it is debarred or suspended.

(00 0102) UPDATED RFB / PLAN SET INFORMATION

This set of Bidding Documents (plan set and RFB/Project Manual) is a revision and re-issue of documents that were originally issued for bid in December 2015. These documents have been updated to include modifications made by addendum during the original bid period and other items. Changes exist between these Bidding Documents and the set previously issued. A brief synopsis of changes follows for information only, and may not be complete. Other changes between the current and previous sets of Bidding Documents may exist. Bidders are advised to thoroughly examine the most current set of Bidding Documents to fully appraise themselves of the extent of Work prior to submitting a Bid. No reference to the Bidding Documents that were issued during the previous bid period shall be made in the current bid period.

Bid period increased to 60 days.
Contract period extended to 240 days.
Liquidated Damages increased to $2,000/day.
Procedures for Prior Approval Requests removed.
Video-conferencing option for attending pre-bid conference by out-of-state bidders added.
Responsibility for payment of CID plan-check/permit fees revised to Owner.
Geotechnical Report and Drainage Pond Soils Report added to appendix at rear of Project Manual.
Mandatory use of effluent water from City Wastewater Division for construction activities added.
AISC shop and erector certification requirement removed.
Landfill accepting soil removed from stormwater basin added to Information Available to Bidders, page 19

(00 1100) BID INFORMATION

CITY OF SANTA FE
CAPITAL IMPROVEMENTS PROGRAM

BID INFORMATION

SEALED BIDS FOR:	CIP # 657A – COMPRESSED NATURAL GAS (CNG) FUEL FACILITY UPGRADES '17/05/B
PRE-BID CONFERENCE:	August 31, 2016 1:00 PM Transit Training Room 2931 Rufina St. Santa Fe, New Mexico
TO BE OPENED AT:	Purchasing Office 2651 Siringo Road Building H Santa Fe, New Mexico 87505 (505) 955-5711
TIME:	2:00 P.M. Local Prevailing Time
DATE:	October 17, 2016
ADDRESSED TO:	City Purchasing Officer City of Santa Fe 2651 Siringo Road Building H Santa Fe, New Mexico 87505

Bids will be received until the above time, then opened publicly at the Purchasing Director's office or other designated place, and read aloud. BIDS RECEIVED AFTER THE ABOVE TIME WILL BE RETURNED UNOPENED.
RFB/Project Manual will be posted on and can be downloaded from the City of Santa Fe web site www.santafenm.gov and will be on file at Builders News and Plan Room, Construction Reporter, CMD Group and through Dodge Reports.

Complete sets of bid document, prints or downloads, may be purchased from Albuquerque Reprographics, or viewed on their website at no charge.

Bids for the project will be presented in the form of a base bid plus alternates if any. Award will be made to the bidder providing the lowest total base bid. Bidder shall Bid all items listed in the Scope of Work. Bidder shall include in the signed documents their license and classification. Contract award will be made to the responsible Bidder submitting the low Base Bid. However the Owner may award the contract to the responsible Bidder submitting the low combined Bid (Base Bid plus Additive Alternate and applicable Gross Receipts Taxes), within the amount of funds available, if applicable.

Bid security, made payable to the City of Santa Fe, the "Owner" in the amount of 5% of the proposal sum shall be submitted with the Bid. Bid security shall be in the form of a Bid Bond issued by Surety licensed to conduct business in the State of New Mexico, or by certified check. The Bidders security shall be retained by the Owner until the Contract is signed; the other Bidder's security shall be returned as soon as practicable. Failure or refusal by the successful Bidder to enter into Contract with the Owner will constitute Liquidated Damages in favor of the Owner. The bid shall also include a signed "Non-Collusion Affidavit of Prime Bidders", signed "Certificate of Non-Segregated Facilities", a signed "Certificate of Bidder Regarding Equal Employment Opportunity", a Subcontractor's Listing and; if applicable, a Local Preference Application. Bidders shall also complete and submit Bidder Qualifications Forms as provided in the Bidding Documents. The project is subject to the New Mexico Office of Labor Commission, Minimum Wage Rates for the State of New Mexico. Such wage rates are bound into the Contract Documents. The successful Bidder shall, upon notice of award of contract, secure from each of his Subcontractors a signed "Non-Collusion Affidavit of Subcontractors".

The Bidding Documents contain a time for completion of the work by the successful Bidder, and further imposes liquidated damages for failure to comply with that time.

The Owner reserves the right to reject any and all Bids, to waive technicalities, and to accept the Bid it deems to be in the best interest of the City of Santa Fe.

The contractor shall be required comply with the most current City of Santa Fe, State of New Mexico and Federal codes.

The work designated as CIP 657A – CNG FUEL FACILITY UPGRADES includes earthwork, grading and compaction of undeveloped portions of the City Yards site to form a new fueling area., expansion of the existing storm water detention pond, construction of new concrete fuel islands and parking stalls for Environmental Services Division, new subsurface storm water infrastructure, including drains, pipes and an oil-water separator, demolition of portions of existing CNG compressor station building to facilitate addition and installation of new equipment, a new one-story addition to the existing CNG compressor station, a new public fuel island. modifications to existing canopy structures in the Transit Yard to facilitate the installation of new fueling infrastructure. a new fueling island within the existing Transit Yard, new concrete foundations for pre-engineered canopy structures at the new public fuel island and the Transit Yard, construction of a complete CNG fueling system, including electrically-operated natural gas compressors, gas dryer, storage vessels, public-use CNG dispenser and fuel management terminal, fuel dispensers, fill posts and hoses for time-fill operations and other items as specified and as necessary to form a complete, functional installation, concrete and asphalt paving and patching, and electrical demolition, power, distribution and lighting, including a new primary electrical service and transformer. Construction of pre-engineered metal canopy over new fuel island in Transit Yard and public fuel island shall, if accepted by Owner, be constructed as Alternates to the Base Bid Work.

Contractor shall be responsible for adherence to the Contract Documents, Construction Documents, Specifications and approved directives.
Contractor shall be responsible for State CID requirements and permit.
Contractor shall be responsible for roof drainage calculations as required by CID.
Contractor shall be responsible for verifications of all existing conditions, measurements and dimensions for bidding.
Contractor shall be responsible for all permits, fees, and CID inspections associated with the construction.

The City of Santa Fe is an Equal Opportunity Employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation or national origin. The successful Bidder will be required to conform to the Equal Opportunity Employment Regulations.

ADVERTISEMENT

BID NO. '17/05/B

Bids will be received by the City of Santa Fe and will be delivered to City of Santa Fe, Purchasing Office, 2651 Siringo Road, Bldg. H Santa Fe, New Mexico 87505 **until 2:00 P.M. local prevailing time October 17, 2016. Any bid received after this deadline will not be considered.** This bid is for the purpose of procuring:

CIP 657A – COMPRESSED NATURAL GAS (CNG) FUEL FACILITY UPGRADES

The bidder's attention is directed to the fact that all applicable Federal Laws, State Laws, Municipal Ordinances, and the rules and regulations of all authorities having jurisdiction over said item shall apply to the bid throughout, and they will be deemed to be included in the bid document the same as though herein written out in full.

The City of Santa Fe is an Equal Opportunity Employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation or national origin. The successful bidder will be required to conform to the Equal Opportunity Employment regulations.

Bids may be held for sixty (60) days subject to action by the city. The city reserves the right to reject any or all bids in part or in whole. The City Project Manager for this Bid is: Mary MacDonald, Facilities Division, 2651 Siringo Road, Bldg. "E", Santa Fe, New Mexico 87505, (505) 955-5934.

Electronic files of the Request For Bid/ Project Manual may be viewed and downloaded at no cost from the City website at the following link: http://www.santafenm.gov/bids_rfps The plan set may be viewed at the Albuquerque Reprographics website: http://www.ariplans.com Downloads or paper copies of the plan set are available at their website for a charge.

ATTEST:

Robert Rodarte, Purchasing Officer

Received by the Santa Fe New Mexican on: 08/11/16
To be published on: 08/16/16

Received by the Albuquerque Journal on: 08/11/16
To be published on: 08/16/16

(00 1114) BID SCHEDULE

1)	ADVERTISEMENT:	August 16, 2016
2)	ISSUANCE OF BID PACKET:	August 16, 2016
3)	PRE-BID CONFERENCE:	August 31, 2016 1:00 PM Transit Training Room 2931 Rufina Street Santa Fe, New Mexico
4)	BID SUBMITTAL DEADLINE:	October 17, 2016
5)	OPENINGS OF BIDS RECEIVED:	October 17, 2016
	RECOMMENDATION OF AWARD:	
	PUBLIC WORKS/CIP AND LAND USE COMMITTEE:	November 7, 2016
	FINANCE COMMITTEE:	November 14, 2016
	CITY COUNCIL:	December 14, 2016

DATES OF CONSIDERATION BY COMMITTEES AND CITY COUNCIL ARE TENTATIVE AND SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE NOTE THAT THE CONTRACTOR BEING RECOMMENDED FOR SELECTION WILL NOT BE REQUIRED TO ATTEND COMMITTEE OR CITY COUNCIL MEETINGS.

INSTRUCTIONS TO BIDDERS
(00 2100)

0.0 MINIMUM BIDDER QUALIFICATIONS

0.1 General

Due to the specialty nature of portions of the construction included in the Contract, only Bids from contractors who are or have subcontractors who are installers of CNG mechanical systems that meet or exceed the minimum experience level and qualifications as presented herein will be considered. Bids submitted by Bidders who do not meet those requirements may be rejected.

0.2 Qualifications

Bidders shall meet the minimum requirements set forth in the Minimum Bidder Qualifications Form for projects which have been completed prior to Bid opening for the following portions of the project:

CNG Mechanical Systems

0.3 Qualifications Form

All Bidders shall complete the Minimum Bidder Qualifications Form contained in Section 00 4550 and submit the completed form with their Bid. All parts of the form shall be completed providing the specified installation. If the form is deemed unacceptable or incomplete, the Bid may be deemed non-responsive and may be rejected.

1.0 DEFINITIONS AND TERMS

1.1 Terms used in these Bidding Documents which are defined in the Conditions of the Contract for Construction (General, Supplementary, and other conditions) have the meanings assigned to them in those Conditions.

2.0 EXAMINATION OF BIDDING DOCUMENTS AND SITE

2.1 Before submitting a Bid, each Bidder must (a) examine the Bidding Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress, or performance of the work, (c) familiarize himself with Federal, State, and local laws, ordinances, rules, and regulations that may in any manner effect cost, progress, or performance of the work, and (d) study and carefully correlate the Bidder's observations with the Bidding Documents.

2.2 On request, the Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his Bid.

2.3 The lands upon which the work is to be performed rights-of-way for access thereto, and other lands designated for use by the Contractor in performing the work are identified in the Bidding Documents.

2.4 The submission of a Bid will constitute an incontrovertible representation by the Bidder that has complied with every requirement of this Section and that the Bidding Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work.

3.0 BIDDING DOCUMENTS
3.1 COPIES OF BIDDING DOCUMENTS

Electronic copies of the Request For Bid / Project Manual may be viewed and downloaded from the City of Santa Fe's website at the following link: http://www.santafenm.gov/bids_rfps
The plan set may be viewed at the Albuquerque Reprographics website: http://www.ariplans.com
Downloads of the plan set or paper copies are available at that website for a charge.

3.2 INTERPRETATIONS

3.2.1 All questions about the meaning or intent of the Bidding Documents shall be submitted to the Purchasing Officer in writing. Replies will be issued by Addenda mailed or delivered to all parties recorded by the Owner as having received the Bidding Documents. Questions received less than ten (10) days prior to the

date for opening of Bids will not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

3.2.2 Addenda will be mailed or delivered to all parties who have received Bid packages. Request/Questions received less than ten (10) days prior to the date for opening of Bids will not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretation or clarifications will be without legal effect.

3.3 SUBSTITUTE MATERIAL AND EQUIPMENT

The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "of-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that substitute "of-equal" item of material or equipment may be furnished or used by the Contractor if acceptable to the Owner, application for such acceptance may be made after Contract award. The procedure for submittal of any such application by the Contractor and consideration by the Architect is set forth in the Bidding Documents.

3.4 ADDENDA

3.4.1 No oral interpretations of the meaning of the specifications or other pre-bid documents will be binding. Oral communications are permitted in order to make assessment for an addendum. **ANY QUESTIONS CONCERNING THE BID SHOULD BE ADDRESSED PRIOR TO BID OPENING DATE**.

Every request for such interpretations should be in writing addressed to Robert Rodarte, Purchasing Officer, 2651 Siringo Road, Bldg H, Santa Fe, New Mexico 87505 and to be given consideration must be received at least ten (10) days prior to the date fixed for the opening of the bids.

3.4.2 Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be delivered to all prospective bidders not later that three (3) days prior to the date fixed for the opening of the bids. Failure of any bidder to receive any such addendum or interpretations shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

3.4.3 The City reserves the right to not comply with these time frames if a critical addendum is required or if the proposal deadline needs to be extended due to a critical reason in the best interest of the City of Santa Fe.

4.0 BIDDING PROCEDURES

4.01 The person or persons opening the bids will adhere to the following procedure:

4.02 Bid – Name the Bidder and the Number of Bidder's New Mexico Contractor's License with a check for proper signatures.

4.03 Bid Bond only for the highest option bid.

4.04 Non-Collusion Affidavit of Prime Bidder.

4.05 Acknowledgement of Addenda, if any on the Bid Form.

4.06 Properly executed Bid Form.

4.07 Equal Employment Opportunity

4.08 Certification of Non-segregated Facilities.

4.09 The state or any political subdivision of the state shall not accept a bid on a public works project subject to the Public Works Minimum Wage Act from a prime contractor that does not provide proof of required registration for itself.

4.10 Properly completed Minimum Bidder Qualifications Forms.

If any of the other requirements have not been met, the bid shall be disqualified and considered a non-responsive bid. Any disqualified bids will not be read.

4.1 FORM AND STYLE OF BIDS

4.1.1 Bids shall be submitted on forms identical to the form included with the Bidding Documents.

4.1.2 All blanks on the Bid Form shall be filled in by typewriter or manually in ink.

4.1.3 Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and figures, and, in case of discrepancy between the two, the amount written in words shall govern.

4.1.4 Any interlineation, alteration, or erasure must be initialed by the signer of the Bid.

4.1.5 All requested Additive or Deductive Alternate Bids shall be Bid. If no change in the Base Bid is required, enter "No Change."

4.1.6 Where there are two or more major items of work (identified as "Bid Lots") for which separate quotations are requested, the Bidder shall submit quotations for all items. Bid forms that do not list quotations for all bid lots identified in the Bidding Documents shall be considered non-responsive and shall be rejected.

4.1.7 Each copy of the Bid shall include the complete name of the Bidder and a statement that the Bidder is a sole proprietor, a partnership, by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the applicable New Mexico Certificate of Incorporation number or Certificate of Authority number. The Bid shall include the current Contractor's license number and type, and the current Contractor's preference number. A Bid submitted by an agent shall have a current Power of Attorney attached certifying the agent's authority to bind the Bidder.

4.1.8 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

4.1.9 The address, to which communications regarding the Bid are to be directed, must be shown.

4.2 BID SECURITY

4.2.1 Bid security only for the highest option bid in an amount equal to at least 5% of the amount of the Bid shall be a bond provided by a Surety company authorized to do business in this State, or the equivalent in cash, or otherwise supplied in a form satisfactory to the Owner. All Bonds shall be executed by such sureties as are named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies.

4.2.2 The Bid security shall be in the amount of five percent (5%) of the highest Bid amount submitted, unless otherwise stipulated, pledging that the Bidder will enter into a Contract with the Owner in the terms stated herein and will furnish bonds covering the faithful performance of the Contract and payment of all obligations arising there under. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the Bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

4.2.3 The Owner will have the right to retain the Bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn, or (c) all Bids have been rejected.

4.2.4 When the Bidding Documents require Bid security, noncompliance by the Bidder requires that the Bid be rejected.

4.2.5 If a Bidder is permitted to withdraw his Bid before award, no action shall take place against the Bidder or the Bid Security.

4.3 PRE-BID CONFERENCE

4.3.1 The Owner of Record shall conduct a Pre-Bid Conference approximately forty five (45) calendar days prior to the Bid opening date stated in the Invitation for Bid.

4.3.2 The Owner of Record and his consultants, as applicable, shall be represented. Prospective Bidders and Prospective Subcontractors should ask questions regarding substitutions and/or request clarification of the Bidding Documents. The failure of a Bidder, Subcontractor, or Vendor to attend shall be interpreted to mean that the Bid Documents are clear and acceptable to all non participants at the Pre-Bid Conference. Such clarity and acceptability shall be presumed with respect to all Bidders.

4.3.3 Questions and requests for clarification are to be presented in written form. Responses will be written and issued as Addenda. No verbal response shall be binding.

4.3.4 Any Bidder whose business is located outside New Mexico may attend the pre-bid conference via video conference. This facility will be made available only as a convenience, with no guarantee of clarity of picture, sound or connection speed, and will not be available for the site tour component. Bidders wishing to attend via video conference shall contact the Architect no later than 5 business days prior to date of pre-bid conference to register and make necessary arrangements.

4.4 RESIDENT PREFERENCE & LOCAL PREFERENCE

INTENT AND POLICY

The city recognizes that the intent of the state resident preference statute is to give New Mexico businesses and contractors an advantage over those businesses, manufacturers and contractors from outside the State of New Mexico. The underlying policy is to give a preference to those persons and companies who contribute to the economy of the State of New Mexico by maintaining businesses and other facilities within the state and giving employment to residents of the state (1969 OP. Att'y Gen. No. 69-42). The city also has adopted a policy to include a local preference to those persons and companies who contribute to the economy of the County of Santa Fe by maintaining businesses and other facilities within the county and giving employment to residents of the county.

APPLICATION-IN-STATE AND OUT OF STATE BIDDERS

With acknowledgment of this intent and policy, the preference will only be applied when bids are received from in-state and county businesses, manufacturers and contractors that are within 5% of low bids received from out-of-state businesses, manufacturers and contractors (13-1-21 (A) -1-21 (F) and 13-4-2 (C) NMSA 1978).

To be considered a resident for application of the preference, the in-state bidder must have included a valid state purchasing certification number with the submitted bid.

Thus it is recommended that in-state bidders obtain a state purchasing certification number and use it on all bids, in order to have the preference applied to their advantage, in the event an out-of-state bid is submitted. In submitting a bid, it should never be assumed that an out-of-state bid will not be submitted.

For information on obtaining a state purchasing certification number, the potential bidder should contact the State of New Mexico General Services Department-Purchasing Office (Joseph Montoya Building-1100 S. St. Francis Drive 87505, 827-0472).

All resident preferences shall be verified through the State Purchasing Office. Applications for resident preference not confirmed by the state Purchasing Office will be rejected. The certification must be under the bidder's business name submitting the bid.

NON-APPLICATION-COMPETING IN-STATE BIDDERS

If the lowest responsive bid and the next responsive bids within 5% of the lowest bid are all from the state of New Mexico, then the resident preference will not be applied and the state purchasing certification number will not be considered. To be considered an in-state bidder in this situation, the bidders must meet the definition criteria of Chapter 13-1-21 (A) (1) and Chapter 13-4-2 (A) NMSA 1978. After examining the information included in the bid submitted, the city Purchasing Director may seek additional information of proof to verify that the business is a valid New Mexico business. If it is determined by the city Purchasing Director that the information is not factual and the low responsive bid is actually an out-of-state bidder and not a New Mexico business, then the procedures in the previous section may be applied.

If the bidder has met the above criteria, the low responsive "resident" bid shall be multiplied by .95. If that amount is then lower than the low responsive bid of a "non-resident" bidder, the award will be based taking into consideration the resident preference of 5%.

APPLICATION FOR LOCAL PREFERENCE

For the purposes of this section, the terms resident business and resident manufacturer shall be defined as set out in Section 13-1-21 NMSA 1978; the term local as applied to a business or manufacturer shall mean:

Principal Office and location must be stated: To qualify for the local preference, the principal place of business of the enterprise must be physically located within the Santa Fe County Geographic Boundaries. The business location inserted on the Form must be a physical location, street address or such. DO NOT use a post office box or other postal address. Principal place of business must have been established no less

than six months preceding application for certification.

The PREFERENCE FACTOR for resident and local preferences applied to bids shall be .95 for residents and .90 for local. The local preference for proposals shall be 1.10.

The PREFERENCE FACTOR for resident and local preferences applied to bids shall be .95 for residents and .90 for local. The local preference for proposals shall be 1.10.

New Mexico Resident Veteran Business Preference: New Mexico law, Section 13-1-22 NMSA 1978, provides a preference in the award of a public works contract for a "resident veteran business". Certification by the NM Department of Taxation and Revenue for the resident veteran business requires the Offeror to provide evidence of annual revenue and other evidence of veteran status.

An Offeror who wants the veteran business preference to be applied to its proposal is required to submit with its proposal the certification from the NM Department of Taxation and Revenue and the sworn affidavit attached hereto as Appendix E.

If an Offeror submits with its proposal a copy of a valid and current veteran resident business certificate, 7%, 8%, or 10% of the total weight of all the evaluation factors used in the evaluation of proposal may be awarded.

The local preference or resident business preference is not cumulative with the resident veteran business preference.

Bids for Goods and Services. When bids for the purchase of goods or services pursuant to Section 22 are received, the lowest responsive bid received from those bidders in the first category listed below shall be multiplied by the Preference Factor. If the resulting price of that bid receiving the preference is lower than or equal to the lowest bid of all bids received, the contract shall be awarded to that bidder receiving the preference. If no bids are received from bidders in the first category, or if the bid receiving the preference does not qualify for an award after multiplication by the Preference Factor, the same procedure shall be followed with respect to the next category of bidders listed to determine if the bid qualifies for award. The priority of categories of bidders is:

(1) Local business
(2) Resident business

Proposals for Goods and Services. When proposals for the purchase of goods or services pursuant to Section 23 are received, the evaluation score of the proposal receiving the highest score of all proposals from those proponents in the first category listed above shall be multiplied by the Preference Factor. If the resulting score of that proposal receiving the preference is higher than or equal to the highest score of all proposals received, the contract shall be recommended to that proponent receiving the preference. If no proposals are received from proponents in the first category, or if the proposal receiving the preference does not qualify for an award after multiplication by the Preference Factor, the same procedure shall be followed with respect to the next category of proposals listed to determine if a proponent qualifies for award.

Qualifications for Resident Preference. No resident business or manufacturer, as defined, shall be given any preference in the awarding of contracts for furnishing goods or services to the city, unless it shall have qualified with the State Purchasing Agent as a resident business or manufacturer and obtained a certification number as provided in Section 13-1-22 NMSA 1978. The certification number must be submitted with its bid for an offeror to qualify for this preference. The Central Purchasing Office shall determine if a resident preference is applicable to a particular offer on a case by case basis.

Qualifications for Local Preference. The Central Purchasing Office shall have available a form to be completed by all bidders/proponents who desire to apply for the local preference as a local business. The completed form with the information certified by the offeror must be submitted by the bidders/proponents with their bid or proposal to qualify for this preference.

Limitation. No offeror shall receive more than a 10% preference pursuant to this section on any one offer submitted. A bidder may not claim cumulative preferences.

Application. This section shall not apply to any purchase of goods or services when the expenditure of federal and/or state funds designated for a specific purchase is involved and the award requirements of the funding prohibit resident and/or local preference(s). This shall be determined in writing by the department with the grant requirements attached to the Purchasing Office before the bid or request for proposals is issued.

Exception. The City Council at their discretion can approve waiving the Local Preference requirements for specific projects or on a case by case basis if it is the City's best interest to do so.

New Mexico Resident Preference Number (if applicable)_____

4.5 SUBCONTRACTORS

4.5.1 The threshold amount for this project is $16,600.00. The General Contractor must list all Subcontractors who will perform work in excess of this threshold. Only one Subcontractor may be listed for each category as defined on by the Contractor. The Subcontractor Fair Practice Act (13-4-31 through 13-4-43 NMSA 1978) shall apply.

The Bidder shall list the Subcontractors or material suppliers he proposes to use for all trades or items on the Subcontractor Listing Form attached to the Bidding Document. If awarded the contract, the Bidder shall use the firm listed, or himself if "General Contractor has been listed, unless a request for a change or substitution is approved by the Owner of any reason as outlined herein.

4.5.2 The Owner shall consider any request for a change in the listed forms if the Bidder can furnish evidence of being able to perform the work in a manner more satisfactory and beneficial to both the Owner and the Bidder by not using the listed form. Satisfactory reasons for a substitution may include the inability to bond or lack of evidence of being able to furnish acceptable materials on schedule. Also, if the Bidder has made a legitimate error in listing a low Subcontractor, a request for substitution, made after the Bid Opening with the Owner's approval, will be considered. The proof of error must be conclusive, based upon the approval of said evidence by the listed Subcontractor or material suppler and/or any other confirmation satisfactory to the Owner.

4.5.3 The Bidder shall not list himself as the supplier or as the Subcontractor for any trade unless he has previously performed work of this type or can prove to the Owner's satisfaction that he actually has or will obtain, fully adequate facilities and plans to perform the work with his own forces.

4.5.4 Omission or non-compliance with the intent of the Subcontractor Listing will be grounds for considering a Bid as non-responsive.

4.5.5 Prior to the award of the Contract, the Owner will notify the Bidder in writing if, after due investigation and written findings of fact, has reasonable and substantial objection to any person or organization on such list and refuses in writing to accept such person or organization, the Bidder may, at his option, (1) withdraw his Bid, or (2) submit an acceptable substitute Subcontractor with no increase in his Bid Price. In the event of withdrawal under this paragraph, Bid security will not be forfeited.

4.5.6 The successful Bidder shall, within seven (7) calendar days of notification of selection for the award of Contract for the work, submit the following information to the Owner:

(A) A signed list of the proprietary names and the suppliers of principal items or systems of materials and equipment proposed for the work; and

(B) A list signed by all Subcontractors proposed for the principal portions of the work in accordance with the Subcontractors Listing Form submitted with the Bid.

4.5.7 The successful Bidder will be required to establish to the satisfaction of the Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the work described in the Bidding Documents.

4.5.8 Persons and organizations proposed by the Bidder and to whom the Owner has made no reasonable objection under the provisions of Paragraph 4.5.7 must be used on the work for which they were proposed and shall not be changed except with the written consent of the Owner.

4.5.9 No successful Bidder shall be required to employ any Subcontractor, other person, or organization against whom he has reasonable objection.

4.6 SUBMISSION OF BIDS

4.6.1 Bids shall be submitted at the time and place indicated in the Invitation for Bid and shall be submitted in a sealed envelope marked with the Project title and name and address of the Bidder, New Mexico License # _____, and accompanied by the Bid Security, Subcontractors Listing, and other required documents listed in the Bid Documents.

4.6.2 The envelope shall be addressed to:

Purchasing Agent/City of Santa Fe
2651 Siringo Road, Building 'H'
Santa Fe, NM 87505

The following information shall be provided on the front of the Bid envelope: Invitation for Bid number, date of opening, time of opening, and New Mexico License Number. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BIDS ENCLOSED" on the face thereof.

4.6.3 Bids received after the date and time for receipt of Bids will be returned unopened.

4.6.4 The Bidder shall assume full responsibility for timely delivery of Bids at the office of the City's Purchasing Division, including those Bids submitted by mail. Hand-delivered Bids shall be submitted at the front desk of the City Purchasing Division and will be clocked in at the time received, which must be prior to the time specified. Bids will then be held for public opening.

4.6.5 Oral telephonic, e-mailed or telegraphic Bids are invalid and will not receive consideration.

4.7 CORRECTION OR WITHDRAWAL OF BIDS

4.7.1 A Bid containing a mistake discovered before Bid Opening may be modified or withdrawn by a Bidder prior to the time set for Bid Opening by delivering written or telegraphic notice to the location designated in the Invitation for Bid as the place where Bids are to be received.

4.7.2 Bid security, if required, shall be in an amount sufficient for the Bid as modified or resubmitted in conformance with Section 4.2.

4.7.3 Withdrawn Bids may be resubmitted up to the time and date designated for the receipt of Bids, provided they are then fully in conformance with the Bid Documents.

4.7.4 After Bid Opening, no modifications in Bid Prices or other provisions of Bids shall be permitted. A low Bidder alleging a material mistake of fact which makes his Bid non-responsive may be permitted to withdraw his Bid if:

(A) The mistake is clearly evident on the face of the Bid document; or

(B) The Bidder submits evidence which clearly and convincingly demonstrates that a mistake was made.

Any decision by the Owner to permit or deny the withdrawal of a Bid on the basis of a mistake contained therein shall be supported by a determination setting forth the grounds for the decision. If withdrawal is permitted, Bid security will not be forfeited.

4.8 NOTICE OF CONTRACT REQUIREMENTS BINDING ON BIDDER

4.8.1 In submitting this Bid, the Bidder represents that he has familiarized himself with the nature and extent of the following requirements of the Conditions of the Construction Contract (General, Supplementary, and Other Conditions).

(A) Definitions - Sections 1.0 to 1.17;
(B) Bribes, Gratuities, and Kickbacks - Section 4.0;
(C) Contract Bond Requirements - Section 4.2;
(D) Equal Employment Opportunity - Labor Standards Provisions and other listed within the Contract Documents.

4.9 REJECTION OR CANCELLATION OF BIDS

4.9.1 An Invitation for Bid may be canceled, or any or all Bids may be rejected in whole or in part, when it is in the best interest of the Owner. A determination containing the reasons shall be made part of the Project file. Bid security for rejected Bids shall be returned to the Bidder.

4.10 PROTESTS

4.10.1 Any Bidder, Offeror, or Contractor who is aggrieved in connection with this procurement (Bid) may protest to the City Purchasing Agent and the Owner in accordance with the requirements. The protest should be made in writing within twenty-four (24) hours after the facts or occurrences giving rise thereto, but in no case more than within fifteen (15) calendar days after the facts or occurrences giving rise thereto.

4.10.2 The complete procedures and requirements regarding protest are available from the Purchasing Office upon request.

4.11 COMPETITIVE SEALED BIDS

4.11.1 Contracts solicited by competitive sealed Bids shall require that the base Bid amount exclude the applicable state gross receipts taxes or applicable local option taxes, but that the contracting agency shall be required to pay the applicable taxes including any increase in the applicable tax which becomes effective after the date the Contract is entered into. The applicable gross receipts taxes or local option taxes shall be shown as a separate amount on each billing or request for payment made under the contract.

5.0 CONSIDERATION OF BIDS

5.1 RECEIPT, OPENING, AND RECORDING

5.1.1 Bids received on time will be opened publicly and will be read aloud, and an abstract of the amounts of the Base Bids and Alternates or Bid items, if any, will be made available to the Bidders. Each Bid shall be open to public inspection. The Owner shall have the right to waive any informalities or irregularities in any Bid or Bids received and to accept the Bid or Bids which are in the Owner's best interest.

5.2 BID EVALUATION AND AWARD

5.2.1 It is the intent of the Owner to award a Contract to the responsible Bidder submitting the lowest option base bid provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available and is in the best interest of the City. The unreasonable failure of a Bidder to promptly supply information in connection with an inquiry with respect to responsibility is grounds for a determination that the Bidder is not a responsible Bidder.

5.2.2 Discrepancies in the Bid Form between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

5.2.3 Acceptance of Alternates: Owner reserves the right to accept any alternate in any order.

5.3 NOTICE OF AWARD

A written Notice of Award shall be issued by the Owner after review and approval of the Bid and related documents by the Governing Authority, "as defined in the Supplementary Conditions", with reasonable promptness.

5.4 IDENTICAL BIDS

5.4.1 When two or more of the Bids submitted are identical in price and are the low Bid, the City Purchasing Agent or the Owner may:

(A) Award pursuant to the identical low bid provisions of the City Purchasing Manual;

(B) Award to a resident local business if the identical low Bids are submitted by a resident or local business and a non-resident business;

(C) Award to resident or local manufacturer if the identical low Bids are submitted by a resident or local manufacturer and a resident business;

(D) Award by lottery to one of the identical low Bidders; or

(E) Reject all Bids and re-solicit Bids or proposals for the required services, construction, or items of tangible personal property.

5.5 CANCELLATION OF AWARD

5.5.1 When in the best interest of the public, the Owner may cancel the award of any Contract at any time before the execution of said contracts by all parties without any liability against the Owner.

6.0 POST-BID INFORMATION

6.1 RETURN OF BID SECURITY

All Bid security in the form of checks, except those of the two lowest Bidders, will be returned immediately following the opening and checking of the Bids. The retained Bid security of the unsuccessful of the two lowest Bidders, if in the form of a check, will be returned within fifteen (15) days following the award of contract. The retained Bid security of the successful Bidder, if in the form of a check, will be returned after a satisfactory Contract bond has been furnished and the Contract has been executed. Bid securities in the form of Bid bonds will be returned only upon the request of the unsuccessful Bidder, but will be released by the City Purchasing Agent after the Notice of Award is sent by the Owner.

6.2 NOTICE TO PROCEED

The Owner will issue a written Notice to Proceed to the Contractor stipulating the date from which Contract Time will be charged and the date Contract Time is to expire, subject to valid modifications of the Contract authorized by Change Order.

6.3 FAILURE TO EXECUTE CONTRACT

Failure to return the signed Contract with acceptable Contract Bonds and Certificate of Insurance within fifteen (15) calendar days after the date of the Notice of Award shall be just cause for the cancellation of the award and the forfeiture of the Bid security, which shall become damages sustained. Award may then be made to the next lowest responsible Bidder, or the work may be re-advertised and constructed under Contract or otherwise, as the Owner may decide.

6.4 CONTRACTOR'S QUALIFICATION STATEMENT (Not Used)

6.5 CONTRACT BONDS REQUIREMENTS

6.5.1 The successful Bidder, where the Contract price exceeds twenty five thousand dollars ($25,000), shall post a one hundred percent (100%) Performance Bond and one hundred percent (100%) Labor and Material Payment Bond. Bonds shall be executed on Performance Bond and Labor and Material Bond forms attached hereto, with amount payable conforming to the terms of the Contract. Surety shall be a company licensed to do business in the State of New Mexico and acceptable to the Owner.

6.6 INSURANCE REQUIREMENTS

6.6.1 The selected Bidder shall purchase and maintain, with a company or companies licensed to do business in the State of New Mexico, Liability and Property Insurance as required by law.

6.6.2 The insurance shall be in limits not less than those stated in the insurance for, enclosed in the Bid package, or greater if required by law.

6.6.3 The insurance coverage shall include worker's compensation, employers liability, comprehensive general liability (Premises Operations, independent contractual liability, explosion and collapse hazard, underground hazard, personal injury), Comprehensive automobile liability (owned and hired), excess liability (umbrella form), and all-risk builder's risk. For more specific insurance requirements refer to page 8 of the boilerplate AIA agreement included in this RFB.

6.6.4 All insurance coverage must be maintained for the entire life of the project. Products and completed operations coverage shall be maintained for a minimum period of one (1) year after final payment.

6.6.5 A valid certificate of insurance must be submitted to the Owner prior to issuance of a Notice-to-Proceed.

7.0 MINIMUM WAGE RATES

7.1 Pursuant to the requirements of any Contract entered into in excess of sixty thousand dollars ($60,000) for construction, alteration, demolition, or repair, or any combination of these, including painting and decorating of public buildings or public works, is subject to the minimum wage rate determination issued by the Office of the Labor Commissioner for this project. This project is subject to State wage rate decision #SF-16-1327-A/B/H.

7.2 The Bidder shall ensure that, in submitting his Bid, the minimum wage rate determination, include herein, has been utilized in preparing his Bid.

7.3 A summary of the City of Santa Fe Ordinance No. 2003-8, passed by the Santa Fe City Council on February 26, 2003 is included herein on pages 96 and 97. The proponent or bidder will be required to submit the proposal or bid such that it complies with the ordinance to the extent applicable. The recommended Contractor will be required to comply with the ordinance to the extent applicable, as well as any subsequent changes to the Ordinance throughout the term of this contract.

8.0 OTHER INSTRUCTIONS TO BIDDERS

8.1 The Owner will make copies of such reports available to any Bidder requesting them.. These reports are not guaranteed as to accuracy or completeness, nor are they part of the bidding documents. Before submitting his Bid, each Bidder shall, at his own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his Bid for performance of the work in accordance with the time, price, and other terms and conditions of the Bidding Documents.

8.2 It shall be the responsibility of the successful Bidder to secure from the New Mexico Regulations & Licensing Department, Construction Industries Division (CID) such permits or licenses required to carry out the construction.

9.0 NEW MEXICO LABOR AND INDUSTRIAL DIVISION OF THE LABOR DEPARTMENT CONTRACTOR AND SUBCONTRACTOR REGISTRATION

9.1 Registration with the Labor and Industrial Division of the Labor Department. A contractor or subcontractor that submits a bid valued at more than sixty thousand dollars ($60,000) for a city project that is subject to the Public Works Minimum Wage Act (13-4-10 NMSA 1978) shall be registered with the labor and industrial division of the labor department. The registration number shall be provided in the bid submitted for the contractor in the space provided and for subcontractors with work proposed over $60,000 on the subcontractor form. After the bid opening, the registration number(s) will be verified by the City and the bid will be determined to be non-responsive and disqualified if the registration number(s) appear to be not valid and the contractor does not provide proof of the required registration for itself or its subcontractors with work proposed over sixty thousand dollars ($60,000). It is the responsibility of the contractor and the subcontractors to ensure the registration is completed prior to the bid opening.

INFORMATION AVAILABLE TO BIDDERS
(00 3000)

(00 3100) EXISTING CONDITIONS

It is the Contractor's responsibility to verify existing conditions prior to bidding. A walk-through of the existing facility will be available at the end of the pre-bid meeting.

(00 3101) GEOTECHNICAL DATA

Geotechnical investigations were conducted at the site by x8eVinyard, 8916-A Adams Street NE, Albuquerque, New Mexico, 87113. The results of the investigation are to be found in the following report:

Geotechnical Investigation
Santa Fe CNG Facility, Santa Fe, New Mexico
Project No. 15-1-036
June 18, 2015

Report is included in appendix at end of Project Manual and is made available for information only. By its nature, Report cannot reveal all conditions that exist at site. Data is not intended as a warranty of continuity of conditions between borings. Owner and Architect do not assume responsibility for the accuracy of Report prepared by others nor for interpretation of data by Bidders.

Report offers recommendations for design of foundations and preparation of sub-base. These recommendations were prepared primarily for use in Project design. Recommendations described shall not be construed as Contract requirements unless specifically stated or referenced in Bidding Documents.

Should subsurface conditions be found to vary substantially from Report, changes in design and construction of foundations may be required by Change Order.

(00 3102) STORMWATER BASIN SOIL INVESTIGATION

Soil investigations were conducted at the site by x8eVinyard, 8916-A Adams Street NE, Albuquerque, New Mexico, 87113. The results of the investigation are to be found in the following report:

Stormwater Basin Soil Investigation of CNG Fuel Facility Upgrades
2931 Rufina Street, Santa Fe, New Mexico
Project No. 15-5-030
November 10, 2015

Report is included in the appendix at the end of the Project Manual and is made available for information only. By its nature, Report cannot reveal all conditions that exist at site. Data is not intended as a warranty of continuity of conditions between sampled areas. Owner and Architect do not assume responsibility for the accuracy of Report prepared by others nor for interpretation of data by Bidders.

Report contains results of soil investigations and laboratory analysis to test for hazardous materials within soil that is to be removed from the site and disposed of. Bidder's attention is drawn to the requirements to comply with all local, state and federal requirements (including EPA requirements) governing the handling and disposal of hazardous materials.

(00 3103) STORMWATER BASIN SOIL DISPOSAL

Soil removed from the stormwater basin may be disposed at the Rio Rancho Waste Management Landfill, 1132 33rd St. NE, Rio Rancho, New Mexico 87144_. Landfill hours of operation are: 7 a.m. to 5 p.m., Monday through Friday.

BID FORM

(00 4113) BID FORM - STIPULATED SUM (Single-Prime Contract)

Invitation No: RFB '17/05/B

Project: CIP Project No: 657A – CNG FUEL FACILITY UPGRADES

Contractor: Date: _____, 2016

This Bid is submitted to: CITY OF SANTA FE
PURCHASING DIRECTOR
2651 SIRINGO ROAD, BUILDING H
SANTA FE, NEW MEXICO 87505

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the Owner in the form included in the Bidding Documents to perform and furnish all work as specified or indicated in the Bidding Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. The Bidder accepts all of the terms and conditions of the Invitation for Bid and Instructions to Bidders, including, without limitation, those dealing with the disposition of Bid security and other Bidding Documents. This Bid will remain subject to acceptance for 60 days after the day of Bid opening. The Bidder shall sign and submit the Agreement between Owner and Contractor (hereinafter called Agreement) with the bonds and other documents required by the Bidding Requirements within fifteen (15) calendar days after the date of the Owner's Notice to Award.

3. In submitting this Bid, the Bidder represents, as more fully set forth in the Agreement, that:

   A. The Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all of which is hereby acknowledged):

   No. _____ Date _____ No. _____ Date _____
   No. _____ Date _____ No. _____ Date _____
   No. _____ Date _____ No. _____ Date _____
   No. _____ Date _____ No. _____ Date _____

   B. The Bidder has familiarized himself with the nature and extent of the Bidding Documents, work, site, locality, and all local condition, laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of the work.

   C. The Bidder has carefully studied all reports and drawings of subsurface conditions which are identified in the Information Available to Bidders and accepts the determination set forth in the Information Available to Bidders of the extent of the technical data contained in such reports and drawings upon which the Bidder is entitled to rely.

   D. The Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Bidding Documents.

   E. The Bidder has given the Architect written notice of all conflicts, errors, or discrepancies that he has discovered in the Bidding Documents, and the written resolution thereof by the Architect is acceptable to the Bidder.

   F. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted inconformity with any agreement or rules of any group, association, organization, or corporations, the Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; the Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and the Bidder has not sought by collusion to obtain for himself any advantage over any other Bidder or over the Owner. It is understood that the Owner reserves the right to reject any or all Bids and to waive any technical irregularities in the bidding.

   G. It is the intent of the City to award a Contract to the responsible Bidder submitting the lowest base bid, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and is in the best interest of the City.

4. The Bidder will complete the work designated as CNG FUEL FACILITY UPGRADES, CIP Project # 657A, which consists of earthwork, grading and compaction of undeveloped portions of the City Yards site to form a new fueling area, expansion of the existing storm water detention pond, construction of new concrete fuel islands and parking stalls for Environmental Services Division, new subsurface storm water infrastructure, including drains, pipes and an oil-water separator, demolition of portions of existing CNG compressor station building to facilitate addition and installation of new equipment, a new one-story addition to the existing CNG compressor station, a new public fuel island. modifications to existing canopy structures in the Transit Yard to facilitate the installation of new fueling infrastructure. a new fueling island within the existing Transit Yard, new concrete foundations for pre-engineered canopy structures at the new public fuel island and the Transit Yard, construction of a complete CNG fueling system, including electrically-operated natural gas compressors, gas dryer, storage vessels, public-use CNG dispenser and fuel management terminal, fuel dispensers, fill posts and hoses for time-fill operations and other items as specified and as necessary to form a complete, functional installation, concrete and asphalt paving and patching, and electrical demolition, power, distribution and lighting, including a new primary electrical service and transformer (construction of pre-engineered metal canopy over new fuel island in Transit Yard and public fuel island shall, if accepted by Owner, be constructed as Alternates to the Base Bid Work), for the following price(s):
(All prices listed below are for a complete installed product and includes all labor, materials, equipment, bonding, insurance, overhead & profit, etc.)

a. Base Bid – Bid Lot 1 – Compressor Station: $_____
b. Base Bid – Bid Lot 2 – Transit Yard: $_____
c. Base Bid – Bid Lot 3 – Solid Waste Fueling Islands: $_____
d. Base Bid – Bid Lot 4 – Public Fast-Fill Island: $_____
e. Subtotal Base Bid: $_____
f. Allowance: Utility Relocation $ 10,000.00

Total Base Bid plus Allowance:

_____ ($_____)
(use words)

Gross Receipts Tax
(8.3125%)
_____ ($_____)
(use words)

Total Base Bid and Allowance Plus Tax

_____ ($_____)
(use words)

Additive Alternate No. 1: Pre-Engineered Canopy Structure in Transit Yard

_____ ($_____)
(use words – including gross receipt tax)

Additive Alternate No. 2: Pre-Engineered Canopy Structure at Public Fuel Island

_____ ($_____)
(use words – including gross receipt tax)

5. The Bidder agrees that:

A. The work to be performed under the Contract shall commence not later than ten (10) consecutive calendar days after the date of written Notice to Proceed, and that completion of the Work shall be achieved not later than two hundred and forty (240) calendar days after the date of written "Notice to Proceed", except as hereafter extended by valid written "Change Order" by the Owner.

B. Should the Contractor neglect, refuse, or otherwise fail to complete the work within the time specified, the Contractor agrees, in partial consideration for the award of this Contract, to pay the Owner the amount of Two Thousand Dollars and 0/00 Cents ($2,000.00) per consecutive calendar days, not as a penalty, but as liquidated damages for such breach of the Contract.

C. The above process shall include all labor, profit, insurance, taxes, etc., to cover the finished work of the several kinds called for. Changes shall be processed in accordance with the Contract Documents.

D. It is understood that the Owner reserves the right to reject any or all Bids and to waive any technical irregularities in the bidding.

6. The following documents are attached to and made a condition of this Bid:

A. Check for the Bid Bond.
B. This Bid Form, properly filled out and executed, including acknowledgement of Addenda, if any
C. Non-Collusion Affidavit of Prime Bidder
D. Equal Employment Opportunity
E. Certificate of Non-Segregated Facilities
F. Certificate of Registration with New Mexico Dept. of Workforce Solutions
G. Subcontractors Listing
H. Minimum Bidder Qualifications Form

If any of the above requirements have not been met, the bid shall not be read.

7. The terms used in this Bid and the Bidding and Contract Documents which are defined in the Conditions of the Construction Contract (General, Supplementary, and Other Conditions)

8. If the Bidder is:

A. AN INDIVIDUAL:

By:_____
(Individual's Name)

doing business as: _____

Business address:
_____

_____

Telephone:_____

(SEAL)

B. A PARTNERSHIP:

By:_____
(Firm Name)

_____
(General Partner)

Business Address:

_____

_____

Telephone:_____

(SEAL)

C. A CORPORATION

By:_____
(Corporation Name)

_____
(State of Incorporation)

By:_____
(Name of person authorized to sign)

_____
(Title)

If a New Mexico
Corporation:_____
Certificate of Incorporation No.

If a Foreign Corporation: _____
Certificate of Authority No.

Attest: _____
(Secretary)

Business address: _____

Telephone: _____

D. A JOINT VENTURE

By:_____
(Name)

Address: _____

By:_____
(Name)

Address:_____

Each joint venture must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated in the appropriate category.

Bidder must fill in the following:

NM License No.: _____ Classification: _____

NM Taxation and Revenue CRS No.: _____

City of Santa Fe Business Registration No.: _____

NM Resident Preference Number (if applicable):_____

One Original and one copy of the Bid Submittal is required

SUPPLEMENT TO BID FORMS
(00 4300-4500)

(00 4313) BID SECURITY FORM

Review and Approval: This Bond has been executed by a Surety named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies," as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, United States Treasury Department.

Approved:

_____ DATE:

_____
Owner's Representative or Governing Authority

THIS FORM MUST ACCOMPANY THE BID BOND

THIS FORM MUST BE
USED BY SURETY

(00 4517) AGENT'S AFFIDAVIT

BID SECURITY FORM

(To be filled in by Agent)

STATE OF)
) ss.
COUNTY OF)

_____ being first duly sworn deposes and says:

that he is the duly appointed agent for
_____
and licensed in the State of New Mexico. Deponent further states that a certain bond given to indemnify the State of New Mexico

in connection with the construction of
_____

dated _____ day of _____, 20___, executed by

_____

contractor, as principal and _____, as surety, signed by this

deponent; and deponent further states that said bond was written, signed, and delivered by him; that the premium on the same has

been or will be collected by him; and that the full commission thereon has been or will be retained by him.

_____

Subscribed and sworn to before me, a notary public in and for the County of _____, this _____ day of _____, 20_____.

My Commission expires: _____

Agent's Address: _____

_____

Telephone: _____

(00 4518) SUBCONTRACTOR LISTING

Note: A subcontractor that submits a bid valued at more than sixty thousand dollars ($60,000) for a city project that is subject to the Public Works Minimum Wage Act 13-4-10 NMSA 1978) shall be registered with the labor and industrial division of the labor department. For this project, list below all subcontractors with more than $16,600 work.

Section 00430

TRADE	NAME	ADDRESS	TELEPHONE#	NM LICENSE #	NM DEPT. OF LABOR REGISTRATION #	SUBCONTRACTOR SIGNATURE - TO BE OBTAINED AFTER AWARD OF CONTRACT

(00 4519) NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

STATE OF)
)ss.
COUNTY OF)

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

1) He is the _____of _____, the Bidder that has submitted and attached Bid;

2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

3) Such Bid is genuine and is not a collusive or sham Bid;

4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with the Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract or has in any manner directly or indirectly, sought by agreement or collusion or communications or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Santa Fe, or any person interested in the proposed Contract; and

5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affront.

By: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
Notary Public

My Commission expires: _____

(00 4533) CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to construction contracts and related subcontracts exceeding $10,000 which are not exempt from the Equal Opportunity Clause.)

The construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means: any waiting room, work areas, rest rooms and wash rooms, restaurants and other eating areas; time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin because of habit, local custom, or otherwise. The construction contractor agrees that (except where he has obtained identical certifications from proposed Subcontractors for specific time periods) he will obtain identical certifications from proposed SUBCONTRACTORS prior to the award of subcontracts exceeding $10,000 which are not exempt from the provision of the Equal Opportunity Clause and that he will retain such certifications in his files.

By: _____
Title: _____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
Notary Public

My Commission expires: _____

(00 4534) INSTRUCTIONS RELATING TO LOCAL PREFERENCE CERTIFICATION FORM

1. All information must be provided. A 10% local preference may be available for this procurement. To qualify for this preference, an offeror must complete and submit the local preference certification form with its offer. If an offer is received without the form attached, completed, notarized, and signed or if the form is received without the required information, the preference will not be applied. The local preference form or a corrected form will not be accepted after the deadline for receipt of bids or proposals.

2. Local Preference precedence over State Preference: The Local Preference takes precedence over the State Resident Preference and only one such preference will be applied to any one bid or proposal. If it is determined that the local preference applies to one or more offerors in any solicitation, the State Resident Preference will not be applied to any offers.

3. Principal Office and location must be stated: To qualify for the local preference, the principal place of business of the enterprise must be physically located within the Santa Fe County Geographic Boundaries. The business location inserted on the Form must be a physical location, street address or such. DO NOT use a post office box or other postal address. Principal place of business must have been established no less than six months preceding application for certification.

4. Subcontractors do not qualify: Only the business, or if joint venture, one of the parties of the joint venture, which will actually be performing the services or providing the goods solicited by this request and will be responsible under any resulting contract will qualify for this preference. A subcontractor may not qualify on behalf of a prime contractor.

5. Definition: The following definition applies to this preference.

   A local business is an entity with its Principal office and place of business located in Santa Fe County.
   A Principal office is defined as: The main or home office of the business as identified in tax returns, business licenses and other official business documents. A Principal office is the primary location where the business conducts its daily operations, for the general public, if applicable. A temporary location or movable property, or one that is established to oversee a City of Santa Fe project does not qualify as a Principal office.

Additional Documentation: If requested a business will be required to provide, within 3 working days of the request, documentation to substantiate the information provided on the form. Any business which must be registered under state law must be able to show that it is a business entity in good standing if so requested.

(00 4534.1) LOCAL PREFERENCE CERTIFICATION FORM

RFP/RFB NO: '16/__/B

Business Name: _____

Principal Office: _____
Street Address City State Zip Code

City of Santa Fe Business License #_____ (Attach Copy to this Form)

Date Principal Office was established: _____ (Established date must be six months before date of Publication of this RFP or RFB).

CERTIFICATION

I hereby certify that the business set out above is the principal Offeror submitting this offer or is one of the principal Offerors jointly submitting this offer (e.g. as a partnership, joint venture). I hereby certify that the information which I have provided on this Form is true and correct, that I am authorized to sign on behalf of the business set out above and, if requested by the City of Santa Fe, will provide within 3 working days of receipt of notice, the necessary documents to substantiate the information provided on this Form.

Signature of Authorized Individual: _____

Printed Name: _____

Title: _____ Date: _____

Subscribed and sworn before me by_____ this____, day of _____

My commission expires_____ _____
Notary Public

SEAL

THIS FORM MUST ACCOMPANY THE BID

(00 4535) RESIDENT VETERANS PREFERENCE CERTIFICATION

_____ (NAME OF CONTRACTOR) hereby certifies the following in regard to application of the resident veterans' preference to this procurement.

Please check one box only:

☐I declare under penalty of perjury that my business prior year revenue starting January 1 ending December 31 is less than $1M allowing me the 10% preference discount on this solicitation. I understand that knowingly giving false or misleading information about this fact constitutes a crime.

☐ I declare under penalty of perjury that my business prior year revenue starting January 1 ending December 31 is more than $1M but less than $5M allowing me the 8% preference discount on this solicitation. I understand that knowingly giving false or misleading information about this fact constitutes a crime.

☐ I declare under penalty of perjury that my business prior year revenue starting January 1 ending December 31 is more than $5M allowing me the 7% preference discount on this solicitation. I understand that knowingly giving false or misleading information about this fact constitutes a crime.

I agree to submit a report or reports to the State Purchasing Division of the General Services Department declaring under penalty of perjury that during the last calendar year starting January 1 and ending on December 31, the following to be true and accurate:

In conjunction with this procurement and the requirements of this business application for a Resident Veteran Business Preference/Resident Veteran Contractor Preference under Sections 13-1-21 or 13-1-22 NMSA 1978, which awarded a contract which was on the basis of having such veterans preference, I agree to report to the State Purchasing Division of the General Services Department the awarded amount involved. I will indicate in the report the award amount as a purchase from a public body or as a public works contract from a public body as the case may be.

I understand that knowingly giving false or misleading information on this report constitutes a crime.

I declare under penalty of perjury that this statement is true to the best of my knowledge. I understand that giving false or misleading statements about material fact regarding this matter constitutes a crime.

_____ _____

(Signature of Business Representative)* (Date)

*Must be an authorized signatory of the Business.

The representation made by checking the above boxes constitutes a material representation by the business. If the statements are proven to be incorrect, this may result in denial of an award or un-award of the procurement.

SIGNED AND SEALED THIS_____DAY OF _____, 20__.

_____

NOTARY PUBLIC

My Commission Expires:

_____

(00 4546) CERTIFICATION OF EQUAL EMPLOYMENT OPPORTUNITY

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any Bidder or perspective contractor, or any of their proposed Subcontractors, shall state as an initial part of the Bid or negotiations of the Contract whether he has participated in any previous Contract or subcontract subject to the equal opportunity clause; and, if so, whether he has filed all compliance reports due under applicable instructions.

Where the certification indicates that the Bidder has not filed a compliance report due under applicable instructions, such Bidder shall be required to submit a compliance report within seven calendar days after Bid opening. No Contract shall be awarded unless such report is submitted.

CERTIFICATION BY BIDDER

Bidder's Name: _____

Address: _____

_____

1. Bidder has participated in a previous Contract or subcontract subject to the equal Opportunity Clause.

   _____ Yes _____ No

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

   _____ Yes _____ No

Certification - The information above is true and complete to the best of my knowledge and belief.

_____
Name and Title of Signer (please type)

_____ _____
Signature Date

(00 4550) MINIMUM BIDDER QUALIFICATIONS FORM

The Bidder shall complete this form providing all required information. The completed form shall be submitted as part of the Bid. Bids that do not include the completed Bidder Qualification Forms may be considered non-responsive and may be rejected.

1. CNG system installer responsible for this work - include the address, telephone number and contact name:

   _____

   _____

2. Indicate if the firm listed will be the prime contractor or a subcontractor: _____

3. How many years has this organization been in business as a Contractor under this present business name? _____ years.

4. List the CNG system installer's experience. Information shall include at least three (3) successfully completed compressed natural gas (CNG) installations of a similar nature having a discharge pressure above 4000 PSIG and having at least two gas compressors with prime movers rated at 100 HP minimum each and CNG-dispensing systems, within the last five (5) years. Projects of a similar nature shall be interpreted as CNG mechanical systems projects with comparable complexity and scope of equipment. Use additional sheets if necessary.

   A. Project Name: _____

      Location of Project: _____

      Date of Installation: _____

      Employer's Name: _____

      Project Owner's Name: _____

      Contact Name, Address, and Phone No.: _____

      _____

      Superintendent Name: _____

      Description of Project: _____

      Construction Cost: _____

   B. Project Name: _____

      Location of Project: _____

      Date of Installation: _____

      Employer's Name: _____

      Project Owner's Name: _____

      Contact Name, Address, and Phone No.: _____

      _____

      Superintendent Name: _____

      Description of Project: _____

      Construction Cost: _____

C. Project Name: _____

Location of Project: _____

Date of Installation: _____

Employer's Name: _____

Project Owner's Name: _____

Contact Name, Address, and Phone No.: _____

_____

Superintendent Name: _____

Description of Project: _____

Construction Cost: _____

THIS FORM MUST ACCOMPANY THE BID

AGREEMENT FORMS
(00 5200)

(00 5213) AGREEMENT (AIA A101 – 2007 Standard Form of Agreement Between Owner and Contractor (Stipulated Sum)

(00 5214) AIA GENERAL CONDITIONS (AIA A201 – 2007 General Conditions of the Contract for Construction)

AIA® Document A101™ – 2007

***Standard Form of Agreement Between Owner and Contractor** where the basis of payment is a Stipulated Sum*

FOR RFB PURPOSES ONLY

AGREEMENT made as of the day of in the year 2016

BETWEEN the Owner:

City of Santa Fe
200 Lincoln Ave.
Santa Fe, New Mexico 87501

and the Contractor:

Contractor
Address 1
City, State, ZIP
phone

for the following Project:

CNG Fuel Facility Upgrades CIP Project #657A

New CNG compression and fueling equipment, addition to existing CNG station and formation of new fuel islands within the Transit facility at 2931 Rufina Street and within the adjacent City Siler Yard.

The Architect:

Huitt-Zollars, Inc.
6501 Americas Parkway NE, Suite 550
Albuquerque, New Mexico 87110
office phone 505-883-8114

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

§ 2.1 The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others, The Work includes but is not limited to the expansion of the existing CNG building, an entire new Compressed Natural Gas system with two new compressors, new CNG supply piping to (a) the new fuel stations under the existing canopies at the Transit Facility, (b) the new public fuel station and (c) the new fuel stations inside Siler Yard for the garbage trucks.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Paragraph deleted)
The date of commencement of the Work will be the date on the Notice To Proceed from the Owner.

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

N/A

§ 3.2 The Contract Time shall be measured from the date of issuing the Notice To Proceed.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than two hundred and forty (240) calendar days from the date of commencement,
(Paragraphs deleted)

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, subject to adjustments of this Contract Time as provided in the Contract Documents. Liquidated damages of one thousand dollars ($2,000.00) per calendar day will apply for work not completed by the Substantial Completion date.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), plus tax at the rate of 0.083125 for a total Contract Sum of , subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
yet to be determined

§ 4. Allowances included in the Contract Sum, if any:

Item	Price
Utility Relocation Allowance	$10,000.00

(Table deleted)
(Paragraphs deleted)
(Table deleted)
(Paragraphs deleted)

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 1st day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the 21st day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than twenty one (21) days after the Architect receives the Application for Payment.

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing.

.3 Subtract the aggregate of previous payments made by the Owner; and

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.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, and

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8
(Paragraphs deleted)
Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

(Paragraph deleted)

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 21 days after the issuance of the Architect's final Certificate for Payment, or as follows:

Within fifteen days of the Contractor's request for final payment has been submitted to the City, provided the Owner has received the Consent of Surety, all required Waivers and Releases of Liens, all warranties, operation and maintenance manuals, certified payrolls and the as-built marked up plan set from the Contractor.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Ownerwill serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(Paragraphs deleted)

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[ ] Litigation in a court of competent jurisdiction

[X] Other *In accordance with New Mexico Public Works Mediation Act 13-4C-1 through 13-4C-11, NMSA 1978*

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

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ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

Mary MacDonald
Project Administrator
Facilities Division, Public Works Department
City of Santa Fe
2651 Siringo Rd., Bldg. "E"
Santa Fe, New Mexico 87505
Office phone (505) 955-5934

§ 8.3 The Contractor's representative:

Contractor Representative
Contractor Name.
Address
City, State ZIP
telephone

§ 8.4
(Paragraphs deleted)
Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.5 Other provisions:

§ 8.5 1 INDEMNIFICATION

The Contractor shall indemnify, hold harmless and defend the City from all losses, damages, claims or judgements, including payments of all attorneys' fees and costs on account of any suit, judgment, execution, claim, action or demand whatsoever arising from Contractor's performance under this Agreement as well as the performance of Contractor's employees, agents, representatives and subcontractors.

(Paragraphs deleted)

§ 8.5.2 APPROPRIATIONS

The terms of this Agreement are contingent upon sufficient appropriations and authorization being made by the City for the performance of this Agreement. If sufficient appropriations and authorization are not made by the City, this Agreement shall terminate upon written notice being given by the City to the Contractor. The City's decision as to whether sufficient appropriations are available shall be accepted by the Contractor and shall be final.

§ 8.5.3 THIRD PARTY BENEFICIARIES

By entering into this Agreement, the parties do not intend to create any right, title or interest in or for the benefit of any person other than the City and the Contractor. No person shall claim any right, title or interest under this Agreement or seek to enforce this Agreement as a third party beneficiary of this Agreement.

§ 8.5.4 STATUS OF CONTRACTOR; RESPONSIBILITY FOR PAYMENT OF EMPLOYEES AND SUBCONTRACTORS

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A. The Contractor and its agents and employees are independent contractors performing professional services for the City and are not employees of the City. The Contractor, and its agents and employees, shall not accrue leave, retirement, insurance, bonding, use of City vehicles, or any other benefits afforded to employees of the City as a result of this Agreement.

B. Contractor shall be solely responsible for payment of wages, salaries and benefits to any and all employees or subcontractors retained by Contractor in the performance of the services under this Agreement.

C. The Contractor shall comply with City of Santa Fe Minimum Wage, Article 28-1-SFCC 1987, as well as any subsequent changes to such article throughout the term of this Agreement.

§ 8.5.5 CONFLICT OF INTEREST

The Contractor warrants that it presently has no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of services required under this Agreement. Contractor further agrees that in the performance of this Agreement no persons having any such interests shall be employed.

§ 8.5.6 ASSIGNMENT: SUBCONTRACTING

The Contractor shall not assign or transfer any rights, privileges, obligations or other interest under this Agreement, including any claims for money due, without the prior written consent of the City. The Contractor shall not subcontract any portion of the services to be performed under this Agreement without the prior written approval of the City.

§ 8.5.7 RELEASE

The Contractor, upon acceptance of final payment of the amount due under this Agreement, releases the City, its officers and employees, from all liabilities, claims and obligations whatsoever arising from or under this Agreement. The Contractor agrees not to purport to bind the City to any obligation not assumed herein by the City unless the Contractor has express written authority to do so, and then only within the strict limits of that authority.

§ 8.5.8 INSURANCE

A. The contractor, at its own cost and expense, shall carry and maintain in full force and effect during the term of this Agreement, comprehensive general liability insurance covering bodily injury and property damage liability, in a form and with an insurance company acceptable to the City, with limits of coverage in the maximum amount which the City could be held liable under the New Mexico Tort Claims Act for each person injured and for each accident resulting in damage to property. Such insurance shall provide that the City is named as an additional insured and that the City is notified no less than 30 days in advance of cancellation for any reason. The Contractor shall furnish the City with a copy of a Certificate of Insurance as a condition prior to performing services under this Agreement.

B. Contractor shall also obtain and maintain Workers' compensation insurance, required by law, to provide coverage for Contractor's employees throughout the term of this Agreement. Contractor shall provide the City with evidence of its compliance with such requirement.

§ 8.5.9 RECORDS AND AUDIT

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User Notes:

(1299335509)

The contractor shall maintain, throughout the term of this Agreement and for a period of three years thereafter, detailed records that indicate the date, time and nature of services rendered. These records shall be subject to inspection by the City, the Department of Finance and Administration, and the State Auditor. The City shall have the right to audit the billing both before and after payment. Payment under this Agreement shall not foreclose the right of the City to recover excessive or illegal payments.

§ 8.5.10 APPLICABLE LAW: CHOICE OF LAW: VENUE

Contractor shall abide by all applicable federal and state laws and regulations, and all ordinances, rules and regulations of the City of Santa Fe. In any action, suit or legal dispute arising from this Agreement, the Contractor agrees that the laws of the State of New Mexico shall govern. The parties agree that any action or suit arising from this Agreement shall be commenced in a federal or state court of competent jurisdiction in New Mexico. Any action or suit commenced in the courts of the State of New Mexico shall be brought in the First Judicial District Court.

§ 8.5.11 AMENDMENT

This Agreement shall not be altered, changed or modified except by an amendment in writing executed by the parties hereto.

§ 8.5.12 NON-DISCRIMINATION

During the term of this Agreement, Contractor shall not discriminate against any employee or applicant for an employment position to be used in the performance of services by Contractor hereunder, on the basis of ethnicity, race, age, religion, creed, color, national origin, ancestry, sex, gender, sexual orientation, physical or mental disability, medical condition, or citizenship status.

§ 8.5.13 SEVERABILITY

In case any one or more of the provisions contained in this Agreement or any application thereof shall be invalid, illegal or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein and any other application thereof shall not in any way be affected or impaired thereby.

8.5.14 NOTICES

Any and all notices provided for hereunder shall be in writing and shall be deemed delivered, given and received when (i) personally delivered, or (ii) five (5) days after the same are deposited in the United States Postal Service mail, postage prepaid, certified mail, return receipt requested, addressed to the applicable party at the address indicated below for each party, or at such other address as may be designated by either party in a written notice to the other party:

OWNER:	Facilities Division, Public Works Department
	City of Santa Fe
	PO Box 909
	Santa Fe, NM 87504-0909
CONTRACTOR:	Contractor Name.
	Address
	City, State ZIP

Init.

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8.5.15 NEW MEXICO TORT CLAIMS ACT

Any liability incurred by the City of Santa Fe in connection with this agreement is subject to the immunities and limitations of the New Mexico Tort Claims Act, Section 41-4-1, et. seq. NMSA 1978, as amended. The City and its "public employees" as defined in the New Mexico Tort Claims Act, do not waive any limitation of liability pursuant to law. No provision in this Agreement modifies or waives any provision of the New Mexico Tort Claims Act.

8.5.16 TERM AND EFFECTIVE DATE

This Agreement shall be effective when signed by the City and the Contractor, whichever occurs last, and terminate on July 31, 2018, unless sooner pursuant to section 7, infra.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
Request For Bid '16/--/B	RFB/Project Manual	August 2016	See Project Manual index

§ 9.1.4 The Specifications:
The specifications are included in the drawings and in the Request For Bid '16/--/B Project Manual

§ 9.1.5 The Drawings:

*(Paragraphs deleted)*CNG Fuel Facility Upgrades as issued with the Request For Bid '16/--/B
(Table deleted)

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

*(Paragraphs deleted)*None

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ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(Paragraph deleted)

Type of insurance or bond	Limit of liability or bond amount ($0.00)
Performance and Payment Bonds	100% of the Contract amount
Commercial General Liability	$1,000,000 per occurrence, $2,000,000 general aggregate
Automobile Liability	$500,000 combined single limit
Workers Compensation	$100,000 each accident, $100,000 disease, each employee
Workers Compensation	$500,000 disease, policy limit

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IN WITNESS WHEREOF, the parties have executed this Agreement on the date set forth below.

CITY OF SANTA FE:

_____
JAVIER M. GONZALES, MAYOR

DATE: _____

ATTEST:

_____
YOLANDA Y. VIGIL
CITY CLERK

APPROVED AS TO FORM:

MDM 7/21/16
KELLEY A. BRENNAN,
CITY ATTORNEY

CONTRACTOR:
CONTRACTOR NAME.

_____
BY: CONTRACTOR REPRESENTATIVE

NM LICENSE # :
CRS # :
CITY BUSINESS REGISTRATION #:

APROVED:

_____
OSCAR S. RODRIGUEZ,
FINANCE DIRECTOR

52251.572970 & 52416.572970
(Paragraphs deleted)
Business Unit/Line Item

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
CNG Fuel Facility Upgrade CIP Project # 657A
located at 2931 Rufina Street, Santa Fe, New Mexico

THE OWNER:
City of Santa Fe
200 Lincoln Avd.
Santa Fe, New Mexico 87504

THE CONTRACTOR:

Yet to be determined
THE ARCHITECT:
Huitt-Zollars, Inc.
6501 Americas Parkway NE, Suite 550
Albuquerque, New Mexico 87110
Office phone (505) 883-8114

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ **3.4.2** Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ **3.4.3** The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ **3.7.1** Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ **3.7.2** The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ **3.7.3** If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ **3.7.4 Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ **3.7.5** If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

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the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

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§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

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required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

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§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

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§ **4.2.14** The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ **5.1.1** A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ **5.1.2** A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ **5.2.1** Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ **5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ **5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ **5.2.4** The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

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be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

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.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

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.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding

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dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

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§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

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.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ **10.2.2** The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ **10.2.3** The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ **10.2.4** When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ **10.2.5** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ **10.2.6** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ **10.2.7** The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ **10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ **10.3.2** Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be

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extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.4 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.5 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

(Paragraph deleted)

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the

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insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PERFORMANCE BOND AND PAYMENT BOND

§ 11.3.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

(Paragraphs deleted)

§ 11.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

(Paragraphs deleted)

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after

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discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

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§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any

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other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case

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may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

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§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding

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on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

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§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

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BONDS, CERTIFICATES AND NOTICES
(006100-6200)

(00 6101) BID BOND

(Insert AIA Document A310 with bid.)

(00 6113.13) PERFORMANCE BOND

(Insert copy of executed Performance Bond later.)

(00 6113.16) LABOR AND MATERIAL BOND

(Insert copy of executed Labor and Material Payment Bond later.)

(00 6216) CERTIFICATE OF LIABILITY INSURANCE

(Insert copy of project-specified Certificate of Liability Insurance later.)

(00 6217) WORKERS' COMPENSATION INSURANCE

(Insert copy of project-specified Workers' Compensation Insurance later.)

(00 6218) NOTICE TO PROCEED

SAMPLE

DATE
NAME
ADDRESS
CITY/STATE/ZIP

RE:

Dear:

"OFFICIAL NOTICE-TO-PROCEED"

On _____, the City Council awarded a Construction Contract to your firm for the above noted project.

This letter shall serve as official Notice-to-Proceed with the work described for this project in the Contract Documents and _____.

The award of the Contract is based on your Bid proposal dated _____, in the amount of $_____.

Based on the date of issuance of this notice, as starting date, _____, and the ( ) calendar day time limit, the entire work under this Contract shall be substantially completed by _____, after which time liquidated damages as outlined in the project specifications will apply.

At the Pre-Construction conference on _____, the City Contract Compliance Officer provided you with a Wage Rate Poster which you are to display on the job site. Please comply with the requirements for filing payroll statements with the State Labor Commission and the City Contract Compliance Officer.

Please acknowledge receipt of this notice and return signed copies to the Owner (City of Santa Fe, Public Works Department, Facilities Division).

Sincerely,

_____ (City Project Manager)

_____ (City Facilities Division Director)

xc: Project/Book File

RECEIPT ACKNOWLEDGED:

_____
By:

_____
Date

SUPPLEMENTARY CONDITIONS
(00 7300)

(00 7301) CITY OF SANTA FE REQUIREMENTS

Document is intended to be used in conjunction with the General Conditions of the Contract.

ADDITIONAL CONDITIONS

1.0 DEFINITIONS - The following definitions shall apply through the Bidding Documents or Contract Documents unless otherwise specified.

1.1 ADDENDUM: Written or graphic instrument issued prior to the execution of the Contract which modifies or interpret the Bidding Documents, including Drawings and Specifications, by additions, deletions, clarifications, or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed. Plural: ADDENDA

1.2 ADDITIVE OR DEDUCTIVE ALTERNATE BID: Amount stated in the Bid to be added or deducted from the amount of the Base Bid if the corresponding change in project scope or alternate materials and/or methods of construction is accepted.

1.3 BASE BID: Amount of money stated in the Bid as the sum for which the Bidder offers to perform the work, not including that work for which Alternate Bids are also submitted.

1.4 BID: A complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein, supported by data called for by the Bidding Documents.

1.5 BID LOT: A major item of work for which a separate quotation or proposal is requested.

1.6 BIDDER: One who submits a Bid for a Prime contract with the Owner, as distinct from a Subcontractor, who submits a Bid to a Bidder. Technically, a Bidder is not a Contractor on a specific project until a contract exists between him and the Owner.

1.7 BIDDING DOCUMENT: Documents that include the Invitation for Bid, Instructions to Bidders, the Bid Form, other sample bidding and contract forms, and the proposed Contract Documents, including any Addenda issued prior to receipt of Bids. The Contract Documents proposed for the work consist of the Owner-Contractor Agreement, the Conditions of the Construction Contract (General, Supplementary, and Other Conditions), the Drawings, the Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract.

1.8 DAY: Calendar day, which is every day shown on the calendar, beginning and ending at midnight.

1.9 CENTRAL PURCHASING OFFICE: The Central Purchasing Office is the City of Santa Fe Purchasing Department.

1.10 GOVERNING AUTHORITY: The Governing Board of the City of Santa Fe for the execution of construction contracts is the Mayor and City Manager.

1.11 INVITATION FOR BID: The Bidding Documents utilized for soliciting sealed Bids. "Invitation to Bid" shall have the same meaning as "Invitation for Bid".

1.12 OWNER: The City of Santa Fe, New Mexico.

1.13 PROCUREMENT OFFICER: The Director of the Purchasing Division, or a designee authorized to enter into or administer contracts and make written determination with respect thereto.

1.14 RESPONSIBLE BIDDER: A Bidder who submits a responsive Bid and who has furnished, when required, information and data to prove that his financial resources, production or service facilities, personnel, service reputation, and experience are adequate to make satisfactory delivery of the services, construction, or items of tangible personal property described in the Bidding Documents (13-1-82, NMSA 1978).

1.15 SUCCESSFUL BIDDER: The lowest qualified and responsible Bidder to whom the Owner, on the basis of the Owner's evaluation, makes an award.

1.16 UNIT PRICES: Amounts stated in the Contract as prices per unit of measurement for materials or services as described in the Contract Documents.

1.17 USER: The City of Santa Fe or agencies or designated entity for whose use the Project is being constructed.

2.0 CONTRACT AUDIT

The Owner shall be entitled to audit the books and records of a Contractor or any Subcontractor under any negotiated contract or subcontract other than a firm fixed-price contract to the extent that such books and records relate to the performance of such contract or subcontract. Such books and records shall be maintained by the Contractor for a period of three years from the date of final payment under the prime contract and by the Subcontractor for a period of three years from the date of final payment under the subcontract unless a shorter period is otherwise authorized in writing (13-1-161, NMSA 1978).

3.0 DEBARRED OR SUSPENDED CONTRACTORS

A business (Contractor, Subcontractor, or Supplier) that has either been debarred or suspended pursuant to the requirements of Sections 13-1-177 through 13-1-180, and 13-4-11 through 13-4-17, NMSA 1978, shall not be permitted to do business with the State and shall not be considered for award of contract during the period for which it is debarred or suspended.

4.0 BRIBES, GRATUITIES, AND KICK-BACKS

4.1 It is illegal in the State of New Mexico for any public employee to solicit or accept anything of value in connection with award of this Bid and for any person to offer or pay anything of value to any such public employee (30-24-1 through 30-24-2, NMSA 1978).

4.2 Pursuant to Section 13-1-191, NMSA 1978, reference is hereby made to the Criminal Laws of New Mexico (including 30-24-1, 30-23-2, and 30-41-1 through 3-41-3, NMSA 1978), which prohibit bribes, kick-backs, and gratuities and violation of which constitutes a felon. Further, the Procurement Code (13-1-28 through 13-1-199, NMSA 1978), imposes civil and criminal penalties for its violation

5.0 PROTESTS

5.1 Any Contractor who is aggrieved in connection with a procurement may protest to the City Purchasing Agent and the Owner. The protest should be made in writing within twenty-four (24) hours after the facts or occurrences; giving rise thereto, but in no case, less that within fifteen (15) calendar days after the facts or occurrences giving rise thereto (13-1-173, NMSA 1978).

5.2 In the event of a timely protest under Section 5.1 (13-1-172 of the Procurement Code, NMSA 1978), the City Purchasing Agent and the Owner shall not proceed further with the procurement unless the State Purchasing Agent or the Owner makes a determination that the award of contract is necessary to protect substantial interests of the Owner (13-1-173, NMSA 1978).

5.3 The City Purchasing Agent or his designee shall have the authority to take any action reasonably necessary to resolve a protest of an aggrieved Contractor concerning a procurement.

5.4 This authority shall be exercised in accordance with adopted regulations, but shall not include the authority to award money damages or attorneys' fees (13-1-174, NMSA 1978).

5.5 The City Purchasing Agent or his designee shall promptly issue a determination relating to the protest. The determination shall:

A) State the reasons for the action taken; and,

B) Inform the protestant of the right to judicial review of the determination pursuant to Section 13-1-183, NMSA 1978 (13-1-175, NMSA 1978).

5.6 A copy of the determination issued under Section 13-1-175, NMSA 1978, shall be mailed immediately to the protestant (13-1-176, NMSA 1978).

6.0 CONTRACT BOND REQUIREMENTS

6.1 The Successful Bidder, where the Contract Price exceeds twenty five thousand dollars ($25,000), shall post a one hundred percent (100%) Performance Bond and a one hundred percent (100%) Labor and Material Payment Bond. Bonds shall be executed on Performance Bond and Labor and Material Payment Bond forms attached hereto, with amount payable conforming to the terms of the contract. Surety shall be a company licensed to do business in the State of New Mexico and acceptable to the Owner.

6.2 Personal sureties may be accepted if the Owner so determines in advance, but in such case the amount of the Bond shall be the full Contract Price, and the sureties shall justify under oath in amounts above liabilities and exemptions aggregating double the amount of the Bond.

6.3 Special attention of Bidders is called to the requirements of Section 13-4-18 through 13-4-20, NMSA 1978 regarding a Contractor who does not have his principal place of business in the State of New Mexico for all taxes due arising out of construction services rendered under the Contract.

6.3.1 The right to sue on this Bond accrues only to the Owner and the parties to whom Sections 13-4-18 through 13-4-20, NMSA 1978 grant such right; and any such right shall be exercised only in accordance with the provisions and limitations of said statues.

7.0 NON-RESIDENT CONTRACTOR'S REQUIREMENTS REGARDING GROSS RECEIPTS TAX SURETY BOND

7.1 Section 7-1-55A, NMSA 1978 provides that any person (as defined in Section 7-1-3, NMSA 1978) engaged in the construction business who does not have his principal place of business in New Mexico and enters into a prime construction contract to be performed in this State shall, at the time such contract is entered into, furnish the Director of the Revenue Division, Taxation and Revenue Department, or his delegate with a surety bond or other acceptable security in a sum equivalent to the gross receipts to be paid under the contract multiplied by the applicable rate of the gross receipts tax imposed by Section 7-9-4, NMSA 1978 to secure payment of the tax imposed on the gross receipts from the contract, and shall obtain a certificate form the Director of the Revenue Division, Taxation and Revenue Department, or his delegate that the requirements of this paragraph have been met.

7.2 If the total sum to be paid under the contract is changed by ten percent or more after the date the surety bond or other acceptable security is furnished, to the Director or his delegate, such person shall increase or decrease, as the case may be, the amount of the bond or security within fourteen days after the change (7-1-55B, NMSA 1978).

7.3 In addition to the above requirements, the Contractor will be subject to all the requirements of the City Procurement Code.

8.0 CONTRACTOR'S GROSS RECEIPTS TAX REGISTRATION

8.1 Section 7-10-4, NMSA 1978 provides that any person (as defined in Section 7-10-3, NMSA 1978) performing services for the City of Santa Fe, as those terms are used in the Gross Receipts and Compensating Tax Act (Section 7-10-1 to 7-10-5, NMSA 1978), must be registered and be issued an identification number with the Revenue Division of the Taxation and Revenue Department to pay the gross receipts tax.

8.2 The identification number is needed to properly complete the approval process of the contract; therefor, so as to cause no delay in the processing, the Contractor must register with the State of New Mexico, Taxation and Revenue Department. For information contact:

Revenue Division
Taxation and Revenue Department
1100 South St. Francis Drive
Santa Fe, New Mexico 87504
(505)827-0700

8.3 If any person who performs services for the City of Santa Fe is not registered to pay the gross receipts tax, the City shall withhold payment of the amount due until the person has presented evidence of registration with the Revenue Department to pay the gross receipts tax.

9.0 CONTRACT WITH NONRESIDENT PERSON OR PARTNERSHIPS OR UNADMITTED FOREIGN CORPORATIONS; AGENT FOR SERVICE OF PROCESS

9.1 Special attention of Bidders is called to requirements of Sections 13-4-21 through 13-4-24, NMSA 1978, whereby a public works contract with a nonresident person or partnership or foreign corporation not authorized to do business in the State shall contain a specific provision designating an agent resident within the State, and his address, upon whom process and writs in any action or proceeding against such business may be served in any action arising out of such contract.

10.0 METHOD OF CALCULATING CHANGE ORDER COSTS

10.1 By submission of a Bid, the Contractor agrees and binds himself to the following method of calculating Change Order costs. The Owner also agrees to the following method of calculating the cost of any changes to the Contract. With each proposal for a change in the amount of the Contract, the Contractor shall submit an itemized breakdown of all increases or decreases in the cost of the Contractor's and all Subcontractor's and Sub-subcontractor's work to include at least the following detail in the general order listed:

A) Material quantities and unit costs;

B) Labor amounts and hourly rates (identified with specific items of material to be placed or operation to be performed);

C) Costs inherent in use of Contractor/Sub-subcontractor owned equipment;

D) Equipment rental, if any;

E) Workmen's compensation and public liability insurance;

F) General administration, overhead, supervision, project insurance and profit, based on the following schedule:

Subtotal before Applying the Percentage Shown	$500 & Less	Over $500
Contractor for work performed by his own forces	22%	19%
Contractor for work performed by Subcontractor	10%	8%
Subcontractor for work performed by his own forces	18%	15%
Subcontractor for work performed by Sub-subcontractor	10%	8%
Sub-subcontractor for work performed by his own forces	18%	15%

G) Employment taxes under FICA and FUTA; and

H) State gross receipts tax (Contractor only).

10.2 The quotation for work under a Change Order shall be binding for sixty (60) days from the date submitted by the Contractor.

11.0 MINIMUM WAGE RATES

11.1 The Minimum Wage Rate Determinations for this Project are shown in this section. This project is subject to New Mexico State Wage Rate Decision No. SF-15-1666-H if the amount of the base bid is equal to or greater than $60,000.

12.0 FORM OF CHANGE ORDER, & SUBSTANTIAL COMPLETION and FINAL COMPLETION CERTIFICATES

12.1 The Change Order forms, Certificate of Substantial Completion form and the Certificate of Final Completion form issued by the Owner are to be utilized by the Contractor and the Architect, pursuant to the requirements of the General Conditions. There are two Change Order forms, one for approval by the City Manager, and one for the approval of City Council.

13.0 STATE OF NEW MEXICO STATE INDUSTRIES DIVISION

13.1 The Contractor, at his own expense, shall secure the required building permits from the State CID as required for this Project. Contractor shall adhere to the requirements established for inspections.

14.0 CITY OF SANTA FE REQUIREMENTS

14.1 The General Contractor shall include in the Bid the cost of all landfill dumping fees; additionally, the General Contractor shall be responsible that all rubble, excess materials, etc., are disposed of at an approved, legal dumping site.

(00 7343) MINIMUM WAGE RATES & CITY LIVING WAGE

STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division,
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
www.dws.state.nm.us

Wage Decision Approval Summary

1) Project Title: CNG Fuel Facility Upgrades
Requested Date: 07/12/2016
Approved Date: 07/14/2016
Approved Wage Decision Number: SF-16-1327-A/B/H

Wage Decision Expiration Date for Bids: 11/11/2016

2) Physical Location of Jobsite for Project:
Job Site Address: 2931 Rufina St
Job Site City: Santa Fe
Job Site County: Santa Fe

3) Contracting Agency Name (Department or Bureau): CITY OF SANTA FE
Contracting Agency Contact's Name: Mary MacDonald
Contracting Agency Contact's Phone: (505) 955-5934 Ext.

4) Estimated Contract Award Date: 10/21/2016

5) Estimated total project cost: $3,322,172.00
a. Are any federal funds involved?: No
b. Does this project involve a building?: Yes - Construction of addition to single story CNG compressor station building for housing of industrial gas processing equipment (approx. 550 sq. ft.), construction of pre-engineered metal building system canopy structures, non-enclosed (7,500 sq. ft. approx. total)
c. Is this part of a larger plan for construction on or appurtenant to the property that is subject to this project?: No
d. Are there any other Public Works Wage Decisions related to this project?: No
e. What is the ultimate purpose or functional use of the construction once it is completed?: CNG fuel facility

6) Classifications of Construction:

Classification Type and Cost Total	Description
Highway/Utilities (A) **Cost:** $804,646.00	earthwork, backfill and compaction, clearing/grubbing, grading, concrete vehicular paving, underground storm water infrastructure, site lighting and general power, and high pressure piping
General Building (B) **Cost:** $1,159,927.00	concrete foundations, masonry exterior walls, steel framing, roofing, pre-engineered metal building systems, installation of CNG fuel compressors and dryers, painting, signage, electrical distribution, power and lighting
Highway Engineering (H) **Cost:** $1,357,599.00	CNG storage tank, slow fill fuelling stations, fast fill fueling station, steel bollards and canopies

TYPE "A" - STREET, HIGHWAY, UTILITY & LIGHT ENGINEERING

Effective January 1, 2016

Trade Classification	Base Rate	Fringe Rate
Bricklayer/Blocklayer/Stonemason	23.32	8.04
Carpenter/Lather	23.40	9.02
Cement Mason	17.11	6.32
Ironworker	26.50	14.32
Painter (Brush/Roller/Spray)	16.00	5.58
Electricians (outside)		
Groundman	21.28	10.53
Equipment Operator	30.54	12.94
Lineman/Wireman or Tech	35.94	14.34
Cable Splicer	39.52	15.28
Plumber/Pipefitter	28.30	4.07
Laborers		
Group I	12.20	5.30
Group II	12.50	5.30
Group III	12.90	5.30
Operators		
Group I	16.69	6.16
Group II	17.44	6.16
Group III	17.55	6.16
Group IV	17.63	6.16
Group V	17.75	6.16
Group VI	17.89	6.16
Group VII	18.27	6.16
Group VIII	18.50	6.16
Group IX	25.45	6.16
Group X	28.35	6.16
Truck Drivers		
Group I	13.32	0.26
Group II	13.52	0.26
Group III	13.72	0.26
Group IV	13.92	0.26

NOTE: SUBSISTENCE, ZONE AND INCENTIVE PAY APPLY ACCORDING TO THE PARTICULAR TRADES COLLECTIVE BARGAINING AGREEMENT. DETAILS ARE LOCATED AT WWW.DWS.STATE.NM.US.

TYPE "B" - GENERAL BUILDING

Effective January 1, 2016

Trade Classification	Base Rate	Fringe Rate	Apprenticeship
Asbestos Worker - Heat & Frost Insulator	31.26	11.11	0.50
Boilermaker	21.77	3.98	0.50
Bricklayer/Blocklayer/Stonemason	23.32	7.30	0.50
Carpenter/Lather	23.40	8.18	0.50
Cement Mason	19.61	9.57	0.50
Electricians			
Outside Classifications			
Groundman	21.28	10.32	0.50
Equipment Operator	30.54	12.64	0.50
Lineman/Tech	35.93	13.98	0.50
Cable Splicer	39.52	14.88	0.50
Inside Classifications			
Wireman/Technician	29.90	9.75	0.50
Cable Splicer	32.89	9.84	0.50
Sound Classifications			
Installer	23.39	8.31	0.50
Technician	28.95	7.52	0.50
Soundman	27.01	8.31	0.50
Elevator Constructor	38.37	28.08	0.50
Elevator Constructor Helper	26.86	28.08	0.50
Glazier	20.15	3.65	0.50
Ironworker	26.50	13.68	0.50
Painter (Brush/Roller/Spray)	16.00	5.18	0.50
Paper Hanger	16.00	5.18	0.50
Drywall Finisher/Taper	23.40	8.18	0.50
Plasterer	21.39	7.66	0.50
Plumber/Pipefitter	31.14	11.55	0.50
Roofer	15.18	0.50	0.50
Sheetmetal Worker	28.28	15.37	0.50
Soft Floor Layer	23.40	8.18	0.50
Sprinkler Fitter	27.95	17.87	0.50
Tile Setter	14.80	1.20	0.50
Tile Setter Helper	13.00	1.02	0.50
Laborers			
Group I	15.68	5.40	0.50
Group II	16.33	5.40	0.50
Group III	17.30	5.40	0.50
Group IV	19.53	5.40	0.50
Group V	17.60	5.40	0.50
Group VI	17.75	5.40	0.50
Operators			
Group I	19.57	6.00	0.50
Group II	21.53	6.00	0.50
Group III	21.95	6.00	0.50
Group IV	22.35	6.00	0.50
Group V	22.52	6.00	0.50
Group VI	22.71	6.00	0.50
Group VII	22.82	6.00	0.50
Group VIII	25.56	6.00	0.50
Truck Drivers			
Group I	14.76	6.25	0.50
Group II	15.00	6.25	0.50
Group III	15.50	6.25	0.50
Group IV	15.51	6.25	0.50
Group V	15.60	6.25	0.50
Group VI	15.75	6.25	0.50
Group VII	15.90	6.25	0.50
Group VIII	16.11	6.25	0.50
Group IX	16.32	6.25	0.50

NOTE: SUBSISTENCE, ZONE AND INCENTIVE PAY APPLY ACCORDING TO THE PARTICULAR TRADES COLLECTIVE BARGAINING AGREEMENT. DETAILS ARE LOCATED AT WWW.DWS.STATE.NM.US.

TYPE "H" - HEAVY ENGINERRING

Effective January 1, 2016

Trade Classification	Base Rate	Fringe Rate	Apprenticeship
Asbestos Worker - Heat & Frost Insulator	31.26	11.11	0.50
Boilermaker	18.50	3.31	0.50
Bricklayer/Blocklayer/StoneMason	23.32	7.30	0.50
Carpenter/Lather	23.40	8.62	0.50
Millwright/Piledriver	31.00	14.56	0.50
Cement Mason	20.50	9.24	0.50
Electricians			
Outside Classifications			
Groundman	21.28	10.57	0.50
Equipment Operator	30.54	12.98	0.50
Lineman/Tech	35.93	14.23	0.50
Cable Splicer	39.52	15.13	0.50
Inside Classifications			
Wireman/Tech	29.70	9.94	0.50
Cable Splicer	32.67	10.03	0.50
Glazier	20.15	3.65	0.50
Ironworker	26.50	13.68	0.50
Painter (Brush/Roller/Spray)	21.17	6.53	0.50
Plumber/Pipefitter	31.14	11.55	0.50
Roofer	19.56	11.34	0.50
SheetmetalWorker	28.28	15.37	0.50
Operators			
Group I	17.67	5.83	0.50
Group II	18.76	5.83	0.50
Group III	19.41	5.83	0.50
Group IV	19.62	5.83	0.50
Group V	19.68	5.83	0.50
Group VI	19.82	5.83	0.50
Group VII	19.94	5.83	0.50
Group VIII	21.38	5.83	0.50
Group IX	26.45	5.83	0.50
Group X	29.35	5.83	0.50
Laborers			
Group I	18.00	5.05	0.50
Group II	19.18	5.05	0.50
Group III	19.53	5.05	0.50
Group IV	19.94	5.05	0.50
Group V	20.30	5.05	0.50
Group VI	19.03	5.05	0.50
Group VII	19.18	5.05	0.50
Group VIII	19.43	5.05	0.50
Group IX	19.63	5.05	0.50
Group X	20.30	5.05	0.50
Truck Drivers			
Group I	15.05	4.94	0.50
Group II	15.25	4.94	0.50
Group III	15.45	4.94	0.50
Group IV	15.65	4.94	0.50

NOTE: SUBSISTENCE, ZONE AND INCENTIVE PAY APPLY ACCORDING TO THE PARTICULAR TRADES COLLECTIVE BARGAINING AGREEMENT. DETAILS ARE LOCATED AT WWW.DWS.STATE.NM.US.

STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
www.dws.state.nm.us

PUBLIC WORKS PROJECT REQUIREMENTS

As a participant in a Public Works project valued at more than $60,000 in the State of New Mexico, the following list addresses many of the responsibilities that are defined by statute or regulation to each project stakeholder.

Contracting Agency

- Ensure that all Contractors wishing to bid on a Public Works project when the project is $60,000 or more are actively registered with the Public Works and Apprenticeship Application (PWAA) website: http://www.dws.state.nm.us/pwaa (Contractor Registration) prior to bidding.
- Please submit Notice of Award (NOA) and Subcontractor List(s) to the PWAA website promptly after the project is awarded.
- Please update the Subcontractor List(s) on the PWAA website whenever changes occur.

General Contractor

- Provide a complete Subcontractor List and Statements of Intent (SOI) to pay Prevailing Wages for each Contractor to the Contracting Agency within 3 (three) days of award.
- Ensure that all Subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: http://www.dws.state.nm.us/pwaa prior to bidding when their bid will exceed $60,000.
- Submit bi-weekly certified payrolls to the Contracting Agency.
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- Confirm the Wage Rate poster, provided in PWAA, is displayed at the job site in an easily accessible place.
- Make sure, when a project has been completed, the Affidavits of Wages Paid (AWP) is sent to the Contracting Agency.

Subcontractor

- Ensure that all Subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: http://www.dws.state.nm.us/pwaa prior to bidding when their bid will exceed $60,000.
- Submit bi-weekly certified payrolls to the General Contractor(s).

- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.

Additional Information

Reference material and forms may be found at New Mexico Department of Workforce Solutions Public Works web pages at: http://www.dws.state.nm.us/new/Labor_Relations/publicworks.html.

CONTACT INFORMATION

Contact the Labor Relations Division for any questions relating to Public Works projects by email at public.works@state.nm.us or call (505) 841-4400.

STATEMENT OF INTENT TO PAY PREVAILING WAGES
To Be Completed Before Construction Starts
All FIELDS ARE REQUIRED
FORM MUST BE SENT TO THE CONTRACTING AGENCY WITHIN 3 DAY OF THE AWARD

General Contractor Information		
Company Name:		
Address:		
City :	State:	Zip:
Phone:	Fax:	E-Mail:
Estimated Start Date:	**State Wage Decision Number:**	
Project Title:	Project Physical Address:	
Total Contract Amount:	Estimated Completion Date:	
Print Name:	General Contractor Signature:	

Sub Contractor Information	Sub Contract Amount:	Start date on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	E-Mail:
Print Name:	Sub Contractor Signature:	

2nd, 3rd, etc. Tier Sub-Contractor Information	Contract Amount:	Start date on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	E-Mail:
Print Name:	Tier Signature:	

I hereby certify that the above information is correct and that all workers I employ on this public works project will be paid no less than the Prevailing Wage Rate(s) as determined by the Department of Workforce Solutions, Labor Relations Division for this project as identified by the State Wage Decision Number. I understand that contractors who violate Prevailing Wage Laws (i.e., incorrect job classification, improper payment of prevailing wages, and/or overtime, etc.), are subject to debarment procedures and shall be required to pay any back wages due to workers. (Ref. Labor Relations Division, Public Works Minimum Wage Act Policy Manual (11.1.2 NMAC) & Public Works Minimum Wage Act (13-4-11 through 13-4-18, NMSA 78).

_____ _____
Contractor's Signature Date

(Revised 08/23/2013)

INSTRUCTIONS FOR COMPLETING STATEMENT OF INTENT TO PAY PREVAILING WAGES

GENERAL CONTRACTOR

1. Enter general contractor information and provide signature.
2. Enter State Wage Decision Number as listed in bid documents. (Example: BE-13-0123 B)
3. Enter project title - listed in bid documents.
4. Enter project physical address - exact location of project (job site).
5. Enter estimated start & completion dates of project.
6. Enter general contractor's contract amount.
7. All Statements must be sent to the Contracting Agency.

SUB CONTRACTOR

1. Enter general contractor information, but general contractor signature is not needed.
2. Enter sub contractor information as indicated and provide signature.
3. Enter sub contractor contract amount.

NOTE: A separate signed form is needed for each contractor.

2ND TIER SUB CONTRACTOR

1. Enter general contractor information, but general contractor signature is not needed.
2. Enter sub contractor information; subcontractor signature not needed.
3. Enter 2nd tier sub information and provide signature.
4. Enter 2nd tier contractors contract amount.

3RD TIER AND HIGHER CONTRACTOR

1. Attach a copy of this completed form & list the 3rd tier contractor information under the 2nd tier

City of Santa Fe Living Wage Ordinance

PURSUANT TO THE CITY OF SANTA FE LIVING WAGE ORDINANCE, SECTION 28-1 SFCC 1987 EFFECTIVE MARCH 1, 2016 ALL WORKERS WITHIN THE CITY OF SANTA FE SHALL BE PAID A LIVING WAGE OF

$10.91 PER HOUR

Santa Fe's Living Wage

- The Santa Fe Living Wage Ordinance establishes minimum hourly wages.
- The March Living Wage increase corresponds to the increase in the Consumer Price Index (CPI).
- All employers required to have a business license or registration from the City of Santa Fe ("City") must pay at least the adjusted Living Wage to employees for all hours worked within the Santa Fe city limits.

Who is Required to Pay the Living Wage?

- The City to all full-time permanent workers employed by the City;
- Contractors for the City, that have a contract requiring the performance of a service but excluding purchases of goods;
- Businesses receiving assistance relating to economic development in the form of grants, subsidies, loan guarantees or industrial revenue bonds in excess of twenty-five thousand dollars ($25,000) for the duration of the City grant or subsidy;
- Businesses required to have a business license or registration from the City; and
- Nonprofit organizations, except for those whose primary source of funds is from Medicaid waivers.
- For workers who customarily receive more than one hundred dollars ($100) per month in tips or commissions, any tips or commissions received and retained by a worker shall be counted as wages and credited towards satisfaction of the Living Wage provided that, for tipped workers, all tips received by such workers are retained by the workers, except that the pooling of tips among workers shall be permitted.

More Information, including the Living Wage Ordinance, is available at
http://www.santafenm.gov
(Click on Hot Topics/Living Wage)

City of Santa Fe Living Wage Ordinance

EFECTIVO DESDE EL DÍA PRIMERO DE MARZO DE 2016 PARA TODOS LOS TRABAJADORES QUE LABOREN DENTRO DE LOS LÍMITES DE LA CIUDAD DE SANTA FE EL SALARIO MÍNIMO ESTABLECIDO QUE DEBERÁ SER PAGADO ES DE

$10.91

POR HORA

Salario Mínimo para la ciudad de Santa Fe

- La ciudad de Santa Fe establece salario mínimo por hora.
- Desde el Marzo el incremento de salario, corresponde con el aumento en el índice de precios al consumidor (IPC).
- Todos los empleadores requieren, por ley, tener una licencia o registro de la ciudad de Santa Fe, deben pagar al menos el salario ajustado a los empleados de todas las horas trabajadas dentro de los límites de la ciudad de Santa Fe.

¿Quién está obligado a pagar el salario?

- La ciudad a todos los trabajadores a tiempo completo permanentes contratados por la ciudad;
- Contratistas para la ciudad, tiene un contrato que requiere la prestación de un servicio, pero excluyendo las compras de mercancías;
- Empresas reciben asistencia en relación con el desarrollo económico en forma de becas, subsidios, garantías de préstamos o bonos industriales de ingresos superiores a 25 mil dólares ($25,000) para la duración de la beca de ciudad o de subvención;
- Empresasrequieren contar con la licencia o el registro de la ciudad; y
- Organizaciones sin fines de lucro, con excepción de aquellos cuya principal fuente de fondos es de exenciones de Medicaid.
- Para los trabajadores que habitualmente reciben más de cien dólares ($100) por mes en consejos o comisiones, consejos o comisiones recibidas y retenida por un trabajador serán contados como salarios y acreditados hacia la satisfacción de los salario siempre que, para los trabajadores reciben propinas, todos los consejos recibidos por estos trabajadores son retenidos por los trabajadores, salvo que se permitirá la puesta en común de consejos entre los trabajadores.

Más información, incluyendo la ordenanza del salario, está disponible en
http://www.santafenm.gov
(haga clic en Hot Topics/Living Wage)

EXHIBITS
(00 8000)

(00 8001) SAMPLE PROJECT SIGN

Sample for project sign follows this page. Refer to Section 01 50 00: Temporary Facilities and Controls for further details.

Another Public Works CITY OF SANTA FE PUBLIC WORKS **Improvement!**

DAVID COSS
Mayor

MIGUEL M. CHAVEZ
Mayor Pro Tem

City Councilors

PATTI J. BUSHEE
CHRIS CALVERT
District 1

KAREN HELDMEYER
REBECCA WURZBURGER
District 2

MIGUEL M. CHAVEZ
CARMICHAEL A. DOMINGUEZ
District 3

MATTHEW E. ORTIZ
RONALD S. TRUJILLO
District 4

GALEN BULLER
City Manager

WILLIAM TALLMAN
Deputy City Manager

Old Pecos Trail Improvements

Phase II Cordova Road to Berger St.

CIP NO. 852A-II

PROJECT COST:

ESTIMATED COMPLETION: Summer 2008

CONTRACTOR:

Mayor's Office
955-6590

City Manager
955-6509

Information
955-6949

Engineering
955-6631

Graffiti Hotline
955-2255

Police Dispatch
428-3710

Public Works Dept.
955-6621

Stormwater Hotline
955-5644

Streets Division
955-3000

Traffic Engineering
955-6631

www.santafenm.gov

Thanks for your patience while we're
Making and Keeping Santa Fe Beautiful...Again!

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Work covered by Contract Documents.
2. Contractor's duties.
3. Work by others.
4. Contractor use of site.
5. Work and site restrictions.
6. Archeological discoveries.
7. Identification of entities.
8. Specification and drawing conventions.
9. Definitions
10. Abbreviations.

B. Related Requirements:

1. Document 00 52 00 – Agreement Forms.

   a. Duties of the Contractor.
   b. Architect's authority.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Contract covers construction of an expansion to the existing compressed natural gas (CNG) fueling facilities for the City of Santa Fe Transit and Environmental Services Divisions located on various portions of the City properties located at 2931 Rufina Street, Santa Fe, New Mexico. Work includes:

1. Earthwork, grading and compaction of undeveloped portions of the City Yards site to form a new fueling area. Expansion of the existing storm water detention area.

2. Construction of new concrete fuel islands and parking stalls for Environmental Services Division.

3. Construction of subsurface storm water infrastructure, including drains, pipes and an oil-water separator.

4. Demolition of portions of existing CNG compressor station building to facilitate addition and installation of new equipment.

5. Construction of a new one-story addition to the existing CNG compressor station.

6. Construction of a new public fuel island.

7. Modifications to existing canopy structures in the Transit Yard to facilitate the installation of new fueling infrastructure.

8. Construction of a new fueling island within the existing Transit Yard.

9. Construction of new concrete foundations for pre-engineered canopy structures at the new public fuel island and the Transit Yard.

10. Construction of a complete CNG fueling system, including:

    a. Electrically-operated natural gas compressors
    b. Gas dryer
    c. Storage vessels
    d. Public-use CNG dispenser and fuel management terminal
    e. Fuel dispensers, fill posts and hoses for time-fill operations
    f. All other items as specified and as necessary to form a complete, functional installation.

11. Concrete and asphalt paving and patching.

12. Construction of pre-engineered metal canopy over new fuel island in Transit Yard and public fuel island shall, if accepted by Owner, be constructed as Alternates to the Base Bid Work.

13. Electrical demolition, power, distribution and lighting, including a new primary electrical service and transformer.

14. Other work as indicted in Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 CONTRACTOR'S DUTIES

A. Except as noted, provide and pay for all labor, materials, and equipment.

B. Pay for all utilities required to complete Work. Owner will pay electric utility provider directly for costs relating to new electric service at compressor station.

C. Pay required sales, gross receipts, and other taxes. Owner will pay Contractor applicable New Mexico Gross Receipts Tax and any increase in tax becoming effective after Contract date. Tax is to be listed separately on Bid Form and included as separate amount on Schedule of Values and Applications for Payment.

D. Secure and pay for permits, fees, and licenses necessary for execution of Work as applicable at time of Bid or as required by other Specification Sections.

E. Give required notices.

F. Coordinate with Public Utility companies as required for orderly progression and completion of the work. Notify utility company's designated representatives of overall project schedule and need dates, and cooperate with utility's workforces for access to site for installation of new electrical transformer and gas meters/regulators.

G. Comply with codes, ordinances, regulations, and other legal requirements of public authorities which bear on performance of Work.

H. Request required inspections from public authorities, correct any noted deficiencies, and obtain certifications of satisfactory inspection. Deliver certificates to Owner in accordance with Section 01 77 00 – Closeout Procedures.

1.5 WORK BY OTHERS

A. Owner will award separate construction contracts or elect to self-perform the following activities:

1. Placement of cold millings on prepared sub-base around the Solid Waste time-fill fuel islands.
2. Landscaping around the expanded CNG compressor station building.

B. Owner's responsibilities: Schedule work by Owner's staff and others under separate contract with owner, and inform Contractor.

C. Contractor's responsibilities:

1. Coordinate work with other installers.
2. Inform Owner of installation dates for work by others.
3. Review shop drawings, product data, and installation instructions; coordinate installation with other work and provide blocking and other preparation required for Owner supplied products.

1.6 CONTRACTOR USE OF SITE

A. Access to the project site shall be as agreed to by the Owner prior to commencement of the Work.

B. Material storage, staging and parking: limit to areas as indicated on Site Mobilization Plan as described in Section 01 50 00: Temporary Facilities and Controls.

C. Unless otherwise agreed in advance by Owner, construction shall be performed only during these time periods:

1. 7 AM to 9 PM for work outside of Siler Yards security fenced area, Monday through Friday.

2. 7 AM to 5 PM for work inside of Siler Yards security fenced area, Monday through Friday.
3. Saturday and Sunday and holidays if scheduled with and authorized by Owner in writing in advance.

D. Construction activities shall be limited to areas of actual construction. Restrict workmen from entering existing buildings and other areas.

E. When on site, Contractor shall not allow work force to:

1. Consume alcoholic beverages.
2. Bring firearms, weapons, or contraband on grounds.
3. Use foul language.
   a. Nonsmoking Site: Smoking is not permitted within any area of the site where construction activities are taking place. Smoking is also not permitted in areas designated as such, including existing fueling facility areas or around entrances of existing buildings.

F. Do not allow dust and debris to blow onto adjacent areas.

G. Existing building emergency exits and site exits shall be maintained during construction in a manner satisfactory to the Owner.

H. Coordinate all utility shutdowns with Owner.

1. Protect facilities and equipment from damage due to shutdown and start-up of utility.
2. Schedule outages to facilitate Owner's operations and minimize disruption of activities.
3. Submit written request for outage to Owner 10 calendar days before anticipated outage. Outage must be approved in writing by Owner.

1.7 WORK AND SITE RESTRICTIONS

A. Siler Yards is presently occupied by City of Santa Fe and sees heavy use by a number of separate City departments. Santa Fe Trails operates the bus system from the Transit Yard and adjacent maintenance shop. No interruptions or shut-downs of the Yard that would adversely affect the operation of the bus system will be accepted. Coordinate with stakeholders as designated by Owner for scheduling of work that could affect operations, and minimize extent and duration of disruptions to greatest extent possible. Do not block or otherwise adversely affect vehicular operations within and around the Transit Yard.

B. The existing CNG compression equipment is presently in-service and is used daily for fueling of the Transit fleet, garbage trucks operated by Environmental Services Division and the traveling public. The existing equipment shall remain undisturbed and in use throughout the construction period. Any disruptions, outages or disconnection of utilities shall be coordinated in advance with the stakeholders as designated by the Owner to minimize disruption to operations.

C. All construction traffic, access points, laydown/staging areas and construction fence lines shall be proposed by the Contractor and indicated on the Site Mobilization Plan in

accordance with Section 01 50 00 – Temporary Facilities and Controls. Contractor shall use all reasonable efforts to allow operations to continue unimpeded within the Transit Yard and CNG Station sites, including access to the existing public-use CNG dispenser. Restore disturbed areas at limits of construction to original condition upon completion of the Work.

1. Conduct photographic or video survey of areas to be disturbed and adjacent areas prior to commencement of Work. Submit electronic media files to Architect. Use as basis for remedial work to existing areas prior to Substantial Completion.

1.8 ARCHAEOLOGICAL DISCOVERIES

A. If archaeological artifacts (i.e. metal, china, historic ceramics, pottery shards, flaked stone, bone, colored glass, etc.) Are found during earth disturbing activities, cease work immediately, protect the discovery and contact the State Historic Preservation Office (SHPO) at (505) 827-6320.

B. If human remains are found, work must cease immediately in the vicinity of the remains pursuant to State Law. Secure the area to protect the remains from further disturbance and contact the Local law enforcement agency (sheriff's office or city police) with jurisdiction over the area. Law enforcement will contact the Office of Medical Investigator (OMI) and the SHPO. If the OMI determines that the remains are without mediolegal significance, the OMI will terminate jurisdiction to the SHPO. The SHPO will, with the assistance of a professional archaeologist, determine if the remains can be left in place and protected or if they need to be excavated by an archaeologist holding permit to excavate unmarked human burials.

C. Notify Architect and the City Project Manager immediately in addition to entities listed in Parts 1.8 A and 1.8 B if any archeological artifacts and/or human remains are discovered.

1.9 INDENTIFICATION OF ENTITIES

A. Where the term "Architect" is used in the Contract Documents it is defined as the authorized representative designated by the Owner as the design professional for this Project and acting within the scope of the particular duties entrusted to such representative.

1. Architect: Huitt-Zollars, Inc.

2. Project Architect/Manager: John L Jarrard, AIA, LEED-AP.

3. Address:
6501 Americas Parkway, Suite 550
Albuquerque, New Mexico 87110-8154

4. Telephone number: 505-883-8114

5. Fax number: 505-883-5022

6. E-mail: jjarrard@Huitt-Zollars.com.

B. Where the term "Owner" is used in the Contract Documents, it is defined as City of Santa Fe.

1. Project Manager: Mary MacDonald.

2. Address:
2651 Siringo Road, Building H
Santa Fe, New Mexico 87505

3. Telephone number: 505-955-5934

4. Fax number:

5. E-mail: memacdonald@santafenm.gov

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

1.11 DEFINITIONS

A. Refer to Document 00 52 00 - Agreement Forms for definitions of terms used within Contract Documents.

B. Additional terms used within Specifications but not defined by Document 00 52 00 - General Conditions of the Contract shall have the following definitions:

1. Gage: Metal thickness. Same meaning as gauge. Based on these standards:
   a. Wire diameter: American (Brown and Sharp).
   b. Sheet metal: U.S. Standard.

2. Gauge: Metal thickness. Spelling variation of gage.

3. Products: Materials, manufactured items, components, fixtures, machinery, equipment, or systems forming the Work but not including machinery, equipment, and other aids used for preparing, fabricating, conveying, and installing the Work.

4. Supply: Furnish, deliver, and unload at Project site. Same meaning as furnish.

5. Furnish: Supply, deliver, and unload at Project site. Same meaning as supply.

6. Install: Operations at Project site to incorporate products into the Work such as unpacking, assembling, anchoring, erecting, applying, placing, curing, finishing, and preparing for use.

7. Provide: To supply or furnish a product and to also install it.

8. Execution: Operations at Project site including preparatory actions, installing, and post-installation adjusting, testing, cleaning, and demonstrating.

1.12 ABBREVIATIONS

A. Abbreviations used within the Specifications are defined as follows. For abbreviations not listed, contact Architect for definitions.

ASTM - American Society for Testing and Materials
ANSI - American National Standards Institute
CF - Cubic feet
CFM - Cubic feet per minute
CNG – Compressed natural gas
F - Fahrenheit
HVAC - Heating, ventilating, and air conditioning
ICC IBC - International Building Code as published by International Code Council
LF - Linear feet
LB - Pound
MPH - Miles per hour
SCFM – Standard cubic feet per minute
SF - Square feet
SY - Square yards
PSF - Pounds per square foot
PSI - Pounds per square inch
RPM - Revolutions per minute
UL - Underwriters Laboratory

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment. Section includes procedures for:

1. Schedule of Values.
2. Applications for Payment.
3. Contract modifications.

B. Related documents and sections:

1. Document AIA A101-2007 Standard Form of Agreement Between Owner and Contractor.

2. Document 00 52 00 - General Conditions of the Contract.

   a. Procedures for Change Orders and Construction Change Directives.
   b. General procedures for Schedule of Values, Applications for Payment, Certificates for Payment, and Progress Payments.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Submit 1 copy of Schedule of Values to Owner and one copy to Architect. At request of Architect submit substantiating data.
B. Submit as typed schedule or electronic media. Format shall be equivalent to AIA Document G703 Schedule of Values.
C. Sum of all values on Schedule of Values for shall equal total Contract Sum.
D. Provide separate line items for:

1. Mobilization.
2. Demobilization.
3. New Mexico Gross Receipts Tax.
4. Punch List and Closeout Items: a separate amount of $33,000 to cover closeout activities and final completion of Project:

    a. Incomplete items and deficiencies resulting from Final Inspection.
    b. Project record documents.
    c. Operation and maintenance data and demonstration.
    d. Other Project closeout procedures and requirements.

E. When Change Orders are approved, revise schedule to include Change Orders.

1.5 APPLICATIONS FOR PAYMENT

A. Submit 3 copies of each Application for Payment to Architect. Use AIA Document G702 and approved format for Schedule of Values.
B. Payment period: Submit monthly or as otherwise stipulated in Document 00 52 00 - Agreement Forms.
C. Use Schedule of Values for listing items in Applications for Payment.
D. Indicate total amount for each item, percent complete, cost of completed item, cost of materials stored at site for each item, subtotal cost of work completed and materials stored, percent remaining to complete, and cost of items remaining to complete. Provide subtotals and total.
E. List each authorized Change Order as a separate line item and in same format as other line items.
F. Applications shall be original documents signed in ink and signed by authorized officer of Contractor, notarized, and dated.
G. Include with Application for Payment:
    1. Updated Progress Schedule (if required) as specified in Section 01 31 00: Project Management and Coordination.
    2. Monthly SWPPP inspection reports indicating compliance with measures stipulated in NPDES Permit.
    3. Appropriate invoices, photographic evidence, and certificates of insurance in favor of Owner for all materials stored off-site.
    4. Certified payroll: submit weekly certified payroll records for the preceding time period with each monthly Application for Payment.
    5. Updated submittal schedule (if required) as specified in Section 01 33 00: Submittal Procedures.

H. At request of Architect, provide additional substantiating data justifying dollar amounts in question.
I. If in the Architect's opinion, some items on Application for Payment are not sufficiently complete, Architect will request Contractor to revise and resubmit Application for Payment to more realistically reflect percentage of work complete.

1.6 CONTRACT MODIFICATION PROCEDURES

A. Changes in the Work shall be determined and Change Orders executed in accordance with Document 00 52 00 Agreement Forms and Document 00 73 00, Section 10.0.

1. Minor changes: Architect will advise Contractor of minor changes in Work not involving adjustment to Contract Sum or Time by issuing supplemental instructions.
2. Architect requested Change Order: Architect may issue request a Proposal for Change Order with detailed description of proposed change and supplementary drawings and specifications as required.
3. Contractor proposed Change Order: Contractor may propose change by submitting Request for Change Order to Architect describing proposed change, reason for change, and its effect on Contract Sum and Time. Document requested substitutions in accordance with Section 01 25 13: Substitution Procedures.
4. Construction Change Directive: Architect may issue AIA Form G713 – Construction Change Directive signed by the Owner and instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes and designate method of determining changes in Contract Sum and Time.

B. Documentation: Maintain adequate records and provide full information required for evaluation of proposed changes and to substantiate costs. Provide for each change:

1. Product, labor, and equipment quantities.
2. General Conditions.
3. Justification for changes in Contract Time.
4. Documented credits for deletions.
5. Other documentation as necessary in order to evaluate request.

C. Format: Architect shall prepare Change Order documentation using Owner's standard form.

D. Methods for determining adjustments to Contract Sum:

1. Stipulated sum: Based on Architect's Proposal Request and Contractor's price quotation or Contractor's Request for Change Order as approved by Architect. Costs shall be presented and determined in accordance with the method stipulated in Document 00 73 00 Supplementary Conditions.

E. Revision of documents: After authorization of Change Order, promptly revise:
1. Schedule of Values and Application for Payment forms to record each Change Order as a separate line item and adjust Contract Sum and Time.
2. Progress Schedules to reflect changes in Contract Time and to adjust times for other work items affected by changes. Resubmit revised schedule.
3. Record changes in Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 20 00

SECTION 01 21 13

CASH ALLOWANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Descriptions, amounts and procedures for cash allowances covering additional work to be determined by Owner and Architect during construction period.

1.1 RELATED SECTIONS

A. Section 01 20 00 – Price and Payment Procedures: procedures for processing change orders involving cash allowances.

1.2 CASH ALLOWANCES

A. Costs included in cash allowances: labor, materials and equipment for executing cash allowance work.

B Costs not included in cash allowance but included in Contract Sum: Contractor's Overhead and Profit, bonds, insurance. Gross Receipts Tax shall be listed separately in accordance with Section 01 20 00 – Price and Payment Procedures.

B. Differences between allowance amounts and actual cost of executed Work and materials shall be adjusted by Change Order in accordance with Section 00 72 00 – General Conditions of the Contract.

1.3 CASH ALLOWANCE SCHEDULE

A. Allowance No. 1 – Utility Removal and Relocation: provide sum of $10,000.00 for the capping, re-routing and removal of unforeseen buried utilities encountered in the course of the Work. Allowance shall only be expended for buried lines where locations are not known, not identified on the Drawings, and cannot be reasonably inferred from Contract Documents or Information Available to Bidders.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used

END OF SECTION 01 21 13

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures and descriptions for alternates which increase scope of Project.

1.1 RELATED SECTIONS

A. Section 00 52 00 – Agreement Forms: incorporation of accepted alternates to determine Contract Sum.

1.2 CONDITIONS

A. All requirements of General and Supplemental General Conditions, applicable section of Specifications, and applicable portions of Drawings shall govern scope, quality, and execution of alternates.

B. Owner shall have right to accept one or more alternates at no change in price listed on Bid Form. Alternates will be selected in any order and as allowed by available funding.

1.3 ADDITIVE ALTERNATE NO. 1 – PRE-ENGINEERED CANOPY AT TRANSIT YARD

A. Alternate requires construction of a free-standing steel canopy structure over the new fuel bays in the Transit Yard.

1. Pre-engineered structure shall be in accordance with design criteria set forth in the Drawings and Specifications.

2. Scope of alternate includes field-painting of exposed steel structure that is not factory finished.

3. Lighting and other Work as described in electrical Drawings and Specifications.

B. If Additive Alternate No.1 is not selected by Owner:

1. Complete all earthwork, structural foundations, asphalt paving work and other items as described in Drawings and Specifications for Base Bid.

2. Record location and depth below surface of foundations on Project Record Drawings in accordance with Section 01 78 39: Project Record Documents.

1.4 ADDITIVE ALTERNATE NO. 2 – PRE-ENGINEERED CANOPY AT NEW PUBLIC FUEL ISLAND

A. Alternate requires construction of a free-standing steel canopy structure over the new public fuel island

1. Pre-engineered structure shall be in accordance with design criteria set forth in the Drawings and Specifications, and shall be designed and constructed specifically for use in compressed natural gas facilities.

2. Scope of alternate includes field-painting of exposed steel structure that is not factory finished.

3. Lighting and other Work as described in electrical Drawings and Specifications.

B. If Additive Alternate No.2 is not selected by Owner:

1. Complete all earthwork, structural foundations, asphalt paving work and other items as described in Drawings and Specifications for Base Bid.

2. Record location and depth below surface of foundations on Project Record Drawings in accordance with Section 01 78 39: Project Record Documents.

1.5 PROCEDURES

A. Consider all work that must be accomplished for complete incorporation of alternates including modification of Base Bid items.

B. Include in lump sum prices for alternates all costs of labor, materials, equipment, permits, fees, insurance, bonds overhead and profit.

C. Immediately after award of Contract, advise all necessary personnel and suppliers as to which alternates have been selected by Owner. Use all means necessary to alert those personnel and suppliers involved as to all changes in the Work caused by Owner's selection or rejection of alternates.

D. Coordinate related work and modify surrounding work to integrate work of each alternate.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used

END OF SECTION 01 23 00

SECTION 01 25 13

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 PRODUCT OPTIONS

A. For products specified by reference standards or by description only, provide any product meeting those standards or description.

B. For products specified by naming one or more manufacturers with the designation that no substitutions are allowed, provide only named products.

C. For products specified by naming one or more manufacturers, provide named products and approved substitute products listed in Addenda, or submit a request for substitution in accordance with Paragraph 1.4.

D. When a manufacturer's specific product is specified, that product shall be the basis for evaluating substitution requests and establishing requirements for product type, characteristics, performance, and quality.

1.4 SUBSTITUTIONS

A. After execution of Contract, Owner and Architect will consider written requests for substitutions from Contractor.

1. Submit separate request for each substitution with Form 01 25 15: Substitution Request Form. Copy of Form follows this Section. Provide data documenting compliance of proposed product with Contract Documents. Include proposed changes to Contract Amount and Time if substitution is accepted.
2. Architect will determine acceptability of proposed substitutions and notify Contractor in writing. Accepted substitutions will be included by Change Order with associated modifications of Contract Amount and Time.
3. Substitutions will not be considered after Contract Award if indicated or implied on shop drawings and product data submittals.

B. Use of approved substitution after Contract Award shall constitute representation that Contractor:

1. Has investigated product and determined it meets or exceeds quality level of specified product.
2. Will provide same warranty for substitution as for specified product.
3. Will coordinate installation and make changes to other work required to accommodate accepted substitution and complete Work.
4. Will pay all costs of modifying Project design caused by use of proposed substitution such as designing, engineering, and drafting at Architect's and Consultants' current, standard rates.
5. Waives claims for additional costs or time extensions related to substitution.
6. Procedure: After Contract Award submit PDF copy of request for substitution to Architect. Hard copies of samples etc. may accompany each substitution request and shall be delivered to the Architect.Limit each request to one proposed substitution.

C. Include in request:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.
2. For products:
   a. Product identification, including manufacturer's name and address.
   b. Manufacturer's literature containing product description, performance and compliance data, and reference standards.
   c. Test reports.
   d. Samples as required.
3. For construction methods:
   a. Detailed description of proposed method.
   b. Drawings illustrating method.
4. Itemized comparison of proposed substitution with product or method specified. List differences between proposed substitution and specified product or method.
5. Any required changes to dimensions indicated on Drawings.
6. Description of affects on other trades.
7. Data relating to changes in construction schedule.
8. For requests submitted after Contract award, give cost data comparing proposed substitution with specified product and amount of proposed change to Contract Sum.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 13

FORM 01 25 15

SUBSTITUTION REQUEST FORM

Specified Product:

_____

Section where specified:

_____

Product for which Substitution is requested:

Product Name:

_____

Model No./Series:

_____

Manufacturer:

_____

Business Address:

_____

Website:

_____

Reason for Substitution Request:

_____

_____

Accompanying Data (Circle as appropriate)

(yes) Description including product data, specifications, performance and compliance data, and applicable referenced standards. (Must be submitted for each substitution request)

(yes) Comparison of proposed product against specified product for all physical properties and characteristics. List differences between proposed substitution and specified product. (Must be submitted for each substitution request)

(yes) (no) Documentation from manufacturer, supplier etc. substantiating reason for substitution request.

(yes) (no) Drawings.

(yes) (no) Photographs.

(yes) (no) Samples.

(yes) (no) Test reports.

(yes) (no) Any required changes to dimensions indicated on Drawings.

(yes) (no) Description of effects on other trades.

(yes) (no) Data relating to changes in construction schedule.

(yes) (no) For items requiring color selections, full range of manufacturer's color samples.

Other:

The undersigned as Contractor for the Project certifies that the following statements are correct. Explanations for all items which are not true are attached.

1. Proposed product meets or exceeds performance, function and quality of specified product.

2. Warranty terms for proposed product shall be no less than that for specified product.

3. Inclusion of proposed product into project shall not require re-design of any aspect of the project.

4. If any aspect of the project will require re-design owing to the inclusion of proposed product, Contractor shall pay for all costs of engineering, design and drafting to Architect and his Consultant's at their prevailing hourly rates.

5. Use of proposed product will not adversely affect dimensions of drawings, ability to integrate within or with other assemblies, correlation and coordination of the work of other trades or the overall construction schedule

6. If any aspect of the project will require re-design owing to the inclusion of proposed product, Contractor shall pay for all costs of engineering, design and drafting to Architect and his Consultant's at their prevailing hourly rates.

7. Maintenance service and replacement parts for proposed product will be readily available in project location.

8. Proposed product does not contain asbestos-containing materials or any other hazardous material in any form.

If substitution is accepted,

- The Contract Sum shall be (increased) (decreased) by $_____
- The Contract Time shall be (increased) (decreased) by _____ days

Submitted By:

Name: _____

Company: _____

Address: _____

Telephone Number: _____

Title: _____

Date: _____

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Submittals.
   2. General coordination procedures.
   3. Field Engineering.
   4. Requests for Information.
   5. Requirements for participation in and administration of:
      a. Pre-construction conference.
      b. Progress meetings.
      c. Pre-installation conferences.
   6. Progress Schedule

1.3 SUBMITTALS

A. Use of CADD files:
   1. Under certain conditions, Contractor will be permitted use of Architect's and Design Consultant's CADD files for documentation of record drawings, submittals, or coordination drawings.
   2. Architect and Design Consultants shall be compensated by Contractor for time required to format the CADD files for delivery to Contractor. Such work may include removal of title blocks, professional seals, calculations, and proprietary information.
   3. Contractor shall complete Electronic Media (Data) Disclosure Form following this Section, including Contractor's name, address, and signature of Contractor's representative prior to request for CADD file usage. Other Divisions of these specifications may include License, Indemnity and Warranty Agreement forms specific to the design professional responsible for those Divisions, in which case those forms shall be used for drawings prepared by that design professional.

B. Provide in accordance with Section 01 33 00 - Submittal Procedures:
   1. Coordination drawings:
      a. Provide where coordination is critical for installation of components fabricated off site and where space is limited and maximum utilization of space is required.
      b. Show relationship and integration of components and construction entities, required installation sequence, dimensions, and tolerances.

c. Combined services coordination drawings: Plans and elevations indicating proposed placement of all fixtures, equipment, devices, and sensors including the following:
   1) Audio-visual, security, and alarm equipment.
   2) Electrical outlets and switches.
   3) Light fixtures.
   4) Control panels.
   5) Fire extinguisher and cabinets.
   6) All other fixtures, devices, equipment, and components mounted on exposed-to-view surfaces.
   7) Major items of equipment specified under Division 43 and their respective recommended minimum manufacturer's clearances.

d. In accordance with Section 01 33 00 - Submittal Procedures provide as part of other appropriate Specification Sections, product data, illustrations, dimensions, and finishes for components listed in Part 1.2.A.1.

C. Staff assignment list:
   1. List of Contractor's principal staff assignments for Project. Indicate names, duties and responsibilities, addresses, and telephone numbers.
   2. Distribute and post in field office and elsewhere on site as appropriate to provide coordination information.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.5 FIELD ENGINEERING

A. Existing control data for field engineering is indicated on Drawings.

B. Locate or establish survey control and reference points prior to starting sitework. Protect points during construction and record locations with horizontal and vertical data on Project Record Documents in accordance with Section 01 78 39: Project Record Documents.

C. Provide field engineering services. Establish elevations, lines, and levels utilizing recognized engineering survey practices. Periodically verify layouts by same means.

D. Promptly replace dislocated control and reference points based on original survey control.

E. Provide field engineering services to locate and stake proposed electric public utility extensions. Coordinate with local utility provider to facilitate timely installation of utility line.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow fifteen days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 20 00: Price and Payment Procedures.

   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within seven days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Present log at each bi-weekly progress meeting. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated. Meetings shall be held weekly during the first month of construction operations, then bi-weekly thereafter or more frequently as required.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees. Items to be included in agenda:
   a. Review previous meeting minutes.
   b. Review schedules and progress, identify impediments, and determine measures to maintain schedules. Provide 3-week look-ahead schedule and discuss progress relative to overall master schedule.
   c. Review field observations, problems, and decisions.
   d. Status of submittals.
   e. Status of RFI's.
   f. Off-site fabrication and delivery schedules.
   g. Quality control.
   h. Review proposed change orders and effect on schedule.

3. Minutes: Architect will record significant discussions and agreements achieved, and will distribute the meeting minutes to everyone concerned, including Owner and Contractor, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Lines of communications.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal of Schedule of Values specified in Section 01 20 00: Price and Payment Procedures.
    k. Review of Site Mobilization Plan as described in Section 01 50 00: Temporary Facilities and Controls.
    l. Submittal procedures.
    m. Procedures for maintaining project record documents.
    n. Use of the premises.
    o. Archaeological discoveries.
    p. Work restrictions.
    q. Working hours.
    r. Responsibility for temporary facilities and controls.
    s. Procedures for disruptions and shutdowns.
    t. Office, work, and storage areas.
    u. Security and housekeeping procedures
    v. Progress cleaning.
    w. Other pertinent items.

4. Minutes: Architect will record and distribute meeting minutes.

C. Preinstallation Conferences: when required by an individual specification section, conduct a preinstallation conference at Project site.
1. Require attendance of entities directly concerned with item of work.
2. Notify Architect 7 days in advance of meeting.
3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Related RFIs.
    c. Related Change Orders.
    d. Deliveries.
    e. Submittals.
    f. Review of mockups/field samples.
    g. Possible conflicts.

h. Compatibility requirements.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's written instructions.
l. Warranty requirements.
m. Compatibility of materials.
n. Acceptability of substrates.
o. Temporary facilities and controls.
p. Space and access limitations.
q. Regulations of authorities having jurisdiction.
r. Testing and inspecting requirements.
s. Installation procedures.
t. Coordination with other work.
u. Required performance results.
v. Protection of adjacent work.

4. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
5. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information within 3 days of meeting.
6. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

1.8 PROGRESS SCHEDULE

A. Format: Horizontal bar chart:
1. Approximate print-out sheet size: 11 by 17 inches.
2. Electronic file of baseline schedule in Microsoft Project format, latest edition.
3. Provide separate bar for each major item of Work. Arrange in sequence and identify bars with six digit numbers and specification section titles from Project Manual Table of Contents.
4. Horizontal scale: Time with first work day of each month identified. Adjust scale to show entire construction period plus extensions.
5. Vertical spacing: Allow space for notations and revisions.

B. Show complete sequence of construction by activity and notate:
1. Dates for beginning and completion of each construction item.
2. Projected percentage of completion for each item as of first work day of each month.
3. Projected percentage of completion for total Work as of first day of each month.
4. Required dates for return of specific submittals, selection of finishes, work by others, and delivery of products supplied by Owner for installation by contractor.

C. Procedures:
1. Submit preliminary Progress Schedule within 10 days of receipt of approval for Schedule of Values specified in Section 01 20 00: Price and Payment Procedures. Provide PDF file and Microsoft Project file.
a. Architect will review with Owner and return within 7 days.
b. If required, revise and resubmit within 5 days.

2. Update Progress Schedule and submit in Microsoft Project electronic file format and paper copy with each Application for Payment specified in Section 01 20 00: Price and Payment Procedures.
   a. Identify progress of each activity to date of submittal and projected completion date.
   b. Identify activities modified since previous submittal and other identifiable changes.
   c. Provide narrative report as needed to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken or proposed and its effect.
   d. Between monthly submittals with each Application for Payment, update schedule and submit upon execution of any change that will cause deviation from the schedule by more than three days or where items on the project critical path are affected.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

HUITT-ZOLLARS, INC.

ELECTRONIC MEDIA (DATA) DISCLOSURE

DATE:

TO:

RE:

Huitt-Zollars, Inc. agrees to provide an electronic file via disk or e-mail for the referenced project subject to the following conditions.

Therefore, the recipient agrees as follows:

1. Due to the potential that the information set forth on the electronic media (hereafter referred to as "File") can be modified unintentionally or otherwise; Huitt-Zollars, Inc. shall reserve the right to remove all indices of its ownership, professional corporation name, and/or involvement from each electronic medium (and its contents) not in its possession.

2. The recipient recognizes that use of such File will be at their risk and without any liability risk or legal exposure to Huitt-Zollars, Inc., and that a Huitt-Zollars, Inc. professional engineer, does not certify the File as correct. The recipient also recognizes that the information on the File may or may not be identical to the construction plans and/or survey. Revision to construction plans and/or other documents may have been made by manual drafting, which will not appear on the File. It is the recipient's responsibility to verify completeness and accuracy of disk information by comparing to the approved plans. Furthermore, recipient shall to the fullest extent permitted by law, defend, indemnify and hold harmless Huitt-Zollars, Inc. from all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the use of such File or data contained on such File.

3. The use of this File is restricted to the original site and project for which it was prepared. File or material prepared from said File shall not be used for other projects, or be transferred to any other party for use on other projects. Reuse or reproduction of the File, data, or documents prepared from, by, or with the File (in whole or in part) for any other purpose for which the material was not strictly intended, is prohibited. Possession of the File, or documents is prima facie evidence of the acceptance of these restrictions.

4. Recipient recognizes that information stored on electronic media, including, but not limited to, computer disks prepared by Huitt-Zollars, Inc. may not be 100% compatible with their own computer system due to differences in computer hardware and software. Therefore, recipient agrees that Huitt-Zollars, Inc. shall not be held liable for the completeness or accuracy of any materials or documents prepared from such File or data contained on such File.

5. Recipient recognizes that designs, plans, and data stored on electronic media, including, but not limited to, computer disk may be subject to undetectable alteration and/or uncontrollable deterioration. Recipient, therefore, agrees that Huitt-Zollars, Inc. shall not be held liable for the completeness or accuracy of any data or information contained on electronic media after possessing said media for 30 days or longer.

ACCEPTED BY:

John Jarrard, AIA
Huitt-Zollars, Inc.
(Phone – 883 – 8114)
(Fax – 883 - 5022)

_____
Signature

_____
Name (Printed)

_____
Title

_____
Company

Note: Recipient must sign a copy of this agreement prior to or at time of obtaining File(s). Faxed copies are acceptable.

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
   1. Section 01 20 00: Price and Payment Procedures for submitting Applications for Payment and the schedules of values.
   2. Section 01 25 13: Substitution Procedures for submittal of substitution requests.
   3. Section 01 31 00: Project Management and Coordination for submittal of project progress schedule and coordination drawings, and for requirements of use of Architect's electronic CADD files.
   4. Section 01 40 00: Quality Requirements for manufacturer's field services and reports.
   5. Section 01 77 00: Closeout Procedures for submittal of certificates of inspection, warranties, extra materials and other closeout submittals.
   6. Section 01 78 23: Operations and Maintenance Data for submittal of operations and maintenance manuals.
   7. Section 01 78 39: Project Record Documents for submittal of record drawings, record specifications and other record documents.
   8. Refer to technical specification sections for particular requirements for submittals under that section.

C. Submittal format: all submittals shall be made electronically using PDF files for all product data, shop drawings, warranty data, test reports and other print-based items unless specifically noted otherwise in a Section. Other items such as samples, color cards and other items requiring physical material may be submitted in their original format with any accompanying data being in PDF format.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedules of values, and Contractor's construction schedule.
2. Submit within 20 days of Agreement between Owner and Contractor. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Revise to incorporate any review comments and resubmit.
4. Submit revised submittal schedule to reflect changes in current status and timing for submittals. Submit 3 copies of updated submittal schedule with each Application for Payment.

5. Format: Arrange the following information in a tabular format:
   a. Specification Section number and title.
   b. Submittal category: Action; informational.
   c. Name of subcontractor.
   d. Description of the Work covered.
   e. Scheduled date for Architect's final release or approval.

1.5 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow fifteen days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow fifteen days for review of each resubmittal.

C. Transmittal form: Provide the following information on transmittal form accompanying each submittal:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Specification Section number and title.
    i. Transmittal number, numbered consecutively and with re-submittals identified.
    j. Remarks.
    k. Signature of transmitter.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single file incorporating submittal requirements of a single Specification Section and transmittal form.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from

requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Contractor's review
   1. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
   2. Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
   3. Submittals not bearing Contractor's approval stamp and signature shall be rejected.

H. Architect's action
   1. Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
   2. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
   3. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
   4. Submittals not required by the Contract Documents may be returned by the Architect without action.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's stamp.

1.6 PRODUCT DATA

A. Collect information into a single submittal for each element of construction and type of product or equipment.

   1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

1.7 SHOP DRAWINGS

A. Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.

1.8 SAMPLES

A. Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample set; remainder will be returned.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

1.9 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

C. Upon Contractor and Architect review of submittals for delegated-design items, submit directly to Authority Having Jurisdiction in accordance with their requirements. Incorporate comments and provide final copy to Architect as Informational Submittal.

1.10 TEST REPORTS, DATA, CERTIFICATES AND OTHER SUBMITTALS

A. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00: Quality Requirements.

B. Closeout Submittals: Comply with requirements specified in Section 01 78 39: Project Record Documents.

C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

D. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

E. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

F. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

G. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

H. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

I. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

J. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

K. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

L. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

M. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

N. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities

having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of three previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data : For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on any delegated-design services.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within ten days of Agreement Between Owner and Contractor and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.

5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect

installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. When testing is complete, remove test specimens, assemblies; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Owner, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.9 QUALITY CONTROL

A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300: Submittal Procedures.

C. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service to Owner, Architect and Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction.

B. Duties of Owner-appointed agency for Special Tests and Inspections:

1. Verify that manufacturer maintains detailed fabrication and quality-control procedures and review the completeness and adequacy of those procedures to perform the Work.
2. Notify Owner, Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submit a certified written report of each test, inspection, and similar quality-control service to Architect and Owner with copy to Contractor and to authorities having jurisdiction.
4. Submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retest and re-inspect corrected work.

C. Duties of Contractor:
1. Provide access to site and areas of Work subject to Special Inspections.
2. Cooperate with Owner-appointed agency for Special Tests and Inspections during on-site testing procedures. Make reasonable accommodations to provide clear access to Work to facilitate inspections, and make available power and other utilities as required for testing.
3. Coordinate with Owner-appointed agency to schedule upcoming required testing to maintain orderly progression of the Work.
4. Make facilities available to Owner-appointed agency as described in Section 01 50 00: Temporary Facilities and Controls.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00: Execution.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01 10 00: Summary for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Water Service: Pay water-service use charges for water used by all entities for construction operations.

C. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Mobilization Plan: prepare and submit a plan indicating the following items.
1. Field office.
2. Material storage, staging areas, tool and equipment storage.
3. Fencing, security and safety measures.
4. Construction access routes.
5. Construction limits.
6. Temporary signage, including project identification sign.
7. Temporary and permanent utility connections.
8. Sanitary facilities.
9. Concrete wash-out area.
10. Parking for contractor personnel and construction equipment.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. After award of contract, submit the above-listed plans and programs for review by Owner and Architect. Revise to incorporate revisions to ensure adequate safety and security and to safeguard existing Operations. Present final version of plan at pre-construction conference in accordance with Section 01 31 00: Project Management and Coordination.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts, top and bottom rails. Provide bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings eight individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

D. Notification Board: provide a weatherproof notification board adjacent to field office. Post statutory notices and notices relevant to Work, including but not limited to labor laws, Wage Rates, safety notifications and other informational briefings.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance and as specified in Section 01 10 00: Summary.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Make arrangements for potable and non-potable water supplies for construction activities. Connect to water service facilities once available and when authorized in writing by Owner. Clean and maintain water service facilities in a condition acceptable to Owner.

1. Obtain permit and purchase effluent water from City Wastewater Division for use in dust control and earthwork compaction operations.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Operational Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
3. Protect existing equipment and prevent dust, debris and other construction waste from coming into contact with, or adversely affecting performance.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Make arrangements for temporary electric power at project site in accordance with Section 01 10 00: Summary. Connect to electric service in accordance with requirements of local utility provider. Maintain equipment in a condition acceptable to Owner.
1. Provide temporary electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office. Telephone may be cellular if acceptable signal strength and reception is available.

1. At each telephone, post a list of important telephone numbers.

   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Owner's office.
   g. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

K. Electronic Communication Service: Provide a computer in the primary field office adequate for use to access Project electronic documents and maintain electronic communications.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Site Mobilization Plan.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Where possible locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 requirements.
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 requirements.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated on Site Mobilization Plan and as indicated in Bidding Documents. Unauthorized signs are not permitted.

1. Project Identification Signs: Provide Project identification signs as indicated in Section 00 80 00 - Exhibits.

a. Size: 4 feet high by 8 feet wide.

b. Construction: exterior plywood substrate and laminated face sheet with graffiti-resistant surface, mounted on 4x4 treated wood posts. Attachments and anchoring shall be capable of withstanding 60mph winds, and shall retain acceptable appearance for duration of construction.

c. Text and Graphics: sign graphics provided in Section 00 80 00 is a representative sample. Owner shall furnish final text and graphics. Submit final sign artwork to Owner and Architect for review prior to fabrication.

2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times. Promptly remove graffiti, repair damage and replace as necessary.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00: Execution.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01 10 00 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
3. Allow Owner and User access to portions of site rendered inaccessible by placement of site enclosure fence.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent

construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00: Closeout Procedures.

E. Restore appearance of ground at edges of construction limits to original condition. Use site survey photographs in Section 01 10 00: Summary as a reference for condition prior to mobilization.

END OF SECTION 01 50 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 01 25 00: Substitution Procedures for requests for substitutions.
   2. Section 01 10 00: Summary for Definitions

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00: Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and

limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00: Closeout Procedures.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered

4. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in Section 01 25 13: Substitution Procedures.

5. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered

6. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in Section 01 25 13: Substitution Procedures.

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 13: Substitution Procedures for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 01 10 00 "Summary" for limits on use of Project site.
2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least ten days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

E. Certified Surveys: Submit two copies signed by land surveyor.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's

aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00: Project Management and Coordination.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: Prior to Substantial Completion, prepare a certified survey of sufficient detail to demonstrate that as-constructed conditions are in accordance with the design intent.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

   a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000: Temporary Facilities and Controls.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00: Quality Requirements.

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 01 73 00 "Execution" for progress cleaning of Project site.
2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 01 79 00 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Closeout Log: Prior to submittal of Operations and Maintenance Data.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 CLOSEOUT LOG

A. Develop and produce a closeout log indicating requirements of each technical specification section. Arrange in a matrix format with each technical section listed on the left side and the following items along the top:

1. Owner stock.
2. Training.
3. Warranties.
4. Special tools/keys.
5. Operations and maintenance data

B. Indicate requirements for each technical specification section in graphic form within matrix.

C. Submit to Architect in conjunction with request for inspection to determine date for Substantial Completion. Highlight completed and outstanding items, and submit updates as required during Substantial and Final closeout procedures.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit certified survey.
3. Submit maintenance tools and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
4. Submit test/adjust/balance records.
5. Submit closeout submittals specified in other Sections, including project record documents, operation and maintenance manuals, warranties and similar final record information.
6. Submit maintenance material submittals specified in individual Sections including spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver two sets of keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00: Demonstration and Training.
6. Advise Owner of changeover in heat and other utilities.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 7 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.8 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01 20 00: Price and Payment Procedures. Include the following documents in accordance with document 00 72 00 General Conditions of the Contract:

   a. Affidavit of Payments (AIA Document G706)
   b. Consent of Surety (AIA Document G707)
   c. Release of Liens (AIA Document G706A)
   d. Certificate of Insurance

2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

2. Submit list of incomplete items as a PDF file.

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

B. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Remove labels that are not permanent.

   j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

   k. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

l. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01 50 00: Temporary Facilities and Controls. Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 Temporary Facilities and Controls.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION 01 77 00

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 01 33 00: Submittal Procedures for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
3. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

B. Initial Manual Submittal: Submit draft copy of each manual at least thirty days before commencing demonstration and training. Architect will provide review comments.

1. Correct or revise each manual to comply with Architect's comments.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 7 days before commencing demonstration and training.

1. Format: Submit operations and maintenance manuals in the following format:
   a. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
   b. Two bound paper copies in accordance with Part 2.2 F.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name and subject matter

of contents, and indicate Division number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.
   5. Power failure.
   6. Water outage.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
D. Emergency Procedures: Include the following, as applicable:

   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 01 78 39: Project Record Documents.

G. Comply with Section 01 77 00: Closeout Procedures for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 01 73 00 "Execution" for certified survey.
2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.

B. Record Specifications: Submit one paper copy and of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and of each submittal.

E. Incorporate items into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Locations of concealed internal utilities.
   i. Changes made by Change Order.
   j. Changes made following Architect's written orders.
   k. Details not on the original Contract Drawings.
   l. Field records for variable and concealed conditions.
   m. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Include all sheets in set, whether or not changes were made.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

3. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit attendance record with the following information:
1. List of attendees and training personnel. Provide contact telephone numbers.
2. Date, time and place of instruction. Include length of instruction time for each module.
3. Subject matter covered during training module.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two dvd copies comprising all training sessions within seven days of end of last training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name of Architect.
c. Name of Contractor.
d. Date of video recording.

2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00: Quality Requirements, experienced in operation and maintenance procedures and training.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.
    k. Seasonal and weekend operating instructions.
    l. Required sequences for electric or electronic systems.
    m. Special operating instructions and procedures.

5. Adjustments: Include the following:

    a. Alignments.

b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

9. Scope: at a minimum, include the following items and systems as discrete training modules:
a. Electrical systems as specified in Division 26.
b. Process gas systems as specified in Division 43.
c. Oil-Water Separator and underground drainage as specified in Division 46.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23: Operation and Maintenance Data.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage an experienced facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

   1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner on electronic media.

   1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
   2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
   3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
   4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

      a. Name of Contractor/Installer.
      b. Business address.
      c. Business phone number.
      d. Point of contact.
      e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

   1. Film training session(s) in segments not to exceed 15 minutes.

a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01 79 00

SECTION 02 41 00

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected building elements.

B. Related Sections. The following Sections contain requirements that relate to this Section:

1. Section 01 73 00 – Execution for cutting and patching procedures for selective demolition operations.

2. Section 01 70 00 - Contract Closeout for record document requirements.

1.3 DEFINITIONS

A. Remove. Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Remove and Salvage. Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

C. Remove and Reinstall. Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

D. Existing to Remain. Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site and disposed of at legal sites.

1. 5 PROJECT CONDITIONS

A. The existing CNG system will remain in operation in portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so that function of the existing system will not be disrupted. Provide not less than 3 business days' notice to Owner of activities that will affect Owner's operations.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Storage or sale of removed items or materials on-site will not be permitted. Demolition activities that generate excessive noise, dust, smell or other similar annoyances will need to be performed in off hours.

1.6 SCHEDULING

A. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations. Demolition activities that generate excessive noise, dust, smell or other similar annoyances will need to be performed in off hours.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.

E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.

a. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.

B. Utility Requirements. Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.

2. Arrange to shut off indicated utilities with utility companies.

3. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.

4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

C. Utility Requirements. Refer to Division 22 Sections for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

2. Protect existing site improvements, appurtenances, and landscaping to remain.

3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

4. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.

5. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.

6. Cover and protect furniture, furnishings, and equipment that have not been removed.

D. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

A. Use temporary enclosures, and other suitable methods to limit the spread of dust and dirt.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.5 SELECTIVE DEMOLITION

A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.

10. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

C. Break up and remove concrete slabs on grade, unless otherwise shown to remain.

3.6 PATCHING AND REPAIRS

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

B. Patching is specified in Section 01 73 00 - Execution.

C. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
   1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.

D. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

E. Patch and repair floor and wall surfaces in the new space where demolished walls or partitions extend one finished area into another. Provide a flush and even surface of uniform color and appearance.

   1. Closely match texture and finish of existing adjacent surface.

   2. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

   3. Where patching smooth painted surfaces, extend final paint coat over entire unbroken surface containing the patch after the surface has received primer and second coat.

   4. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

   5. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.

F. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning. Do not burn demolished materials.

C. Disposal. Transport demolished materials off Owner's property and legally dispose of them.

3.8 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.

B. Change filters on air-handling equipment on completion of selective demolition operations.

END OF SECTION 02 41 00

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes formwork for cast-in-place concrete, including water stops, and installation of embedded items.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Reinforcement - Section 03 20 00

B. Cast-In-Place Concrete - Section 03 30 00

1.3 QUALITY ASSURANCE

A. Comply with the American Concrete Institute Standard, ACI 347-04, Recommended Practice for Concrete Formwork.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM D 226-05 Specification for Asphalt - Saturated Organic Felt used in Roofing and Waterproofing"

2. ASTM D 1751-04 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms for Exposed Finish Concrete: Plywood complying with U.S. Product Standard PS-1-83 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection. Form faces shall be flat with no warping, twisting or other irregularities.

B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

D. Chamfer Strips: ¾ inch by ¾ inch wood, PVC, or rubber.

E. Preformed Construction Joint: 24-gage steel, galvanized, shaped to form a continuous tongue and groove key.

F. Preformed Control Joint: Rigid plastic or metal strip with removable top section.

G. Expansion Joint Material: Asphalt saturated fiberboard, ½ inch thick, meeting the requirements of ASTM D 1751.

H. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.

I. Water stops: PVC, meeting the requirements of CRD-C572. Provide 6 inches wide dumbbell shape water stop with 3/16-inch minimum web thickness and 3/8 inch minimum end bulb diameter.

OR

J. Water stops: Volclay RX manufactured by Colloid Environmental Technologies Co. (CETCO).

K. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

L. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical,

plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

A. Form Coating: Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

3.3 INSTALLATION

A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.

B. Chamfer Strips: Provide at exposed corners and edges.

C. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.

B. Water stops: Install according to manufacturers printed instructions. Splice water stop sections using square cut butt joints and fuse sections together with indirect heat from preheated splicing iron. Use of direct flame is prohibited.

3.5 JOINTS

A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints unless noted otherwise.

B. Keyways: Provide keyways at least 1-½ inch deep in construction joints in walls and slabs.

C. Preformed Construction Joint For Slabs on Grade: Secure with galvanized steel stakes, 1/8 inch thick by 1-1/8 inches wide with ½ inch deep rib and tapered point. Splice adjoining joints with 24 gage steel, galvanized splice plates.

D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints on exterior slabs abutting vertical surfaces with ½ inch thick expansion joint material.

D. Control Joints in Slabs-on-Grade:

1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10-foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.

2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/3 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.

E. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch.

3.6 REMOVAL OF FORMWORK

A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.

C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

3.7 RE-USE OF FORMS

A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and latence. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

END OF SECTION 03 10 00

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Forming and Accessories - Section 03 10 00.

B. Cast In Place Concrete - Section 03 30 00.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. American Concrete Institute (ACI)

a. ACI 301-02 Specifications for Structural Concrete for Buildings

b. ACI 315-99 Details and Detailing of Concrete Reinforcement

c. ACI 318-11 Building Code Requirements for Structural Concrete

2. ASTM International

a. ASTM A 82/ A 82M-05 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

b. ASTM A 185/ A185M-06 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

c. ASTM A 615/ A 615M-06 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

3. Concrete Reinforcing Steel Institute (CRSI).
. Design Handbook - 2002 Edition.

1.4 SUBMITTALS

A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of

bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.

B. Welded Wire Fabric: ASTM A 185, flat sheets.

C. Steel Wire: ASTM A 82, 16 gage.

D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

2.2 FABRICATION

A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.

B. Do not fabricate reinforcing steel until shop drawings are approved.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

PART 3 - EXECUTION

3.1 PLACING BAR SUPPORTS

A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.

B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

3.2 PLACING REINFORCING STEEL

A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".

B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Concrete Cover:	
Concrete cast against and permanently exposed to earth	3 inches
Concrete exposed to earth or weather:	
Bars larger than No. 5	2 inches
Bars No. 5 or smaller.	1 ½ inches

D. Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters (18 inches minimum) in length.

E. Welded Wire Fabric Splices: Lap one complete wire spacing.

F. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18 inches minimum length.

G. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

A.	Submittals:	SECTION 01 30 00.
B.	Quality Control:	SECTION 01 40 00.
C.	Concrete Forming & Accessories:	SECTION 03 10 00.
D.	Concrete Reinforcement:	SECTION 03 20 00.
E.	Metal Fabrications:	SECTION 05 50 00.

1.2 QUALITY ASSURANCE:

A. Qualification of Manufacturer: Manufacturer of ready mix concrete shall be approved by Construction Industries officials and shall conform to ASTM C 94.

B. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Codes and Standards: Comply with the following codes and standards including current editions, revisions and supplements.

1. ACI 301, Specifications for Structural Concrete for Buildings.
2. ACI 306.1, Standard Specification for Cold Weather Concreting.
3. ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
4. ACI 117, Specifications for Tolerances for Concrete Construction and Materials.
5. ACI 318, Building Code Requirements for Reinforced Concrete.
6. International Code Council – International Building Code.

E. Quality Control: Testing Laboratory, test costs, and test reports in accordance with SECTION 01 40 00. QUALITY CONTROL.

1.3 SUBMITTALS:

A. Manufacturer's Literature: Description and recommended installation/application instructions for admixtures, curing compounds, sealers/hardeners, coatings, patching compounds, grouts, filler strips, leveling compounds, etc.

B. Qualification Data: For Installer.

C. Test Reports: Reports of concrete compression, yield, air content, and slump tests. Testing Laboratory shall submit one copy of the report to Architect and one copy to the Contractor.

D. Design Mix: Mix design shall conform to the requirements of ACI 301, Section 4. Submit design mix prior to placing any concrete, with the following information:

1. Material content per cubic yard of each class of concrete furnished.

2. Results of laboratory tests performed within past six months indicating that aggregate from the proposed source meet requirements of ASTM C 33.

3. Dry weights of cement, saturated surface-dried weights of fine and coarse aggregate, quantities, type and name of admixtures, weight of water, ready-mix delivery tickets, ASTM C 94, design mix certification that mix designs conform to specification by Testing Laboratory.

4. All flyash shall conform to Class F.

E. Exterior Concrete: All exterior concrete shall contain between six (6) and eight (8) percent entrained air.

F. Shop Drawings: Submit shop drawings indicating dimensions drawn to a minimum scale of 1/8" = 1'-0". Contractor shall be responsible for verifying dimensions.

PART 2 – PRODUCTS

2.1 MATERIALS:

A. Portland Cement: ASTM C 150, Types I or II, low alkali. Use only one brand throughout the Project. Do not change brand without prior approval.

B. Aggregates: ASTM C 33. Furnish clean, crushed rock or washed gravel coarse aggregate.

C. Water Reducing Admixtures: ASTM C 494, Type A.

D. Air-Entraining Admixtures: ASTM C 260, CRD C 13, AASHTO M 154.

E. Water Reducing and Retarding Admixture: ASTM C 494, Type D.

F. High Range Water Reducing Admixture: ASTM C 494, Type F.

G. Water: Potable.

H. Concrete Patching Compound:

1. Description: Fast setting, non-shrink patching material used for repairing/patching honeycomb, spalls, cracks, holes left by tie wires or spreaders and construction faults in concrete.

2. Product/Manufacturer: "Thorite", manufactured by Thoro Systems Products, or acceptable substitution.

I. Non-Shrink Grout: Corps of Engineers CRD-C 588, "CRYSTEX", manufactured by L & M Construction Chemicals, Inc., or the following substitutions:

1. "Burke Non-Ferrous Non-Shrink Grout", manufactured by The Burke Company.

2. "Sikagrout 212", manufactured by Sika Chemical Corporation.

J. Curing Sheet: ASTM C 171, polyethylene, non-staining white types.

K. Floor Filling/Leveling Materials:

1. "ARDEX K-15 Cement-Based Self-Leveling Underlayment", manufactured by ARDEX, Inc.

2. "Thoro Underlayment-Self-Leveling", manufactured by Thoro Systems Products, or acceptable substitution.

L. Filler Strips: Provide widths and depths as indicated on the Drawings.

1. Bituminous Type: ASTM D 1751, non-extruding, resilient type, for exterior use as required.

2. Non-Bituminous Type: ASTM D 1752, Type I or II, non-extruding, resilient type, for interior use where expansion material is required.

M. Curing-Sealing-Hardener Compound: ASTM C 309, FS TT-C-00800A.

1. "Kure-N-Seal 30", as manufactured by Sonneborn Building Products.

2. "Dress & Seal No. 30", manufactured by L & M Construction Chemical.

3. "Spartan Cote Acrylic", manufactured by The Burke Company.

N. Curing Compound: ASTM C 309 and ASTM C 156, clear, non-staining and non-discoloring, non-residual cure for concrete to receive toppings or adhered-type floor covering.

1. "RES-X", manufactured by The Burke Company.

2. "L & M Cure", manufactured by L & M Construction Chemical, or acceptable substitution.

2.2 PROPORTIONING AND DESIGN OF MIXES:

A. Footings and Foundation walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 5 inches, plus or minus 1 inch .
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch and 3/4-inch nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd..
3. Slump Limit: 5 inches , plus or minus 1 inch .
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch and 3/4-inch nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
7. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of 50 lb/cu. yd.

C. Concrete Toppings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 470 lb/cu. yd..
3. Slump Limit: 4 inches, plus or minus 1 inch .
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch and 3/4-inch nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished toppings to exceed 3 percent.

2.3 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according Reato ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

B. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

C. Prepare design mixes for each type on concrete. Admixtures shall not be used for cement replacement to reduce minimum cement content.

PART 3 – EXECUTION

3.1 PREPARATION FOR CONCRETE PLACEMENT:

A. Formwork: Comply with requirements of ACI 301, Section 2, and the completed cast-in-place shall conform to the tolerances specified in that referenced standard specification.

B. Refer to Specifications Section 03 10 00 this volume for specific formwork requirements.

C. General: Before placing concrete, inspect and verify that formwork, reinforcing steel and items to be embedded or cast-in-place have been installed. Notify other trades to complete the installation of embedded items, coordinate trades in setting such work, as required. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen substructure or substructure containing frozen materials. Remove excess water from forms before concrete is deposited. Remove hard concrete, debris, and foreign materials and ice from interior of forms and from inner surfaces of mixing and conveying equipment. Do not add water at job site without permission and approval by Architect or Contractor's superintendent. Report on batch ticket the amount of water added at the job site.

D. Earth Subgrade: Lightly dampen 24 hours in advance of concrete placing, but do not muddy. Re-roll where necessary for smoothness and remove loose material.

3.2 HOT AND COLD WEATHER OPERATIONS:

A. Hot Weather Concreting Operations:

1. When concrete is placed under conditions of hot weather concreting, provide extra protection of concrete, as specified within ACI 305. Hot weather is defined as air temperatures which exceed 80 degrees F.

2. During curing operation cover concrete with wet burlap or cotton mats. Keep mats constantly wet for seven (7) days minimum. Keep mats covered with sheet polyethylene. Leave mats in place for three (3) days after discontinuing wetting process.

B. Cold Weather Concreting Operations:

1. When concrete is placed under conditions of cold weather concreting (defined as a period when the mean daily temperature drops below 40 degrees F. for more than three (3) successive days), take additional precautions as specified herein and in "Specifications for Cold Weather Concreting" by American Concrete Institute (ACI 306) when placing, curing, monitoring and protecting fresh concrete.

2. During the curing operation, maintain the temperature of the placed concrete as constant as possible, and protect from rapid atmospheric temperature changes.

3. Maintain the concrete in a continually moist condition during the curing process by leaving the forms in place as long as possible and by use of steam and/or moisture retaining covers on unformed surfaces.

4. Following the curing operation, avoid rapid changes in concrete temperature. Do not allow the internal temperature of the concrete to change at a rate which exceeds 50 degrees F. in any 24-hour period or 5 degrees F. in any one hour.

3.3 CONCRETE PLACING:

A. Joints in Concrete:

1. Locate joints in concrete where indicated or at points of low stress.

2. Keep hardened concrete wet for at least 24 hours before placing new concrete.

B. Conveying and Placing:

1. Do not place concrete until reinforcing steel and forms have been approved by Architect and other authorities having jurisdiction.

2. Do not drop concrete from its point of release at mixer, hoppers, tremies, or conveyances more than six (6) feet for concealed concrete and three (3) feet for exposed concrete.

3. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one portion to another.

4. Place concrete into forms immediately after mixing in a manner that will prevent separation of ingredients and in horizontal layers not over 18 inches thick.

C. Consolidating: Consolidate each layer of concrete with mechanical vibrating equipment. Transmit vibration directly to concrete, in no case through forms. Supplement vibration by forking or spading by hand adjacent to forms. Consolidate concrete into corners and angles of forms and around reinforcement and embedded fixtures.

D. Operation of Vibrators: Employ skilled and experienced workmen to operate vibrators. Do not transport concrete in forms with vibrators nor allow vibrator to contact forms or reinforcing. In vibrating freshly placed concrete, push the vibrator down vertically into preceding layers that are still completely plastic and slowly withdraw, producing maximum obtainable density in concrete without creating voids or segregation. Under no circumstance disturb concrete that has stiffened or partially set. Vibrate at intervals not exceeding 2/3 the effective

visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes concrete segregation.

E. Correction of Segregation: Before placing next left, and at top of last placement for vertical elements, remove concrete containing excess water or fine aggregate, or showing deficiency of coarse aggregate and fill the space with compacted concrete of correct proportions.

F. Slabs: Compact and tamp interior concrete slabs to bring 1/8" to ¼" of mortar so surface, and wood float to straightedges and screeds. Do not use tampers on exterior slabs. Do not use steel or plastic floats of any kind for initial floating operations. Do not apply finish until surface water disappears and surface is sufficiently hardened. Remove bleed water and laitance as it appears.

1. Slab-on-Grade Areas: Slabs shall be placed in long panels as indicated on the Drawings. There shall be a minimum of one (1) day elapsed time between the placement of adjoining slabs.

2. Expansion Joints: Install in sidewalk joints and curbs and at perimeter of exterior slabs. Install expansion joint material at 20'-0" intervals and control joints at 5'-0" intervals.

3. Isolation Joints:

   a. Joints shall be provided at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

   b. Expansion joints shall be filled with premolded joint filler strips ½ inch thick, extending full slab depth unless otherwise indicated. Filler strips shall be installed at proper level below finish floor elevation with slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form groove not less than ¾ inch in depth. Where joint will be sealed with sealing compound and not less than 1/4 inch in depth joint sealing is not required. Wood strip shall be removed after concrete has set. Clean groove of foreign matter and loose particles after surface has dried.

   c. Joints where indicated on the Drawings shall be isolated with the use of 30 pounds per square roofing felt complying with F.S. HH-R-590, Type II, Class A.

4. Construction Joints: Joints shall be provided to form panels as indicated.

5. Sealing of Joints: Isolation and construction joints which will not be covered with finish flooring material shall be sealed with joint sealing compound after concrete curing period. Groove shall be slightly underfilled with joint sealing compound to prevent extrusion of compound. Excess material shall be removed as soon after sealing as possible.

3.4 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches , and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written

instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.5 CURING FORMED CONCRETE: Maintain forms containing concrete in a thoroughly wet condition until forms are removed. Maintain concrete continuously moist for not less than seven (7) consecutive days after pouring. Keep concrete moist with fine fog spray until protected by curing materials. Use curing sheet material, or liquid membrane-forming curing compound.

3.6 RUBBED CONCRETE FINISH: As indicated on Drawings.

A. Preparation: Remove form marks, offsets, high spots and other defects and in uniform planes, in good condition to receive concrete coating. Fill honeycombed areas 3/8" or more in depth with concrete patching compound specified above. Surface of concrete to be coated shall be clean, free of laitance, dirt, dust, grease, form oil, efflorescence, paint and foreign materials which may be detrimental to adhesion of concrete coating.

B. Application: Mix concrete coating materials with clean water and bonding agent following manufacturer's recommendations. Apply a light trowel coat of concrete coating compound over entire surface to be treated, making sure the material is firmly pressed into voids and leveled. Allow this coat to cure thoroughly before applying the final trowel application. When surface is set to point where the coating will not roll or lift, float uniformly using a sponge to achieve desired texture.

3.7 SLAB FINISHING: Finish surfaces level or sloped as indicated with maximum deviation of 1/8 inch from a ten (10) foot straightedge on trowelled surfaces. Keep surface moist with fine fog spray of water as necessary. Dusting with cement or sand during finishing operation is not permitted. Finish exposed edge of slabs and slab joints with edging tool.

A. Steel Float Finish:

1. Location: Exposed interior concrete and where floor coverings are indicated to be installed.

2. Finish: After surface water disappears and floated surface in sufficiently hardened, steel trowel and retrowel to smooth surface. After concrete

has set enough to ring trowel, retrowel to smooth uniform finish free of trowel marks or other blemishes. Avoid excessive troweling that may produce burnished areas.

B. Broom Finish:

1. Location: Exposed exterior concrete walks, curbs, drive pad curb and where indicated on the Drawings (non-exposed aggregate).

2. Finish: Prepare same as steel float finish, then apply uniform approved coarse texture by sliding broom in one direction along straightedge guide placed at right angles to direction of vehicular traffic.

C. Non-Slip Broom Finish: Apply heavy non-slip broom finish to exterior concrete handicapped ramps where indicated on Drawings. Immediately after trowel finishing, roughen concrete surface by heavy brooming with fiber bristle broom perpendicular to main pedestrian traffic route. Coordinate required final finish with Architect before application.

3.8 CONCRETE PROTECTING AND CURING: Apply curing after finishing operations and in any case on same day. Apply liquid compounds in accordance with manufacturer's recommendations at an application rate to achieve ASTM C 309.

A. General:

1. Freshly placed concrete shall be protected from premature drying and cold or hot temperature, shall be maintained without drying at relatively constant temperature for period of time necessary for hydration of cement and proper hardening of concrete.

2. Initial curing shall start as soon as free water has disappeared from surface of concrete after placing and finishing. Concrete shall be kept moist for minimum 72 hours.

3. Final curing shall immediately follow initial curing and before concrete has dried. Final curing shall continue until cumulative number of hours or fraction thereof (not necessarily consecutive) during which temperature of air in contact with concrete is above 50 degrees F. has totaled 168 hours. Rapid drying at end of final curing period shall be prevented.

B. Curing Materials: Apply curing after finishing operations and in any case on same day.

1. Curing Sheet: Cover concrete surfaces with moisture-retaining cover, place material in widest practical width with sides and ends lapped at least three (3) inches and sealed with waterproof adhesive tape compatible with curing sheet membrane. Immediately repair any holes or tears during curing sheet membrane. Immediately repair any holes or tears during curing period using additional layer(s) of curing sheet and waterproof adhesive tape.

2. Restriction: Do not use liquid membrane-forming curing compound on concrete to receive subsequent concrete or mortar, or on surfaces to

receive subsequent applied materials unless such use and compound used are approved by manufacturer of materials to be applied; verify with related trades.

3. Curing-Sealer-Hardener: Apply at a rate to achieve ASTM C 309. Where dustproof finish is required for either exposed concrete finish or where additional floor finish material such as resilient flooring, carpeting, etc. is specified to be installed, apply two (2) coats of specified curing-sealer-hardener in accordance with the manufacturer's recommendations; first coat applied immediately after finishing; second coat applied after clean-up prior to completion of concrete work.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch . Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through

unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 EQUIPMENT PADS: Cast-in-place equipment pads for mechanical and electrical apparatus as indicated and/or as detailed on the Drawings. Verify exact sizes and location prior to forming concrete.

3.11 GROUTING: Grout as indicated or required except for items grouted by other trades.

A. Mixing: Mix approved non-shrink grout with sufficient water to cause it to flow under its own weight for grout. Mortar Mix shall conform to ASTM C 270 and be proportioned by volume as follows:

1. One (1) part Portland cement.

2. ½ parts Type "S" hydrated lime or lime putty.

3. 4-1/2 parts sand.

B. Placing and Curing: Place fluid grout from one side and puddle for complete filling of voids; do not remove dams or forms until grout attains initial set. Finish exposed surfaces smooth and cure with damp burlap at least three (3) days.

3.12 INSPECTION AND TESTING OF CONCRETE:

A. General:

1. The Contractor shall engage at his expense, an independent testing laboratory approved by Architect, to conduct and interpret tests and reports and retests and reports. Testing Laboratory will perform tests as specified herein and as directed by Architect. One copy of the test results shall be forwarded immediately to each, Architect, Owner and Structural Engineer, once test results are obtained. Retesting due to non-compliance shall be at Contractor's expense.

2. Concrete will be sampled and tested for quality control during the placement of the concrete as follows:

REQUIREMENT	TEST METHOD	NUMBER OF TESTS
Sampling fresh concrete	ASTM C 172 except modified for slump per ASTM C 94	As required for each test.
Slump test	ASTM C 143	One (1) for each concrete load at point of discharge and one (1) for each set of compressive strength tests.
Air content by	ASTM C 138, C 173, or C 231	One (1) for each set of method compressive strength tests.
Compression test	ASTM C 31	One (1) set of six (6) standard specimen cylinders for each compressive strength test. Provide one (1) set for specific testing at the following frequencies: Grade/Tie Beams – 16 cy Footings, 24 cy Slab on Grade – 40 cy Other concrete, provide one (1) set for each 100 cubic yards or fraction thereof of each concrete class placed in any one day nor less than one set for each 5000 SF of

		surface area for slabs not less than one (1) a day.
Concrete temperature		Hourly when air temperature is 40 degrees F. or below and 80 degrees F. or above; each time a set of compression test specimens is made.
Compressive	ASTM C 39	Specimens shall be tested at the strength test following rates and intervals: One (1) specimen at seven (7) days. Two (2) specimens at twenty-eight (28) days. Two (2) specimens for possible future testing.

B. Compression Test Cylinders: Made by Testing Laboratory personnel in accordance with ASTM C 39.

1. Test Cylinders: Cast test cylinders at site in accordance with ASTM C 31; 24 hours after mixing, store cylinders under moist curing conditions at approximately 70 degrees F. until tested. Test specimens in accordance with ASTM C 39 at 7, 14 and 28 day ages. Contractor shall hold two (2) test cylinders in reserve for additional testing if required.

2. Core Tests: Should tests indicate strength of concrete is below required minimum, additional tests of concrete which the unsatisfactory samples represent may be required. Make such tests in accordance with ASTM C 42. Fill core holes with drypack concrete. Contractor shall bear cost of tests for below-strength concrete even though such tests indicate the concrete has attained required minimum compressive strength.

3. Slump Tests: Performed by Testing Laboratory at job site in accordance with ASTM C 143.

4. Test Reports: Submit as specified in Paragraph 1.03 above, including the inclusion of admixtures.

C. Batch Plant Tickets: Submit certification of ready mixed concrete. If concrete is altered by addition of water, admixtures, etc. on site, these alterations must be recorded on the batch ticket and a copy sent directly to the Architect that same day. Other batch plant tickets shall be retained on site for review by Architect.

D. Defective Work: Acceptance or rejection of concrete shall be based on ACI 318-83 Building Code Requirements for Reinforced Concrete.

1. Concrete proven to be defective for any reason may be ordered to be removed and replaced at discretion of Architect. If drilled core tests are required by Architect to determine exact strength of concrete in question,

costs of drilling and testing will be at Contractor's expense. Indications of strength below requirements shall make it mandatory that cement or water ratio be changed immediately to improve strength at Contractor's expense.

2. When there is evidence that strength of concrete structure in place does not meet Specification requirements, cores drilled from hardened concrete for compressive strength determination shall be made in accordance with ASTM C 42, and as follows:

   a. At least three (3) representative cores shall be taken from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by Architect.

   b. Cores shall be tested after moisture conditioning in accordance with ASTM C 42 if concrete they represent will be more than superficially wet under service.

3.13 PATCHING:

A. Honeycombed Areas and Aggregate Pockets: Remove concrete down to sound concrete. Edges shall be perpendicular to surface and at least 3/8" deep. Sandblast surfaces to receive repair. Cast sandblasted surface with epoxy bonding compound. Place mortar in layers having a compacted thickness of 3/8". Scratch surface of each layer to promote bonding with next layer. Match finish on adjacent concrete and cure as specified.

B. Spalled and Pitted Areas: Chipped back to sound concrete sufficiently to obtain good mechanical bond, and filled with lean mortar.

C. Rough Areas and High Spots: Rubbed or ground to match plane of adjacent surface and to an acceptable smoothness, unless otherwise approved by Architect.

END OF SECTION 03 30 00

SECTION 03 45 00

PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 RELATED SECTIONS

A. Section 26 00 00 - Electrical

B. Section 32 13 13 –Concrete Paving

C. Section 43 01 05 – CNG Fueling Equipment

1.3 REFERENCED STANDARDS

A. PCI Manual 117: "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

B. NMDOT Standard Specifications Highway and Bridge Construction, 2014 Edition.

1.4 SUMMARY

A. Section Includes:
1. Pre-Cast Concrete Splash blocks.
2. Heavy Duty Parking stops.
3. NMDOT compliant Precast Concrete Wall Barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail fabrication and installation of architectural precast concrete units.
2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.

3. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.

1.6 QUALITY ASSURANCE

A. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.

B. Support units during shipment on nonstaining shock-absorbing material.

C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

D. Place stored units so identification marks are clearly visible, and units can be inspected.

E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 SPLASH BLOCK

A. Rectangular 36" by 18" by 4" (nominal), pre-cast concrete with integral, sloped interior channel.

2.2 PRECAST CONCRETE PARKING STOP:

A. 8'-0" long, 10" wide by 8" tall with chamfered top edges. Designed to withstand dynamic axle loads generated by 80,000 pound vehicles. Provide drainage slots cast into bottom and mounting holes cast into body of unit.

2.3 PRE-CAST CONCRETE WALL BARRIER:

A. Design Standards; NMDOT standard design and specifications per highway and bridge construction New Mexico State Department of Transportation 2014 edition, Section

606 “Metal and Concrete Wall Barrier” and sections referenced therein. Units are 10”-0” long by 2’-8” tall with four (4) anchoring pockets and integral connection loops at each end to facilitate attaching units to one another. New, un-used Barriers only (no previously installed units will be accepted).

2.4 PERFORMANCE REQUIREMENTS

A. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

2.5 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

2.6 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.

B. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

2.7 FABRICATION

A. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

2.8 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.9 FINISHES

A. Finish exposed surfaces of architectural precast concrete units with smooth, steel-trowel finish.

B. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to

reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Splash blocks: Install at each downspout so that unit will drain properly away from building.

B. Parking bumpers: Install after pavement is placed. Center in parking space. Anchor to ground with 1/4 inch diameter steel dowels 24 inches long minimum. Drive rods flush with top of parking bumper.

C. Concrete Wall Barrier: Securely install in accordance with NMDOT standard details and specifications. Provide four (4) 7/8" diameter anchor bolts securely fastened to paving.

D. Connect architectural precast concrete units in position by bolting, or as otherwise indicated on Shop Drawings.

3.3 PREPARATION

A. Before beginning installation, inspect work of other trades insofar as it affects the work of this section. Commencing installation of units will be construed as accepting as suitable the work of other trades.

3.4 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

SECTION 04 10 00

MORTAR AND GROUT

PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

A.	Submittals:	SECTION 01 30 00.
B.	Quality Control:	SECTION 01 40 00.
C.	Cast-in-Place Concrete:	SECTION 03 30 00.
D.	Concrete Masonry Units:	SECTION 04 22 00.

1. 2 QUALITY ASSURANCE: Comply with the following codes and standards including current editions, revision and supplements.

A. ASTM C 143, Test for Slump of Portland Cement Concrete.

B. ASTM C 270, Mortar for Unit Masonry.

C. ASTM C 476, Mortar and Grout for Reinforced Masonry

D. International Code Council Materials – International Building Code.

1.3 SUBMITTALS:

A. Design Mix: Submit certification of specified mix designs, prepared by an approved testing laboratory.

B. Test Reports: Testing Laboratory shall submit test reports indicating compression, yield and slump of mortar and grout directly to Architect.

1.4 ENVIRONMENTAL REQUIREMENTS: Heat mixing water when air temperature is below 40 degrees F and heat aggregates when air temperature is below 32 degrees F, to assure mortar and grout temperatures between 40 degrees F and 120 degrees F until used. Do not heat water or aggregates above 120 degrees F.

PART 2 – PRODUCTS

2.1 MATERIALS:

A.	Portland Cement:	ASTM C 150, Type I or III.
B.	Hydrated Lime:	ASTM C 207, Type S.
C.	Fine Aggregate:	ASTM C 144, sand, clean and sharp.
D.	Coarse Aggregate:	ASTM C 404, maximum size 3/8 inch sieve.

E. Admixtures: May be used only with prior written approval of Architect or Engineer.

F. Water: Clean and free of deleterious amounts of acids, alkalies, or organic materials, and potable.

2. 2 MIXES:

A. Mortar:

1. Type "S", minimum strength 2800 psi at 28 days, use with unit masonry. Proportion by volume as follows:

a. One (1) part Portland cement.

b. ¼ to ½ parts hydrated lime or lime putty.

c. 2-1/4 to 3 parts fine aggregates times the sum of volume of cement and lime used.

2. Color: Submit actual mortar for approval of color mixture.

3. Mixing Procedures: Measure materials by volume or equivalent weight. Do not measure by shovel. Mix ingredients in clean mechanical batcher for 3 to 5 minutes. Use maximum amount of water to produce workable consistency. Do not retemper stiffened mortar.

B. Grout (minimum strength 1900 psi at 28 days):

1. Fine Grout: Proportion by volume as follows:

a. One (1) part Portland cement.

b. Not more than 1/10 part hydrated lime or lime putty.

c. 2-1/4 to 3 parts fine aggregate.

2. Coarse Grout: Proportion by volume as follows:

a. One (1) part Portland cement.

b. Not more than 1/10 part hydrated lime or lime putty.

c. 2 to 3 parts fine aggregate.

d. Not more than 2 parts coarse aggregate.

C. General: Coarse grout may be used in grout spaces in masonry 2 inches or more in horizontal dimension and in grout spaces in filled-cell construction 4 inches or more in both horizontal dimensions, otherwise use fine grout.

PART 3 – EXECUTION

3.1 PREPARATION OF MIXES:

A. Mortar: Mix mortar materials in a mechanical mixer with approximately one-half (1/2) of the water and fine aggregate placed into the mixer first. Cementitious materials, and remaining water and sand should then be added and mixed for not less than 5 minutes. Hand mixing shall not be used unless specifically approved by Architect.

B. Grout: Mix to a fluid consistency in a mechanical mixer. The mixture shall be fluid as possible without segregation of materials. Consistency of grout such that at time of placement it has slump of 8 to 10 inches, as determined by ASTM C 143.

3.2 USAGE: Use mortar and grout within 1-hour of initial mixing. Discard mortar and grout that have begun to set. Retempering mortar and grout will not be permitted.

3.3 APPLICATION: Use as specified in SECTION 04 22 00 – CONCRETE MASONRY UNITS.

END OF SECTION 04 10 00

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.
3. Masonry joint reinforcement.
4. Ties and anchors.
5. Embedded flashing.
6. Miscellaneous masonry accessories.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification to be reviewed at the site: For each type and color of the following:

1. Exposed CMUs.
2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
3. Accessories embedded in masonry.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.

   a. Include material test reports substantiating compliance with requirements.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.5 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 36 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions as indicated on plans.
2. Provide bullnose units for interior outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.

1. Match existing in color, finish, and appearance.
2. Density Classification: Normal Weight.

3. Size (Width): As shown on plans and manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Burnished faces of colors as selected from manufacturers standard colors.
5. Integral Water Repellant.

2.3 MASONRY LINTELS

A. General: Provide one of the following:

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.187-inch diameter.
5. Wire Size for Veneer Ties: 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 641/A 641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch-diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls, unless otherwise indicated.

C. Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

D. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from copper, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.
6. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Asphalt-Coated Copper Flashing: 7-oz./sq. ft. copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Cop-R-Cote.
2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Coated Thru-Wall Flashing.
3) Hohmann & Barnard, Inc.; H & B C-Coat Flashing.
4) Phoenix Building Products; Type ACC-Asphalt Bituminous Coated.
5) Sandell Manufacturing Co., Inc.; Coated Copper Flashing.

2. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) DuPont; Thru-Wall Flashing.
2) Hohmann & Barnard, Inc.; Flex-Flash.
3) Hyload, Inc.; Hyload Cloaked Flashing System.

b. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.

c. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing or flexible flashing with a metal drip edge.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Sandell Manufacturing Co., Inc.; Blok-Flash.

E. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."

1. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/4 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/4 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet , or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet , or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch .

2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches . Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches .

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING

A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
4. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/ TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 60 inches.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 28 days.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fabrication and erection of Structural Steel.
2. Grout.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
3. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.

1.2 DEFINITIONS

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

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.3 PERFORMANCE REQUIREMENTS

A. Moment Connections: Type PR, partially and FR, fully restrained.

B. Construction: Combined system of moment frame, braced frame, and shear walls.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.
8. For structural-steel connections indicated to comply with design loads, include structural design data.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.

6. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.6 QUALITY ASSURANCE

A. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P3 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

C. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Reference Standards:

1. ASTM International (ASTM)

a.	ASTM A 36 A36M-05	Standard Specification for Carbon Structural Steel
b.	ASTM A 53/Black A53M-05	Standard Specification for Pipe, Steel, and Hot-Dipped, Zinc-coated Welded and Seamless
c.	ASTM A 307-04	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
d.	ASTM A 325-04b	Standard specification for Structural Bolts, Steel Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
e.	ASTM A 490-04a	Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
f.	ASTM A 500-03a	Standard Specification for Cold-Formed Welded And Seamless Carbon Steel Structural Tubing in Rounds and Shapes
g.	ASTM A 992/ A 992M-04a	Standard Specification for Structural Steel Shapes
h.	ASTM C 1107-05	Specification for Packaged Dry, Hydraulic-Cement Grout (non-shrink)
i.	ASTM F1554-04	Standard Specification for Anchor Bolts, Steel

36, 55, and 105ksi Yield Strength.

j. ASTM A6/A6M Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

2. American Welding Society (AWS), latest edition.

   a. AWS D1.1 Structural Welding Code-Steel

3. American Institute of Steel Construction (AISC), Steel Construction Manual, latest edition.

   a. Specification for Structural Steel Buildings
   b. AISC Code of Standard Practice
   c. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

E. Pre-installation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

   1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
   2. Clean and relubricate bolts and nuts that become dry or rusty before use.
   3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

C. Support structural steel above ground on skids, pallets, platforms, or other supports.

D. Protect steel from damage.

E. Store packaged materials in original unbroken package or container.

F. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.

G. Replace damaged shapes or members.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Allowable Stress Design; data are given at service-load level.

B. Moment Connections: Type PR, partially Type FR, fully restrained as indicated.

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

2.2 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:

1. W-Shapes: 60 percent.
2. Channels, Angles: 60 percent.
3. Plate and Bar: 25 percent.
4. Cold-Formed Hollow Structural Sections: 25 percent.
5. Steel Pipe: 25 percent.
6. All Other Steel Materials: 25 percent.

C. All Wide Flange Shapes shall conform to ASTM A 992, Grade 50 unless noted otherwise.

D. All Angles, Channels, Plates, and Bars: ASTM A36.

E. Structural Steel Pipe: ASTM A 53, Type E or S, Grade B Fy=35 ksi

F. Rectangular or Square Hollow Structural Section: ASTM A 500, Grade B, Fy=46 ksi.

G. Round Hollow Structural Sections ASTM A 500, Grade B, Fy-42ksi.

H. Anchor Bolts: ASTM F1554, Grade 36

I. Welding Electrodes: E 70 Series.

J. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436 , Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.

C. Unheaded Anchor Rods: ASTM F 1554, Grade 36

1. Configuration: Hooked
2. Nuts: ASTM A 563 hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Plain or Hot-dip zinc coating, ASTM A 153/A 153M, Class C

D. Headed Anchor Rods: ASTM F 1554, Grade 36 straight.

1. Nuts: ASTM A 563 hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain or Hot-dip zinc coating, ASTM A 153/A 153M, Class C

E. Threaded Rods: ASTM A 36/A 36M

1. Nuts: ASTM A 563 hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Plain or Hot-dip zinc coating, ASTM A 153/A 153M, Class C

F. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

G. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

H. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.4 PRIMER

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting.

C. Primer: Fabricator's standard lead-and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 GROUT

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

2.6 FABRICATION

A. Fabrication shall be in accordance with the AISC "Code of Standard Practice for Buildings and Bridges".

B. Connections: Weld or bolt shop connections as indicated on the approved shop drawings. Design connections to support reactions and forces where indicated on the drawings.

C. Shop Welds: Shall be visually inspected by the Fabricator's quality control department.

D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

E. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.

F. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches on center unless otherwise indicated.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.

2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

H. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

I. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning." or SSPC-SP 2, "Hand Tool Cleaning."

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened or Pre-tensioned or Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils . Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

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

1. Joint Type: Snug tightened or Pre-tensioned or Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified independent testing agency to perform tests and inspections.

C. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

    a. Liquid Penetrant Inspection: ASTM E 165.
    b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    c. Ultrasonic Inspection: ASTM E 164.
    d. Radiographic Inspection: ASTM E 94.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 05 12 00

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Noncomposite form deck.

B. Related Requirements:

1. Division 03 Section "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Division 09 painting Sections for repair painting of primed deck and finish painting of deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

D. Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.

D. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASC Profiles, Inc.; a Blue Scope Steel company.

2. Canam United States; Canam Group Inc.
3. CMC Joist & Deck.
4. Consolidated Systems, Inc.; Metal Dek Group.
5. Cordeck.
6. DACS, Inc.
7. Epic Metals Corporation.
8. Marlyn Steel Decks, Inc.
9. New Millennium Building Systems, LLC.
10. Nucor Corp.; Vulcraft Group.
11. Roof Deck, Inc.
12. Valley Joist; Subsidiary of EBSCO Industries, Inc.
13. Verco Manufacturing Co.
14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
15. Equivalent as approved by Architect or Engineer.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

   a. Color: Manufacturer's standard.

2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
6. Span Condition: As indicated.
7. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 NONCOMPOSITE FORM DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASC Profiles, Inc.; a Blue Scope Steel company.
2. Canam United States; Canam Group Inc.
3. CMC Joist & Deck.
4. Consolidated Systems, Inc.; Metal Dek Group.
5. Cordeck.
6. DACS, Inc.
7. Marlyn Steel Decks, Inc.
8. New Millennium Building Systems, LLC.
9. Nucor Corp.; Vulcraft Group.
10. Roof Deck, Inc.
11. Valley Joist; Subsidiary of EBSCO Industries, Inc.
12. Verco Manufacturing Co.
13. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
14. Equivalent as approved by Architect or Engineer.

B. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

   a. Color: Manufacturer's standard.

2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.
4. Span Condition: As indicated.
5. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

L. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch or 3/4 inch, nominal.

2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.
3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Fasten with a minimum of 1-1/2-inch- long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches , with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches apart with at least one weld or fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform special tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Owner, Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing wall framing.

2. Exterior load-bearing wall framing.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on drawings.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1/2 inch.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Mechanical fasteners.
4. Vertical deflection clips.
5. Horizontal drift deflection clips
6. Miscellaneous structural clips and accessories.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

E. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

G. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Studco.
2. AllSteel Products, Inc.
3. California Expanded Metal Products Company.
4. Clark Steel Framing.
5. Consolidated Fabricators Corp.; Building Products Division.
6. Craco Metals Manufacturing, LLC.
7. Custom Stud, Inc.
8. Dale/Incor.
9. Design Shapes in Steel.
10. Dietrich Metal Framing; a Worthington Industries Company.
11. Formetal Co. Inc. (The).
12. Innovative Steel Systems.
13. MarinoWare; a division of Ware Industries.
14. Quail Run Building Materials, Inc.
15. SCAFCO Corporation.
16. Southeastern Stud & Components, Inc.
17. Steel Construction Systems.
18. Steeler, Inc.
19. Super Stud Building Products, Inc.
20. United Metal Products, Inc.
21. Equivalent as approved by Design Professional.

2.2 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

C. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50 , Class 1 or 2.
2. Coating: G90 .

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated.
2. Flange Width: As indicated.
3. Section Properties: As indicated.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Dietrich Metal Framing; a Worthington Industries Company.
b. MarinoWare, a division of Ware Industries.
c. SCAFCO Corporation
d. The Steel Network, Inc.
e. Equivalent as approved by Architect.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Dietrich Metal Framing; a Worthington Industries Company.
b. MarinoWare, a division of Ware Industries.
c. SCAFCO Corporation
d. The Steel Network, Inc.
e. Equivalent as approved by Architect.

2. Minimum Base-Metal Thickness: Match steel studs.
3. Flange Width: 1 inch plus the design gap for 1-story structures and 1 inch plus twice the design gap for other applications.

E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C or mechanically deposition according to ASTM B 695, Class 50.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 MISCELLANEOUS MATERIALS

A. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

   a. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.
2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
3. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

   a. Install solid blocking at centers indicated on Shop Drawings.

2. Bridging: Cold-rolled steel channel welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel framing and supports for ceiling-hung toilet compartments.
2. Steel framing and supports for countertops.
3. Steel framing and supports for mechanical and electrical equipment.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Shelf angles.
6. Metal ladders.
7. Miscellaneous steel trim including steel angle corner guards, steel edgings, and loading-dock edge angles.
8. Metal bollards.
9. Abrasive metal nosings.
10. Metal downspout boots.
11. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
3. Division 05 Section "Structural Steel Framing."

1.2 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Metal nosings and treads.
3. Paint products.
4. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 NONFERROUS METALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

C. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).

D. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).

E. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 , Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A ; with hex nuts, ASTM A 563 ; and, where indicated, flat washers.

C. Plain Washers: Round, ASME B18.22.1 .

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

F. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches , with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Prime shelf angles located in exterior walls with zinc-rich primer.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.10 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

1. Cap bollards with 1/4-inch- thick steel plate.
2. Where bollards are indicated to receive controls for door operators, provide necessary cutouts for controls and holes for wire.
3. Where bollards are indicated to receive light fixtures, provide necessary cutouts for fixtures and holes for wire.

B. Prime bollards with zinc-rich primer.

2.11 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Prime plates with zinc-rich primer.

2.12 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches unless otherwise indicated.

C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.13 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each

unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

A. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

2.16 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

1. Do not fill removable bollards with concrete.

B. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

C. Fill bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

3.4 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

A. Center nosings on tread widths unless otherwise indicated.

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

C. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 07 Section "Joint Sealants" to provide a watertight installation.

3.5 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.6 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

END OF SECTION 05 50 00

SECTION 05 70 00

ORNAMENTAL METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Woven steel wire mesh for ventilation at CNG building addition.

B. Related Sections:
1. Division 04 Section "Unit Masonry" for installing mesh into unit masonry.
2. Division 05 Section "Structural Steel Framing".
3. Division 09 Section “Painting”.

1.2 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:
1. Woven steel mesh.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal mesh fabrications and their connections. Show anchorage and accessory items.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.5 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide sheet materials without bends or distortions.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 , Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

2.3 MISCELLANEOUS MATERIALS

A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Where exposed fasteners are required, use Phillips pan-head (or domed) fasteners with large diameter "fender" washers to span mesh weave. Locate joints where least conspicuous.

D. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 WOVEN STEEL WIRE MESH

A. Provide woven steel wire mesh at addition to CNG station. Weave, wire gauge, orientation and attachment to match existing mesh currently installed on building.

B. Manufacturer: The Western Group (TWG), 4025 NW Express Ave, Portland OR 97210 Tel: 503.222.1644; Web: www.architecturalwire.com

C. Requests for Substitution shall be in accordance with Section 01 25 13 – Product Substitution Procedures.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.7 STEEL AND IRON FINISHES

A. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal mesh. Set metal mesh accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal mesh is required to be fastened to in-place construction. Provide threaded fasteners for use with through bolts, lag screws and other connectors.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

END OF SECTION 05 70 00

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire retardant treated ¾" thick un-painted electrical panel backer-boards.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide fire retardant treated plywood for all applications.

PART 3 - EXECUTION

3.1 GENERAL

A. Discard units of material with defects which might impair quality of work.

B. Set carpentry work with members plumb and true and accurately cut and fitted.

C. Countersink fasteners and exposed work.

D. Securely attach carpentry work to substrates as shown or as required by recognized standards.

END OF SECTION 06 10 00

SECTION 07 41 13

METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-finished, formed roof panels.

B. Flashings and counterflashings.

C. Integral facia.

D. Coping cap at parapets.

1.1 RELATED SECTIONS

A. Section 05 12 00 - Structural Steel

B. Section 07 62 00 – Sheet Metal Flashing

C. Section 07 90 00 - Joint Sealants

1.2 REFERENCES

A. American Iron and Steel Institute (AISI): SG-673 Cold-Formed Steel Design Manual

B. American Society of Civil Engineers (ASCE): Minimum Design Loads for Buildings and Other Structures

C. American Society of Testing Materials (ASTM):

1. A-446 Steel Sheets Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

2. A-525 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

3. A653-00 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip process

4. A-792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot Dip process.

1.3 DESIGN REQUIREMENTS

A. Determine loading criteria in accordance with ASCE 7.

B. Design panels and accessory items and their attachments in accordance with AISI SG-673 using manufacturer's standard methods.

C. Roof panels shall support a dead load of actual weights of the materials and a live load of 20 psf.

D. Design and fabricate the roofing system to conform to UL 580 Class 90 wind uplift resistance.

E. Determine steel gauge by spacing of supports and by loading in accordance with ASCE 7.

1.4 SUBMITTALS

A. Product data including manufacturer's product specifications, standard details, certified product test results, installation instructions, and general recommendations.

B. Samples and color chips for all proposed finishes, textures and patterns for selection by Architect.

C. Sample panel 12 inches long by actual panel width, in the profile, style color and texture indicated.

D. Shop drawings showing panel profiles, layouts of panels on roofs, details of edge construction, joints, sealants, supports, fastening methods, trim, flashings, closures and accessories.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified with minimum 10 years documented experience.

B. Installer: Approved by manufacturer with experience on at least six projects of similar nature in past five years.

C. Field Measurements: Where possible, prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 01 60 00.

B. Deliver panels and other components so they will not be damaged of deformed. Package roof panels for protection against transportation damage.

C. Handle panels to prevent twisting, bending, warping, and surface damage.

D. Stack materials on platforms or pallets covered with weatherproof ventilated covering. Slope panels to ensure drainage. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.7 WARRANTY

A. Provide warranty signed and countersigned by installer and Contractor covering workmanship for two (2) years from date of substantial completion.

B. Warrant factory applied exterior finish coating against cracking, checking blistering, peeling, flaking and chipping for a period of 20 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis of design; Berridge "R" Panel roofing with panel shear capacity of 296plf at 2'-0" o.c. purlin spacing.

A. Berridge Manufacturing Company
1720 Maury Street
Houston, Texas 77026
Phone: (800) 231-8127 Outside TX
(713) 223-4971 In TX
Fax: (713) 236-9422

B. Substitutions in accordance with section 01 25 13 Product Substitution Procedures.

2.2 MATERIALS

A. Galvanized Steel Sheet: Hot dip zinc-coated steel sheet complying with ASTM A 446 with G90 coating complying with ASTM A 525, Grade D.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip aluminum-zinc-coated steel sheet complying with ASTM A 792 with Class AZ-55 coating; Grade 50.
1. Texture: Smooth

2.3 COMPONENTS

A. Roof Panels: Manufacturer's standard factory-formed, "R-Panel" roof panel. Designed for mechanical attachment of panels to roof purlin or deck.

1. Roof Panel: Mechanically seamed panel system. 1 ½ inch high, 36 inch (nominal) wide panel.

2. Air and water penetration: Conform to ASTM E 283 and ASTM E 331. Panel joint shall show no air leakage when tested at 15 psf and no water leakage when tested at 13.24 psf.

3. Steel gauge: Minimum 24, or as dictated by project design requirements.

B. Fascia: Continuous panel transition from roof panel, prefinished color to match architect's sample, 24 gauge steel.

D. Parapet Coping System: Metal coping cap with steel chair and concealed, hemmed splice plate at splices for capping parapet wall, 24 gauge steel. The system shall be watertight and not require exposed fasteners.

1. Product Characteristics:
   a. Coping system shall lock to anchor chair by Snap-On installation.
   b. Coping shall expand and contract while mechanically locked in place.
   c. Coping sections minimum 10'-0" in length.
   d. 4" nominal coping front and rear.
   e. Splice Plate: 6 inches wide, concealed and hemmed to drain moisture.
   f. Butyl Tape and one part polyurethane sealant must be applied to splice plate per manufacturer's recommendation and details.
   g. Anchor Chair: 20 gauge galvanized steel, 8 inches wide at 5 foot 0 inches on center and mechanically fastened. Shim Plates must be installed on chair when splice plate is not required.
   h. Corners, endcaps, transitions, etc., fabricated by the product manufacturer with same gauge, color and profiles.

E. Roof, fascia, & parapet coping panels to be fabricated by same manufacturer.

F. Clips: Provide clips as recommended by the roofing manufacturer.

1. Fixed Clips: Minimum 24 gauge (0.024 inch), (.65 mm) thick, galvanized steel.
2. Sliding Clips: Minimum 24 gauge (0.024 inch), (.65 mm) thick, galvanized steel.
3. Base Clips: Minimum 18 gauge (0.052 inch), (1.32 mm) thick, galvanized steel.

G. Copings, trim, flashings, fillers, metal inside and outside closures: match material, gauge, and finishes of panels.

H. Use metal outside closures to secure the ridge assembly and to create a weathertight condition. Material shall be of same gauge, color, finish as the panel.

I. Use minimum 18 gauge galvanized end lap plates to secure end lap conditions.

2.4 ACCESSORIES

A. Fasteners: Manufacturers standard to withstand design load.

B. Panel clips: Galvanized steel, gauge as required by design requirements.

C. Sealant: Sealant as recommended by the manufacturer.

2.5 FABRICATION

A. Roll form panels at the factory to the greatest extent possible.

B. Fabricate notched and swagged panels in the factory for end lap conditions.

C. Perform job site cutting and forming only with sheet metal cutting and forming tools.

D. Fabricate trim, flashing and accessories to detailed profiles.

E. Form sections true to shape, accurate in size, square, and free from distortion.

F. Form panels in longest practical lengths.

2.6 FINISHES

A. Mill-finished galvalume steel sheet.

B. Kynar 500: Prime pretreated substrate with 0.25 to 0.35 mil corrosion resistant primer. Apply finish coat of 0.70 to 0.80 mil over primed substrate.

C. Color: Selected by Architect's from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that slope of framing is minimum required for roofing system with tolerance of 1/4 inch in 20 feet.

B. Inspect roof framing to verify that members are true to line, free of depressions, waves or projections.

C. Inspect framed openings, support framing, pipes, sleeves, ducts and vents which pass through roof are solidly set in place.

D. Report inconsistencies to the Architect before commencing roofing installation.

E. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Field measure and verify site conditions prior to fabricating work.

3.3 METAL ROOFING & ACCESSORIES INSTALLATION

A. Install roofing in accordance with manufacturer's instructions and project shop drawings.

B. Anchor components securely in place, with provisions for thermal structural movement.

A. Install panels with concealed fasteners except where exposed fasteners are recommended by the manufacturer.

B. Align transverse joints of roofing panels.

C. Accessories: Install components required for a complete roof panel system, including trim, copings, fascias, ridge closures, flashings, sealants, gaskets, fillers, closure strips, and similar items.

D. Joint Sealants: Install gaskets, joint fillers, and sealants where required for weatherproof performance of panel systems. Provide types of gaskets tapes sealants, and fillers recommended by panel manufacturer.

3.5 CLEANING

E. Remove temporary protective coverings and strippable films as soon as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction

.

F. Remove drill shavings and scraps from panels and flashings after each work period.

END OF SECTION 07 41 13

SECTION 07 62 00

FLASHING AND SHEET METAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to work of this Section.

A. Section 07 41 13 – Metal Roof Panels

B. Section 07 92 00 – Joint Sealants

1.2 SUMMARY

A. This Section includes the following:

1. Metal wall flashing and expansion joints.

2. Metal valleys, gutters, and scuppers.

3. Gutters and downspouts (rain drainage).

4. Exposed metal trim/fascia units.

5. Miscellaneous sheet metal accessories.

1.3 SUBMITTALS

A. General. Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, Flashing, Sheet Metal, and Accessories. Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

C. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counterflashings, trim/fascia units, gutters, downspouts, scuppers, and expansion joint systems. Provide layouts at 1/4-inch scale and details at 3-inch scale.

1.4 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

1.5 WARRANTY

A. 20 year warranty on color fastness of pre-finished, Kynar 500 metal trim and flashing.

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM MATERIALS

A. Zinc-Coated Steel. Commercial quality with 0.20 percent copper, ASTM A 526 except ASTM A 527 for lock-forming, G90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359-inch thick (20 gage) except as otherwise indicated. Flashings and trim to be pre-finished with Kynar 500 or approved equal, color as selected by Architect from manufacturer's full range.

B. Solder. For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.

C. Fasteners. Same metal as flashing/sheet metal or other non- corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

D. Bituminous Coating. SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

E. Elastomeric Sealant. As recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

F. Adhesives. Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

G. Metal Accessories. Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

2.2 FABRICATED UNITS

A. General Metal Fabrication. Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams. Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

C. Expansion Provisions. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints. Where movable, nonexpansion type joints are indicated or required for

proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations. Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

2.3 ACCESSORIES

To include eave trim, gutters, downspouts: Standard profiles, unless otherwise noted and furnished as specified. Metal Coating on Gutters, Downspouts and Eave Trim: full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General. Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Underlayment. Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Clean all gutters and downspouts and test roof for water-tightness in presence of Architect. Repair deficiencies and re-test. Adjust fascia and soffit panels for neat, level and uniform appearance.

B. Protection. Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 07 62 00

SECTION 07 92 00

SEALANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The installation of sealants in interior joints around door frames, around items penetrating the structure and wherever else indicated or required to prevent the penetration of air or water into the building.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-In-Place Concrete

B. Section 04 22 00 – Concrete Masonry Units

C. Section 08 11 14 -- Metal Doors and Frames

D. Section 09 91 00 -- Painting

1.3 SUBMITTALS

Submit schedule of sealants and gaskets to be used and color samples of exposed sealants for selection by Architect.

1.4 HANDLING

Deliver materials in original sealed containers with manufacturer's label and product identification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sealants shall be single or double component, non-sagging materials as listed below or approved equal:

1. All exterior and interior applications except concrete paving:

   a. Dow Corning 790 Building Sealant, Fed. Spec. TT-S-001543A.

   b. General Electric Silicone Construction 1200 Sealant, Fed. Spec. TT-S-001543A.

2. Concrete Expansion Joint Sealer:

   a. Volken 255 two-part polyurethane, Fed. Spec. TT-S-00227E, Type I, Class A.

b. Sonneborn Sonalastic Paving Joint Sealant, two-part urethane, Fed. Spec. TT-S-00227E, Type II, Class A.

c. Or approved equal.

B. Sealant Primers: If required, shall be by the same manufacturer as the sealant.

C. Colors: Selected by Architect from manufacturer's full range of products that are compatible with materials to be sealed.

D. Joint Filler: All filler materials shall be non-oily, non-staining back-up filler such as polyethylene foam rod, expanded polyurethane, neoprene, glass fiber or other compressible filler compatible with sealant.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Examine joints to be sealed for defects which would adversely affect work.

B. Ensure that masonry and concrete have cured 28 days minimum.

C. Clean joint surfaces of dust, dirt, oil, grease, rust, paint, laitance, release agents, moisture, or other matter which might adversely affect adhesion of sealant. Use joint cleaners as necessary.

D. Mask areas adjacent to joints which would be difficult to clean if sealant was smeared.

3.2 APPLICATION:

A. Completely seal all joints or spaces noted on Drawings to be caulked or as required to render building completely watertight.

B. All sealants shall be installed according to manufacturer's instructions, a copy of which shall be on the job during this entire operation.

C. Joint depth and width shall be 1/4 inch by 1/4 inch minimum, or as called out on the Drawings. Joint width shall be 1 inch maximum. Where these requirements are not met, no caulking shall be done without approval of Architect.

D. Install filler material in joints using blunt instrument to avoid puncturing. Do not twist rod while installing. Install filler so that joint depth is 50% of joint width, but a minimum of 1/4 inch deep. Install bond breaker tape in joints without filler to prevent sealant adhering to bottom of joint.

E. Apply sealant in joints with a minimum exposure to air using pressure gun with nozzle cut to fit joint width. Make sure sealant is deposited in uniform, continuous beads without gaps or air pockets.

F. Tool joints concave within 10 minutes of sealant application. If masking materials are used, remove immediately after tooling. Upon completion, caulking shall have a smooth,

even, well-tooled finish. The use of kerosene or any other solvent for tooling of joints is prohibited.

G. Sealant must not lap onto metal surfaces or feather onto masonry surfaces. Remove excess materials adjacent to joints by mechanical means or with mineral spirits as work progresses. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.

H. Defective sealant installations will be removed and replaced at no additional cost to the Owner.

END OF SECTION 07 92 00

SECTION 08 11 14

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The supply and installation of hollow metal doors and frames and borrow lite frames. See Door Schedule for sizes, and location.

1.1 RELATED SECTIONS

A. Section 07 92 00 – Sealants

B. Section 08 71 00 - Finish Hardware

C. Section 09 91 00 - Painting

1.2 QUALITY ASSURANCE

A. General: Hollow metal doors and frames shall conform to Commercial Standard CS 242-62, U.S. Department of Commerce.

1.3 SUBMITTALS

A. Shop drawings of metal doors and frames.

B. Manufacturer's catalog data.

C. Schedule of installation locations.

1.4 COORDINATION

Coordinate with hardware supplier as required for proper preparation of frames and doors for reception of hardware items. Provide copies of approved shop drawings to hardware supplier and obtain verification of hardware details and dimensions.

1.5 PRODUCT HANDLING

A. Doors: Provide wrapping as required to protect doors during shipping and storage. Store doors upright in a protected, dry area with a 1/4 inch air space between doors.

B. Frames: Before shipment, install temporary spreaders at bottom of bucks; do not remove until frames are finally secured in place.

PART 2 - PRODUCTS

2.1 GENERAL

A. All metal doors and frames are to be the product of one manufacturer.

B. The Drawings indicate the profile and general detail of the hollow metal frame construction and installation.

2.2 DOORS

A. Construction: All metal doors shall be 1-3/4" thick, cold rolled steel both sides and spot welded to full length vertical reinforcement on 6" centers, both vertically and horizontally. 16 gage face sheet unless indicated otherwise.

1. Interior: Top and bottom of door shall have continuous inverted stiffener channel welded to side plates.

2. Exterior: Top and bottom of door shall have continuous stiffener channels welded to side plates to form flush edges.

B. Insulation: Insulate in each space between reinforcements with non- combustible material to deaden metallic sound.

C. Hardware: Secure templates from finish hardware supplier and accurately mortise, reinforce and drill doors to receive hardware.

D. Glazing Stops: Manufacturer's standard snap-in metal stops. Locate removable stops on secure side of door.

2.3 FRAMES

A. Construction: Frames shall be fabricated of 14 gauge cold rolled commercial quality prime steel free from scale, pitting or surface defects. Heads and jambs to be notched, mitered and welded and finished flush to present a smooth surface for painting.

B. Door Frame Anchors: A minimum of 3 anchors per jamb to be furnished to suit wall construction. All frames will be supplied with a standard bottom clip angle with 2 holes for anchorage.

C. Hardware: Frames will be mortised, reinforced, drilled and tapped for all mortise type hardware and reinforced only for surface type hardware and to be drilled and tapped in the field. Masonry frames will be supplied with plaster guards behind each hardware reinforcing plate to eliminate screw holes being clogged with mortar during construction. All hinge reinforcing to be minimum 3/16" steel bar with 12 gauge steel used for strikes and surface closer and bracket reinforcing unless specified otherwise. Punch all frames to receive three door silencers on strike side of frame.

D. Drawing: After fabrication all frames shall be cleaned of all scale and oil, phosphatized and then run through a conveyorized painting system which will bake on a red iron oxide primer meeting federal specs ETP 663. The finished frame will have a hard durable prime finish ready for normal field handling until ready for the final painting on the job.

E. Borrow Lite Glazing Stops: Manufacturer's standard, screw applied channel shaped steel.

2.4 FINISH

After fabrication, clean all surfaces and apply one shop coat of standard air drying rust-inhibitive primer to frames.

PART 3 - EXECUTION

3.1 INSPECTION

Prior to installation of metal doors and frames, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.2 INSTALLATION

A. Door Frames: Install frames plumb, rigid and in true alignment. Properly brace until built in. Secure door frames to concrete floor with two expansion anchors at each jamb. Secure door frames to wall with a minimum of 3 anchors or as noted in Drawings.

B. Grout: Grout all frames solid with standard masonry grout.

C. Doors and Finish Hardware: Install finish hardware in accordance with manufacturer's recommendations. Eliminate all hinge-bind conditions and make all doors and items of hardware operate smoothly.

D. Borrow Lite Frames: Install frames, plumb, rigid and in true alignment. Shim sill as necessary.

END OF SECTION 08 11 14

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes hardware for hollow metal doors.

1. Provide door weather stripping and thresholds.

B. Related Sections:

1. Section 08 10 00 – Metal Doors and Frames: Silencers integral with steel frames.

1.2 REFERENCES

A. American National Standards Institute:

1. ANSI A156.1 - Butts and Hinges.
2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
3. ANSI A156.3 - Exit Devices.
4. ANSI A156.4 - Door Controls - Closures.
5. ANSI A156.5 - Auxiliary Locks and Associated Products.
6. ANSI A156.6 - Architectural Door Trim.
7. ANSI A156.7 - Template Hinge Dimensions.
8. ANSI A156.8 - Door Controls - Overhead Holders.
9. ANSI A156.12 - Interconnected Locks and Latches.
10. ANSI A156.13 - Mortise Locks and Latches.
11. ANSI A156.14 - Sliding and Folding Door Hardware.
12. ANSI A156.15 - Closer Holder Release Devices.
13. ANSI A156.16 - Auxiliary Hardware.
14. ANSI A156.18 - Materials and Finishes
15. ANSI A156.19 - Power Assist and Low Energy Power Operated Doors.
16. ANSI A156.23 - Electromagnetic Locks.
17. ANSI A156.24 - Delayed Egress Locks.
18. ANSI A156 - Complete Set of 24 BHMA Standards (A156 Series) with Binder.

B. Builders Hardware Manufacturers Association:

1. BHMA Directory of Certified Products.

C. National Fire Protection Association:

1. NFPA 80 - Standard for Fire Doors, Fire Windows.
2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

D. Underwriters Laboratories Inc.:

1. UL 10B - Fire Tests of Door Assemblies.
2. UL 305 - Panic Hardware.
3. UL - Building Materials Directory.

E. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

1.3 PERFORMANCE REQUIREMENTS

A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.

1. Hardware: Tested in accordance with NFPA 252.

1.4 SUBMITTALS

A. Section 01 30 00 - Submittals: Submittal procedures.

B. Shop Drawings:

1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
2. Submit manufacturer's parts lists and templates.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Contract Closeout: Closeout procedures.

B. Project Record Documents: Record actual locations of installed cylinders and their master key code.

C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:

1. ANSI A156 series.
2. NFPA 80.
3. UL 305.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

B. Hardware Supplier: The hardware supplier must have in his/her employment an Architectural Hardware Consultant (AHC), as recognized by the Door And Hardware Institute, with a minimum of 10 years of Architectural Hardware experience or an equivalent person with 20 years of Architectural Hardware experience, who shall be responsible for the detailing, scheduling, and ordering of the finish hardware for this Contract.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.9 COORDINATION

A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.

C. Sequence installation to accommodate required utility connections.

D. Coordinate Owner's keying requirements during course of Work.

1.10 WARRANTY

A. Section 01 70 00 – Contract Closeout: Product warranties and product bonds.

B. Furnish 3 copies of the following written warranty to be included in the Maintenance Manual:

1. Warranty against mechanical failure of exit devices for a 3 year period.
2. Warranty against mechanical failure of locksets and cores for a 7 year period.
3. Warranty against mechanical failure of door closers for a 10 year period.
4. Warranty door operators and supporting equipment for a 2 year period.
5. Warranty against failure of parts of all hardware except exit devices, locksets, and door closers for a 1 year period.

1.11 MAINTENANCE MATERIALS

A. Section 01 70 00 – Contract Closeout: Maintenance materials.

B. Furnish special wrenches and tools applicable for each different and for each special hardware component.

C. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.1 DOOR HARDWARE

A. Hinge Manufacturers:

1. Ives Model 5BB1 / 5BB1HW
2. Bommer Model BB500 / BB5004
3. Stanley Model FBB179 / FBB168
4. Substitutions: Section 01 63 10 - Substitutions.

B. Lockset and Latch Set Manufacturers:

1. Schlage ND Series
2. Best 93K Series w/LM
3. Falcon T Series
4. Substitutions: Section 01 63 10 - Substitutions.

C. Cylinder Manufacturers:

1. Schlage
2. Substitutions: Section 01 63 10 - Substitutions.

D. Closers Manufacturers:

1. LCN 4011 / 4111 Series.
2. Sargent 281 Series.
3. Substitutions: Section 01 63 10 - Substitutions.

E. Door Controls and Overhead Holders Manufacturers:

1. Glynn Johnson Model 900 Series
2. ABH Model 9000 Series
3. Rixson Model 9 Series
4. Substitutions: Section 01 63 10 - Substitutions.

F. Push/Pulls, Manual and Automatic Bolts, Protection Plates, and Trim Manufacturers:

1. Ives
2. Don-Jo
3. Trimco
4. Substitutions: Section 01 63 10 - Substitutions.

2.2 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.

1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
   a. Finish: Match hardware item being fastened.
4. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.

B. Hinges: ANSI A156.1, full mortise type complying with following general requirements unless otherwise scheduled.

1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
   a. Fire Rated Doors to 86 inches High: Minimum three hinges.
3. Size and Weight: 4-1/2 inch standard weight typical for 1-3/4 inch doors.
   a. Doors Over 40 inches Wide: Extra heavy weight ball bearing hinges.
   b. Doors 2 inch Thick: 5 inch extra heavy weight ball bearing.
   c. Doors Over 48 inches Wide: 5 x 4.5 inch extra heavy weight ball bearing.
4. Pins: Furnish non-removable pins (NRP).
5. Tips: Flat button tips with matching plug.
6. Stainless Steel with stainless steel pins at all exterior doors.

C. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series. Fastened with through-bolts.

1. Chassis: Cylindrical design, corrosion - resistant plated cold-rolled steel.
2. Latch Retractors: Forged steel. Balance of inner parts: Corrosion-resistant plated steel, or stainless steel.
3. Lever Trim: Accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
4. Locks shall be of such construction that when locked, the door may be opened from within by using lever and without the use of a key or special knowledge.
5. Rosettes: Minimum 3-7/16" diameter for coverage of ANSI/DHI A115.18, 1994 door preparation, through-bolt lugs on both spring cages to fully engage this pattern.
6. Springs: Full compression type.

7. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.

D. Cylinders: ANSI A156.5, Grade 1,

1. Keying: Keyed as directed by Owner. Master keyed, Grand master keyed, Great grand master keyed as directed.
2. Permanent cores shall be keyed/combined in sets or subsets, master keyed or great grand master keyed, as directed by Owner. Permanent keys and cylinders/cores shall be marked with the applicable blind code for identification.
3. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate - Patented". Keys and cylinder identification stamping to be approved by Architect and Owner. Failure to properly comply with these requirements may be cause to require replacement of all or any part of the cylinders and keys involved as deemed necessary at no additional cost to the Owner.
4. Equip locks and cylinders with patent protected, full size cores with nickel silver blocking pin to check for patented feature on keys. Provide a minimum of six pins with nickel silver bottom pins. Cylinders must allow for multiplex master keying, combinated to Owner's instructions.
5. Supply all locks and cylinders with metal construction cylinders/cores.
6. It is the material supplier's responsibility to de-activate the construction keying and to deliver all permanent key blanks and other security keys direct to Owner's representative. Failure to properly comply with these requirements may be cause to require replacement of all or any part of the cylinders and keys involved as deemed necessary at no additional cost to the Owner.
7. Keys Required: Furnish quantity of keys as follows:
   Five (5) Master Keys
   Two (2) keys per lock or cylinder.
   Two (2) core keys.

8. All keys shall be made of nickel silver.
9. Include construction keying.
10. Keys: Nickel silver. Stamp keys with "DO NOT DUPLICATE".

E. Closers: ANSI A156.4 modern type with cover, surface mounted ; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.

1. Surface type door closers shall be fully hydraulic, full rack and pinion action with a one piece forged steel piston 1-1/2" diameter minimum and have a cast iron case at heavy duty closers with a ten year warranty.
2. Closers at fire rated doors shall be in compliance with UL 10 C and UBC 7.2 certified for positive pressure.
3. Hydraulic fluid shall be of a type requiring no seasonal adjustments for temperatures from 120 degrees F. to -30 degrees F..
4. Pinion shaft shall be minimum of 5/8" diameter.
5. Barrier-free at all interior doors.
6. Separate adjusting valves shall be provided for closing speed, latching speed and backcheck.
7. Adjusting valves shall be of a metal material, concealed, adjustable only with special wrench, and shall be seated with "O" type rings.
8. Closers shall have forged steel main arms at high traffic doors.
9. Closers shall NOT be supplied with "Pressure Relief Valves".

F. Door Controls and Overhead Holders: Furnish with accessories as required for complete operational installation.

1. Overhead Stops: ANSI A156.8, Grade 1 types as specified

2.3 ACCESSORIES

A. Lock Trim: Furnish levers with design as indicated in Schedule.

B. Push/Pulls, Manual and Automatic Bolts, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.

1. Push Plates and Pulls Plates: ANSI A156.6; push plates 4" x 16" . Furnish straight pull on 4" x 16" plate with bolts to secure from opposite door face; furnish with minimum 0.050 inch pull plates unless otherwise indicated.
2. Manual and Automatic Bolts: ANSI A156.16 Grade 1 top and bottom flush bolts, with dust-proof floor strike, unless otherwise indicated.
1. Kickplates : ANSI A156.6, metal; height indicated in Schedule by 2 inch less than door width; minimum 0.050 inch thick stainless steel.
2. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
3. Thresholds: Maximum 1/2 inch height.
4. Wall Stops: ANSI A156.1, Grade 1.
5. Electrical Power Transfer (EPT) units shall be fully concealed when the door is closed. EPT shall contain either 2 each 18 gauge stranded or 10 each 24 gauge stranded wires as determined in the hardware sets. The transfer tube shall be made of stainless steel. "Spring Tubes" are NOT acceptable. Electric hinges are NOT an approved substitution.

2.4 FINISHING

A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.

1. Hinges:
   a. BHMA 652 at exterior doors, 652 at interior doors, satin finish.
2. Typical Exterior Exposed and High Use Interior Door Hardware:
   a. BHMA 630, satin finished stainless steel.
   b. BHMA 626, satin chromium plated brass or bronze.
3. Typical Interior Door Hardware:
   a. BHMA 626, satin chromium plated brass or bronze.
   b. BHMA 630, satin finished stainless steel.
4. Closers:
   a. BHMA 689, satin aluminum, powder coated.
5. Thresholds:
   a. BHMA 628, satin aluminum, clear anodized.
6. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings or instructed by manufacturer.

B. Verify electric power is available to power operated devices and is of correct characteristics.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

3.3 FIELD QUALITY CONTROL

A. The Architectural Hardware Consultant (A.H.C.) or equivalent (as stated in Part 1.7 above), as employed by the material supplier of this section, in conjunction with the manufacturer's factory representative for locks, closers, and exit devices, along with the lead finish hardware installer shall inspect complete installation and certify that the hardware, installation, and adjustment of the hardware items has been furnished and installed in accordance with manufacturer's instructions and as specified herein.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust hardware for smooth operation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

B. Do not permit adjacent work to damage hardware or hardware finish.

3.6 SCHEDULES

3.7

A. The following hardware set(s) are intended to establish type and standard of quality when used together with this sections requirements. Examine Drawings and Specifications and furnish proper hardware for door Openings.

3.8

HARDWARE GROUP NO. 01

DOOR NUMBER: 1
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-996-06-SNB	626	VON
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND96PD SPA 14-042	626	SCH
1	EA	OH STOP	900S SNB	630	GLY
1	EA	SURFACE CLOSER	4111 CUSH TBSRT	689	LCN
1	EA	DOOR SWEEP	200NA X D.W.	CL	NGP
1	EA	THRESHOLD	425E X D.W.	AL	NGP

END OF SECTION 08 71 00

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section covers all job site painting. See Drawings and Schedules for type and location of various surfaces to be painted.

B. The term "paint", as used herein includes enamels, paints, sealers, fillers, emulsions and other coatings whether used as prime, intermediate, or finish coats.

1.2 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications

B. Section 08 11 14 - Metal Doors and Frames.

1.3 REFERENCES

A. ANSI/ASTM D16 - Definitions of terms used in this Section.

1.4 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five years experience.

B. Applicator: Company specializing in commercial painting and finishing with three years documented experience.

1.5 SUBMITTALS

A. Submit product data, samples and application instructions.

B. Provide product data on all finishing products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.

B. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

C. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F in well ventilated area, unless required otherwise by manufacturer's instructions.

D. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for Interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.8 EXTRA STOCK

A. Provide a one-gallon container of each color and type of paint.

B. Label each container with color, room and wall locations, in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PAINT

A. PPG Industries, Inc.

B. Sherwin Williams Company.

C. Or approved equal.

2.2 MATERIALS

A. Coatings: Ready mixed. Pigments capable of being readily and uniformly dispersed to a homogeneous coating.

B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.3 FINISHES

A. Refer to schedule at end of Section for surface finish schedule.

B. Refer to finish plans in Drawings for color selections and location for application.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of Work. Report any condition that may potentially affect proper application.

C. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings not to be painted prior to preparing surfaces or finishing.

B. Correct minor defects and clean surfaces which affect Work of this Section.

C. Shellac and seal marks which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry. Use zinc-sulphate solution as required to correct alkalinity.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

G. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

H. Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.3 PROTECTION

A. Protect elements surrounding the Work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by Work of this Section.

C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.4 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each prime coat of paint slightly lighter than succeeding coats. Finish coat shall be the color specified.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

3.5 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.6 SCHEDULE – EXTERIOR SURFACES

A. Steel - Unprimed

1. One coat TT-P-645 zinc chromate primer.

2. Two coats acrylic, semi-gloss, “Preferred Stock”.

B. Steel – Shop Primed

1. Touch-up with zinc chromate primer.

2. Two coats acrylic semi-gloss, “Preferred Stock”.

C. Steel - Galvanized

1. One coat zinc chromate primer.

2. Two coats gloss alkyd enamel.

D. Concrete Masonry Units / Concrete Columns / Concrete Walls

1. Two coats ultra shield two part aliphatic polyurethane enamel.

E. Anti-Graffiti Coating

1. Two coats two component aliphatic water borne polyurethane coating on all exposed CMU.

3.7 SCHEDULE – INTERIOR SURFACES

A. Steel - Unprimed

1. One coat TT-P-645 zinc chromate primer.

2. Two coats latex, enamel, semi-gloss.

B. Steel - Primed

1. Touch-up with original primer, enamel.

2. Two coats latex, semi-gloss.

C. Steel - Galvanized

1. One coat zinc chromate primer.

2. Two coats latex, enamel, semi-gloss.

D. Door Frame Metal

1. Touch-up with original primer, enamel.

2. Two coats latex semi-gloss.

E. Exposed CMU

1. 1 Coat Acrylic Block Filler

2. Two coats two component aliphatic water borne polyurethane coating on all exposed CMU.

END OF SECTION 09 91 00

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. CNG Process Signage.

1.2 SUBMITTALS

A. Submit shop drawings, product data and samples under Division 1 Section "Submittals".

B. Shop drawings: Submit shop drawings showing sizes of signs and lettering, construction details of signs and anchoring details.

1. Mounting details.

2. Materials list.

C. Submit color and texture samples for approval.

1.3 PRODUCT HANDLING

Use all means necessary to protect signs before, during and after installation. In the event of damage, immediately make all necessary repairs and replacements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. ANDCO, KROY, MOHAWK

B. Or Approved Equal.

2.2 MATERIALS

A. CNG PROCESS SIGNS

1. Vinyl lettering on Aluminum backing.

2. Size: 6" x 6" x 1/4" (or as required for text).

3. Type: Kroy "CRITERION" or approved equal.

4. Quantity: See "CNG Process Plans".

END OF SECTION 10 14 00

SECTION 10 44 00

FIRE EXTINGUISHERS AND CABINETS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Fire extinguishers.

2. Fire extinguisher cabinets.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility. Obtain extinguishers and cabinets from one source from a single manufacturer.

B. Coordination. Verify that cabinets are sized to accommodate type and capacity of extinguishers indicated and provided by Owner under separate Contract.

C. UL-Listed Products. Fire extinguishers shall be UL listed with UL listing mark for type, rating, and classification of extinguisher.

D. FM-Listed Products. Fire extinguishers approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher with FM marking.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Ansul Fire Protection.

2. Badger-Powhatan.

3. American Specialties Inc.

4. Bobrick Washroom Equipment, Inc.

5. Croker Div., Fire-End and Croker Corp.

6. Filtrine Manufacturing.

7. Lyon Metal Products.

8. J.L. Industries.

9. Larsen's Manufacturing Co.

10. Modern Metal Products by Muckle.

11. Potter-Roemer, Inc.

12. Or approved equal.

2.2 FIRE EXTINGUISHERS

A. General. Provide fire extinguishers for each cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard, that comply with authorities having jurisdiction.

B. Multipurpose Dry Chemical Type. UL-rated 4-A.80-B.C, 10-lb nominal capacity, in enameled steel container.

2.3 CABINETS

A. Construction. Manufacturer's standard box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

B. Cabinet Type. Suitable for containing the following:

1. Fire extinguisher.

C. Cabinet Mounting. Suitable for the following mounting conditions.

1. Surface Mount Cabinet. Cold rolled steel tub with powder coat finish with recessed handle. Size as required for 10lb. extinguisher.

D. Trim Style. Fabricate trim in one piece with corners mitered, welded, and ground smooth.

1. Trim Metal. Of same metal and finish as door.

E. Door Material and Construction. Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.

1. Unbacked Acrylic. Manufacturer's standard unbacked acrylic door construction with metal edge reinforcing at hinge jamb and at latch.

F. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door.

G. Door Hardware. Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 deg.

2.4 FINISHES FOR CABINETS, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying temporary strippable protective covering prior to shipping.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine indicated locations to verify mounting prior to cabinet installation.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Follow manufacturer's printed instructions for installation.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights to comply with applicable regulations of governing authorities.

1. Fasten cabinets to structure, square and plumb.

END OF SECTION 10 44 00

SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal Building System:

1. Structural steel framing system.
2. Metal roof system.
3. Metal soffit panels.

1.2 RELATED REQUIREMENTS

A. Section 01 23 00 – Alternates: procedures for inclusion of Alternates.

B. Section 03 30 00 – Cast-In-Place Concrete: Concrete foundations furnished under Base Bid.

C. Section 05 50 00 – Metal Fabrications: Steel Bollards furnished under Base Bid.

D. Section 09 91 00 – Painting.

E. Division 26 – Electrical: Electrical wiring, lighting and connections.

F. Division 43 – CNG Fueling Equipment: fuel dispensers and fill posts furnished under Base Bid..

1.3 REFERENCE STANDARDS

A. American Institute of Steel Construction (AISC):

1. AISC 360 - Specification for Structural Steel Buildings.
2. AISC 341 – Seismic Provisions for Structural Steel Buildings (when appropriate).
3. AISC Design Guide 3 – Serviceability for Steel Buildings

B. American Iron and Steel Institute (AISI):

1. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members.

C. American Welding Society (AWS):

1. AWS D1.1 / D1.1M – Structural Welding Code – Steel.

2. AWS D1.3 / D1.3M – Structural Welding Code – Sheet Steel.

D. Association for Iron & Steel Technology (AISE):

1. AISE 13 – Specifications for Design and Construction of Mill Buildings.

E. ASTM International (ASTM):

1. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
2. ASTM A 653 / A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A 792 / A 792M – Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
4. ASTM B 117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
5. ASTM D 522 – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
6. ASTM D 523 – Standard Test Method for Specular Gloss.
7. ASTM D 968 – Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
8. ASTM D 1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
9. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
10. ASTM D 2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
11. ASTM D 3361 – Standard Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
12. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
13. ASTM E 1592 – Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
14. ASTM G 87 – Standard Practice for Conducting Moist SO2 Tests.

F. FM Global:

1. FMRC Standard 4471 – Approval Standard for Class 1 Roofs for Hail Damage Resistance, Combustibility, and Wind Uplift Resistance.

G. Metal Building Manufacturers Association (MBMA):

1. MBMA Metal Building Systems Manual.
2. Seismic Design Guide for Metal Building Systems.

H. The Society for Protective Coatings (SSPC):

1. SSPC-Paint 15 - Primer for Use Over Hand Cleaned Steel performs to SSPC-Paint 15 standards.
2. SSPC-SP2 – Hand Tool Cleaning.

I. Underwriters Laboratories (UL):

1. UL 580 – Standard for Tests for Uplift Resistance of Roof Assemblies.

1.4 PREINSTALLATION CONFERENCE

A. In accordance with Section 01 31 00 – Project Management and Coordination, convene a pre-installation conference 2 weeks before start of installation of metal building system.

B. Require attendance of parties directly affecting work of this section, including Contractor, Architect, Engineer, installer, and metal building system manufacturer's representative.

C. Review materials, submittals, installation, protection, and coordination with other work.

1.5 SUBMITTALS

A. Comply with Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit metal building system manufacturer's product information, specifications, and installation instructions for building components and accessories.

C. Erection Drawings: Submit metal building system manufacturer's erection drawings, including plans, elevations, sections, and details, indicating roof framing, transverse cross-sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.

D. Delegated Design: Metal Building System supplier shall furnish complete building drawings and calculations signed and sealed by a professional engineer licensed in the State of New Mexico. Calculations shall identify all reaction loads at connection points to concrete foundation.
   1. Upon review of Submittal by Architect, prepare and submit metal building design data as a deferred submittal to Authority Having Jurisdiction for review. Incorporate any review comments and revise drawings prior to commencement of fabrication.

E. Certification: Submit a written "Certificate of design and manufacturing conformance" indicating compliance with requirements listed under Part 1.6: Quality Assurance.

F. Submit certification verifying that the metal roof system has been tested and approved by Underwriter's Laboratory as Class 90.

G. Dealer Certification: Submit certification that the metal building system supplier is a manufacturer's authorized and franchised dealer of the system to be furnished.
   1. Certification shall state date on which authorization was granted.

H. Installer Certification: Submit certification that the metal building system installer complies with the requirements listed under Part 1.6: Quality Assurance

I. Warranty Documentation: Submit manufacturer's standard warranty.

J. Finishes: Submit manufacturer's color card with full range of colors for selection by Architect.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Manufacturer regularly engaged, for past 10 years, in manufacture of metal building systems of similar type to that specified.
   2. Accredited based on IAS Accreditation Criteria AC472 and requirements in International Building Code (IBC), Chapter 17.

B. Installer's Qualifications:

   1. Installer regularly engaged, for past 5 years, in installation of metal building systems of similar type to that specified.
   2. Employ persons trained for installation of metal building systems.

C. Certificate of design and manufacturing conformance:

   1. Metal building system manufacturer shall submit written certification prepared and signed by a professional engineer licensed in the State of New Mexico verifying that building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.
   2. Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year, and load applications.
   3. Certificate shall be on metal building system manufacturer's letterhead.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
   3. Do not store materials directly on ground.
   4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.
   5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.8 WARRANTY

A. Metal building system manufacturer shall provide a written weathertightness warranty for a maximum of 10 years against leaks in roof panels, arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions.

   1. Warranty shall be signed by both the metal roof system manufacturer and the metal roof system installer.

2. Maximum liability of warranty shall be no less than $0.20 per square foot of roof area.

B. Metal building system manufacturer shall provide a written warranty for 25 years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions.

1. Warranty shall be signed by metal roof system manufacturer.

C. Metal building system manufacturer shall provide a paint film written warranty for 25 years against cracking, peeling, chalking, and fading of exterior coating on painted roof panels.

1. Warranty shall be signed by metal building system or roof system manufacturer and state that the coating contains 70 percent "Kynar 500" or "Hylar 5000" resin.
2. Metal building system manufacturer shall warrant that the coating shall not peel, crack, or chip for 25 years.
3. For a period of 25 years, chalking shall not exceed ASTM D 4214, #8 rating and shall not fade more than 5 color difference units in accordance with ASTM D 2244.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Metal Building System Manufacturer: Butler Manufacturing, PO Box 419917, Kansas City, Missouri 64141. Phone 816-968-3000. Website www.butlermfg.com.

B. Substitutions: Requests for substitutions will be considered in accordance with Section 01 25 13 – Product Substitution Procedures.

2.2 BUILDING DESCRIPTION

A. Building Dimensions: as indicated on the Drawings.

1. Horizontal Dimensions: as indicated on the Drawings.
2. Eave Height: Measure from top of grade to intersection of insides of roof and sidewall sheets.
3. Clear Height Between Finished Floor and Bottom of Roof Beams: as indicated on the Drawings.

B. Primary Structural Members:

1. Primary Framing System: Butler Manufacturing framing system as specified in this specification section.
2. Frames: Welded-up plate section columns and roof beams, complete with necessary splice plates for bolted field assembly as specified in this specification section.
3. Bolts for Field Assembly of Primary Steel: High-strength bolts as indicated on erection drawings of metal building system manufacturer.
4. Beam and Post Endwall Frames: Endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.

5. Exterior Columns: Welded-up "H" sections or cold-formed "C" sections.
6. Interior Columns: "H" sections or tube columns.
7. Connection of Primary Structural Members: ASTM A 325 bolts through factory-punched holes.
8. Primary Structural Members: Paint with metal building system manufacturer's standard primer with surface preparation as specified in this specification section.

C. Secondary Structural Members:

1. Secondary Framing System: Butler Manufacturing framing system as specified in this specification section.
2. a. C/Z Purlins and Girts: Acrylic-coated G30 galvanized finish.
   b. Truss Purlins: Acrylic-coated G30 galvanized finish.

D. Metal Roof System: Butler Manufacturing metal roof system as specified in this specification section.

E. Where metal panels are required to be painted, use coating system as specified in this specification section.

2.3 DESIGN REQUIREMENTS

A. Governing Design Code:
1. Structural design for the building structural system shall be provided by the metal building system manufacturer for the following design criteria:

   a. Governing Building Code: New Mexico Commercial Building Code.
   b. Year/Version: 2009.
   c. Occupancy Category: III.

B. Roof Live Load:

1. Roof live loads are loads produced during the life of the structure by moveable objects.
2. Wind, snow, seismic, or dead loads are not live loads.
3. Roof live loads are applied based on the Tributary Area as stated in code.

C. Roof Snow Load:

1. Roof snow load used for designing the structure shall not be reduced and shall be as noted on the plans.
2. Design snow load shall include the effects of minimum flat roof load limits, rain on snow, drifting snow, and unbalanced snow load as defined in the governing building code specified above.

D. Wind Load:

1. Wind load used for designing the structure shall be as noted on the plans.
2. Wind Pressure Coefficients and the design pressures shall be applied in accordance with the governing code.

E. Seismic Load:

1. Seismic load used for designing the structure shall be as noted on the plans.
2. Seismic loads shall be applied in accordance with the governing code.

F. Dead Load: Dead load shall consist of the weight of building system construction, such as roof, framing, and covering members.

G. Collateral Load:

1. Collateral load in pounds per square foot shall be applied to the entire structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, hung partitions, and ceilings.
2. This allowance does not include the weight of hung equipment weighing 50 pounds or more.
3. Equipment loads of 50 pounds or more shall be indicated on the Drawings and the structure shall be strengthened as required.
4. Architect will provide the metal building system manufacturer with the magnitude and approximate location of concentrated loads greater than 50 pounds before design of the building starts.
5. Refer to plans for loading for soffit and future photo-voltaic panels.

H. Load Combinations: Load combinations used to design primary and secondary structural members shall be in accordance with the governing code.

2.4 DEFLECTIONS

A. Structural Members:

1. Maximum deflection of main framing members shall not exceed 1/480 of their respective spans.
2. Maximum deflection due to snow load in roof panels and purlins shall not exceed 1/360 of their respective spans.

B. Lateral deflections, or drift, at the roof level of the structure in relation to the floor or slab on grade, caused by deflection of horizontal force resisting elements, shall not exceed H/200.

C. Calculations for deflections shall be done using only the bare frame method.

1. Reductions based on engineering judgment using the assumed composite stiffness of the building envelope shall not be allowed.
2. Drift shall be in accordance with AISC Serviceability Design Considerations for Low-Rise Buildings.
3. Use of composite stiffness for deflection calculations is permitted only when actual calculations for the stiffness are included with the design for the specific project.

4. When maximum deflections are specified, calculations shall be included in the design data.

2.5 STRUCTURAL STEEL FRAMING SYSTEM

A. General:

1. Design of Structural System: Clear or multi-span rigid frame with tapered columns and roof beams, with single-slope roof.
2. Actual Building Length: as indicated on the Drawings.
3. Actual Building Width: as indicated on the Drawings.
4. Minimum Roof Slope: as indicated on the Drawings.
5. Foundations:
   a. Foundations, Including Anchor Bolt Embedment Length: Properly designed by qualified engineer, retained by other than metal building system manufacturer, in accordance with specific soil conditions for building site.
   b. Reactions for Proper Design of Foundations: Delegated-design engineer of metal building system shall provide reaction loads at connection points to concrete foundations.
   c. Anchor Bolts:
      1) Anchor Bolt Diameter: Indicated on anchor bolt layout drawings furnished by metal building system manufacturer.
      2) Anchor Bolts: Provide anchor bolts in accordance with requirements of metal building system manufacturer.
      3) Anchor Bolts on Moment-Resisting Column Bases: Nuts above and below base plates.

B. Structural Steel Design:

1. Structural Mill Sections or Welded-up Plate Sections: Design in accordance with AISC Specification for Structural Steel Buildings.
2. Cold-Formed Steel Structural Members: Design in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
3. Structural System: Design in accordance with specified building code (Refer to Design Loads and Building Codes).

C. Primary Framing:

1. Rigid Frames:
   a. Frames: Welded-up plate section columns and roof beams, complete with necessary splice plates for bolted field assembly.
      1) Base Plates, Cap Plates, Compression Splice Plates, and Stiffener Plates: Factory welded into place and connection holes factory fabricated.
      2) Columns and Roof Beams: Fabricated complete with holes in webs and flanges for attachment of secondary structural members and bracing, except for fieldwork as noted on erection drawings furnished by metal building system manufacturer.
   b. Bolts for Field Assembly of Frame Members: ASTM A 325 high-strength bolts as indicated on erection drawings furnished by metal building system manufacturer.

D. Secondary Structural Members:

1. Purlins:
   a. Purlins:
      1) "Z"-shaped, precision-roll-formed, acrylic-coated G30 galvanized steel in different gauges to meet specified loading conditions.
      2) 7-inch, 8-1/2-inch, 10-inch, or 11-1/2-inch-deep "Z" sections.
   b. Outer Flange of Purlins: Factory-punched holes for panel connections.
   c. Attach purlins to main frames and endwalls with 1/2-inch-diameter bolts.
   d. Brace purlins at intervals indicated on erection drawings furnished by metal building system manufacturer.
   e. Concentrated Loads: Hung at purlin panel points.
2. Eave Members:
   a. Eave Struts: Factory punched 7-inch, 8-1/2-inch, 10-inch, or 11-1/2-inch-deep "C" sections, precision-roll-formed, acrylic-coated G30 galvanized steel in different gauges to meet specified loading conditions.
3. Bracing:
   a. Locate bracing as indicated on the Drawings.
   b. Diagonal Bracing:
      1) Hot-rolled rods of sizes indicated on the Drawings.
      2) Attach to columns and roof beams as indicated on the Drawings.
   c. Optional fixed-base wind posts or pinned-base portal frames may be substituted for wall rod bracing on buildings as required.
   d. Flange Braces and Purlin Braces: Cold formed and installed as indicated on the Drawings.

E. Welding:

1. Welding Procedures, Operator Qualifications, and Welding Quality Standards: AWS D1.1 - Structural Welding Code – Steel and AWS D1.3 - Structural Welding Code – Sheet Steel.

F. Painting of Structural Steel Framing System:

1. General:
   a. Structural Steel: Prime paint as temporary protection against ordinary atmospheric conditions.
   b. Perform subsequent finish painting, if required, in field as specified in the painting section.
   c. Before painting, clean steel of loose rust, loose mill scale, dirt, and other foreign materials.
   d. Steel Fabricator: Not required to sand blast, flame clean, or pickle steel before painting, unless otherwise specified.
2. Primary Frames:
   a. Clean steel in accordance with SSPC-SP2.
   b. Factory cover steel with 1 coat of gray water-reducible alkyd primer paint formulated to equal or exceed performance requirements SSPC-Paint 15.
   c. Minimum Coating Thickness: 1.0 mil.
3. Secondary Structural Members – Roll-Formed:
   a. Hot-dipped zinc coating, ASTM A 653, G30; followed by 1 coat of clear acrylic finish.
   b. Acrylic-Coated G30 Galvanized Steel: Equal or exceed performance requirements of SSPC Paint-15.

2.6 METAL ROOF SYSTEM

A. Metal Roof System: Butler Manufacturing "Butlerib®II" roof system.

B. Roof System Design:

1. Design roof panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Design roof panels to support a 200-pound load distributed evenly over a 2-foot square area centered between purlins, without exceeding a panel deflection-to-span ratio of 1/240 in a 2-span condition.
3. Design roof paneling system for a minimum roof slope of 1/2 inch in 12 inches.
4. Design roof paneling system to support design live, snow, and wind loads.

C. Roof System Performance Testing:

1. UL Wind Uplift Classification Rating, UL 580: Class 90.
2. Structural Performance Under Uniform Static Air Pressure Difference: Test roof system in accordance with ASTM E 1592.
3. FM Global (Factory Mutual):
   a. Roof system has been tested in accordance with FMRC Standard 4471 and approved as a Class 1 Panel Roof.
   b. Metal Building System Manufacturer: Provide specific assemblies to meet required wind rating in accordance with FM Global.
   c. Installation modifications or substitutions can invalidate FM Global approval.

D. Roof Panels:

1. General:
   a. Factory roll-formed to provide width coverage of 3 feet.
   b. Four major corrugations spaced 12 inches on center.
   c. Each Major Corrugation: 1-1/2 inches high, 2-7/8 inches wide, tapering 1-9/32 inches wide at top, with no intermediate minor corrugations.
   d. In Panel Flat: Two additional minor corrugations, 1 inch wide, 1/8 inch high, spaced 4 inches on center, between major corrugations.
2. Roof Panel Side Laps:
   a. Overlap 1 major corrugation.
   b. One of the Outboard Corrugations: Formed as overlapping corrugation.
   c. Other Outboard Corrugation: Formed as underneath corrugation.
      1) Full corrugation to provide bearing support to side lap.
      2) Formed with continuous-length sealant groove.
3. Roof Panel End Laps:
   a. 6 inches.
   b. Supply maximum possible panel lengths, up to 38'-9", to minimize panel end laps.
   c. Factory punch roof panel end laps (top panel with a round hole and bottom panel with a slotted hole) to provide for expansion and contraction and panel alignment.
   d. Design end laps to occur over and be fastened to secondary structural members.
4. Eave Panels: Extend beyond building structural line.

5. Factory punch roof panels at panel ends to match factory-punched or field-drilled holes in structural members to ensure proper alignment.
   a. Upper End of Eave and Splice Panels: 3/4-inch-long slots to provide for expansion and contraction of panels.
6. Panel Material and Finish:
   a. 26-gauge or 24-gauge painted Galvalume aluminum-zinc alloy (approximately 55 percent aluminum, 45 percent zinc), ASTM A 792.
   b. Paint with exterior colors of "Butler-Cote™" finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
   c. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
      1) Not to peel, crack, or chip.
      2) Chalking: Not to exceed ASTM D 4214, #8 rating.
      3) Fading: Not more than 5 color-difference units, ASTM D 2244.

E. Provision for Expansion and Contraction:

1. Optional Factory-Punched Roof Panels: 5/16-inch by 3/4-inch-slotted holes at upper end and 5/16-inch-diameter holes at lower end.
2. Slotted Holes: Permit thermal movement of panels without detrimental effect on roof panels.

F. Fasteners:

1. Fastener Locations and Quantities: Indicated on erection drawings furnished by metal building system manufacturer.
2. Panel-to-Structural Connections: Case-hardened, electrogalvanized carbon steel, yellow-chromate finish "Scrubolt™" fasteners, 3/8-inch hex head, with 3/4-inch OD galvanized-steel-backed EPDM washers.
3. Panel-to-Panel Connections: #14-14 by 7/8-inch galvanized steel 3/8-inch hex-head mini-point self-drilling screws, with 5/8-inch OD metal-backed EPDM washers.

G. Accessories:

1. Accessories (eave trim, gutters, downspouts): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
2. Metal Coating on Gutters, Downspouts and Eave Trim: "Butler-Cote™ " finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
3. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

2.7 METAL SOFFIT PANELS

A. Metal Soffit Panels: Butler Manufacturing Mod-36 profiled soffit panel.

B. Soffit Panels:

1. General:
   a. Factory roll-formed to provide width coverage of 3 feet.
   b. Corrugations spaced 3 inches on center.

c. Each corrugation: 1/2 inch high, 1-7/8 inches wide, tapering 1-1/8 inches wide.

2. Roof Panel Side Laps:
   a. As required by manufacturer for tight fit and neat appearance.
3. Roof Panel End Laps:
   a. 6 inches.
   b. Supply maximum possible panel lengths, up to 38'-9", to minimize panel end laps.
   c. Factory punch roof panel end laps (top panel with a round hole and bottom panel with a slotted hole) to provide for expansion and contraction and panel alignment.
   d. Design end laps to occur over and be fastened to secondary structural members.
4. Factory punch roof panels at panel ends to match factory-punched or field-drilled holes in structural members to ensure proper alignment.
5. Panel Material and Finish:
   a. 26-gauge painted Galvalume aluminum-zinc alloy (approximately 55 percent aluminum, 45 percent zinc), ASTM A 792.
   b. Paint with exterior colors of "Butler-Cote™" finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
   c. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
      1) Not to peel, crack, or chip.
      2) Chalking: Not to exceed ASTM D 4214, #8 rating.
      3) Fading: Not more than 5 color-difference units, ASTM D 2244.

2.8 METAL COATING SYSTEM

A. Metal Coating System: Butler Manufacturing™ "Butler-Cote™" finish system a factory-applied, exterior metal coating system

B. Substrate Preparation:

1. G90 Hot-Dipped Galvanized Steel or AZ50 Galvalume: Factory-controlled chemical-conversion treatment.

C. Coating:

1. Material: Full-strength, 70 percent, "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) color coating.
2. After steel preparation, coat exterior exposed surface with primer and PVDF
   a. Nominal Total Dry Film Thickness: 1.0 mil.
3. Interior Exposed Surfaces: Coat with polyester color coat.
4. Apply coatings to entire material dimensions of steel sheets before forming of panels.

D. Physical Characteristics of Exterior Coating:

1. Resistance to failure through cracking, checking, peeling, and loss of adhesion.
2. Measure by the following laboratory weather-simulating tests to obtain test results justifying metal building system manufacturer's 25-year warranty:

a. Humidity resistance at 100 degrees F and 100 percent relative humidity, ASTM D 2247.
b. Salt-spray resistance at 5 percent salt fog, ASTM B 117.
c. Reverse impact resistance, ASTM D 2794.
d. Resistance to accelerated weathering, Atlas Model XW-R Dew Cycle Weather-O-Meter, ASTM D 3361.
e. Resistance to dry heat.
f. Abrasion resistance, ASTM D 968.
g. Chemical/acid/pollution resistance, ASTM D 1308 and G 87.
h. Maintain gloss of finish evenly over entire surface, ASTM D 523

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine area to receive metal building system.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin installation until unacceptable conditions are corrected.

3.2 ERECTION – STRUCTURAL STEEL FRAMING SYSTEM

A. Erect structural steel framing system in accordance with the Drawings and metal building system manufacturer's erection drawings.

B. Field Modifications:

1. Require approval of metal building system manufacturer.
2. Responsibility of building erector.

C. Fixed Column Bases: Grout flush with floor line after structural steel erection is complete.

3.3 INSTALLATION – METAL ROOF SYSTEM

A. Metal Roof System Installation:

1. Install roof system in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
2. Install roof system weathertight.
3. Factory cut-to-length roof panels in accordance with erection drawings furnished by metal building system manufacturer.
4. Position and align roof panels to hold 3-foot module throughout building length.
   a. Position and align optional factory-punched roof panels by matching factory-punched holes in panels with factory-punched holes in roof structural members.
5. Install side laps with minimum of 1 full corrugation.
6. End Laps:
   a. Minimum of 6 inches.
   b. Fasten together over and to structural members.

3.4 INSTALLATION – METAL SOFFIT PANELS

A. Metal soffit panel installation:

1. Install soffit panels in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
2. Factory cut-to-length soffit panels in accordance with erection drawings furnished by metal building system manufacturer.
3. Position and align soffit panels plumb and square throughout building length.
4. Install side laps in accordance with manufacturer's printed installation instructions.
5. End Laps:
   a. As required by manufacturer for tight fit and neat appearance.
   b. Fasten together over and to structural members.

3.5 INSTALLATION – GENERAL

A. Paint all exposed steel surfaces which do not have a factory finish in accordance with Section 09 91 00 – Painting. Inspect factory primer and make necessary touch-ups prior to proceeding with paint finishes.

B. Complete electrical Work for lighting and power as specified in Division 26 – Electrical.

3.6 ADJUSTING AND CLEANING

A. Thoroughly clean canopy structure, roof and soffit panels. Remove all debris, oils, grime and scale. Clean all gutters and downspouts and test roof for water-tightness in presence of Architect. Repair deficiencies and re-test. Adjust fascia and soffit panels for neat, level and uniform appearance.

B. Complete electrical Work for lighting and power as specified in Division 26 – Electrical.

3.7 PROTECTION

A. Protect installed metal building system to ensure that, except for normal weathering, metal building system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 13 34 19

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Freestanding, pre-engineered metal canopy structure at public fuel island including, steel framing, metal roof, roof drains and leaders, fascia components, and metal ceiling and accessories.

1.2 RELATED SECTIONS

A. Section 01 23 00 – Alternates: procedures for inclusion of Alternates.

B. Section 03 30 00 - Cast-In-Place Concrete: Concrete islands and foundations furnished under Base Bid

C. Section 05 50 00 - Metal Fabrications: Steel bollards at fuel island and canopy columns furnished under Base Bid.

D. Section 07 92 00 - Joint Sealants.

E. Section 09 91 00 - Painting

F. Division 26 - Electrical: Electrical wiring, lighting and connections.

G. Division 43 – CNG Fueling Equipment: fuel dispenser and fuel management terminal at public fuel island furnished under Base Bid.

1.3 REFERENCES

A. American Institute of Steel Construction, Inc. (AISC): AISC 360 - Specification for Structural Steel Buildings.

B. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. American Welding Society (AWS): AWS D1.1 - Structural Welding Code – Steel.

D. ASTM International (ASTM):

1. ASTM A 36/A 36M - Standard Specification for Structural Steel.
2. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
3. ASTM A 325/A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
4. ASTM A 500/A 500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

5. ASTM A 653/A 653 M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
6. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

E. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM MFM - Metal Finishes Manual.

F. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code

G. National Fire Protection Association (NFPA): NFPA 52 – Vehicular Gaseous Fuel Systems Code

1.4 DESIGN REQUIREMENTS

A. Governing Design Code:
1. Structural design for the building structural system shall be provided by the metal building system manufacturer for the following design criteria:
   a. Governing Building Code: New Mexico Commercial Building Code.
   b. Year/Version: 2009.
   c. Occupancy Category: III.

B. Roof Live Load:

1. Roof live loads are loads produced during the life of the structure by moveable objects.
2. Wind, snow, seismic, or dead loads are not live loads.
3. Roof live loads are applied based on the Tributary Area as stated in code.

C. Roof Snow Load:

1. Roof snow load used for designing the structure shall not be reduced and shall be as noted on the plans.
2. Design snow load shall include the effects of minimum flat roof load limits, rain on snow, drifting snow, and unbalanced snow load as defined in the governing building code specified above.

D. Wind Load:

1. Wind load used for designing the structure shall be as noted on the plans.
2. Wind Pressure Coefficients and the design pressures shall be applied in accordance with the governing code.

E. Seismic Load:

1. Seismic load used for designing the structure shall be as noted on the plans.
2. Seismic loads shall be applied in accordance with the governing code.

F. Dead Load: Dead load shall consist of the weight of building system construction, such as roof, framing, and covering members.

G. Collateral Load:

1. Collateral load in pounds per square foot shall be applied to the entire structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, hung partitions, and ceilings.
2. This allowance does not include the weight of hung equipment weighing 50 pounds or more.
3. Equipment loads of 50 pounds or more shall be indicated on the Drawings and the structure shall be strengthened as required.
4. Architect will provide the metal building system manufacturer with the magnitude and approximate location of concentrated loads greater than 50 pounds before design of the building starts.
5. Refer to plans for loading for soffit and future photo-voltaic panels.

H. Load Combinations: Load combinations used to design primary and secondary structural members shall be in accordance with the governing code.

1.5 Thermal Movements: Provide pre-engineered canopies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

1.6 SUBMITTALS

A. General: Submit under provisions of Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: Submit shop drawings. Include plans, elevations, sections, details, and attachments to other work.

D. Delegated Design: Canopy supplier shall furnish complete canopy drawings and calculations signed and sealed by a professional engineer licensed in the State of New Mexico. Calculations shall identify all reaction loads at connection points to concrete foundations

1. Upon review of Submittal by Architect, prepare and submit canopy design data as a deferred submittal to Authority Having Jurisdiction for review. Incorporate any review comments and revise drawings prior to commencement of fabrication.

E. Samples:

1. Submit samples for initial color selection. Submit samples of each specified finish. Submit samples in form of manufacturer's color charts showing full range of colors and finishes available. Where finishes involve normal color

variations, include samples showing the full, range of variations expected.

F. Certificates: Submit product certificates signed by the manufacturer certifying material compliance with specified performance characteristics and criteria, and physical requirements.

G. Warranty Data: Submit warranty documents specified herein.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in engineering and manufacturing pre-engineered canopies with a minimum documented experience of twenty years and with a quality assurance program utilizing a quality inspection for each system.

B. Welding: Qualify procedures and personnel according to the following:

1. Welding shall be in accordance with AWS D1.1 (with E70XX electrodes).
2. Structural shop welding shall be done by certified welders.
3. Steel shop connections shall be welded and field connections shall be bolted unless otherwise noted on the Shop Drawings. Shop welds may be changed to field welds if approved in advance by the Architect and delegated-design Engineer of Record in writing.
4. Slag shall be cleaned from welds and inspected. Steel shall be painted with red oxide rust-inhibitive primer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Source Limitations: Obtain pre-engineered metal canopy through one source from a single manufacturer who shall manufacture and install the canopy.

E. Product Options:

1. Information on the Drawings and in the Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance. Do not modify intended aesthetic effects, as judged solely by the Architect, except

with the Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review.

F. Coordination:

1. The Contractor shall convene a pre-installation conference in accordance with Section 01 31 00 – Project Management and Coordination to verify project requirements, substrate conditions, utility connections, manufacturer's drawings and installation instructions, and other requirements pertinent to the execution of this part of the Work.
2. Canopy Manufacturer shall furnish anchor bolt setting drawings as well as provide anchor bolts to be embedded in concrete footer. Such items shall be delivered to project site in a timely manner so as to not delay placement of concrete foundations.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect components and accessories from corrosion, deformation, damage, and deterioration when stored at job site. Keep materials free from dirt and foreign matter.

1.9 PROJECT CONDITIONS

A. Field Measurements: The Contractor shall verify location and elevation of footings relative to finished grade, columns, and other construction contiguous with pre-engineered metal canopies by field measurements before fabrication and indicate measurements on shop drawings.

1.10 WARRANTY

A. A limited warranty issued by the Canopy Manufacturer covering defects in materials, leaks and workmanship from one year from date of substantial completion.

B. Provide a 10 year manufacturer's warranty against failure of the aluminum composite metal (ACM) panel including peeling, flaking, chipping, delamination or discoloration of the surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Austin Mohawk and Company, Inc., 2I75 Beechgrove Place ; Utica, NY 135O1; Toll Free Tel: 800-765-3110; Tel: 315-793-3000; Web: www.austinmohawk.com

B. TFC Canopy – A Division of Centurion Industries, 1107 North Taylor Road, Garrett, IN 46738; Toll Free Tel: 800-832-3212; Web: www.tfccanopy.com

C. Substitutions: Requests for substitutions will be considered in accordance with Section 01 25 13 - Product Substitution Procedures.

2.2 MATERIALS

A. Structural Steel:

1. Material and work shall conform to the latest AISC 360.
2. Wide flange I-beam shall conform to ASTM A 572/A 572M GR.50, Fy = 50 ksi. Other rolled sections shall conform to ASTM A 36/A 36M, Fy = 36 ksi.
3. Square and rectangular tubing shall conform to ASTM A 500/A 500M, Grade B, Fy = 46 ksi.
4. Plate steel shall conform to ASTM A 36/A 36M, Fy = 36 ksi.
5. Structural steel shall be painted with a rust inhibitive (red oxide) primer.

B. Sheet Metal:

1. Decking: 3 inch by 16 inch by 20 gage smooth white, ASTM A 653/A 653M GR40, Fy = 40 ksi, galvanized steel with baked enamel finish.
2. Center and Tapered Gutter: 24 gage hot-dip galvanized steel baked enamel finish.
3. Perimeter Gutter: 20 gage hot-dip galvanized steel baked enamel finish.
4. Internal Downspout: 3 inch diameter PVC.
5. External Downspouts: 3 inch by 4 inch by 24 gage hot-dip galvanized steel with baked enamel finish.

2.3 PRE-ENGINEERED METAL CANOPY

A. General: Provide a complete, integrated set of manufacturer's standard design canopy components using a flexible frame with fixed base wherein the steel framing system uses stacked I Beam construction transferring the moment to the concrete footing without requiring a rigid connection between steel frame members. The beam arrangements allow for a cantilever design which can bring the columns from the perimeter of the structure to the inner protected zones between the drive lanes. These mutually dependent components form a pre-engineered canopy, ready for construction on project site. Said pre-engineered metal canopy will be designed to meet all site structural wind, snow and seismic requirements.

B. Canopy Fascia:

1. Aluminum Composite Panel (ACM): Available with a fluorocarbon paint finish, masked on one side. Shall be warranted for 10 or 20 years depending on color and finish.
2. Fascia height and style: as indicated on the Drawings.

C. Canopy Finishes: Comply with NAAMM MFM for recommendations for applying and designating finishes.

1. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

D. Fabrication: Fabricate pre-engineered canopies completely in factory.

E. Compliance: comply with requirements of NFPA 52: Vehicular Gaseous Fuel Systems Code. Canopy shall be designed and constructed to prevent accumulation or entrapment of ignitable vapors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Architect in writing of any unsatisfactory conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Examine supporting foundations for compliance with manufacturer's requirements, including installation tolerances and other conditions affecting performance of supporting members.
2. Check installed anchor bolts for accuracy. Verify that bearing surfaces are ready to receive the work.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Provide a dedicated work area extending 10 feet beyond canopy in all directions to the extent practical. Coordinate specific requirements of work area and staging area with Site Mobilization Plan as specified in Section 01 50 00 – Temporary Facilities and Controls.

B. Set pre-engineered metal canopy plumb and aligned. Level base plates true to plane with full bearing on concrete bases.

C. Fasten pre-engineered metal canopy columns to anchor bolts and/or foundation bolts.

D. Provide anchor bolts as follows:

1. Set anchor bolts in accordance with reviewed Shop Drawings. Do not vary from size and dimensions shown on erection drawings. Use plywood template to set bolts accurately. Remove template prior to column erection.
2. Anchor bolts shall conform to ASTM A 307, and shall have a minimum exposed thread, embedment and nut and washer as embedment end as indicated on the Shop Drawings.
3. Shrink-resistant grout shall be ASTM C 1107, factory-packaged, aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30 minute working time installed by the Contractor.

E. Provide bolted connections as follows:

1. Structural erection bolts shall conform to ASTM A 325/A 325M.
2. A minimum diameter of 3/4 inch (19 mm) erection bolts shall be used for cross beam-to-column connections and a minimum of 5/8 inch (16 mm) diameter bolts for all other connections.
3. Drilled holes in structural steel shall be deburred.
4. Flat structural washers (minimum of one) shall be used on bolted connections.
5. Bolts shall be tightened to snug tight per latest RCSC specifications (unless otherwise specified).

F. Provide screws as follows:

1. Fastening shall be performed per installation prints provided by the manufacturer.
2. Installation screws shall be furnished with electrode deposited cadmium coating unless otherwise noted.
3. Self-drilling and self-tapping screws shall have a sufficient cut point and a 1/2 inch outside diameter dished metal-backed neoprene washer to be used in water sealing applications.

G. All anchor bolts and/or leveling plates shall be set within 1/4 inch tolerance on layout and grade level.

H. Paint all exposed steel surfaces which do not have a factory finish in accordance with Section 09 91 00 – Painting. Inspect factory red oxide primer and make necessary touch-ups prior to proceeding with paint finishes.

I. Complete electrical Work for lighting and power as specified in Division 26 - Electrical.

3.4 ADJUSTING AND CLEANING

A. Thoroughly clean canopy structure, decking and fascia. Remove all debris, oils, grime and scale. Clean all gutters and downspouts and test canopy for water-tightness in presence of Architect. Repair deficiencies and re-test. Adjust fascia panels for neat, level and uniform appearance.

3.5 PROTECTION

A. Protect completed installation until completion of project.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 13 34 23

SECTION 26 05 00

GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Conform with applicable provisions of the General Provisions.

1.2 REQUIREMENTS

A. Furnish all labor, materials, service, equipment and appliances required to complete the installation of the complete electrical system in accordance with the specifications and contract drawings.

1.3 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

A. Regulatory Agencies: Installation, materials, equipment and workmanship shall conform to the applicable provisions of the 2014 National Electrical Code (NEC), New Mexico State 2014 Edition, the National Electrical Safety Code (NESC), and the terms and the conditions of the authorities having lawful jurisdiction pertaining to the work required. All modifications required by these codes, rules, regulations and authorities shall be made by the Contractor without additional charge to the Owner.

B. Underwriter's Laboratories (UL): All materials, appliances, equipment or devices shall conform to the applicable standards of Underwriter's Laboratories, Inc. The label of, or listing by, UL is required.

1.4 SUBMITTALS

A. Materials List: Within 15 days after award of contract, the Contractor shall submit to the Architect a minimum of 7 (seven) copies of all equipment to be furnished. Where such equipment will be furnished "as specified", a statement to that effect is sufficient. Where substitutions are proposed, the Contractor shall submit for prior approval. Written approval of the Architect must be obtained.

B. Samples: If required by the Architect, the Contractor shall submit for inspection samples of both specified and proposed substitute items.

C. Shop Drawings: Submit for approval a minimum of seven (7) copies of all shop drawings after the materials list has been approved and prior to ordering. Show complete outlines, dimensions, electrical services, control diagrams, electrical characteristics of special nature or critical to the installation and pertinent data required for installation. Indicate in the transmittal that submittal has been reviewed and accepted and all contract deviations identified.

PART 2 – PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

A. The electrical requirements for equipment specified or indicated on the drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than indicated on the electrical drawings, the Contractor shall make all adjustments to wire and conduit size, controls, over current protection and installation as required to accommodate the equipment supplied, without additional charge to the Owner. The complete responsibility and costs for such adjustments shall be assigned to the respective section of this specification under which the equipment is furnished.

2.2 MATERIALS

A. All similar materials and equipment shall be the product of the same manufacturer.

B. Where no specific material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be used, providing it conforms to the contract requirements and meets the approval of the Architect.

C. Material and equipment shall be the standard products of manufacturers regularly engaged in the productions of such material and shall be the manufacturer's current and standard design.

D. Altitude: Equipment affected by altitude shall perform satisfactorily for the function intended at an altitude of the project site.

PART 3 - EXECUTION

3.1 GENERAL

A. Fabrication, erection and installation of the complete electrical system shall be done in a first class workmanlike manner by qualified personnel experienced in such work and shall proceed in an orderly manner so as not to hold up progress of the project. The Electrical Contractor shall check all areas and surfaces where electrical equipment material is to be installed, removed or relocated and report any unsatisfactory conditions before starting work. Commencement of work signifies this Contractor's acceptance of existing conditions. In the acceptance or rejection of the finished installation, no allowance will be made for lack of skill on the part of workmen.

3.2 TEMPORARY POWER AND LIGHTING

A. Furnish and install all temporary electrical facilities required for construction and safety operations.

3.3 PERFORMANCE TESTS

A. Thoroughly test all fixtures, services and all circuits for proper operating condition and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances, and devices shall be operated under load conditions.

3.4 AS-BUILT DRAWINGS

A. During progress of the work, maintain an accurate record of the installation of the system, locating each circuit precisely by dimension. Upon completion of the installation, transfer all record data to blue line prints of the original drawings.

3.5 OPERATING INSTRUCTIONS AND MANUALS

A. Instructions: Without additional charge to the Owner, furnish competent instruction to the Owner in the care, adjustment and operation of all parts of the electrical equipment and systems.

B. Manuals: Upon completion of the work, prepare and deliver to the Owner three (3) sets of complete operating and maintenance manuals for the systems and major equipment installed. Include catalog data, shop drawings, wiring diagrams, performance curves and rating data, spare parts lists and manufacturer's operating and maintenance data.

C. Other: The above requirements are in addition to specific instructions and manuals specified for individual systems or equipment.

3.6 DRAWINGS

A. General: The electrical drawings show the general arrangement of all conduit, equipment, etc. and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the electrical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, elbow, pullboxes, and accessories as may be required to meet such conditions.

B. Field Measurements: The Contractor shall verify the dimensions governing the electrical work at the building. No extra compensation shall be claimed or allowed on account of differences between actual dimensions and those indicated on the drawings.

3.7 LOCATION OF EQUIPMENT AND OUTLETS

A. The approximate locations of cabinets, panelboards, wiring, power outlets, etc., are indicated on the drawings; however, they are not intended to give complete and accurate information. Determine the exact location after thoroughly examining the general building plans and by actual measurements during construction, subject to

the approval of the Architect.

3.8 ELECTRICAL INSTALLATIONS

A. Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other building components.

2. Verify all dimensions by field measurements.

3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

7. Coordinate connection of electrical systems with existing utilities and services. Comply with other governing regulations.

8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.

9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in other sections of these specifications.

12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.9 WARRANTY

A. Deliver originals of all guarantees and warranties on this portion of the work to the Owner. Warrant all equipment, materials and workmanship for one year in accordance with the terms of this Contract.

END OF SECTION 26 0500

SECTION 26 05 19

LOW VOLTAGE CONDUCTORS

PART 1 - GENERAL

1.1 CONFORMANCE

A. Conform with applicable provisions of the General Conditions, Special Provisions, and General Requirements.

1.2 RELATED WORK IN OTHER SECTIONS

A. Section 26 0010, General Provisions; Section 26 0526, Grounding.

PART 2 - PRODUCTS

2.1 WIRES AND CABLES (600 VOLTS)

A. Type: Conform to the applicable UL and IPCEA Standards for the use intended. Copper conductors with 600 volts insulation unless otherwise specified or noted on the drawings. Stranded conductors for No. 8 or larger where elsewhere specified or noted on the drawings.

B. Use of aluminum conductors will not be permitted.

C. Insulation: Type THHN insulation, 75 degrees C, for all conductors otherwise specified or noted on the drawings. 90 degrees C minimum insulation within fixture wireways of fluorescent fixtures. All control conductors shall be THHN stranded or MTW.

D. Size: No. 14 minimum for controls and No. 12 minimum for lighting and convenience outlets, etc. unless otherwise specified or noted on the drawings. Not less than NEC requirements for the system to be installed. If the equipment to be installed required larger conductor and conduit sizes than indicated on the drawings, the required changes shall be made without additional charge to the Owner.

E. Color Coding: Phase, neutral, and ground conductors color-coded in accordance with NEC. Connect all conductors of the same color to the same phase conductor. Color coding shall be A-black, B-red, C-blue, N-white, for 120/208 volts and A-brown, B-orange, C-yellow, N-off white for 277/480 volts, with green for all ground conductors. Conductors No. 14, 12 and 10 shall be solid color compounded for entire length.

2.2 CONNECTORS AND LUGS

A. For Copper Conductors No. 6 and Smaller: 3M Scotch-Lok or T & B Sta-Kon compression or indent type connectors with integral or separate insulating caps.

B. For Copper Conductors Larger than No. 6: Solderless, indent, hex screw or bolt type pressure conductors, properly taped or insulated.

2.3 TAPE

A. Plastic tape: 8.5 mils minimum thickness, 1,000,000 megohms minimum insulation resistance, oil resistant vinyl backing, oil resistant acrylic adhesive, incapable of supporting combustion per ASTM D-568 Test Method B.

PART 3 - EXECUTION

3.1 SPLICES

A. (480 Volts and Under): Conductor lengths shall be continuous from termination to termination without splices unless approved by the Owner.

3.2 PULL WIRES

A. In each empty conduit, except underground conduits, install a No. 14 galvanized steel pull wire or a plastic line having a tensile strength of not less than 200 pounds. In each empty underground conduit install a No. 10 AWG bare, hard drawn copper or copper clad pull wire or a plastic line having a tensile strength of no less than 200 pounds.

3.3 IN RACEWAYS

A. Install conductors in rigid conduit. EMT or flexible metallic conduit, unless otherwise specified or noted on the drawings.

3.4 CABLE BENDS

A. Radius of ends not less than 10 times the outer diameter of the cable.

3.5 BUNDLING

A. Conductors No. 10 and smaller shall be neatly and securely bundled and conductors larger than No. 10 shall be neatly and securely cabled in individual circuits, utilizing marlin twine, two ply lacing or nylon straps.

3.6 CONDUCTOR PULL

A. Conductors shall not be pulled into conduits until after all plastering or concrete work is completed and all conduits in which moisture has collected have been swabbed out.

3.7 CONNECTORS AND LUGS

A. Install with manufacturer's recommended tools and with the type and quantity of

deformations recommended by manufacturer.

3.8 LABELING

A. All conductors and neutrals shall be tagged in every junction box and cabinet with wrap around, stick-on labels or pre-marked nylon clip sleeves identifying panel and circuit number.

END OF SECTION 26 05 19

SECTION 26 0526

GROUNDING

PART 1 - GENERAL

1.1 RELATED WORK IN OTHER SECTIONS

A. Section 26 0010, General Provisions; Section 26 0533, Raceways, Boxes and Fittings; Section 26 0519, Low Voltage Conductors; Section 26 2726, Wiring Devices and Plates; Section 26 2416, Panelboards.

PART 2 - PRODUCTS

2.1 GROUNDING SYSTEM

A. Materials, equipment and devices related to the grounding system are specified under other sections of these specifications.

PART 3 - EXECUTION

3.1 GENERAL

A. Install two separate grounding systems: a service grounding system and an equipment grounding system. The service equipment, conduit systems, supports, cabinets, equipment, and neutral conductor shall be grounded in accordance with the minimum code requirements and as further indicated on the drawings or specified. Connect the two grounding systems together only at the main service equipment and at the secondary terminals of transformers creating separately derived distribution systems such as dry-type transformers.

3.2 SERVICE GROUNDING SYSTEM

A. General: The service grounding system is provided for the AC service neutral ground. Current return conductors, such as neutrals of the service entrance, feeder circuits and branch circuits, shall not be used for equipment grounding. Care must be exercised to insure that neutral bars are not bonded to the enclosures of panelboards, etc., which are not part of the main service equipment. Except for separately derived systems, the neutral conductors shall be grounded only in the main service equipment.

B. Common Ground Point: Establish one common ground point in the main service equipment by interconnecting the insulated neutral bus (or bar), the uninsulated equipment ground bus (or bar), and service grounding electrode conductor.

C. Neutral Disconnecting Means: Install a neutral disconnecting means in the main service equipment for disconnecting and isolating the neutral bus from the common ground. The disconnecting means may be disconnecting links in the interconnection between the insulated neutral and uninsulated equipment ground.

D. Neutral Bars: Provide an insulated neutral bar, separate from the uninsulated equipment ground bar, in all panelboards, transformers, starters, disconnect switches, cabinets, etc., which have neutral connections.

3.3 EQUIPMENT GROUNDING SYSTEM

A. General: Provide a complete equipment grounding system in accordance with the minimum code requirements and as further indicated on the drawings or specified. The equipment ground (green conductor) consists of metallic conditions to ground of non-current carrying metal parts of the wiring system or apparatus connected to the system. The primary purpose of equipment grounding is to provide greater safety by limiting the electrical potential between non-current carrying parts of the system to provide a low impedance path to ground for possible ground fault currents.

B. Common Ground Point: Establish one common ground point as specified elsewhere in this section of the specifications for interconnection of the equipment grounding system and the service grounding electrode conductor.

C. Service Equipment Enclosure: Bond the enclosure of the main service equipment to the uninsulated equipment ground bus (or bar) with a conductor or bar sized for 25% of the largest service overcurrent device.

D. Ground Bar: Provide an uninsulated equipment ground bar, separate from any insulated neutral bar, in all switchboards, panelboards, transformers, motor control centers, starters, disconnect switches, cabinets, etc., for grounding the enclosure and for connecting other equipment ground conductors. The ground bar shall be an integrally mounted and braced bus bar in switchboards or a separately mounted bar adequately braced or bolted at the enclosure of other types of equipment. The ground bar shall be adequately braced or bolted to the enclosure after thoroughly cleaning both surfaces to assure good contact. Provide solderless pressure connectors for all conductor terminations. Number and size of pressure connectors on equipment grounding bars as required for the termination of equipment grounding conductors. In addition to the active circuits, provide pressure connectors for all three-phase spares and spaces.

E. Conduits: Where metallic conduits terminate without mechanical connection to a metallic housing of electrical equipment by means of lock nut and bushings, provide ground bushing connected with a bare copper conductor to the ground bar in the electrical equipment. Metallic conduits containing ground wiring shall be bonded to the ground wire at both conduit entrance and exit. Install grounding conductor in each non metallic conduit or duct except those used for telephone, sound, or low-voltage signals and in all flexible conduit that does not have a built-in ground conductor. Bond the conductor at both ends to the equipment grounding system.

F. Feeders and Branch Circuits: Provide a separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit with a three-phase protective device. Provide a separate green insulated equipment grounding conductor for single phase branch circuits where indicated on the drawings. Install the required grounding conductor in the common conduit or raceway with the related phase and/or neutral conductors and connect to the box or cabinet grounding terminal. Where

there are parallel feeders installed in more than one raceway, each raceway shall have a green insulated equipment ground conductor.

G. Devices: Install a minimum No. 12 green insulated equipment bonding conductor from a grounding terminal in the respective outlet or junction box to the green ground terminal of all receptacles and through flexible conduit to all light fixture housings.

H. Motors: Install a separate green insulated equipment bonding conductor from the equipment ground bar in the motor control center of separate starter through the conduit and flexible conduit to the ground terminal in the connection box mounted on the motor. Install the grounding conductor in the common conduit or raceway with the related motor circuit conductors.

3.45 GROUNDING ELECTRODES

A. The service ground electrodes shall be utilized. One shall be the main cold water metallic water piping system and the other shall be a made electrode consisting of not less than twenty feet of bare copper conductor encased along the bottom of a concrete foundation footing which is in direct contact with the earth (NEC 250-83a). Make the connections to the cold water pipe inside the building at the point of entrance. The grounding electrode for separately derived systems shall be approved for this application.

3.5 GROUNDING CONDUCTORS

A. The grounding conductors for both service ground electrodes shall be insulated or bare copper, sized in accordance with NEC 250-94(a), including the conductor for the made electrode. The conductors shall be continuous without joint or splice and shall be installed in conduit with the conduit bonded to the conductor at each end. Install the conductor to permit the shortest and most direct path and terminate in the main service equipment on the common ground point. Equipment grounding conductors shall be green insulated conductors equivalent to the insulation on the associated phase conductor, but not less than Type TW. The equipment grounding conductor or straps shall be sized in accordance with NEC. Where one feeder serves a series of panelboards or transformers, the equipment grounding conductor shall be continuous without splices. Grounding conductors shall not be installed through metal-sheathed holes. All connections shall be available for inspection and maintenance.

3.6 GROUND CONNECTIONS

A. Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated the coating must be removed down to the bare metal. After the coating has been removed, apply a non-corrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox", or equal.

3.7 TESTS

A. Test the completed grounding system with a meggar at the service ground bar and submit a written report to the Architect for approval. The service shall not be energized if the test shows more than 5 ohms, unless approved by the Engineer.

END OF SECTION 26 05 26

PART 1 - GENERAL

1.1 CONFORMANCE

A. Conform with applicable provisions of the General Conditions, Special Provisions and General Requirements.

1.2 RELATED WORK IN OTHER SECTIONS

A. Section 26 00 10, General Provisions; Section 26 05 26, Grounding.

PART 2 - PRODUCTS

2.1 CONDUITS

A. Steel Conduit: Rigid, threaded, thick wall, zinc coated on the outside and either zinc coated or coated with an approved corrosion resistant coating on the inside.

B. Electrical Metallic Tubing (EMT): Mild steel, zinc coated on the outside and either zinc coated or coated with an approved corrosion resistant coating on the inside. Maximum, size 2 inch electrical trade size unless noted on the drawings or specifically approved.

C. Intermediate Metal Conduit (IMC): Rigid, threaded, lightweight steel, zinc-coated on the outside and either zinc-coated or coated with an approved corrosion resistant coating on the inside.

D. Flexible Conduit: Commercial greenfield, galvanized steel, with a separate grounding bond wire installed in the conduit in addition to other wires.

E. Liquid Tight Flexible Conduit: Flexible galvanized steel tubing with extruded liquid tight PVC outer jacket and a continuous copper bonding conductor wound spirally between the convolutions. Where a separate grounding conductor is installed in the conduit, bonding conductor in the convolutions may be omitted.

F. Plastic coated rigid steel conduit shall be hot galvanized steel conduit with a coating of polyvinyl chloride, minimum 15 mills (0.015), on the exterior surfaces, shall have an approved corrosion resistant coat inside and shall be Pittsburgh, J & L, Republic or approved equal.

G. Rigid Non-Metallic Conduit: Schedule 40, high impact PVC with 7,000 psi tensile strength at 73.4 F., 11,000 psi flexural strength, 8,600 psi compression strength, approved for 90 C. conductors. Carlon, Triangle, or approved equal.

H. Aluminum Conduit: Rigid, threaded, thick wall type, approved for the application.

I. Conduit Size: Minimum conduit size 1/2 inch except where specifically approved for equipment connections. Sizes not noted on drawings shall be as required by the NEC. All home runs to panel shall be 3/4 inch minimum. Conduits for #12 THHN wire shall be sized the same as for #12 TW wire.

2.2 CONDUIT FITTINGS

A. Connectors and Couplings: Compression type threadless fittings for rigid steel conduit or IMC not permitted. Set screw type fittings for rigid aluminum conduit not permitted. EMT couplings and connectors either steel or malleable iron only. "Concrete Tight" or "Rain Tight" and either the gland and ring compression type or the stainless steel multiple point locking type. Connectors to have insulated throats. EMT fittings using set screws or indentations as a means of attachment are not permitted.

B. Bushings: Insulated type, designed to prevent abrasion of wires without impairing the continuity of the conduit grounding system, for rigid steel conduit, IMC and rigid aluminum conduit larger than 1/2 inch size and connectors for EMT.

C. Rigid Steel Conduit, IMC and EMT Fittings: Iron or steel only.

D. Liquid Tight Flexible Conduit Fittings: With threaded grounding cone, a steel, nylon or equal plastic compression ring and a gland for tightening. Either steel or malleable iron only with insulated throats and male thread and locknut or male bushing with or without "O" ring seat. Each connector shall provide a low resistance ground connection between the flexible conduit and the outlet box, conduit or other equipment to which it is connected.

E. Rigid Aluminum Conduit Fittings: Malleable iron, steel or aluminum alloy. Ferrous fittings zinc coated or cadmium plated. Aluminum alloy fittings shall conform with the characteristics defined by UL for aluminum rigid metallic conduit and shall not contain more than 0.04 percent copper.

F. Flexible Conduit Fittings (Commercial Greenfield): Either steel or malleable iron only, with insulated throats.

G. Fittings for PVC Coated Rigid Steel Conduit: Ells and couplings used with PVC coated rigid steel conduit shall have a factory applied coating of polyvinyl chloride, minimum 15 mills (0.015) on exterior surfaces and shall have a PVC sleeve extruded a minimum of 2" from one end of the fitting.

2.3 OUTLET BOXES

A. Construction: Zinc coated or cadmium plated steel boxes of a class to satisfy the condition at each outlet except where unilet on condulet bodies are required. Knockout type with knockouts removed only where necessary to accommodate the conduit entering. Square cornered, straight sided gang boxes, 4 inch octagon concrete rings and 4 inch octagon hung ceiling boxes with bars may be folded type, one piece deep drawn type for all other boxes.

B. Size: To accommodate the required number and sizes of conduits, wires and splices in

accordance with NEC requirements, but not smaller than size shown or specified. Standard concrete type boxes not to exceed 6 inches deep except where necessary to permit entrance of conduits into side of boxes without interference with reinforcing bars. Special purpose boxes shall be sized for the device or application indicated.

2.4 PULLBOXES

A. Minimum NEC requirements unless larger box is noted. As specified for outlet boxes with blank cover for pullboxes with internal volume not more that 150 cubic inches. As specified for cabinets for pullboxes with internal volume over 150 cubic inches, except covers to have same thickness as box with corrosion resistant screw or bolt attachment.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATIONS

A. Conduit Systems: Rigid Steel conduit, IMC, EMT, or Rigid Non-Metallic conduit unless noted. Install steel conduits for underground runs, runs in concrete feeder circuits and where required by the NEC for mechanical protection, etc. Use flexible conduit only for motor or equipment connections and then only to the extent of minimum lengths required for connections. Install flexible conduit connections at all resilient mounted equipment. Provide liquid tight flexible conduit in exterior, wet or damp locations and for connections to the pipe mechanical system. Aluminum conduit may be used only in dry locations above ground in sizes two inch or larger for power and communications systems. Conduit and tubing shall be kept at least 6 inches from paralleled runs or hot water or steam pipes.

B. Conduit Installation: Install concealed conduit and EMT in as direct lines as possible. Install exposed conduits and EMT parallel to or at right angles to the lines of the building. Right angle bends in exposed conduit and EMT runs shall be made with standard elbows, screw jointed conduit fittings or conduit bent to radius no less than those of standard elbows.

C. Concealed Conduits: Install conduit systems concealed where possible unless otherwise noted. Conduit systems may be exposed in unfinished utility areas, ceiling cavities and where specifically approved by the Architect.

D. Conduit in Concrete: Conduits shall not be installed in floor slabs poured on grade. Rigid steel conduit may be embedded in above grade concrete providing the outside diameter does not exceed 1/3 thickness of concrete slab, wall or beam, is located entirely within the center third of the member and lateral spacing of conduits is not less than 3 diameters. Aluminum conduit shall not be embedded in concrete or masonry.

E. Conduit in Ground: PVC plastic coated rigid steel conduit shall be installed for all underground feeders and in all locations where conduit is in contact with dirt, soil, fill or earth. All fittings, couplings, ells, etc., used with conduit shall have same factory applied PC coating.

1. At his option, Contractor may substitute Schedule 40 rigid non-metallic conduit for PVC plastic coated rigid steel conduit, where allowed by the Code enforcing Authority. Installations and use of rigid non-metallic conduit shall comply with the NEC. An equipment grounding conductor, in accordance with NEC, shall be installed in all non-metallic conduits. All conduit sizes, shown on the plans, shall be increased to accommodate the installation of the equipment grounding conductor. All joints shall be made with solvent cement per manufacturer's recommendations and shall be watertight. Plastic conduit runs stubbing up to above grade junction boxes or conduit by installing a female adapter, 90 degree PVC coated rigid steel elbow and a PVC coated rigid steel nipple of length as required to stub conduit up. No plastic conduit shall be installed above grade. Plastic conduit shall be used for straight runs only. PVC coated rigid steel conduit shall be used for all bends, ells and offsets.

F. Conduit Bends: In any conduit or EMT run, the number of quarter bends or equivalent between terminations at cabinets or boxes shall not exceed four bends for conduits up to 1 1/4 inch, three bends for 1 1/2 to 2 1/2 inch conduits and two bends for 3 to 4 inch conduits. Conduit runs between cabinets or boxes shall not exceed 200 feet for straight runs nor 100 feet for runs with maximum number of bends. Bends in telephone feeder conduits shall be long radius.

G. Conduit Openings: Protect all vertical runs of conduits or EMT terminating in the bottoms of boxes or cabinets, etc., from the entrance of foreign material prior to installation of conductors.

H. Sleeves for Conduit: Install sleeves for conduit where shown or as required. Conduit sleeves not used shall be plugged with recessed type plugs. Sleeve all conduit passing through walls. Sleeves that are used shall be caulked tight with lead yarn.

3.2 CONDUIT SUPPORTS

A. Supports: Provide supports for horizontal conduits and EMT not more than 8 feet apart with not less than two supports for each 10 foot straight length and one support near each elbow or bend including runs above suspended ceilings and within 3 feet of all junction boxes, switches, fittings, etc.

B. Strap: Install one hole pipe straps on conduits 1 1/2 inch or smaller. Install individual pipe hangers for conduits larger that 1 1/2 inch. Spring steel fasteners with hanger rods may be used in dry locations in lieu of pipe straps.

C. Trapezes: Install multiple (trapeze) pipe hangers where two or more horizontal conduits or EMT run parallel and at the same elevation. Secure each conduit or EMT to the horizontal hanger member by a U-bolt, one hole strap or other specially designed and approved fastener.

D. Hanger Rods: Install 1/4 inch diameter or larger galvanized steel rods for trapezes, spring steel fasteners, clips or clamps. Wire or perforated strapping shall not be used for the support of any conduit or EMT.

E. Fastening: Fasten pipe straps and hanger rods to concrete by means of inserts or expansion bolts to brickwork by means of expansion bolts and to hollow masonry by

means of toggle bolts. Wooden plugs and shield shall not be used. Power driven fasteners may be used to attach pipe straps and hanger rods to concrete only where approved by the Architect.

F. All conduits not embedded in concrete shall be firmly secured by means of pipe clamps, hangers, etc., equal to Caddy fasteners of ERICO Prodicts, Inc. Wire wrapped around conduits and supporting members will not be accepted.

3.3 CONDUIT STUB-UPS

A. All conduits run under floor shall be stubbed up to a coupling set flush with floor. This includes conduits stubbed up in walls and feeder conduits. Install flush plug until after floor is finished, then complete connections to boxes or equipment.

3.4 OUTLET BOXES

A. Outlet boxes, covers and fittings, according to the particular use for which they are required, shall be provided in the locations marked on the drawings by symbols, and/or for use to facilitate the installation of the electrical systems. When necessary, outlets shall be relocated so that where fixtures of other fittings are installed they will be symmetrically located according to the room layout and will not interfere with other work or equipment required by the drawings and these specifications.

B. Installation: Unless otherwise specified or shown on the drawings, outlet boxes shall be flush mounted and the front edges of the boxes or plaster covers shall be flush with the finished wall or ceiling line or if installed in walls and ceilings of incombustible construction, not more than 1/4 inch back of same. Mount boxes with the long axes of devices vertical, unless otherwise specified. Boxes in plastered walls and ceilings shall be provided with plastic covers. A multiple of box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hangers, box cleats, adjustable box hangers, etc. Use wood screws on wood, expansion shields on masonry and machine screws on steel work.

3.5 PULLBOXES

A. Provide additional pullboxes wherever necessary to meet requirements for maximum length of conduit runs and maximum numbers of bends as specified under "Conduit and Fittings".

3.6 FIXTURE CONNECTIONS

A. Recessed or surface light fixtures in lay-in or accessible ceilings shall be connected with minimum 1/2 inch flexible metallic conduit, 4 to 6 feet long with grounding provisions.

3.7 CLOSING OF OPENINGS

A. Wherever slots, sleeves, or other openings are provided in floors or walls for the passage of conduits or other forms of raceway, such openings, if unused, or the spaces left in

such openings, shall be filled or closed in a manner approved by the Architect.

END OF SECTION 26 05 33

SECTION 260553

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED WORK IN OTHER SECTIONS

A. Section 26 00 10, General Provisions; Section 26 05 26, Grounding.

1.2 CONFORMANCE

A. Conform with applicable provisions of the General Conditions and Supplementary Conditions and Division 1 specifications sections.

1.3 SUMMARY

A. This Section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including but not limited to the following:

1. Identification labeling for raceways, cables, and conductors.

2. Equipment labels and signs.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 9 Section "Painting" for related identification requirements.

2. Division 16 Section "Wires and Cables" for requirements for color coding of conductors for phase identification.

3. Refer to other Division 16 sections for additional specific electrical identification associated with specific items.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Schedule of identification nomenclature to be used for identification signs and labels.

D. Samples of each color, lettering style, and other graphic representation required for

identification materials; samples of labels and signs.

1.5 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

PART 2 - PRODUCTS

2.1 ELECTRICAL IDENTIFICATION PRODUCTS

A. Adhesive Marking Labels for Raceway: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency power system, Lighting, Power, Light, HVAC, Communications, Control, Fire, Security, CCTV, Telephone).

B. Label Size as follows:

1. Raceways 1-Inch and Smaller: 1-1/8 inches high by 4 inches long.

2. Raceways Larger than 1-Inch: 1-1/8 inches high by 8 inches long.

C. Color: Black legend on orange background.

D. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

E. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pre- tensioned gripping action when coiled around the raceway or cable.

F. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field-printed legends to suit the application. Orange background, except as otherwise indicated, with Eyelet for fastener.

G. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners.

H. Fasteners for Plastic-Laminated nameplates: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

I. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self- locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature

range from minus 50 deg F to 350 deg F. Provide ties in specified colors when used for color coding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.

C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

D. Identify Raceways of Certain Systems with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be pretensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs. Apply the following colors:

1. Fire Alarm System: Red
2. Security Alarm System: Blue and Yellow
3. Mechanical and Electrical Supervisory System: Green and Blue
4. Data/Communication System: Green and Yellow
5. Closed Circuit TV: Green
6. Sound/Intercom (including bells): Orange
7. Telecommunications: Orange and Yellow
8. 120/208V Power System: Black
9. 277/480V Power System: Blue
10. 120/208V Emergency Power System: Black and Orange
11. 277/480V Emergency Power System: Blue and Orange

E. Identify Junction, Pull, and Connection Boxes: Code-required caution sign for boxes shall be pressure-sensitive, self-adhesive label indicating system voltage in black, preprinted on orange background. Install on outside of box cover. Also label box covers with identity of contained circuits. Use pressure- sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.

F. Use conductors with color factory-applied the entire length of the conductors except as

follows:

1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.

   (a) Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.

   (b) In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.

G. Power Circuit Identification: Securely fasten identifying metal tags or aluminum wraparound marker bands to cables, feeders, and power circuits in pull boxes, junction boxes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb test monofilament line or one-piece self-locking nylon cable ties.

H. Tag or label conductors as follows:

1. Future Connections: Tag or label conductors indicated to be for future connection or connection under another contract with identification indicating source (device to panelboard) and circuit numbers. Submit as-built record drawings for distribution to site administrator, Mr. Ron Gallegos, authorized APS representative and FC&P manager.

2. Multiple Circuits: Where multiple branch circuits or control wiring or telecommunications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

3. Fiber Optic Cable and Conduit: All fiber optic cable shall bear factory printed cable identification markings indicating the cable is Afiber optic@ on colored tape or tags to this effect on conduit runs containing fiber optic cable at changes in direction, at

penetrations of walls and floors (each side0, at junction boxes and termination, and at 40 foot maximum intervals.

3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

4. Install equipment/system circuit/device identification .

5. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 2-inch-high lettering on 1-1/2-inch-high label (2-inch-high where two lines are required), white lettering in black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.

   (a) Panelboards, electrical cabinets, and enclosures.
   (b) Access doors and panels for concealed electrical items.
   (c) Electrical switchgear and switchboards.
   (d) Motor starters.
   (e) Pushbutton stations.
   (f) Contactors.
   (g) Remote-controlled switches.
   (h) Dimmers.
   (i) Control devices.
   (j) Fire alarm control panel.
   (k) Security alarm control panel.

I. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

J. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

END OF SECTION 26 0553 - ELECTRICAL IDENTIFICATION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED WORK IN OTHER SECTIONS

A. Section 26 00 10, General Electrical Requirements; Section 26 05 26, Grounding.

1.2 SUBMITTALS

A. Submit complete shop drawings with outline dimensions, descriptive literature and complete descriptions of the frame size, trip setting, class and interrupting rating of all overcurrent devices. Identify available space.

PART 2 - PRODUCTS

2.1 GENERAL

A. Dead front, safety type with voltage ratings as scheduled. Panelboards shall be of the type required for the short circuit and duty ratings indicated on the drawings or specified. All panelboards shall have a neutral bus and a ground bus. Panelboards shall be circuit breaker as scheduled, unless otherwise noted.

2.2 CABINETS

A. Each panelboard shall be enclosed in a single sheet metal cabinet with front doors, catches, locks, etc.

B. Door-In-Door: Both surface and flush panels shall be door-in-door. The door over the interior of the panel shall be provided with hinges and combined lock and latch. The outside door over the panel gutters shall have a hinge on one side and machine screws into threaded holes in the panelboard cabinet on the other three sides. In order to insure the rigidity of the outside door, surface type panels shall have a 1/2 inch deep lip bent over all around with the corners welded and ground; or, in the case of flush panels a steel angle frame equivalent in strength to the bent-over lip, shall be welded to the inside of the door. The outside door shall be of such size as to allow a minimum of 2 3/4 inches opening to all four sides of the wiring gutter. All locks shall be keyed alike.

2.3 BRANCH CIRCUIT PANELS

A. All branch circuit panels for lighting and single phase loads shall be "Quick-lag" circuit breakers with 10,000 amps interrupting capacity, main lugs or main breaker as indicated on the drawings, "Door-In-Door" cover. Circuit breakers providing motor short circuit

protection shall have trip elements sized to meet NEC requirements or equipment manufacturer's recommendations, whichever are smaller.

B. Breakers: Molded case as scheduled or required. Provide quick make and quick break toggle mechanism, inverse time trip characteristics and trip free operation on overload or short circuit. Automatic tripping shall be indicated by a handle position between the manual OFF and ON position. Provide trip ratings as indicated in the panelboard schedules. Adjustable magnetic trip devices shall be set at the factory to the low trip setting. Provide breaker frame sizes as required for the continuous rating or the interrupting capacity, whichever is larger.

C. Bolted Type: Circuit breaker current carrying connections to the bus shall be of the bolted type, factory assembled. Stab in type not permitted. Provide bus bars for three phase panelboards of the sequence phased type connection and arranged for 3 phase, 4 wire mains, unless otherwise indicated on the drawings.

D. Space Only: Where "space only" is noted on the drawings, provide necessary connectors, mounting brackets, etc., for the future insertion of an overcurrent device. Spaces shall be sized for 100 amp straps minimum. The word "space" is intended to mean a space for a future branch circuit breaker, and will include connection straps rated at 100 amperes, minimum, holding brackets, and an identifying numbering unit, so that all that is necessary to convert it to an active circuit is installation of the circuit breaker.

E. Directories: Provide typewritten circuit descriptions referencing permanent room numbering assigned in lieu of the room numbering shown on the drawings.

F. Labels:

1. Labels for identifying the breaker shall be engraved laminated plastic strips attached by screws or phenolic buttons or small window frame type.

2. Labels for identifying the panel shall be engraved laminated plastic attached by screws. The nameplate shall identify the panel by name or designation, the voltage system, number of phases, number of wires, and the location of the overcurrent protective device (e.g. "PANEL 2A - 120/208V, 3PH, 4W FED FROM MDS-2". Lettering shall be minimum 2" high white letters on black background.

G. Skirts: Where noted on the drawings panelboards shall be skirted with complete metal enclosures and barriers separating the panel interior.

2.4 BUS BARS

A. All bus bars shall be copper. Use of aluminum bus bars will not be permitted.

2.5 SPARE CONDUITS

A. Provide a minimum of five (5) 1"C stubbed from each branch circuit lighting and appliance panel to the closest accessible lay-in ceiling area, for future branch circuit

wiring. The total number of spare conduits shall be determined by one (1) 1"C for every three (3) spare 20A/1P circuit breaker in the panel. All spare conduits shall be stubbed, capped, and labeled as "spare conduit". Refer to the plans for additional spare conduits.

PART 3 - EXECUTION

3.1 CIRCUIT NUMBERING

A. Circuit numbering shown on the drawings is based on pole position in the panelboard and not consecutive numbering.

3.2 PHASE ROTATION

A. Phase A, left bus; phase B, center bus; phase C, right bus (front viewing).

3.3 CABLE TIE-WRAPPING AND TRAINING

A. All branch circuit conductors within the panelboard shall be neatly tie-wrapped and trained - no exceptions. Utilize nylon cable wraps and group branch circuit conductors towards the rear of the panel interior. Other means of tie-wrapping branch circuit conductors will not be accepted (wire, string, or conductors).

B. Label all branch circuits at the point of entry into the panelboard. Labels shall be nylon clip-on sleeve and shall identify the branch circuit conductor by the panelboard circuit number.

3.4 CLEANING

A. All panel interiors shall be cleaned of dirt and debris prior to energizing the panels.

B. Clean all exposed panel surfaces of dirt and paint. Touch-up all scratches with matching paint.

END OF SECTION 26 24 16

SECTION 26 27 26

WIRING DEVICES AND PLATES

PART 1 - GENERAL

1.1 RELATED WORK IN OTHER SECTIONS

A. Section 26 00 10 General Provisions; Section 26 05 26, Grounding.

PART 2 - PRODUCTS

2.1 SNAP SWITCHES

A. Unless otherwise specified, each snap switch (flush tumbler-toggle) shall be of the A.C. General use type for mounting in a single gang spacing, fully rated 20 amperes minimum at 120/277 volts, conforming to minimum requirements of the latest revision of the Underwriter's Laboratories, Inc., UL 20 Fifth Edition Standard Snap Switches and further requirements herein specified. Specification grade, heavy duty, single pole, 3-way or 4-way, of the maintained, momentary or lock type as indicated on the drawings. Ivory color handles unless otherwise indicated on the drawings. Silver or silver alloy contacts. A.C. 120/277 volt general use snap switches shall be capable of withstanding tests as outlined in NEMA Publications and shall be as follows unless otherwise noted.

20A 120/277 AC	HUBBELL	P&S	AH&H	GE
1P	1221-1	20-AC-1-1	1991-1	5951-2
3-WAY	1223-1	20-AC-3-1	1993-1	5953-2
4-WAY	1224-1	20-AC-4-1	1994-1	5954-2

2.2 RECEPTACLES

A. General: Configuration and requirements for all connector or outlet receptacles shall be in accordance with NEMA Publications. Fire resistant, non-absorptive, hot welded, phenolic composition or equal bodies and bases with metal plaster ears (integral with the supporting member). Single or duplex as shown or noted on drawings. Ivory color unless otherwise noted on the drawings. Double grip contacts for each prong.

B. Grounding Type: All receptacles shall be grounding type with a green colored hexagonal equipment ground screw of adequate size to accommodate an insulated grounding jumper
(based on Table 250-95 of the NEC with minimum size No. 14 AWG). Grounding terminals of all receptacles shall be internally connected to the receptacle mounting yoke.

C. Unless otherwise noted, receptacle shall be as follows:

DEVICE	HUBBELL	P&S	AH&H	GE
20A-125V AC 2P 3W	5362-1	6300-1	5739-1	4108-2
15A-125V AC 2P 3W	5262-1	5262-1	5262-1	4065-2

D. Special: Receptacles for special applications shall be as indicated on the drawings.

2.3 DEVICE PLATES

A. General: Provide plates for each switch, receptacle, signal and telephone outlet and special purpose outlet. Plates shall be stainless steel unless otherwise noted. Do not use sectional gang plates.

B. Exposed: Plates for exposed screw jointed fittings shall match the fittings with edges of plates flush with edges of fittings. Heavy cadmium plates, steel with gasket. Plates for cast type boxes at locations subject to set or rain conditions shall be of the cast, vapor tight type. Provides hinged covers for devices.

C. Communications: Plates for telephone and signal outlets shall each have a 3/8 inch bushed opening in the center. Wall plates for push button and buzzer outlets shall have openings to suit the push buttons and buzzers.

PART 3 - EXECUTION

3.1 DEVICE PLATES

A. Install with alignment tolerance of one-sixteenth inch and all edges in continuous contact with wall surfaces.

END OF SECTION 26 2726

SECTION 26 43 13

SURGE PROTECTIVE DEVICES (SPD)

PART I - GENERAL

1.1 RELATED WORK IN OTHER SECTIONS

A. Section 26 0510, General Electrical Provisions; Section 26 0526, Grounding and Bonding for Electrical Systems.

1.2 DESCRIPTION

A. This section describes the material and installation requirements for surge protective devices (SPD) for the protection of all AC electrical circuits from the effects of lightning induced currents, substation switching transients and internally generated transients resulting from inductive and/or capacitive load switching.

1.3 REFERENCES

A. ANSI/IEEE C62.41.1 – 2002, IEEE Guide for Surge Voltages in Low Voltage (1000 V and Less) AC Power Circuits and ANSI/IEEE C62.41.2 – 2002, IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits.

B. ANSI/IEEE C62.45 – 2002, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less AC Power.

C. FIBS PUB 94 (1983) - Guide on Electrical Power for ADP Installation

D. NEC - ARTICLE 285.

E. NFPA-20, NFPA-70, NFPA-75, NFPA-78

F. UL 1283 - Electromagnetic Interference Filters.

G. UL 1449 Third Edition, or most recent edition – Surge Protection Devices.

1.4 SUBMITTALS

A. Shop drawings, product data and manufacturer's installation instruction for non-approved manufacturers shall be submitted for review ten days prior to the bid date. Approved manufacturers shall provide the same required documentation at the shop drawing approval stage.

B. The submittal shall include the following:

1. Dimensional drawing of each suppressor type indicating the following:

   a.) Service Entrance SPD

      1.) Copper bus bars (electrical grade copper 1.5" wide x 0.25" thick)

      2.) Diagnostic monitoring package.

      3.) Line to neutral, and neutral to ground suppression paths.

   b.) Panelboard SPD

      1.) Line to neutral, line to ground, and neutral to ground suppression paths.

2. UL Standard 1449 . Third Edition, or most recent edition, Listing, Standard for Safety, Surge Protection Devices, documentation verifying:
   1. Short Circuit Current Rating (SCCR)
   2. Voltage Protection Ratings (VPRs) for all modes
   3. Maximum Continuous Operating Voltage rating (MCOV)
   4. I-nominal rating (In)
   5. Type 1 Device Listing

3. UL Standard 1283 Listing, Electromagnetic Interference Filters, documentation.

4. Spectrum analysis of SPD based on MIL-STD-22A test procedures between 50kHz and 200kHz.

5. Endurance Testing: Capable of protecting against and surviving 5000 ANSI/IEEE C62.41 C-High transients without failure or degradation of UL 1449 Voltage Protection Rating by more than 10%.

6. A document of specification compliance shall be included outlining the prospective manufacturers compliance or deviation from each point ;in the specification. Should deviations be noted, a comprehensive clarification shall be provided outlining the reason for deviation.

PART 2 - PRODUCTS

2.1 SURGE PROTECTION DEVICES (SPD)

A. Main Distribution Panelboard SPD Protection: Provide at each main distribution panelboard, where indicated on the plans or as otherwise noted on the plans a

main distribution panelboard SPD. The SPD shall have the following characteristics:

1. Shall be UL Listed to UL 1449, Standard for Safety, Transient Voltage Surge Suppressors, UL 1283, Electromagnetic Interference Filters and CSA Certified to CSA C22.2.

2. Shall be tested with Category C3 high exposure waveform (20kV-1.2/50us, 10kA-8/20us) per ANSI/IEEE C62.41 - 1991.

3. Shall be modular in design. Each suppression element shall be a user replaceable surge current diversion module (MOV based). Each surge current diversion module shall be fused with user replaceable 200kAIC rated fuses. Each surge current diversion module shall include solid state status indicator lights.

4. Shall provide redundant surge current diversion modules between each phase conductor and the neutral conductor, and between the neutral conductor and ground. Each mode of protection shall utilize two current sharing surge current diversion modules in parallel.

5. Shall incorporate copper bus bars for the surge current path. Small gauge round wiring or plug-in connections shall be used in the path for surge current diversion. Surge current diversion modules shall use bolted connections to the bus bars for reliable low impedance connections.

6. Shall meet or exceed the following criteria:

   a.) Maximum surge current capability (single pulse rated) shall be 240kA per phase, in accordance with NEMA LS 1 Standard.

   b.) Endurance Testing: Capable of protecting against and surviving 4000 ANSI/IEEE C62.41 Category C3 transients without failure or degradation of UL 1449 Suppression Voltage Rating by more than 10%.

   c.) UL 1449 Suppression Voltage Ratings shall not exceed 400V (L-N) and (N-G).

   d.) The ANSI/IEEE C62.41-1991 Category C3 let through voltages shall not exceed 470V (L-N) and (N-G).

   e.) Shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.

   f.) Shall have a minimum EMI/EFI filtering of -50dB at 100kHz with an

insertion ratio of 50:1 using MIL STD.220A methodology, in accordance with NEMA LS 1 Standard.

g.) Shall be equipped with onboard visual and audible diagnostic monitoring. Red and green indicator lights shall provide full time visual diagnostic monitoring of the operational status of each phase as well as each surge current diversion module. Audible diagnostic monitoring shall be by way of audible alarm. This alarm shall activate upon a fault condition. An alarm on/off switch shall be provided to silence the alarm. An alarm push to test switch shall be provided. The SPD diagnostic monitoring devices shall be mounted on the front to for the SPD enclosure. The diagnostic monitoring circuits shall continually monitor the operational status of the surge current diversional modules. No other test equipment shall be required for SPD monitoring or testing before or after installation.

h.) Shall have a response time no greater than one nanosecond for any of the individual protection modes.

i.) Shall have a warranty for a period of five (5) years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

j.) Shall be equipped with a transient event surge counter, an internal UL listed disconnect and a Form C dry contact for remote annunciation.

A. Panelboard SPD Protection: Provide at each sub panel, where indicated on the plans or as otherwise noted on the plans an integrally mounted SPD device, Square "D" Model IMA, similar and equal. The panelboard SPD shall have the following characteristics:

1. Shall be UL listed to UL 1449 Third Edition, Standard for Safety, Surge Protection Devices, UL 1283, Electromagnetic Interference Filters and CSA Certified to CSA C22.2.

2. The mounting position of the SPD shall permit a straight and short lead length connection between the SPD and the point of connection to the panelboard.

3. Shall provide suppression components between each phase conductor and neutral, between each phase conductor and ground and between the neutral conductor and ground.

4. All encapsulated SPD's, whether modular or chase nipple units, shall utilize an encapsulant that is UL listed and holds a 94-V2 fire retardant rating. No encapsulant compounds that incorporate epoxy shall be allowed.

5. Shall meet or exceed the following criteria:

   a.) Maximum surge current capability shall be: 50kA per mode/100kA per phase.

   b.) SPD shall be UL labeled with 20kA I nominal (In), which is verifiable at "UL.com".

   c.) The UL 1449 Third Edition, or most recent edition, Voltage Protection Rating (VPR) shall not exceed:

MODES	L-N	L-G	N-G	L-L
480Y/277V, 3φ, 4W	1200	1200V	1200V	2000V
208Y/120V, 3φ, 4W	700V	700V	700V	1200V
480V Δ, 3φ, 3W	N/A	1800V	N/A	1800V
240V Δ, 3φ, 3W	N/A	1000V	N/A	1000V
120/240V, 1φ, 3W	700V	700V	700V	1200V

   d.) Shall be made of solid state components and operate bidirectionally.

   e.) Shall have a response time no greater than one nanosecond for any of the individual protection modes.

   f.) Shall have designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.

   g.) Shall have a visible indication of proper SPD connection and operation. Visual indication shall be by means of solid state status indicator lights on the front of the SPD.

   h.) Shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

   i.) SPD shall be UL labeled Type 1, intended fo ruse without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal over temperature controls. SPD's relaying upon exterior or supplementary installed safety disconnects do not meet the intent of this specification.

   j.) SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install SPD in location as indicated on the drawings and elsewhere as required by the manufacturer. The SPD main panelboard protection device shall be mounted within 18" to the panel being protected, minimizing the lead length between the SPD and panelboard circuit breaker to 24" or less. All conductors (phase, neutral, and ground) shall be kept as straight as possible.

B. Install SPD equipment per the manufacturers recommendations and wiring diagrams.

END OF SECTION 264313

SECTION 26 51 13

LIGHTING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED WORK IN OTHER SECTIONS

A. Section 26 00 10, General Electrical Requirements; Section 26 05 26, Grounding.

1.2 SUBMITTALS

A. Submit for approval complete shop drawings, catalog cuts, special installation instructions, photometric data and descriptive literature. When fixtures are proposed for substitution and prior approval has not been issued, the submittal for approval shall include catalog cuts of both the specified and proposed fixtures.

PART 2 - PRODUCTS

2.1 GENERAL

A. Furnish all lighting fixtures throughout the type indicated on the drawings, complete with LED drivers, wiring, fitters, hangers, plaster rings, canopies, etc., as required.

2.2 LED FIXTURES

A. All fixtures shall be LED as scheduled on the drawings complete with drivers and supports. Louvers, shields, reflectors and all sections of the channel structure shall be securely held in position.

2.3 FINISH

A. Bonderized or equal treatment on all steel parts prior to applying finish. Metal parts shall be aluminum, brass, copper, bronze, or steel, with baked white enamel finish unless otherwise noted on the drawings.

2.4 CEILING TRIM

A. Furnish proper ceiling frames for the ceiling material in which recessed fixtures are to be installed.

2.5 LENS

A. When acrylic lens or diffuser is specified, it shall be molded of 100% acrylic meeting American Society for Testing Materials specifications for Methacrylate Molding and Extrusion Compounds (ASTM D788-63). Plastic diffusing panels, luminous side panels and other luminous plastic members of fixtures shall be made of not less than .125 inch thick prismatic clear acrylic material. Plastic shall be non-flammable or shall have a flame

spread rate of not more than 3.2 inches per minutes for a 1/2 inch width of the material. The plastic shall be non-electrostatic or the finished parts shall be treated with an anti-static wax.

2.6 HOUSING

A. Not less than 20 gauge steel with baked white enamel finish applied over corrosion-resistant primer unless otherwise specifically approved.

2.7 EXIT LIGHTS

A. Exit lights shall be constructed of die cast high strength aluminum construction, with removable snapouts provided in the stencil fact casting to allow for right, left, or double directional arrows. Exit stencil letter shall beet UL 924 requirements for height, width, stroke and minimum spacing. Exit lights shall be white in color with brushed aluminum stencil face.

B. Exit lights shall be supplied with lamp panels which consume less than .5 watt per face, and shall meet or exceed UL 924 requirements for exit face illumination and contrast ratio. Lamps shall be compact fluorescent as indicated on the fixture schedule.

PART 3 - EXECUTION

3.1 SUPPORTS

A. Support ceiling fixtures by anchorage to the ceiling only where the ceiling is concrete or masonry units. For ceilings of other construction, anchor ceiling fixtures to metal supports provided for that purpose of suitable strength and stability, adequately attached to and supported by joists, trusses, or other structural members, unless other methods of support are specifically approved by the Architect. Lay-in fixtures shall be supported independently of the ceiling support system.

3.2 CEILING TRIM AND MEANS OF SUPPORT

A. The ceiling trim and means of support of recessed fixtures shall be coordinated with the type of the ceiling to be installed to insure proper installation.

3.3 SUSPENDED FIXTURES

A. Provide swivel hangers to insure a plumb installation. For single unit suspended fluorescent fixtures provide tubings or stems for wiring at one point and a tubing or rod suspension provided for each unit of chassis. Provide 3/16 inch diameter rods minimum.

3.4 BLOCKING

A. Protect housing of recessed lighting fixtures during installation by internal blocking or framing to prevent distortion of sides or dislocation of threaded lugs which upon

completion must be in perfect alignment and match the corresponding holes in frames or rims so that holding screws can be installed freely without forcing and remain so they can be easily removed when servicing. Threads to receive holding screws shall be chased after plating and finishing to insure easy installation and removal of knurled headed screws by thumb pressure.

3.5 CLEAN-UP

A. At final inspection all fixtures and lighting equipment shall be in first class operating order, in perfect condition as to finish and free from defects, completely lamped, clean and free from dust, plaster or paint spots and complete with the required glassware, reflectors, side panels, louvers or other components necessary to complete the fixtures.

3.6 CEILING TRIM

A. Furnish proper ceiling frames for the ceiling material in which recessed fixtures are to be installed; verify prior to ordering. Rims of all fixtures that overlap ceiling shall be installed tight and snug against the ceiling surfaces so that no light leakage occurs around the rim. If unevenness of surface of fixture allows light to show, then this contractor shall provide soft sponge filler or gasket on all fixtures requiring this treatment.

3.7 FLUSH AND RECESSED FIXTURES

A. Special attention is directed to the special provisions for flush and recessed fixtures in the National Electrical Code. All recessed fixtures shall have top connections to the outlet boxes installed in accordance with the code. Connections to lay-in fixtures shall be made with flexible connections 4'-0" minimum length.

3.8 LAY-IN FIXTURES

A. All lay-in fixtures shall be adequately supported to structure and not to ceiling alone.

3.9 TOP PLATES

A. All surface mounted fixtures shall be furnished with top plated whenever applicable.

3.10 CEILING FIRE RATING

A. All fixtures to be installed in a fire-resistive ceiling which shall be of a type suitable for such installation to ensure the maintenance of the ceiling fire rating or the fixtures shall be tented per UBC.

END OF SECTION 26 5113

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A.	Submittals:	SECTION 01 33 00
B.	Quality Control:	SECTION 01 40 00
C.	Asphaltic Paving:	DIVISION 32 12 16
D.	Concrete Paving	DIVISION 32 13 13
E.	Cast-in-Place Concrete:	SECTION 03 30 00
F.	Mechanical Utility Excavation:	DIVISION 22
G.	Electrical Utility Excavation:	DIVISION 26

1.2 CODES AND STANDARDS

A. Comply with the following codes and standards including current editions, revisions and supplements.

1. International Code Council – International Building Code.
2. ASTM D 1556, Test for Density of Soil in Place by the Sand-Cone Method.
3. ASTM D 1557, Test Method for Laboratory Compaction Characteristics Modified Effort (56,000 ft-lbs/ft3 (2,700KN-m/m3)).
4. ASTM D 2922, Methods for Determining the Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow-Depth).
5. ASTM D 3017, Test for Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow-Depth).
6. ASTM D 4318, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

B. Field Quality Control: Testing of soils and submitting of test reports in accordance with paragraph 3.6.

1.3 SUBMITTALS

A. Submit copies of each prescribed test as specified in paragraph 3.6 below.

1.4 PROTECTION

A. Protect and guard against damage to life and property of every description at all times throughout life of contract.

B. Keep excavations free from water from any source at all times. Provide and operate pumps if necessary. Remove water from site in manner to avoid damage to adjoining property.

C. Contractor shall take every precaution to protect adjoining property from damage during earthwork and excavation operations and shall be responsible for protection of same.

D. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit amount of dust and dirt rising and scattering in the air to lowest practical level.
Comply with governing regulations pertaining to environmental protection.

1. Clean adjacent structures and improvements of dust, dirt, and debris caused by earthwork operations, as directed by the Architect or governing authorities. Return adjacent areas to condition existing prior to the start of the Work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Fill Quality Requirements: Structural fill and backfill shall be free of vegetation, debris and other deleterious material and shall be approved by the Architect.

1. Structural Fill Beneath Slabs, Foundations and Footings and Roadways:

a. Gradation: See General Foundation Notes on the Contract Drawings.
b. Plasticity Index: See General Foundation Notes on the Contract Drawings; test in accordance with ASTM D 4318.

B. Rocks larger than three (3) inches in diameter shall not be used in the upper two (2) feet of structural fill.

PART 3 EXECUTION

3.1 GROUND SURFACE PREPARATION

A. Vegetation, asphalt paving, concrete, gravel, debris, existing fill and soft or disturbed soil shall be stripped and removed throughout the site where new construction is planned or indicated. Included in Clearing shall be any structures or other appurtenances indicated on the Drawings to be removed. Cleared areas shall be inspected by the Architect prior to placing and compacting engineered fill. Debris shall be cleared and removed from site to a legal dump.

3.2 EXCAVATION

A. General:

1. Excavated areas shall be scarified, wetted and compacted as specified in paragraph 3.3 (areas to receive structural fill) after excavating as specified above.

2. Excavations which are greater than required by Drawings or Specifications and which is within bearing area of footings, shall be filled with concrete or structural fill.
3. If utility lines are encountered that are not indicated on Drawings, Contractor shall contact the Architect immediately.

B. Stockpiling Excavated Materials:

1. The majority of soils removed from excavation are suitable for use as engineered fill and backfill meeting the requirements of paragraph 2.1.A above provided that the soils are thoroughly blended with non-plastic soils and processed and are approved by the Architect.

3.3 STRUCTURAL FILL AND BACKFILL

A. Preparation of Substrate: See General Foundation Notes on the Drawings.

B. Required Degree of Compaction:

1. Exposed Ground Surface: See General Foundation Notes on the Drawings
2. Fill Materials:

   a. Fill materials: See General Foundation Notes on the Drawings
   b. Fill beneath asphaltic concrete paving: Upper one (1) foot 95 percent of ASTM D 1557 maximum density, fill below upper one (1) foot 95 percent ASTM D 1557 maximum density.
   c. A minimum of six (6) inches of compacted fill shall be placed under all exterior concrete slabs unless noted otherwise on the Drawings.

3. Backfill Materials:

   a. Backfill beyond 2 feet of the perimeter footing edge of the building pad or paved areas: 95 percent ASTM D 1557 maximum density.
   b. All backfill under platforms, ramps and walks: 95 percent ASTM D 1557 maximum density.

4. For purposes of acceptance, the in-place density of the fill and backfill shall be defined as that determined by nuclear methods ASTM D 2922 and D 3017, or by sand cone method ASTM D 1556.

5. Structural fill compaction requirements shall apply to all utility trench, footing, retaining wall, and other backfill in various areas of the project designated for site grading.

6. Compaction Methods and Equipment: Compaction of structural fill after original ground preparation shall be by whatever method the Contractor chooses. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to insure that vibrations do not damage nearby buildings or other adjacent property.

C. Thickness of Lifts:

1. For structural fill and backfill, lifts shall have a thickness, of no more than eight (8) inches maximum loose depth.

2. In areas not accessible to heavy equipment, place material in four (4) inch thick loose layers and compact with approved mechanically operated hand-held equipment.

D. Compaction Observation:

1. Contractor is responsible to employ a material testing lab for quality control and assurance. Continuous on-site inspection from a certified material testing technician is required for all earthwork activities.

3.4 UTILITY TRENCHING

A. General:

1. Perform all trenching required for installation of items where trenching is not specifically described in other Sections of these specifications.
2. Make all trench construction with sufficient width to provide free working space at both sides of trench and around installed item as required for proper execution of the work, slope sides as required.
3. Mechanical and Electrical Contractors shall perform their respective excavations to requirements specified herein.

B. Depth:

1. Trench as required to elevations as indicated or required by the Drawings.
2. Where elevations are not shown on the Drawings, trench to sufficient depth to give a minimum of 24" of fill above top of pipe, conduit, etc., as measured from adjacent finished grade, except as required otherwise.
3. Trench bottoms shall have smooth, firm, and stable foundation, free of rock points, etc., throughout length of trench.
4. Backfill soils in utility trenches to minimum of 95% of modified proctor density, unless a higher degree of compaction is required due to location within building footprint or roadways.

C. Correction of Faulty Grades: Where trench excavation is inadvertently carried below proper elevations, backfill with material approved by Architect and then compact as specified in paragraph 3.3 above providing firm and unyielding substrate. Correction of faulty grades shall be at Contractor's expense.

D. Backfilling: Backfill soils shall be placed and compacted as specified in paragraph 3.3 above.

3.5 SITE GRADING

A. Grade site within limits shown on the Drawings, to conform to finished grades indicated and to accomplish drainage away from building and paved areas.

B. Grade areas under asphaltic concrete paving to proper level to receive asphalt concrete pavement.

3.6 FIELD QUALITY CONTROLS

A. General:

1. Contractor shall employ the services of a registered, licensed Geotechnical Engineer in the State of New Mexico, approved by Architect, who shall provide continuous on-site inspection by experienced personnel during the execution of all earthwork operations which includes Structural Fill and backfill work. Where critical elements are to be supported on structural fill or densified native soils, continuous observations and tests of grading operations shall be made by the Geotechnical Engineer. Contractor shall notify Geotechnical Engineer at least two (2) working days in advance of any field operations on the earthwork, or of any resumption of operations after stoppages due to thawing of frozen substrates, or during unfavorable weather conditions. Tests of the fill materials and embankments will be made at the following approximate rates or as deemed necessary by the Geotechnical Engineer:

a. One field density test for each 300 square yards of subgrade prior to placing fill.
b. One field density test for each 100 cubic yards of fill placed, or each layer of fill for each work area, whichever is greater.
c. One moisture-density curve for each type material used, as indicated by sieve analysis and plasticity index.
d. Field density and moisture tests may be determined by current ASTM sand cone or nuclear methods.
e. One field density test for each 100 lineal feet of utility trench backfill.
f. Not less than 30 density tests shall be taken.

B. Test Reports: Submit three (3) copies of density test reports. Deliver two (2) copies directly to Architect and one (1) copy to the Owner for each prescribed test in accordance with paragraph 1.3 above.

C. Costs of Testing and Inspection: Costs of all tests and inspections by Geotechnical Engineer specified herein, or required, shall be paid by Contractor, including retests and reinspections.

END OF SECTION 31 00 00

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Removing existing vegetation.
2. Temporary erosion and sediment control.
3. Existing utilities.
4. Clearing and grubbing.
5. Site Improvements.
6. Disposal of Surplus waste materials.
7. Temporary erosion- and sedimentation-control measures.

B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities.
2. Division 01 Section "Execution" for field engineering and surveying.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. All material is the owner's property.

1.5 SUBMITTALS

A. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify New Mexico One Call (phone number is 811) for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

E. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

1. The City has available borrow material offsite.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings prepared by Contractor and approved by Owner prior to commencement of construction activities.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

B. Locate, identify, and disconnect utilities indicated to be abandoned in place.

C. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
3. Use only hand methods for grubbing within protection zones.
4. Chip removed tree branches.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.
2. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 10 00

SECTION 31 23 11

EARTHWORK FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work covered by this Section consists of furnishing all plant, labor, equipment, appurtenances and material in performing all operations, hauling, placing, spreading, watering, processing, compacting and shaping earth sections, within the building limits, complete in place in accordance with the Project Manual and Drawings.

1.2 RELATED WORK ELSEWHERE

A. Clearing - Section 31 10 00

B. Under-Slab Vapor Retarder – Section 07 26 00

C. General foundation notes on Drawings. In case of conflict or omission, the general foundation notes shall govern.

1.3 SUBSURFACE SOIL DATA

A. Subsurface soil investigations have been made and the results are available for examination by the Contractor. This is not a warranty of conditions, the Contractor is expected to examine the site and determine for himself the character of materials to be encountered.

B. No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal, or removal of any unclassified materials.

1.4 REFERENCES

A. ASTM International

1.	ASTM D 1556-07	Standard Test Method for Density of Soil in Place by the Sand-Cone Method
2.	ASTM D 1557-09	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))
3.	ASTM D 4318-10	Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

4. ASTM D 6938-10 — Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.5 SUBMITTALS

A. Submit copies of materials certificates and test results for materials in accordance with type of tests, frequencies and remarks as outlined in the sampling and testing schedule.

1.6 TESTING AND INSPECTION

A. General: The Owner shall employ the services of a registered, licensed Geotechnical Engineer to observe all controlled earthwork soil testing. The testing laboratory shall provide continuous on-site observation by experienced personnel during construction of fill material. The Contractor shall notify the testing laboratory at least two working days in advance of any field operations of controlled earthwork, or of any resumption of operations after stoppages.

B. Report of Field Density Tests

1. The Geotechnical Engineer shall submit, daily, the results of field density tests required by these specifications.

C. Costs of Tests and Inspection

1. The cost of testing, inspecting and engineering, as specified in this section of the specifications, shall be borne by the Owner.

D. Lines and Grades: Alignment and grade of all elements shall be made on true tangents and curves. Grades shall conform to the elevations indicated on Drawings, with minor adjustments, to provide a smooth approach at building lines, at connections to existing paving and to provide proper drainage. Correct irregularities at no cost to the Owner.

1.7 WEATHER LIMITATIONS

A. Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the Contractor to protect all areas of completed work against any detrimental effects of ground freezing by methods approved by the testing laboratory. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the Contractor in conformance with the requirements of this specification without additional cost to the Owner.

PART 2 - PRODUCTS

2.1 STRUCTURAL FILL MATERIAL

A. Material shall consist of soils that conform to the following physical characteristics:

Sieve Size Sq. Openings	Percent Passing By Weight
6 inch	100
3 inch	90 - 100
No. 4	50 - 100
No. 200	10 - 50

B. The plasticity index of the material to be used for fill or backfill, as determined in accordance with ASTM D 4318 shall not exceed 10.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clearing and Grubbing: Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled offsite or stockpiled for subsequent use in landscaped areas or non-structural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

3.2 CONSTRUCTION AREA TREATMENT

A. Site Preparation - Fill Areas: Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined in accordance with ASTM D 1557. Any soft or "spongy" areas shall be removed as directed by the Architect and replaced with structural fill as described herein.

B. Site Preparation - Cut Areas: Following excavation to rough grade all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D 1557.

3.3 EQUIPMENT AND METHODS

A. In areas not accessible to heavy equipment, distribute by and compact with hand operated vibratory compactors.

3.4 BORROW

A. The Contractor shall provide sufficient material for fill to the lines, elevations and cross sections as shown on the contract drawings from borrow areas.

B. The Contractor shall obtain from the Owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved, and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

3.5 COMPACTION

A. Fill shall be spread in layers not exceeding 8 inches, watered as necessary, and compacted. Moisture content at time of compaction shall plus/minus 2 percent of optimum moisture. A density of not less than 95 percent of maximum dry density shall be obtained within the building pads.

B. Optimum moisture content and maximum dry density for each soil type used shall be determined in accordance with ASTM D 1557.

C. Compaction of the fill shall be by mechanical means only. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to ensure that the vibrations do not damage nearby buildings or other adjacent property. Where vibratory compaction is not possible, pneumatic rolling equipment shall be used.

MATERIAL	MINIMUM PERCENT COMPACTION
Structural & granular fill in construction area	95
Subgrade below structural fill	95
Structural fill under exterior walls	95
Miscellaneous backfill	95
Pond Grading	90

3.6 MOISTURE CONTROL

A. The material, while being compacted, shall be within the moisture range of 2 percent below to 2 percent above optimum, well distributed throughout the layer.

3.7 DENSITY REQUIREMENTS

A. Density of undisturbed soils, in-place fill and backfill shall be determined in accordance with the procedures of ASTM D 1556 or ASTM D 6938. If tests indicate that the density of in-place soil is less than required, the material shall be scarified, moistened or dried as necessary to obtain proper moisture content and recompacted as necessary to achieve the proper densities. Sufficient density tests shall be made and reports submitted by the Testing Laboratory indicating all cut and fill areas were compacted and graded in accordance with the requirements.

3.8 SLOPE PROTECTION & DRAINAGE

A. Berming and grading shall be done as may be necessary to prevent surface water from flowing into and out of the construction area. Any water accumulating therein shall be removed by pumping or by other methods.

3.9 SOIL EROSION PROTECTION

A. The Contractor shall ensure that no soil erodes or blows from the site into public right-of-way or onto private property.

B. The Contractor shall promptly clean up any material which erodes or blows into the public right-of-way or onto private property.

3.10 PRESERVATION OF PROPERTY

A. Provide temporary fences, barricades, coverings, or other protections to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Apply protections to adjacent properties as required.

B. Restore damaged work to condition existing prior to start of work, unless otherwise directed.

3.11 EXISTING UTILITIES

A. The Contractor shall verify the location of any utility lines, pipelines, or underground utility lines in or near the area of the work in advance of and during Earthwork. The Contractor is fully responsible for any and all damage caused by failure to locate, identify and preserve any and all existing utilities, pipelines and underground utility lines. Repair damaged utilities to the satisfaction of the utility owner at no expense to the Owner.

B. Should uncharted or incorrectly charted piping or other utilities be encountered during grading, consult the Architect immediately for directions as to procedures.

C. Cooperate with the Owner and public or private utility companies in keeping service and facilities in operation.

3.12 WASTE

A. Dispose of all waste off Owner's property.

B. Burning of waste will not be permitted.

3.13 AIR POLLUTION

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt air pollution. Comply with governing regulations pertaining to environmental protection.

SAMPLING AND TESTING SCHEDULE FOR EARTHWORK FIELD QUALITY CONTROL			
MATERIAL	**TEST FOR**	**FREQUENCY**	**REMARKS**
NATURAL GROUND	Compaction in accordance with ASTM D 1556 or ASTM D 6938	1 per 500 square yards of surface	Conduct a minimum of 2 tests on each section.
EMBANKMENT AND/OR SUBGRADE	Soil Conditions Moisture-Density in accordance with ASTM D 1557	Test 1 per soil classification	
	Compaction control in accordance with ASTM D 1556 or ASTM D 6938	1 per each lift every 300 square yards of surface	Immediately after placing, Conduct a minimum of 2 tests per section
		1 per each lift for each 100 cubic yards of fill	

END OF SECTION 31 23 11

SECTION 31 23 17

TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from **5** outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 33 41 00 - Storm Utility Drainage Piping: Storm sewer piping and bedding from building to utility service.
2. Section 33 46 00 - Subdrainage: Building perimeter drainage filter aggregate.

1.2 REFERENCES

A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for geotextile fabric indicating fabric and construction.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NM APWA.

1.6 QUALIFICATIONS

A. Not Used.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Subsoil Fill: Type S1 or S2

B. Structural Fill: Type S1 or S2

C. Granular Fill: Type A1

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades and indicated on Drawings.
   1. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service not less than three (3) working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way.

3.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Remove lumped subsoil, boulders, and rock up of 1/3 cubic yard, measured by volume.

C. Perform excavation within 24 inches of existing utility service.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 3 feet wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.

H. Do not interfere with 45 degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, until suitable material is encountered. Notify Architect/Engineer.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type S1 and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Remove loose matter.

M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 4 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place material in continuous layers as follows:

1. Subsoil Fill: Maximum 8 inches compacted depth.
2. Structural Fill: Maximum 6 inches compacted depth.
3. Granular Fill: Maximum 6 inches compacted depth.

D. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave more than 10 feet of trench open at end of working day.

G. Protect open trench to prevent danger to Owner.

3.6 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Frequency of Tests: as specified in NM APWA.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

A. Storm and Sanitary Piping:
1. Cover pipe and bedding with Fill Type S1
2. Compact uniformly to minimum 95 percent of maximum density.

END OF SECTION 31 23 17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2010) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C117	(Current Edition) Standard Test Method for Sieve Analysisof Fine and Course Aggregates
ASTM D75	(Current Edition) Standard Practice for Sampling Aggegrates
ASTM D422	(Current Edition) Standard Test Method for Particle-Size Analysis of Soils
ASTM D1557	(Current Edition) Standard Test Methods for Laboratory Compaction Charateristics of Soil using Modified Effort
ASTM D2419	(Current Edition) Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2844	(Current Edition) Standard Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils
ASTM D2922	(Current Edition) Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D2940	(Current Edition) Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports
ASTM D3017	(Current Edition) Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods

1.3 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.3.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.3.2 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve are expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.4 SYSTEM DESCRIPTION

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Provide adequate equipment having the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.5 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools;
Waybills and Delivery Tickets;

SD-06 Test Reports

Sampling and Testing;
Field Density Tests;

1.6 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor and performed by a testing laboratory approved in accordance with Section 01 45 00.00 10 QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements; perform testing at the specified frequency. The Contracting Officer may specify the time and

location of the tests. Furnish copies of test results to the Contracting Officer within 24 hours of completion of the tests.

1.6.1 Sampling

Take samples for laboratory testing in conformance with ASTM D 75/D 75M. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.6.2 Tests

Perform the following tests in conformance with the applicable standards listed.

1.6.2.1 Sieve Analysis

Make sieve analysis in conformance with ASTM C117.

1.6.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index.

1.6.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture content in accordance with ASTM D 1557.

1.6.2.4 Field Density Tests

Measure field density in accordance with ASTM D 2922.

a. Submit certified copies of test results for approval not less than 30 days before material is required for the work.

b. Submit calibration curves and related test results prior to using the device or equipment being calibrated.

c. Submit copies of field test results within 24 hours after the tests are performed.

1.6.3 Testing Frequency

1.6.3.1 Initial Tests

Perform one of each of the following tests, on the proposed material prior to commencing construction, to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

1.6.3.2 In Place Tests

Perform each of the following tests on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 350 square yards or portion thereof, of completed area.

b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 250 square yards or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

d. Measure the total thickness of the base course at intervals, in such a manner as to ensure one measurement for each 300 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

1.6.4 Approval of Material

Select the source of the material 45 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

1.7 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 AGGREGATES

Provide ABC consisting of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, angular sand, or other approved material. ABC shall be free of silt and clay as defined by ASTM D 2487, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve is known as coarse aggregate; that portion passing the No. 4 sieve is known as fine aggregate.

2.1.1 Coarse Aggregate

Provide coarse aggregates with angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.

c. Crushed Recycled Concrete: Provide crushed recycled concrete consisting of previously hardened portland cement concrete or other concrete containing pozzolanic binder material. The recycled material shall be free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and shall be crushed and processed to meet the required gradations for coarse aggregate. Reject recycled concrete aggregate exceeding this value. Crushed recycled concrete shall meet all other applicable requirements specified below.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.3 Gradation Requirements

Apply the specified gradation requirements to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE 1. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2
1-1/2 inch	100	100
1 inch	95-100	100
¾ inch		90-100
1/2 inch	64-75	
3/8 inch		65-80
No. 4	35-46	48-55
No. 40	12-18	18-25
No. 200	5-12	6-15

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Apply liquid limit and plasticity index requirements to the completed course and to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, clean the previously constructed layer of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area. Provide line and grade stakes as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course(s), the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 31 00 00 EARTHWORK. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the base course is placed.

3.3 INSTALLATION

3.3.1 Placing

Place the mixed material on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, place the material in a single layer. When a compacted layer in excess of 6 inches is required, place the material in layers of equal thickness. No layer shall be thicker than 6 inches or thinner than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.3.2 Grade Control

The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth

for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

3.3.3 Edges of Base Course

The base course(s)shall be placed so that the completed section will be a minimum of 2 feet wider, on all sides, than the next layer that will be placed above it. Additionally, place approved fill material along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of base course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.3.4 Compaction

Compact each layer of the base course, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Continue compaction until each layer has a degree of compaction that is at least 100 percent of laboratory maximum density through the full depth of the layer. Make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.3.5 Thickness

Construct the compacted thickness of the base course as indicated. No individual layer shall be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 300 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.3.6 Proof Rolling

Proof rolling of the areas indicated shall be in addition to the compaction specified and shall consist of the application of 10 coverages with a heavy pneumatic-tired roller having four or more tires, each loaded to a minimum of 30,000 pounds and inflated to a minimum of 125 psi. In areas designated, apply proof rolling to the top of the underlying material on which the base course is laid and to each layer of base course. Maintain water content of the underlying material at optimum or at the percentage directed from start of compaction to completion of proof rolling of that layer. Water content of each layer of the base course shall be maintained at the optimum percentage directed from start of compaction to completion of proof rolling. Any base course materials or any underlying materials that produce unsatisfactory results by proof rolling shall be removed and replaced with satisfactory materials, recompacted and proof rolled to meet these specifications.

3.3.7 Finishing

The surface of the top layer of base course shall be finished after final compaction and proof rolling by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in compacted and proof rolled to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.3.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 25 foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.4 TRAFFIC

Do not allow traffic on the completed base course.

3.5 MAINTENANCE

Maintain the base course in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.6 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of in waste disposal areas indicated. No additional payments will be made for materials that must be replaced.

END OF SECTION 32 11 23

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.
2. Pavement-marking paint.

B. Related Sections:

C.

1. Division 32 Sections for other paving installed as part of crosswalks in asphalt pavement areas.
2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants and fillers at paving terminations.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Material Certificates: For each paving material, from manufacturer.

D. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of New Mexico Standards for Public Works Construction for asphalt paving work.

   1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

D. Pre-installation Conference: Conduct conference at Project site.

   1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

      a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
      b. Review condition of subgrade and preparatory work.
      c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
      d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

   1. Prime Coat: Minimum surface temperature of 60 deg F.
   2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
   3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D 1073 sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder:

B. Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-30 or MC-70.

C. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

B. Sand: ASTM D 1073 Grade Nos. 2 or 3.

C. Pavement-Marking Paint: Conform to the requirements of the NMDOT for white and Blue Traffic line Paints (combination Alkyd & Hypalon – fast drying type).

1. Color: White, Blue As indicated.

D. Glass Beads: AASHTO M 247, Type 1.

E. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, 4-1/2 inches high by 9 inches wide by 72 inches long. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch diameter, 10-inch minimum length.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: Type 1.
3. Surface Course: SP IV.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd.. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.

3.3 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

   1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

   1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927, but not less than 94 percent nor greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

   1. Base Course: Plus or minus 1/2 inch.
   2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

   1. Base Course: 1/4 inch.
   2. Surface Course: 1/8 inch .

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.7 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.

3.8 WHEEL STOPS

A. Install wheel stops in bed of adhesive as recommended by manufacturer.

B. Securely attach wheel stops to pavement with not less than two galvanized-steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

   a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
   b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

D. Replace and compact hot-mix asphalt where core tests were taken.

E. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 12 16

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Aprons.
2. Curbs and gutters.
3. Walks.

B. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.

D. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:

1. Wheel Stops: 6 inches long showing cross section; with fasteners.

E. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

F. Qualification Data: For qualified ready-mix concrete manufacturer.

G. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Curing compounds.
4. Applied finish materials.
5. Bonding agent or epoxy adhesive.

H. Material Test Reports: For each of the following:

1. Aggregates.

I. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

E. ACI Publications: Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, gray portland cement Type I.

   a. Fly Ash: ASTM C 618, Class C.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3 or burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

1. Products: Provide Lambert Corporation; LAMBCO skin, or approved equal, as required.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Lambert Corporation; AQUA KURE - CLEAR or approved equal.

F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

1. Products: Provide Lambert Corporation; AQUA KURE - WHITE or approved equal.

2.5 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

2.6 WHEEL STOPS

A. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, 4-1/2 inches high by 9 inches wide by 72 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4 inch in diameter, 10-inch minimum length.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a **3/8-inch** radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.

    a. Tolerance: Ensure that grooved joints are within **3 inches** either way from centers of dowels.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

    a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

    1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. Use only square-faced shovels for hand spreading and

consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

M. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to

power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 SPECIAL FINISHES

A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:

1. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture-retaining-cover curing as follows:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm) and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.11 WHEEL STOPS

A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.

B. Securely attach wheel stops to paving with not less than two galvanized-steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

3.13 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 13 73

CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.

B. Related Sections:

1. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
2. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Pavement-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Qualification Data: For qualified Installer.

E. Product Certificates: For each type of joint sealant and accessory, from manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.

G. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer..
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: Grey.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Crafco Inc., an ERGON company; RoadSaver Silicone.
   b. Dow Corning Corporation; 888.
   c. Pecora Corporation; 301 NS.

B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
   b. Dow Corning Corporation; 890-SL.
   c. Pecora Corporation; 300 SL.

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place joint sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.6 PAVEMENT-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within cement concrete pavement.

1. Joint Location:

   a. Expansion and isolation joints in cast-in-place concrete pavement.
   b. Contraction joints in cast-in-place concrete slabs.
   c. Other joints as indicated.

2. Silicone Joint Sealant for Concrete: Single component, self-leveling.
3. Urethane Joint Sealant for Concrete: Multicomponent, pourable, traffic-grade.
4. Hot-Applied Joint Sealant for Concrete: Single component.
5. Joint-Sealant Color: Grey.

B. Joint-Sealant Application: Joints between cement concrete and asphalt pavement.

1. Joint Location:

   a. Joints between concrete and asphalt pavement.
   b. Joints between concrete curbs and asphalt pavement.

2. Hot-Applied Joint Sealant for Concrete and Asphalt: Single component.
3. Joint-Sealant Color: Grey.

END OF SECTION 32 13 73

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes painted markings applied to asphalt pavement.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

B. Shop Drawings: For pavement markings.

1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches (200 mm) square.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials and 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

1. Color: As indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm) with three passes.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. NEW MEXICO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.

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

1.2 SUMMARY

A. Work on the water and sanitary sewer lines five (5) feet outside of building footprint shall be in accordance with the New Mexico Standard Specifications for Public Works Construction, Current Edition.

B. This Section includes the following:

1. Piping joining materials.
2. Transition fittings.
3. Sleeves.
4. Identification devices.
5. Piped utility demolition.
6. Piping system common requirements.
7. Equipment installation common requirements.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. PE: Polyethylene plastic.

D. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Identification devices.

1.5 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

4. PVC to ABS Piping Transition: ASTM D 3138.

2.2 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings NPS 1-1/2 and Smaller:

1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
2. Aboveground Piping: Specified piping system fitting.

C. AWWA Transition Couplings NPS 2 and Larger:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Cascade Waterworks Mfg. Co.
   b. Dresser, Inc.; DMD Div.
   c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
   d. JCM Industries.
   e. Smith-Blair, Inc.
   f. Viking Johnson.

3. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Spears Manufacturing Co.

3. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

E. Plastic-to-Metal Transition Unions:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Colonial Engineering, Inc.
   b. NIBCO INC.
   c. Spears Manufacturing Co.

3. Description: MSS SP-107, PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Cascade Waterworks Mfg. Co.
   b. Fernco, Inc.
   c. Mission Rubber Company.
   d. Plastic Oddities.

3. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 SLEEVES

A. Mechanical sleeve seals for pipe penetrations are specified in Division 22 Section "Common Work Results for Plumbing."

B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.4 IDENTIFICATION DEVICES

A. General: Products specified are for applications referenced in other Division 33 Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
2. Location: Accessible and visible.

C. Stencils: Standard stencils prepared with letter sizes complying with recommendations in ASME A13.1. Minimum letter height is 1-1/4 inches for ducts, and 3/4 inch for access door signs and similar operational instructions.

1. Material: Brass.
2. Stencil Paint: Exterior, oil-based, alkyd-gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.

D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.

F. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.

G. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.

H. Lettering: Manufacturer's standard preprinted captions as selected by Architect.

I. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.

1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches 2-1/2 inches for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

J. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
1. Material: 0.0375-inch- thick stainless steel.

K. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

L. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: 1/16 inch unless otherwise indicated.
3. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.

M. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Brown: Energy reclamation equipment and components.
4. Blue: Equipment and components that do not meet criteria above.
5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
6. Terminology: Match schedules as closely as possible. Include the following:

   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

N. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.5 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.6 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, portland.
2. Density: 115-lb/cu. ft. (1840- to 2325-kg/cu. m).
3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
4. Aggregates: ASTM C 33, natural sand, fine.
5. Admixture: ASTM C 618, fly-ash mineral.
6. Water: Comply with ASTM C 94/C 94M.
7. Strength: 150 psig at 28 days.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

A. WORK ON THE PUBLIC UTILITIES SHALL BE IN ACCORDANCE WITH THE NEW MEXICO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.

B. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

C. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

D. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING INSTALLATION

A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and

calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Verify final equipment locations for roughing-in.

J. Refer to equipment specifications in other Sections for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

F. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

G. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

H. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

I. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

J. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.
2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.5 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

END OF SECTION 33 05 00

SECTION 33 05 13

MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Monolithic concrete manholes **and structures** with **masonry** transition to cover frame, covers, anchorage, and accessories.
2. Modular precast concrete manhole **and structures** with tongue-and-groove joints **with masonry transition to cover frame,** covers, anchorage, and accessories.
3. Monolithic FRP manholes **and structures** with transition to cover frame, covers, anchorage, and accessories.
4. Masonry manholes **and structures** with masonry transition to cover frame, covers, anchorage, and accessories.
5. Bedding and cover materials.

B. Related Requirements:

1. Section 03 10 00 - Concrete Forming and Accessories: Erecting forms and bracing them against movement.
2. Section 03 20 00 - Concrete Reinforcing: Installation of reinforcing steel.
3. Section 03 30 00 - Cast-in-Place Concrete: Concrete type for manhole **and structures** base pad construction.
4. Section 04 05 14 - Masonry Mortaring and Grouting: Execution requirements for mortar and grout as specified in this Section.
5. Section 04 20 00 - Unit Masonry: Product requirements for clay brick units for use in manhole **and structure** construction.
6. Section 31 05 13 - Soils for Earthwork: Soil for backfill in trenches.
7. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
8. Section 31 23 16 - Excavation: Excavating for manholes **and structures**.
9. Section 31 23 23 - Fill: Compaction requirements for precast concrete manholes **and structures** specified in this Section.
10. Section 33 05 16.13 - Precast Concrete Utility Structures: Execution requirements for utility structures affected by this Section.
11. Section 33 71 19 - Electrical Underground Ducts and Manholes: Execution requirements for ducts and manholes affected by this Section.

1.2 REFERENCE STANDARDS

A. American Concrete Institute:

1. ACI 318 - Building Code Requirements for Structural Concrete.
2. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.

B. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C55 - Standard Specification for Concrete Building Brick.
4. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
5. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
6. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
7. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
8. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
9. ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit cover and frame construction, features, configuration, dimensions.

C. Shop Drawings: Indicate manhole **and structure** locations, elevations, and elevations of penetrations.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statements:

1. Submit qualifications for manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Unload, store, and handle precast manholes **and structures** according to manufacturer instructions.

C. Storage:

1. Store precast concrete manholes **and structures** as to prevent damage to Owner's property or other public or private property.
2. Repair property damaged from materials storage.

1.5 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Subsequent Conditions: Maintain materials and surrounding air temperature at minimum 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of masonry Work.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318 (318M).

B. Design of Lifting Devices for Precast Components: According to ASTM C913.

C. Design of Joints for Precast Components:

1. According to ASTM C913.
2. Maximum Leakage: 0.025 gal. (95 mL) per hour per foot (0.3 m) of joint at 3 feet (91 cm) of head.

D. Shaft Construction: Concentric with **eccentric** cone top section; lipped male/female joints; sleeved to receive **pipe** sections.

E. Shape: **Cylindrical**.

F. Clear Inside Dimensions:

1. **48**-inch diameter.

G. Clear Cover Opening:

1. **26** inches.

2.2 MANHOLES [**AND STRUCTURES**]

A. Manhole **and Structure** Sections:

1. Reinforced precast concrete according to ASTM C478 (C478M).
2. Gaskets: According to ASTM C923 (C923M).

B. Reinforcement:

1. Formed steel wire.

2.3 FRAMES AND COVERS

A. Description:

1. Construction: **ASTM A48 (A48M), Class 30B** cast iron.
2. Surface: Machined flat bearing.
3. Lid: Removable.
4. Cover Design: **Closed**.
5. Live Load Rating: HS-20.

2.4 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill Type **A1**.
2. Cover: Fill Type **A1**.
3. Soil Backfill from Above Pipe to Finish Grade:
   a. Soil Type **S**.
   b. Subsoil: No rocks over 6 inches (150 mm) in diameter, frozen earth, or foreign matter.

2.5 FINISHES

A. Steel:

1. Galvanizing:
   a. ASTM A123 (A123M).
   b. Hot dip galvanize after fabrication.

2.6 ACCESSORIES

A. Manhole **and Structure** Steps:

1. Formed **galvanized steel** rungs.
2. Formed integral with manhole **and structure** sections.
3. Diameter: **¾ inch**.
4. Width:
   a. **12 inch**.

B. Base Pad:

1. Leveled top surface.
2. Cast-in-place concrete.

PART 3 XECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that items provided by other Sections of Work are properly sized and located.

C. Verify that built-in items are in proper location and ready for roughing into Work.

D. Verify correct size of manhole **and structure** excavation.

3.2 PREPARATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.

C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.

D. Do not install structures where Site conditions induce loads exceeding structural capacity of structures.

E. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

A. Excavation and Backfill:

1. Excavate manholes **and structures** as specified in Section 31 23 16 - Excavation in location and to indicated depth.
2. Provide clearance around sidewalls of structure for construction operations.
3. When groundwater is encountered, prevent accumulation of water in excavations; place manholes **and structures** in dry trench.
4. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation as approved by Architect/Engineer.

B. Base Pad:

1. Place base pad.
2. Trowel top surface level.

C. Place manhole **and structure** sections plumb and level, trim to correct elevations, and anchor to base pad.

D. Backfill excavations for manholes **and structures** as specified in Section **31 23 16 - Excavation**.

E. Form and place manhole **and structures** cylinder plumb and level and to correct dimensions and elevations.

F. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour **to form continuous drainage channel**.

G. Set cover frames and covers level without tipping and to correct elevations.

H. Coordinate with other Sections of Work to provide correct size, shape, and location.

I. Precast Concrete Manholes **and Structures**:

1. Lift precast components at lifting points designated by manufacturer.
2. When lowering manholes **and structures** into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
3. Set precast structures bearing firmly and fully on crushed stone bedding, compacted as specified in Section **31 23 16 - Excavation** or on other support system as indicated on Drawings.
4. Assemble multi-section structures by lowering each section into excavation; set level and firmly position base section before placing additional sections.
5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.
6. Maintain alignment between sections by using guide devices affixed to lower section.
7. Joint sealing materials may be installed on Site or at manufacturer's plant.
8. Verify that installed manholes **and structures** meet required alignment and grade.
9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
10. Cut pipe flush with interior of structure.
11. Shape inverts through manhole **and structures** as indicated on Drawings.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

B. Test concrete manhole and structure sections according to ASTM C497 (C497M).

C. Test cast-in-place concrete as specified in Section 03 30 00 - Cast-in-Place Concrete.

D. Vertical Adjustment of Existing Manholes **and Structures**:

1. If required, adjust top elevation of existing manholes **and structures** to finished grades as indicated on Drawings and adjacent existing grades.
2. Reset existing frames, grates, and covers that were carefully removed and cleaned of mortar fragments to required elevation according to requirements specified for installation of castings.
3. When removal of existing concrete wall is required, remove concrete without damaging existing vertical reinforcing bars, clean concrete from vertical bars, and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.
4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete as specified in Section 03 30 00 - Cast-in-Place Concrete.

END OF SECTION 33 05 13

SECTION 43 01 05

CNG FUELING SYSTEM

1 - GENERAL

1.01 SUMMARY OF EQUIPMENT AND WORK REQUIREMENTS

A. Summary System Description. This Section includes specifications for the mechanical equipment and their required functions for a complete compressed natural gas (CNG) vehicle-fueling system, for installation at the City of Santa Fe public works facility. The base CNG equipment and related work specified herein includes the (2) 860-SCFM CNG compressor skids with electric motor prime movers, 1,720 SCFM-rated suction-gas dryer, (1) two-hose public-access fast-fill dispenser, 58 one-hose post-type time-fill dispensers, (34) overhead-type time-fill dispensers, (3) CNG-storage vessels, electrical panels, and other components and appurtenances as required for a new and complete CNG fueling system.

B. Existing CNG System. The new CNG system will be installed adjacent to an existing CNG system. The existing CNG system shall not be modified and shall remain functional in relation to the project, except as directly required per the project documents.

C. Engineered Design. The CNG fueling system shall be constructed in accordance with the accompanying construction-drawing package. The Contractor's design shall comply with the project plans and specifications, except where deviations are approved by the Owner or are explicitly allowed by the plans and specifications. Contractor shall be responsible for obtaining approval for deviations from the plans as may be required by the City Building Department.

D. CNG System.

1. This system is designed to produce CNG from natural gas transported by the local natural gas utility to a new site meter set assembly (MSA) that will be unregulated. Delivery pressure at MSA outlet will range between 215 and 260 PSIG, and will have a design outlet pressure of 220 PSIG, for purposes of calculating pressure drops and compressor output.

2. The natural gas dryer shall be a suction-side type. The dryer shall include one desiccant vessel with manually initiated temperature-swing regeneration, and shall generate no more than 5-PSI pressure drop from flange to flange at design gas-supply pressure at 860 SCFM, but shall be able to flow 1,720 SCFM at 220 PSI supply pressure if required, though the pressure drop may be higher than 5 PSI.

3. The new compressor system shall consist of two compressor skids, each with a minimum capacity of 860 SCFM at a discharge pressure of 4500 PSIG per compressor, based on a design suction supply at compressor PSIG and a skid-suction pressure of 215 PSIG. The compressor controls shall be configured so that only any single compressor can run at a time, in order to operate within the available gas-supply parameters of the gas utility. However, the controls shall have the ability to allow both compressors to run simultaneously if needed, but this ability shall be locked out at startup. Each skid shall include a

microprocessor-based controller that is accessible from the outside of the skids and is housed in a NEMA 3R enclosure for independent skid operation. The skids shall be provided without enclosures.

4. The flow of CNG through the valve-control panel shall be able to be directed to either the time-fill CNG dispensing circuits, or the three-bank fast-fill storage system, or direct fill to the fast-fill dispenser, including only filling vehicles when storage is depleted.

5. Provide (1) weights-and-measures approved two-hose fast-fill dispenser with internal three-bank sequencing and internal logic for providing temperature-compensated fills.

6. Provide (34) one-hose time-fill dispenser assemblies configured for overhead installation, including electronic temperature-compensated fill control, header-supply tubing, aggregate flow metering, and local ESD buttons.

7. Provide (20) one-hose time-fill dispenser-post assemblies with poured-concrete sonotube mounting bases, including electronic temperature-compensated fill control, header-supply tubing, aggregate flow metering, and local ESD buttons.

8. Provide (20) two-hose time-fill dispenser-post assemblies with k-rail mounting, including electronic temperature-compensated fill control, header-supply tubing, aggregate flow metering, and local ESD buttons.

9. Other key features of the new equipment shall include automatic demand-based compressor standby/start/stop, automatic fill limiting with temperature compensation, gas supply from an existing MSA to the CNG equipment with a fire-shutoff valve, and a common and expandable emergency shutdown (ESD) system that stops all compressors, including interconnect to the ESD system of the existing CNG system.

10. All components, materials, displays and systems provided shall be designed for normal operation in outdoor ambient temperatures ranging between 10 °F and 94°F, unless explicitly excepted elsewhere in this specification section.

E. Additive Alternates.

1. See drawings.

F. Summary Contract Requirements. Work under this Specification section requires, furnishing, delivering constructing, installing and starting CNG equipment as required to make the CNG systems functional, and provide a one-year warranty covering all parts, labor, and labor transportation on the facility following acceptance by the Owner, except for consumable materials and parts. Consumable materials and parts are those items that are expected to be replaced or replenished within 12 months and/or based on 12 months of run time, per wear and replacement schedules published by the respective component or system manufacturers.

G. Other Contractor Responsibilities.

1. Contractor shall be responsible for constructing the CNG system per the listed codes and standards, and is subject to complying with the requirements of the Authorities Having Jurisdiction. Contractor shall also be responsible for providing

all equipment, components, material, labor, documentation and warranties required to comply with the plans and specifications.

2. If the Contractor seeks to change any design elements as shown in the plans or specifications, approval from the Owner shall be provided prior to implementing changes. Contractor shall provide design drawings and details for all such changes that are inconsistent with the approved construction drawings, including PE seal and also including approval by AHJs when warranted.

H. Work Not Required By The Contractor.

1. The gas meter set assembly (MSA) that will supply the CNG system is existing.

2. Portions of the CNG-equipment building as well as bus-fueling canopies are existing as shown in the drawings.

1.02 STANDARDS

A. The latest editions of the following listed codes, specifications and standards shall be considered an integral part of this specification. Compliance with these documents is mandatory.

1. ASME Boiler and pressure vessel code, Section VIII, Division 1, latest edition with latest addenda.

2. ANSI/ASME B31.3 -2002- Process Piping.

3. ANSI/ASME B16.5 Steel pipe flanges and fittings.

4. National Electrical Code (NFPA 70) with New Mexico amendments.

5. Uniform Mechanical Code with New Mexico amendments.

6. Uniform Fire Code, articles 5201 and 5204 with New Mexico amendments.

7. National Fire Protection Association (NFPA) 52, Compressed Natural Gas Vehicular Systems Code, 2002 Edition.

8. Occupational Safety and Health Act, Standards, 29 CFR - Occupational Noise Exposure, 1910.95.

B. The following documents form a part of the Specification to the extent that their respective content is pertinent to the products and methods contained herein and to the extent that work required under this project applies to the documents.

1. American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, latest edition Section V: Nondestructive Examination.

2. American Petroleum Institute (API) Specification 11P.

3. American Society for Nondestructive Testing (ASNT) SNT-TC-1A: Recommended Practice.

4. American Society for Testing and Materials (ASTM)

a. ASTM A 36: Standard specification for structural steel.

b. ASTM A 213: Seamless ferric or austenitic alloy-steel boiler, superheater or heat-exchange tubes.

c. ASTM A 214: Resistance-welded carbon-steel heat-exchanger or condenser tubes.

5. American Welding Society (AWS) D1.1-88: Structural Welding Code - Steel.

6. National Electrical Manufacturers Association (NEMA) NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum), latest edition.

1.03 SUBMITTALS

A. Stamping By Professional Engineer. Any new drawings or drawing modifications provided by the Contractor shall be stamped by an appropriate New Mexico-licensed Professional Engineer, in accordance with the New Mexico Administrative Code.

B. Bill of Materials. A bill of materials, including at least the following: high-pressure tubing, tube fittings and valves; piping; conduit for electrical wiring, electric wire and switches, and devices for vehicular impact protection (i.e. k-rail or concrete-filled bollards).

C. Manufacturers' Warranties. All manufacturers' original standard warranties for material, components and assemblies. These are in addition to the comprehensive Facility warranty that is the responsibility of the Contractor.

D. Approvals. Prior to shipping to site, the Owner shall approve all information required under article 1.03.D.1 and 1.03.D.2.

1. Packaged Equipment. Submittals are required for all pre-packaged equipment listed in this Section, and are subject to approval by Owner. Submittals shall include but are not limited to:
   a. Gas dryer.
   b. Compressor frames and cylinders.
   c. Compressor prime movers.
   d. Compressor cooling sections.
   e. Assembled compressor skid.
   f. CNG-priority valve panel.
   g. CNG time fill-metering panel.
   h. Compressor-skid controller.
   i. Remote communication panel or module.
   j. CNG-storage vessels.
   k. CNG fast- and time-fill dispensers.
   l. Motor control center.
   m. Motor starters.
   n. TVSS hardware.

2. Parts & Materials. Submittals are required for all listed components and materials installed between packaged equipment and used in manufacture of prepackaged equipment, and are subject to approval by Owner. Submittals shall include but are not limited to:
   a. Actuated and manual valves.

b. Pressure relief valves.
c. Stainless steel tubing and unions.
d. CS piping, unions and joints for natural gas and CNG.
e. Interstage and discharge coalescing filters.
f. Cathodic-protection materials and equipment for buried piping.
g. Flange-insulating kits.
h. Particulate filters.

E. Required documentation.

1. The following are required as applicable for each size and/or type of item listed in article 1.03.D.1 and 2 of this Section, as applicable.
   a. Manufacturers' data sheets with dimensional drawings, with pressure rating and testing data for dispenser and other hoses, piping, tubing and valves.
   b. Installation and operating instructions and test procedures.
   c. Recommended maintenance instructions and schedules.
   d. Special tools required for maintenance and testing.
   e. Warranties, including those of the original manufacturer.
   f. Piping and instrumentation shop drawings.
   g. Electrical and wiring-termination schematics.
   h. Test data indicating compliance with all normal and specified functions and processes, including dispenser authorization, dispenser valve-flow control, dispenser pulse-count output for mass, compressor start-stop, compressor ESD, and faults for high dryer-heater temperature, low- and high-pressure compressor suction, high-pressure compressor discharge, high-temperature compressor discharge, low and high compressor-oil pressure.

2. Submittal books shall be grouped and tabbed by assembly, including a front index of contents. All data for a particular packaged system shall be grouped, i.e. P&ID, required sub-component listings, shop drawings, test data, etc. Cut sheets or catalog sheets containing multiple product listings shall include marks to clearly indicate actual unit(s) proposed for use, and all submittals shall include a mark or reference indicating intended location of use or application, i.e. '3rd stage pressure relief valve', 'compressor inlet manual ball valve', etc. PDF submittals are strongly preferred and may be submitted via email, web-share link, CDR or other electronic method through the Owner.

1.04 QUALITY ASSURANCE

A. Provide all materials, components and services in accordance with a quality control program that assures compliance with the applicable codes, standards, and this specification, including compliance with tests required under article 1.03.E.1.h.

B. Provide qualified test personnel to perform test and inspection functions. Personnel qualifications shall be made available to Owner upon request.

C. All instruments, controls, and other electrical equipment must be qualified for the hazardous area classification where the equipment is to be installed.

1.05 PREPARATION AND COORDINATION

A. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, complete and functional CNG fueling system.

B. Coordinate accepted equipment changes from those scheduled or specified with other equipment affected.

C. Contractor shall comprehensively coordinate the design and construction of the CNG fueling system within and during the construction of the overall maintenance facility project.

1.06 PRODUCT DELIVERY AND HANDLING

A. Materials shall be delivered in the manufacturer's original unopened packaging, labeled to indicate the manufacturer's name and product identification.

B. Delivered materials shall be handled to ensure that the packaging and labeling remain intact until installation of material. Materials shall be stored and protected from ground contact and from the elements.

C. All containers, including internal containers, shall be indelibly labeled with item description(s) per title.

D. Misdelivered equipment, material and packages shall be corrected at the Contractor's expense.

1.07 PAINTING AND FINISH

A. All packaged and manufactured equipment shall be delivered to the work site with specified factory finish. Should the finish be damaged in transit or during the installation, it shall be finished to present a neat workmanlike appearance to the satisfaction of the Owner prior to acceptance.

B. All other materials and components installed or fabricated on site shall have a suitable multi-coat industrial-grade finish applied, as specified elsewhere in this Specification.

1.08 PROJECT COMPLETION

A. Submit test-record data as required under article 1.03.E.1.h, and (3) printed and bound operating and maintenance manuals for the complete facility.

B. Deliver tools, spare parts, and similar physical items as applicable.

C. Complete onsite start-up and testing of systems and instruction to the Owner's operating and maintenance personnel.

D. Complete punch list corrections from Owner.

1.09 RECOMMENDED SPARE PARTS LIST (RSPL)

A. Prepare a listing of all parts on a RSPL form for each packaged piece of equipment or systems that are of a maintenance-significant nature.

B. Evaluate all parts listed on the RSPL and advise the Owner of the spare parts quantities (minimum/maximum) required for a 12-month operation period. Base the evaluation upon the schedules shown, Contractor data, interchangeability between sets, remoteness of the Worksite and Operations and Maintenance (O&M) analysis to

support maintenance of all systems. Show a zero requirement in the minimum/maximum columns when none is required for any listed item. The schedules show minimum required spare parts. Incorporate these quantities into the RSPL submittal to the Owner.

C. Submit the RSPL to the Owner for approval. Upon receipt of the approved RSPL, procure, expedite, receive, inspect, check, and store spare parts at a location designated by the Owner. Procurement of spare parts will be under a separate contract than the equipment procurement described herein.

D. Use the RSPL form in submitting other spares requirements such as consumables, furnishings, tools, and materials to the Owner for approval.

1.10 INSPECTION, TESTING AND ACCEPTANCE

A. General. The Contractor shall be responsible for proving to the satisfaction of the Owner that the minimum specifications for the Equipment and installation work, as described herein, have been meet. The Owner will require the execution of various inspections and tests, including their documentation, prior to accepting the Equipment as complete and in compliance with these specifications. Such inspections and tests shall be based on recommendations by the Contractor, as well as the CNG-skid manufacturer and manufacturer/vendors of various components and systems of the Facility. If the Owner determines that such recommended inspections and tests are not adequate, the Owner shall require additional inspections and tests as needed. Neither inspections, witnessing of tests, nor waiving of any such procedure by the Owner shall release the Contractor, or other vendors from full responsibility for compliance with equipment, materials and functional requirements according to the project specifications.

B. Requirements. Contractor shall supply the Owner all recommended acceptance and testing procedures of main vendor and other vendor in-process manufacturing, factory pre-delivery functional demonstration, installation and start-up for at least the components and systems described as:

1. CNG compressor skids.

2. Gas dryer.

3. CNG valve panel.

4. Motor control center.

5. PLC-control system and remote-communication module.

6. Storage vessels.

7. CNG dispensers.

8. Fuel-management terminal.

C. Contractor shall also provide test equipment, material and labor to conduct on-site testing and start-up procedures. Such procedures will be provided to the Owner to include each of the above components and systems. All tests shall be made available to be witnessed by the Owner to determine compliance to specifications.

D. Documentation and Notification. Recommended procedures for main-vendor manufacturing acceptance and testing will be submitted in writing to the Owner not more than thirty days after contract award, or not later that two weeks prior to start of tests, whichever occurs first. Complete compressor skids, dispensers, storage-vessel assemblies and dryer must be accompanied with factory test, inspection reports and manufacturer warranties at or before delivery to site. Notification that such procedures will be witnessed by Owner will be given at least 48 hours prior to start of construction test/inspection, and at least two weeks prior to factory test, unless otherwise agreed to by vendor; additionally, the Owner will give notice of required modifications to inspections and tests originally recommended, if any, at this time.

E. In-Process Manufacturing Inspections. Included shall be recommendations for inspections and tests, if any, to be performed at 50-percent completion, and again at 100-percent completion, of compressor-skid manufacture/assembly at compressor-skid vendor's site. Purpose of inspections shall be to confirm schedule and design compliance, and at 100-percent complete inspection and testing, for functional verification of all relevant components and systems. Inspections and tests may be conducted by Owner or Owner's representative at Owner's discretion.

F. Construction-Site Inspections. Inspections and tests will be performed at the construction site and in accordance with construction schedule as required by Contractor standards and jurisdictional building codes.

G. Additional Inspections. Additional inspections will be carried out by the Owner to determine compliance with performance, materials and component specifications that may be beyond the scope of jurisdictional inspections. The Owner will prescribe a final punch list as a result of start-up tests and end-to-end functional demonstrations.

H. Criteria. All design performance pass/fail criteria to be recommended by the Contractor and other vendors shall be submitted with the Contractor bid proposal as limits of acceptability for performance requirements of all equipment provided as required herein. Tests shall also comply with article 1.03.F.1.h.

I. Acceptance. Owner will only accept facility as complete after Contractor provides compliance with the requirements under article 1.10, and article 3.08.

1.11 WARRANTY

A. General. The Contractor shall warrant that the equipment specified herein be free from defects in design, installation, workmanship and construction for a period of one year commencing with the final acceptance of the equipment package by the Owner as being complete. The Contractor shall also warrant that all components, systems and materials specified herein shall be free from defects in design and manufacture for a period of one year commencing with the acceptance of the Facility by the Owner as being complete. Contractor shall pay all costs associated with parts, labor and travel as required to satisfy warranty claims.

B. Original Component Warranties. All manufacturers' original standard specifications and warranties for material, components and assemblies shall be forwarded to the Owner. These are in addition to the comprehensive Facility warranty that is the responsibility of the Contractor.

C. Warranty Enforcement. In case warranty is invoked, Contractor shall ensure that the appropriate installer, supplier, and/or manufacturer, i.e. component manufacturers

and/or sub-vendors and suppliers(s), shall respond with suitable repair within 48 hours of notification.

2 - PRODUCTS

2.01 GENERAL

A. New Equipment. Equipment to be supplied by the Contractor shall be in new condition unless otherwise permitted by the Owner in writing and shall include all components and systems necessary to operate the respective system or component, compressors, prime movers, gas coolers, gas dryer, CNG storage vessels, dispensers, CNG-flow control systems, blowdown receivers, filters, safety systems, skids, frame and enclosure, and other related components and systems as described herein.

B. Pressure Ratings. All piping, tubing, unions, vessels, valves, filter bodies and appurtenances shall have a manufacturer's rated normal working pressure that is equal to or above its respective normal duty pressure, with a burst-safety factor as specified by either ASME B31.3, or the ASME Boiler and Pressure Vessel Code, as appropriate. Such ratings shall be indicated on component and material submittals to be approved by Owner.

C. Electrical Classifications. All electrical and electronic components shall be installed and configured appropriately for their respective service conditions and locations. All such installations shall comply with NFPA 70 standards for Class I, Group D, Divisions 1 and 2, and as stipulated in Table 8.4.2.9 of NFPA 52, 2006, or other requirements as called for by AHJs.

D. Material Compatibility. Contractor shall be responsible for providing and installing components and materials throughout the entire Facility that are compatible with, and do not adversely react to other component or material that could be expected to come in contact during normal operation.

E. Ball Valves. All ball valves larger than 1" shall use 3-piece construction, shall include bodies, balls and stems fabricated from 304 or 316 stainless steel, and shall have a listed MAWP of not less than the highest service pressure normally existing in the process segment where it will be located. Automatic ball valves shall use pneumatic operators powered by regulated gas.

F. Cold Weather Exposure. All equipment and materials provided by the contractor shall be listed or otherwise suitable for exposure to ambient temperatures as low as 10°F. Include options as appropriate, such as heat-trace tape, oil heaters with automatic oil-circulating systems and other appurtenances as needed for manufacturers of CNG compressors and gas dryer to warranty the operation of the equipment in the indicated temperature conditions. Heat-trace tape or other heating appurtenances shall be automatically regulating.

2.02 SUMMARY COMPONENT DESCRIPTIONS

A. Gas Dryer. "Manual-simplex" suction-side natural gas dryer assembly with a minimum flow rating of 860 SCFM at 220 PSIG inlet, and a maximum pressure drop of 5 PSIG at a flow of 860 SCFM, with onboard, manually initiated, automatically terminating, temperature-swing desiccant regeneration, including outlet auto-dew sensor, dryer bypass, and inlet and outlet filters.

B. Compressor System. Two – CNG compressor skids, which will each be driven by a 480V, 3-phase electric-motor prime mover, and sized appropriately for the suction conditions and discharge specifications. The compressors shall have a minimum capacity of 860 SCFM each at a discharge pressure of 4500 PSIG, based on a design compressor-inlet pressure of 215 PSIG.

C. Control Panels. PLC controller system capable of automatically controlling compressor operation, and valve panel/dispenser supply, based on dispensing-demand, ambient temperature, time of day and sequence-storage conditions. Each compressor shall be controlled by its own PLC, with one PLC designated as master to control lead-lag compressor starting. Include remote-communication module or sub-panel as required for IP-based monitoring and automatic fault notice. Alternately, a master remote PLC may control local micro processor controller/HMI's located on each compressor.

D. Valve Panel. Pre-assembled priority-valve panel system for controlling flow of CNG between the discharge of compressors, the low, medium and high storage-vessel banks, the fast-fill dispenser and the time-fill dispenser-supply header (branches to three sub-headers after discharge from the panel).

E. Time-fill Metering Panel. Pre-assembled panel for metering each of three time-fill sub-headers.

F. CNG Storage. Contractor Provided. Three – spherical ASME CNG storage vessels with a capacity of 11,500 SCF at 4500 PSIG, and an MAWP of 5000 PSIG.

G. Fast-Fill Dispenser. (1) two-hose fast-fill CNG dispenser with weights and measures approval for sale of fuel to the public.

H. Time-Fill Dispensers.

1. (34) time-fill hoses configured for overhead mounting at two 'transit bus' canopies.

2. (20) post-style one-hose time-fill dispenser assemblies with concrete sonotube mounting at 'paratransit' area.

3. (20) post-style two-hose time-fill dispenser assemblies with pre-cast k-rail mounting at 'solid waste' area.

2.03 CNG COMPRESSOR SKIDS

A. General. Two CNG compressors installed in pre-assembled skids shall be provided. Compressors shall be intended for use with natural gas and shall each have a minimum discharge capacity of 860 SCFM at 4500 PSIG, based on a suction-supply pressure of 105 PSIG at skid inlet. Compressor shall be capable of operating at skid-suction pressures as low as 215 PSIG. Since the MSA gas supply will be unregulated with an upper limit of 260 PSIG, the contractor shall provide regulation at the compressor inlet pressure as needed to maintain proper operation of the equipment over the entire possible range of MSA-supply pressures. Any regulation shall be installed downstream of the gas dryer, unless approved otherwise by the Owner.

B. ESD Buttons. A button shall be located on the outside of the skid perimeter.

C. Oil 'Day' Tank. Each compressor shall include a 10-gallon oil supply tank piped to supply makeup compressor oil to the compressor sump. Tank system shall include a low-level switch, which shall annunciate at its respective compressor control panel, and a sight glass.

D. Enclosure. Provide skids without enclosures.

E. Enclosure Accessories. None.

F. Vibration Speed. The compressor skid frame shall have a maximum vibration speed of 0.1" per second.

G. Acceptable Packager/Manufacturers:

1. ANGI Energy Systems
   305 W. Delevan Dr.
   Janesville, WI 53546
   Telephone: (800) 955-4626

2. Exterran
   20602 E. 81st Street
   Broken Arrow, OK 74014
   Telephone: (918) 251-8571

3. Clean Energy Compression (formerly IMW Industries)
   1600 Union Dr.
   Evanston, WY 82930
   Telephone: (307) 789-5088

4. J.W. Operating Company
   122 Dovel Rd.
   Longview TX 75603
   (903) 643-3413

5. Or approved equal.

2.04 CNG COMPRESSORS

A. General. These requirements apply to Ariel JGQ or IMW50 compressors, or approved equal, with oil-lubricated cylinders and related equipment mounted on a skid with weather-resistant enclosure, intended for vehicular-use natural gas only, a design-maximum discharge temperature immediately downstream of each stage of compression of no more than 20° F greater than the design ambient temperature of up to 94°F and outdoor installation.

B. Required Capacity. Each compressor shall be sized to produce not less than 860 SCFM of CNG at a discharge pressure of 4500 PSIG during simultaneous operation. This capacity is conditional on a design skid-inlet pressure of 105 PSIG. The design capacity shall also allow for all pressure drops through filters, pulsation bottles, interstage devices, dryer, coolers and piping from the inlet flange to the discharge-tubing connection on the skid.

C. Compressor Size. The compressor frames shall be furnished with cylinders which, when operating at normal operating condition(s), shall, as far as practical, load the electric motor to their design load level.

D. Interstage Velocity. The velocity of gas from inlet to discharge shall not exceed 50 feet per second at the design conditions. All piping, coalescers, valves, unions etc. shall be sized appropriately.

E. Accessories. Compressors shall be provided with direct-drive assemblies, interstage and discharge coalescers, and interstage- and after-cooling. Each compressor shall be designed for automatic starting, unloading and captured blowdown and equipped with a fail-closed inlet valve, suction check valve, discharge check valve, suction flex line, suction particulate filter, and discharge coalescing filter. Fail-closed inlet valve shall be controlled by skid controller.

F. Compressor Lubrication System. Compressor cylinders shall be oil-lubricated and force-lubricated systems shall include a pre-lube pump. IMW and any other approved oil-free cylinder configuration are acceptable.

1. Lubrication Oil Consumption. Net carryover of lubrication oil from the compressor crankcases through to the dispensers shall be no greater than 0.5 pounds of oil per million SCF of compressed natural gas. Net carryover shall not include oil drained or recovered from the blowdown receiver and coalescers.

2. Piston Rings. All compressor piston rings shall be ferrous or synthetic, subject to approval by Owner.

3. Piston-Ring Wear. Compressor piston rings shall have a minimum design life of 4000 operating hours and be listed as part of the written warranty. Upon ring wear not meeting 4000 hours, as defined by interstage/discharge pressures and/or temperatures falling outside of factory-listed tolerances (and not caused by another factor such as debris or a failed valve), the Contractor shall replace rings, including parts, labor and any travel costs. Validity of warranty subject to verification by Owner that Owner has performed compressor PM, as prescribed by O&M manual.

4. Lube Oil. Compressor-lube oil for both crankcase lubrication and cylinder lubrication shall be a diester-type synthetic oil, as approved by the compressor-skid packager.

G. Compressor Crankcase Ventilation. Each compressor shall be equipped with means to prevent an accumulation of combustible gases in the crankcase. Vent exhaust shall be directed to a safe location outside of the skid enclosure and shall be protected from rain and debris by a rain cap or similar means.

H. Interstage Coalescing Filters. Each stage shall include oil coalescing downstream of cooler outlet for that stage, or other method of interstage oil removal as approved by the Owner. Coalescing filters shall include automatic drainage to the compressor's blowdown-recovery vessel.

I. Loadings. Compressors, drive motors and auxiliary equipment shall be designed and constructed for operation under full load at normal operating conditions.

J. Pressure Rating For Controls. All gas controls shall have an MAWP equal to or greater than the maximum pressure to which they will be subjected during normal operation of the compressors.

K. Appurtenances. Each compressor stage shall include a surge chamber sufficient in capacity to adequately dampen the effects of compressor pulsation on adjacent components, and shall include a flexible inlet pipe section to protect against vibration and movement of the compressor vs. the suction-supply piping. Final discharge from each compressor shall be teed to a common tube/pipe to edge of skid. The MSA and each compressor discharge shall be protected by check valves.

L. Alignment. Direct compressor and prime mover alignment shall be set in the factory using a commercial laser alignment system, (e.g., Hamar Laser). Laser alignment shall verify rigidity of the motor mount (avoid excessive soft-foot alignment), and parallelism of the axes of rotation between the motor and compressor crankshaft prior to shipment. Alignment shall be mechanically field verified to factory tolerance following completion of all anchor connections but prior to any bump-over or startup on site.

M. Design Conditions. The compressor system shall be capable of operating within the full range of conditions specified in articles 1-4 below. Values listed as 'design' shall be used for sizing the compressors with respect to specified flow rate.

1. Skid Suction Pressure. MSA outlet pressure shall range from 215-260 PSIG, with a design pressure of 220 PSIG. The design pressure loss across the dryer and piping between the MSA and compressor inlet shall be 5 PSI.

2. Gas Conditions. The incoming gas supply will have a design specific gravity of 0.59 and a temperature of 70ºF.

3. Ambient Temperature. The ambient temperature will range from 10ºF - 94ºF, with a design temperature of 80ºF.

2.05 CNG COOLING SYSTEM

A. Design. Forced draft air circulation shall be used to cool the CNG from the effects of compression. Fan drive may be either derived from the prime mover or by its own electric drive motor.

B. Design Criteria. The criteria to be used for design shall include the following:

• Max. design ambient temperature	94° F.
• Site elevation above MSL	7200 feet.
• Design compressor suction gas temperature	70° F.
• Max. allowable aftercooler gas discharge temp.	20°F above ambient temperature.

C. Tube Material. Tube material shall be of appropriate diameter, wall thickness and material as required for its respective compression stage, be seamless, and be manufactured and labeled according to ASTM.

D. Cooler Configuration. Cooler intake and exhaust sections shall be shrouded and directed so as to minimize the introduction of exhaust air from either skid into the intake of either skid.

2.06 SKID-MOUNTED PRESSURE VESSELS

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

- MAWP.
- The water volume of the vessel.
- ASME U-stamp.
- Vessel volume of gas at the MAWP.

B. Suction Filter. Furnish (1) particulate filter upstream of each 1st stage compressor inlet.

1. Specification. This filter shall eliminate all suction gas particles (liquid and solids) with a diameter of 50 microns or greater. The filter shall be adequately sized for the maximum compressor throughput. The filter body design pressure shall not be less than the blowdown receiver relief valve set pressure.

2. Ancillary Equipment. A drain with manual valve and differential pressure gauges shall be provided with this filter.

C. Pulsation/Volume Bottles. Pulsation bottles sufficient in capacity to adequately dampen the effects of compressor pulsation on adjacent components shall be included in the following locations: upstream of the first-stage inlet; downstream of final-stage discharge.

1. Compliance. Design of compressor system shall comply with the guidelines of the Compressed Air and Gas Handbook, fifth edition, chapter 10, published by the Compressed Air and Gas Institute, so as to minimize the effects of harmonics and pulsation. Pressure curves in Handbook (Figure 10.50, approximate bottle sizing chart) shall be extrapolated to pertinent working pressures of the relevant compression stages and systems.

2. Drains. Pulsation bottles shall be equipped with drains.

D. Interstage Oil Removal. Interstage coalescer downstream of each oil-lubricated cylinder between the interstage cooler and next-stage compressor inlet shall be provided.

1. Size. Coalescing filters shall be housed in Parker J4 housings, or larger, and shall be designed to eliminate 95 percent of entrained liquids and handle liquid accumulation, which may result from 12 hours of continuous compressor operation. Automated in-process blowdown to drain oil accumulations is allowed.

2. Drains. Drains shall be minimum 1/4-inch tube or 3/8-inch pipe and be fitted with a matching check valve. An automatic valve shall be provided to allow liquid blowdown to the blowdown receiver vessel. Drain lines and the actuated valve shall be sized to handle compressor idling gas volumes.

E. Two-Stage Discharge-Coalescing Filtration. Both pre-coalescer and coalescer filters shall be housed in a Parker J4SL housing at minimum and shall be located immediately downstream of the final stage aftercooler.

1. Specification. Coalescer filter discharge shall contain no more oil or other liquid hydrocarbons, exclusive of non-condensables, than 50 part per million on a mass basis. The filters shall be sized for the maximum compressor gas flow rate over gas pressures ranging from 2000 to 4500 PSIG so that pressure drop does not exceed 2%. The first filter shall use a Parker Hannifin grade-10 coalescer element and the second filter shall use a Parker Hannifin grade-4 coalescer element.

2. Drains. The filter(s) shall have an automatic liquids purge to the blowdown receiver. An automatic valve shall be provided to allow liquid blowdown to the blowdown receiver vessel. Drain lines and the actuated valve shall be sized to handle compressor idling gas volumes.

F. Blowdown Receivers. Independent blowdown receivers of adequate capacity and pressure rating for the normal operation of each compressor shall be included. Design working pressure for each blowdown system shall be sized appropriately to accommodate the blowdown volume and pressure of the compressor.

G. Connections. The blowdown receiver(s) shall have the following connections:

- Condensate drain. A 1/2-inch ball valve and drain port shall be provided in a readily accessible location for manual draining of liquids accumulation in the blowdown receiver. Ball valve shall be piped to edge of skid exterior and shall include downward
- Interstage separator blowdown. A manual ball valve shall be provided to isolate the blowdown receiver from the actuated blowdown valve, to facilitate servicing of the blowdown piping, without the need to depressurize the receiver.
- Gas connection to compressor suction from the blowdown receiver and its regulator shall be upstream of suction filter and downstream of the suction check valve.

2.07 NATURAL GAS DRYER

A. General. A low-pressure, manually operated, single-tower temperature-swing absorber heat regenerative gas dryer shall be provided. The system shall include inlet and outlet particulate filters, and pressure gauges for measuring differential pressure across the dryer-inlet and -outlet filters, and across the entire dryer assembly, i.e. flange to flange. Dryer shall generate no more than 5-PSI pressure drop from flange to flange at design gas-supply pressure at 860 SCFM and 220 PSI supply, but shall be able to flow 1,720 SCFM at 220 PSI supply pressure if required.

B. Discharge-Moisture Content. The discharge gas shall comply with SAE standard J-1616, based on inlet natural gas with 7 lb moisture per MMSCF, and a design low ambient temperature of 10° F.

C. Adsorbent. The adsorbent shall be 3Å molecular sieve and shall not affect the character and odor of the incoming gas. The dryer design shall be such that the adsorbent shall have a minimum useful life of five years.

D. Design. The dryer shall utilize a manual-simplex design consisting of one desiccant vessel. Dryer shall be pre-assembled on a skid and shall include common connection at system inlet and outlet. Piping, vessels and valves shall be sized, configured and ported so that pressure drop between inlet and outlet flanges of dryer does not exceed 5 PSI at the design MSA supply pressure. MAWP of vessels, piping

and complete assembly shall be based on final dryer-supply pressure as configured by the Contractor plus allowance as required to accommodate for pressure rise during regeneration-heating and plus an additional 10% safety factor. If a pressure regulator is located upstream of the dryer inlet, the base MAWP may be reduced to the set pressure of the regulator.

E. Drying Capacity. The dryer vessel shall be sized so that regeneration shall be required after no less than 250 hours of full gas throughput during the normal operation of 860 SCFM of the compressor system, based on an inlet gas-moisture content of 7 lb./MMSCF. The dried gas shall pass through a particulate after filter.

F. Instrumentation. An in-line dew-point sensor alarm shall be provided at the dryer-discharge port. The detector shall have two levels of alarm; one light shall be activated upon moisture at dryer discharge approaching maximum saturation and a second light be activated upon moisture upon dryer discharge reaching maximum saturation. Inlet and outlet connections shall each be equipped with a pressure gauge scaled to 125% of the dryer MAWP. Differential-pressure gauges shall be provided on the inlet and outlet filters, and across the entire dryer assembly.

G. Regeneration. Regeneration of the desiccant bed shall be by temperature swing with closed loop gas circulation, and shall be initiated manually and terminate automatically. Maximum regeneration and cooling time shall be eight hours.

H. Bypass Capability. Dryer bypass and isolation manual ball valves shall be provided so that the compressors may operate while the entire duplex dryer is off line.

I. Recirculation Blower. Blower shall include pressure transducers to detect low and high differential pressures. Blower hose shall be reinforced with stainless steel braid, or other means to prevent kinking of the line shall be provided.

J. Regeneration Heater Assemblies. Each heating vessel shall include a PRV that cannot be isolated from its vessel, and a redundant thermocouple for detection of over-temperature. Redundant thermocouple may be external to the vessel.

K. Acceptable Manufacturers:

1. Xebec Inc.
   730 Boulevard Industriel
   Laval, QC, H7L-3M5
   CANADA
   Telephone: (450) 979-8718

2. PSB Industries, Inc.
   1202 W. 12th Street
   Erie, PA 16501
   Telephone: (814) 453-3651

3. SPX Pneumatic Products Corp.
   4647 S.W. 40th Avenue, Ocala, FL
   Telephone: (352) 873-5763; (352) 237-5500

2.08 INSTRUMENTS AND CONTROLS FOR COMPRESSOR SYSTEM

A. General. Compressor-system controls, including start and shutdown shall be electronic and shall operate automatically and unattended.

B. Control System. A micro-processor based controller (controller) in a NEMA 3-R enclosure shall be provided for the compressor and mounted in an area consistent with its electrical classification. System shall be designed in accordance with the following:

1. Performance Specification. This controller shall be capable of controlling operations of its associated compressor skid as required, without reliance on any parallel controllers. All set points for this controller shall be modifiable at a local input/output display panel and shall also be modifiable remotely by modem or remote IP connection.

2. Programmability. Owner shall have unimpeded access to modify set points and operating parameters upon completion of the Work. Contractor shall provide PC-host software (or similar) as required to modify controller program, including providing training and any specialized PC-interface connector.

3. Local Display. Controller shall include a touch-type LCD display for fault annunciation, display of operating conditions and interface for modifying set points. Modification of set points shall require a password. Display shall include a backlight and shall be rated for outdoor installation. Display shall be protected or oriented on site so that it is clearly visible in any day lighting condition.

C. Telecom. All set points for this controller shall be modifiable at a local input/output display panel and by remote IP LAN/WAN connection. Controller system shall also provide automatic annunciation to cell-phone text message in case of fault. Text function shall include fault-code indication in the message.

D. Performance Specification.

1. Compressor Starting. Logic in master PLC or MCC shall prohibit a second compressor from starting within 15 seconds of the primary-starting compressor but shall allow both compressors to operate concurrently, based on demand from the time- and fast-fill dispensers and storage pressure, which shall ha adjustable. Controller shall facilitate incremental compressor startup based on threshold-storage pressure. Incremental compressor-start sequence shall be associated with storage-bank pressure, i.e. the first compressor starts when low bank falls to 3600 PSIG and the second compressor starts when mid-bank falls to 3300 PSIG. Both set points shall be adjustable. The second compressor shall be prohibited from starting based on time of day.

2. Storage Bypass. Controller shall control and prioritize compressor discharge to time-fill header, priority storage banks or fast-fill direct supply. Priorities and control-pressure set points shall be user adjustable via the controller.

E. Shutdowns, Alarms and Annunciators.

1. General. All shutdowns, alarms and annunciators shall be electronic and adjustable.

2. Specifications. The first column, below, lists the relevant component or system. The second column lists the corresponding required action (i.e. shutdown, alarm, indicator):

3. Compressors:
   a. Low suction pressure: Shutdown.
   b. High interstage pressure, all stages: Shutdown.
   c. High discharge pressure: Shutdown.
   d. Low lube oil pressure: Shutdown.
   e. High discharge temp., each cylinder: Shutdown.
   f. High compressor & cooler vibration: Shutdown.
   g. High vibration: Shutdown.
   h. 20% LEL methane detection level: Alarm.
   i. 50% LEL methane-detection level: Shutdown.
   j. High storage pressure, each bank: Shutdown.
   k. Nearing low control-air pressure (header). Alarm.
   l. Low control-air press. (air-supply header). Shutdown.
   m. High blowdown pressure (95% MAWP): Shutdown

4. Electric motors:

   a. High winding temperature: Shutdown.

F. Additional Requirements. In addition to the devices previously listed, the panel shall include:

1. Manual shutdown switch.

2. Key lockout.

3. Lights to indicate main power is energized, condition light for each compressor indicating “running”, “standby” or “fault.

4. Compressor automatic-start-cycle failure.

5. First-out fault annunciation.

6. An emergency shutdown switch shall be provided at the control panel. The ESD switch shall shut off the compressor motor power supply and close the actuated suction valve at each compressor. ESD system shall be expandable to other locations on a common 24VDC or 120VAC circuit.

7. Hourmeter. Each compressor shall have a non-resettable hour meter to record cumulative time of operation and may be part of a multi-functional digital display with a backup battery.

8. 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".

9. Temperature for high interstage and discharge temperatures shall be measured at the outlet of each cylinder.

G. Instrumentation.

1. Temperature Measurement. Thermocouples shall be used for temperature sensing for controller functions.

2. Pressure Measurement.

• Required Pressure Gauges. Pressure gages shall be provided for compressor suction, interstage pressures, blowdown receiver and final compressor discharge for each compressor.
• Calibration Valve. All pressure switches and transducer/transmitters shall have a dedicated block-and-vent valve to facilitate pressure calibration. The block valve should be lockable with a wire and lead seal.
• Pressure Gauges. Manual pressure gauges shall monitor the following pressures:
+ Compressor lube oil
+ First-stage suction
+ Each stage discharge
+ Blowdown receiver

H. Timer Control. PLC system shall include ability to program the start/run of any compressor based on time of day, i.e. no start unit B between 5:30 AM and 6:00 PM daily.

I. Acceptable Manufacturers.

1. Allen Bradley.

2. Siemens.

3. Or approved equal.

2.09 VALVE-PANEL SYSTEM

A. General. The valve-panel system shall direct the flow of CNG from the common skid discharge, to the one-hose fast-fill CNG dispenser, three storage banks and time0fill header. Panel shall also have connection to from a second future compressor discharge.
1. General Conditions and Assumptions:
a. Design compressor-discharge pressure (control-stop pressure) is 4500 PSIG.
b. Prior to operation, all storage vessels are at full pressure (4500 PSIG).
c. The two compressors are off and there are no vehicles being fueled.

2. In addition to I/O signals required under article 2.08.E, the controller system shall interface with the following input/output signals:
a. Compressor run and stop.
b. Storage-bank pressure.
c. Actuated valves in Valve Panel.

3. All ESD valves shall fail closed in case of activation of ESD system, interruption of control-air system or power failure to the valve-actuator solenoids.

B. Connections and line sizes shall be per the Piping and Instrumentation Diagram.

2.10 TIME-FILL METERING PANEL

A. General. Provide shop-fabricated panel with three MicroMotion model CNG-050 meters with matching display transmitters. Meters shall be mounted and housed in a NEMA 3R or NEMA 4 cabinet. Include 120V power wiring.

B. Configuration. Panel shall be configured to measure CNG flow through each of three separate and parallel time-fill distribution sub-headers. Displays shall be calibrated in GGE's. Displays shall be arranged so that they can be readily seen and read with the door open. Provide ½" SS ball manual valves at inlet and outlet of each meter to facilitate servicing meter. Provide 6000 PSI pressure gauge for each bank that is visible from the outside of the cabinet with the door closed. Provide weather-resistant labels for SOLID WASTE, PARATRANSIT and TRANSIT at each meter and at each pressure gauge. Coordinate labels in the field.

2.11 EMERGENCY SHUTDOWN SYSTEM

A. General. An emergency shutdown system shall be provided that, when activated, shall interrupt the power supply to the compressor motors, shut off the inlet natural gas supply valve to the compressors and shutoff the electrical power and the discharge of CNG to the dispensers. The system shall be controlled in the control panel, common to all compressors, be on a normally closed circuit and shall be expandable so that additional switches may be added. Buttons shall be push-in mushroom-head type and appropriately rated as required by location.

B. Specification.

1. Circuit. ESD shall be 120VAC normally closed serial-type circuit, so that the opening (activation) of any ESD switch shall cause an ESD fault. Control panel shall require manual reset from ESD activation.

2. Buttons. ESD buttons shall be red mushroom-headed press-to-open type and must be pulled out to reset. Button shall have a protective fence flush with its face in order to minimize accidental pressing. Buttons shall be rated for class-1 division-2 service if located within a hazardous area. Install one ESD button on fuel-management terminal, and as otherwise shown on the plans

C. ESD Fire Valve. Fire valve shall be located upstream of gas dryer and shall be actuated ball type with API 607 rating. Valve shall shut except when required to open for compressor operation.

D. Connection to Existing System. The CNG master PLC shall provide a 120V signal to the ESD system of the existing CNG facility. Install a new normally closed relay that will open upon activation of the existing facility's ESD system. The master PLC shall interpret the broken 120V circuit as an ESD event.

2.12 CNG-STORAGE VESSELS

A. General. (3) ASME-rated CNG storage vessels shall be provided. Each vessel shall have a capacity of 11,500 SCF at 4500 PSIG, an MAWP of 5500 PSIG, and shall include framing and bracing suitable for IBC seismic classification-C.

B. Acceptable Manufacturers and Packagers:

1. Allied Equipment, Inc.
   Odessa, TX
   Telephone: (432) 367-6000

2. Exterran
   20602 E. 81st Street
   Broken Arrow, OK 74014
   Telephone: (918) 251-8571

3. Or approved equal.

C. Arrangement. Locate per plans.

D. Valves And Drains. Each vessel shall include a full-port 3/4" pressure relief valve (PRV) set at vessel MAWP with a full-port 3/4" ball valve locked open between the PRV and the vessel. Each vessel shall include a 3/4" service ball valve, a drain port at its low point with a throttling plug valve and a pressure-rated discharge pipe or tube convenient for draining. Outlet of drain port shall be anchored and shall be directed away from servicing personnel.

E. Vent Risers. Each storage vessel PRV shall have its own vent riser constructed of 1-inch diameter schedule 80 carbon-steel pipe. Riser openings shall be 10 feet above grade and shall be protected by a rain cap or tee w/ 6" pipe nipples. Vent riser assembly shall be supported by a steel bracket anchored to the concrete slab; threaded connections to PRVs shall not be the means of support for the risers.

2.13 FAST-FILL DISPENSER

A. General. (1) two-hose medium-flow CNG dispenser with internal fill-control logic shall be provided. Dispenser shall be approved for sale of CNG to the public in New Mexico. Include pit frame or mounting frame.

B. Specifications. Dispenser shall be capable of delivering fills of 3600 PSIG temperature compensated to 70°F, based on control logic housed in the dispenser. Dispenser shall include two MicroMotion CNG-050 meters, and mechanical vehicle pressure gauge for each hose at exterior of cabinet and shall have a backlit data display. All CNG tubing and fittings shall be 1/2" x .065", grade 304/316 SS. Vent tubing shall be 3/8" x .049", grade 304/316 SS, and PRV line shall be one each at ½" SS or aggregated at ¾" SS or ¾" CS sch 80 pipe. A means of preventing the escape of CNG from the fast-fill system in case the dispenser is knocked off of its base shall be provided, such as a vibration switch wired to the ESD circuit. Dispenser-control valves shall be ball or solenoid valves. Provide vent outlet that is 10' AFF at each dispenser.

C. Filters.

1. Oil Coalescing. Dispenser shall include one inline oil-coalescing filter for each of the three sequence-bank feed lines and a block and bleed valve arrangement to facilitate servicing of filters. Three total filters shall be housed in Parker-Hannifin J4 housings and shall include a grade-4 coalescer element. Filters shall be located upstream of the meter and control valves and may be located in the dispenser pit beneath or next to the dispenser, and/or in the dispenser cabinet.

2. Startup Cleaning and Filtration. Contractor shall be responsible for ensuring that all pipes and vessels upstream of the dispensers are free of dirt, welding slag, moisture and debris prior to startup. Contractor shall submit a pipe-cleaning method for approval by the Owner prior to startup. Contractor shall also comply with temporary filtration requirements per article 3.05.C.2.e.

D. Hose And Nozzle. Hoses shall be ½" x 12 ft. long with 5000 PSIG MAWP, shall have inline breakaway mechanisms with check valves, and be electrically conductive. Nozzle shall be NGV-1 type-2. Retractor shall keep hose from contacting ground when nozzle is in its keeper. The nozzle keeper shall be installed on a side of the dispenser cabinet that does not face toward the fueling lane and so that the nozzle cylinder is parallel with the fueling lane when it is in its keeper. Nozzles shall be 'P36' with yellow jackets.

E. Operation. Dispenser shall be controlled by internal logic controller and shall include internal 3-bank sequencing with ½" tubing connections to the storage array. Sequencing shall be pneumatically actuated ball valves powered by regulated CNG or high-flow solenoid valves.

F. Interface With Fuel-Management Terminal. Dispensers shall be configured for connection to the fuel-management terminal, so that terminal must authorize the dispensing of fuel, and so that CNG fuel consumption mass is recorded by the terminal, along with user ID, time of day, payment data/authorization and vehicle ID.

1. Pulse-Count Output. Dispenser shall generate 100 pulse-count per mass of CNG dispensed (i.e. 100 pulses per gasoline-gallon equivalent of CNG). Mass-calibration rate shall be 5.660 lb NG / GGE or as otherwise coordinated with Owner.

2. Interface with Fuel Management terminal. Furnish connections between each dispenser and the fuel management terminal for the following signals: handle switch, low-voltage meter pulser and 'authorize' signal. Conductors of different voltages shall be routed in separate conduits.

G. Acceptable Manufacturers:

1. ANGI Energy Systems
305 W. Delevan Dr.
Janesville, WI 53546
Telephone: (800) 955-4626

2. Kraus Global

3. Tulsa Gas Technologies
10117 E. 48th Street
Tulsa, OK 74146
Telephone: (918) 665-2641

2.14 FUEL MANAGEMENT SYSTEM

A. General. The fast-fill dispenser island shall be equipped with a fuel management terminal. The terminal shall be used to authorize and record all fueling transactions.

B. Performance requirements. The contractor shall wire and configure the dispenser to the terminal on the island so that the terminal limits the dispensing of fuel to authorized transactions. Fueling authorization shall be achieved by a choice of keypad entry or card swipe, including credit cards. The fuel management terminal shall record the volume of fuel dispensed by the gasoline dispenser by reading and recording pulses generated by the dispenser. All fueling records shall include user ID number, date, time of day, vehicle ID number, fuel fill volume, cc transaction/authorization data and hose ID.

C. The Fuel Management System shall be by Multiforce. Provide one master # FF814CK terminal.

D. Installation requirements:

1. Contractor shall install all conduit and wires between the fuel management terminal and other connected equipment in PVC-coated rigid-galvanized steel. This includes 120 VAC control wiring and low-voltage pulser wiring between the terminal and gasoline dispenser. All low-voltage pulser wiring shall be installed in dedicated conduits. Wire serial cable from slaves to master and wire Ethernet cable from master to DSL / IP switch.

E. ADA. Controls and interface for all on-island fuel-management equipment shall be configured per ADA requirements. This includes max height of 48" above driveway surface, max lateral reach inside of island edge of 10", and bollards arranged for access.

F. Provide weather-tight receipt printer at terminal on CNG-dispenser island.

2.15 TIME-FILL DISPENSER SYSTEM

A. General. Provide two time-fill circuits for separate control-stop pressures using electronic measurement and control. One circuit shall dispense to 3000 PSIG compensated to 70°F and the other circuit shall dispense to 3600 PSIG compensated to 70°F. The 3600 PSI line shall be tee'd to provide two 3600 PSI sub-headers, thus providing three total time-fill sub-headers.

1. Hoses shall have an MAWP to 5000 PSIG rating, shall be 20' long x 3/8" Siamese, be electrically conductive, shall include inline breakaways for both fill and vent lines, and shall have 1/4 inch male pipe thread at the supply end.

2. A Bourdon-tube pressure gauge shall be installed at both ends of each of the TF-parking areas to indicate dispenser-manifold pressure. Pressure gauges shall be scaled to 6000 psig, shall be weatherproof, with cases and movements fabricated from ASTM type 304/316 stainless steel, and shall have a blow-out type backs, and be glycerin-filled.

3. All electrical conduit, gas tubing and fill assemblies shall be properly grounded and bonded, per Electrical drawings and specifications.

B. Overhead-Type Time Fill Dispenser Assemblies for Transit Vehicles

1. Provide (34) OH-type dispensers for mounting to existing parking canopies. Includes groups of 16 and 18 OH-type dispenser assemblies at two separate canopies. Hose assembly shall be factory fabricated and shall include 3/8"-thick

steel angle bracket, bulkhead fittings for supply and vent lines, and supply/vent hoses.

2. Nozzles shall be NGV-1 'P30' profile with blue jackets.

3. Route each hose vent to VTA-header tubing.

C. Post-Type Time-Fill Dispenser Assemblies for Paratransit Vehicles

1. Provide (20) one-hose post-type dispensers on k-rail mounting base.

2. Nozzles shall be NGV-1 'P36' profile with yellow jackets.

3. The time-fill dispenser posts shall be hot-dipped galvanized 2" dia. schedule 40 CS pipe, or of 2" dia. hot-dipped galvanized RMC, or other approved pipe type, but shall be hot-dipped galvanized.

4. Posts shall be bolted to 20' long x 2' wide pre-cast concrete k-rail. K-rails shall include pin slots at each corner and shall be anchored to ground by driving a 36" long x 1" dia. Steel pin through each slot.

5. Each post shall be protected from impact by a 6" tall concrete bump stop placed in front of the posts. Bump stops shall be at least 8ft wide and shall be anchored to grade with two ¾" x 18" steel pins or rods.

D. Post-Type Time-Fill Dispenser Assemblies for Solid Waste Vehicles

1. Provide (20) two-hose post-type dispensers on k-rail mounting base.

2. Nozzles shall be NGV-1 'P36' profile with yellow jackets.

3. The time-fill dispenser posts shall be hot-dipped galvanized 2" dia. schedule 40 CS pipe, or of 2" dia. hot-dipped galvanized RMC, or other approved pipe type, but shall be hot-dipped galvanized.

4. Posts shall be bolted to 20' long x 2' wide pre-cast concrete k-rail. K-rails shall include pin slots at each corner and shall be anchored to ground by driving a 36" long x 1" dia. Steel pin through each slot.

5. Each post shall be protected from impact by a 6" tall concrete bump stop placed in front of the posts. Bump stops shall be at least 8ft wide and shall be anchored to grade with two ¾" x 18" steel pins or rods.

E. Acceptable Manufacturers:

1. AFV Fleet Service
   8930 Center Ave.
   Rancho Cucamonga, CA 91730
   Telephone: (909) 350-7500

2. ANGI Energy Systems
   305 W. Delevan Dr.
   Janesville, WI 53546
   Telephone: (800) 955-4626

3. Panels Plus
   2054 Francis St.
   Ontario, CA 91761
   Telephone (909) 923-3770

4. Tulsa Gas Technologies
   10117 E. 48th Street
   Tulsa, OK 74146
   Telephone: (918) 665-2641

2.16 COMPRESSOR PRIME MOVERS

A. General. Each gas compressor prime mover shall be a 460V AC, 60 Hz, 3-phase squirrel cage induction motor. Prime movers shall be totally enclosed and fan-cooled (TEFC), having a minimum continuous rating of 250 HP, with a 1.15 service factor. Prime movers shall be designed, constructed and tested in accordance with NEMA Standard MG1-1998. Motors shall also comply with the applicable portions of the Energy Policy Act of 1992, and meet NEMA Premium design and performance standards.

B. Motor Ratings. Prime movers shall be rated for continuous duty at 60 HZ, single voltage with across-the-line full voltage start at 460 VAC. Prime movers shall have a 1.15 service factor. Torque characteristic shall be NEMA Design B. Motors shall have 4 poles, and a full load rated speed of 1785 RPM. Motors shall be listed for use in Group D, Class 1, Division 2 hazardous atmospheres.

C. Service Conditions. Motors shall be suitable for continuous duty operation without de-rating under the following service conditions:

   1. Exposure to ambient temperatures from 30ºF to 115ºF, plus temperature rise resulting from friction, compression and normal system operation.

   2. Exposure to elevation of to 7,200 feet above sea level.

D. Electrical Design. Motor efficiency shall be evaluated in accordance with IEEE standard 112-1991, Subclause 6.4, Method B. The nominal efficiency, 3⁄4-load efficiency and guaranteed minimum efficiency shall be stamped on the motor's nameplate.

E. Motor Insulation. Motor insulation shall be a non-hygroscopic, chemical and humidity resistant system. The minimum thermal rating of the system shall be Class F, as defined in NEMA MG1-1998. The stator windings shall meet or exceed NEMA MG1-1998, Part 31. Stator shall be double dipped and baked in varnish to form a heavy build that exceeds the test criteria of moisture resistance per NEMA MG-1. When operated at rated horsepower, voltage and frequency, the temperature rise of the stator winding shall not exceed 80°C, when measured by winding resistance. Motor insulation shall be designed and tested to withstand 2000 Volt transients without premature motor failure, and have no cable limitations in motor application.

F. Service Factor. Motors shall be rated for a 1.15 service factor on sine wave power in a 40°C ambient temperature.

G. Mechanical Design. Motor shall be totally enclosed and fan cooled (TEFC). Motor bearings have a degree of protection of IP54, from moisture and foreign material.

Motors shall be equipped with ball bearings or roller bearings. Ball bearings shall be the same size on both ends. Bearings shall be re-greasable without disassembling the fan or fan cover and provide for the elimination of purged grease through fittings extending beyond the fan cover. Inner bearing caps shall be provided for bearing retention and to prevent harmful amounts of lubricant from entering the motor interior. For direct-coupled motors, stabilized bearing temperature shall not exceed a temperature rise of 45°C, as measured by a thermocouple on the surface of the bearing house.

1. Bearings shall provide for an L-10 life of at lest 26,000 hours per ANSI/AFBMA 9-1990, based on NEMA belting application limits per NEMA MG1-1993, section 14.41. The insulation system and motor leads shall be compatible with mineral oil.

2. Condensation drain holes shall be provided at the low points in the end brackets and shall be supplied with corrosion resistant breather drain plugs.

3. Ventilating fans shall be of non-sparking conductive plastic material. The proper fan rotation direction shall be indicated by a permanent label on the outside of the motor.

4. The motor's conduit box shall be equipped with a ground lug. Gaskets shall be provided between the conduit box and frame, and between conduit box base and cover, to provide a moisture resistant barrier.

5. Shouldered eyebolts with a minimum safety factor or 10 shall be provided for motor lifting. All fastening hardware shall be hex-head bolts or socket head cap screws with zinc plating. Cast iron motor components shall be primed and painted to surpass a 250-hour salt spray test per ASTM B117-90.

H. Nameplate. Motor nameplate shall be stainless steel, and shall contain the following information in addition to that noted in section 10.40 of NEMA MG1-1993.

1. AFBMA bearing ID.

2. Manufacture date code.

3. Motor weight.

4. Guaranteed minimum efficiency.

5. Balance.

I. Airborne Sound. Motor sound power level, when measured at a no load condition, shall not exceed 90 dBA, when determined in accordance with IEEE Standard 85-1973.

J. Vibration. Motor vibration measured in any direction on the bearing housing meets the levels listed below when tested per section 12.08 of NEMA MG1-1993:

1. Unfiltered vibration at rated voltage and frequency shall not exceed 0.15 in/s peak velocity.

K. Production Tests. The motor manufacturer shall perform production tests according to NEMA MG-1-12 and ANSI/IEEE Standard 112, Method B.

1. The following test information shall be recorded and inserted in the motors' shipper.

a. Winding Resistance.

b. No load current and speed at rated line voltage and frequency.

c. Current input at rated frequency with rotor at stand-still.

d. High-potential test.

e. The following five unfiltered vibration readings, measured as described above: drive end (horizontal, vertical, and axial) and opposite drive end (horizontal and vertical).

L. Warranty. Motor components shall have a full three-year performance warranty when operated on sine wave power and three year warranty on inverter power.

M. Approved Manufacturers and Models.

1. TECO Westinghouse MAX-E1 Premium Efficiency Severe Duty TEFC.

2. Siemens – Medallion Motors, Premium Efficiency Severe Duty TEFC Type CZ.

3. Reliance Electric Liberator TEFC.

2.17 MOTOR STARTERS

A. General. Starters matched to the compressor prime movers, cooler-fan motors (if required), and pre-lube pump motors shall be provided with the compressor system, shall be controlled by the programmable-logic control (PLC) system and shall be located in a non-hazardous area.

B. Motor Starter Panel.
1. Provide a factory-fabricated UL 508-listed motor-starter panel in a NEMA 3R or NEMA 4 enclosure capable of driving all electrical loads and appurtenances related to the two compressor skids. Starters matched to the compressor prime movers, cooler-fan motors, and pre-lube pump motors shall be provided with the compressor system, shall be controlled by the programmable-logic control (PLC) system and shall be located in a non-hazardous area.
2. MCC shall also provide power for the gas dryer and 120V loads for dispensers and control loads.
3. MCC shall be protected by a TVSS module on the main bus. Verify AIC ratings with electric utility.

C. Electromechanical Motor Control.
1. Compressor fan drive motors and pre-lube pump motors shall be controlled by Full-Voltage Non-Reversing (FVNR) magnetic starters, i.e. across-the-line starters.

2. Magnetic starters through NEMA Size 9 shall be equipped with double-break silver alloy contacts. The starter must have straight-through wiring. Each starter shall have one (1) NO auxiliary contact.
3. Solid-State Overload Relay.
   a. Provide a solid-state overload relay for protection of the motors. The relay shall be Cutler Hammer type CEP7 or approved equal.
   b. The overload relay shall be modular in design, be an integral part of a family of relays to provide a choice of levels of protection, and be listed under UL Standard 508.
   c. The overload relay shall have the following features:
      1) Be self-powered.
      2) Class 10 or 20 fixed tripping characteristics.
      3) Manual or automatic reset.
      4) Provide phase loss protection. The relay shall trip in 2 seconds or less under phase loss condition when applied to a fully loaded motor.
      5) Visible trip indication.
      6) One NO and one NC isolated auxiliary contact.
      7) Test button that operates the normally closed contact.
      8) Test trip function that trips both the NO and NC contacts.
      9) A current adjustment range of 3.2:1 or greater.
      10) Ambient temperature compensated.
      11) Ground fault protection. Relay shall trip at 50% of full load ampere setting.
      12) Jam/Stall protection. Relay shall trip at 400% of full load ampere setting, after inrush.
      13) FVNR Motor starters shall be Cutler-Hammer Freedom Series or approved equal.

D. Solid-State Reduced Voltage Motor Control.

1. Controller for 250 HP compressor prime movers shall be Cutler-Hammer type S801, Frame Size V, and shall have PLC control unit complete with built-in 24VDC control power transformer, i.e. programmable soft starter.

2. The solid-state reduced-voltage starter shall be UL and CSA listed.

3. The solid-state reduced-voltage starter shall be an integrated unit with power SCRs, logic board, paralleling bypass contactor, and electronic overload relay enclosed in a single molded housing. The SCR-based power section shall consist of six (6) back-to-back SCRs and shall be rated for a minimum peak inverse voltage rating of 1500 volts PIV.

4. Units using triacs or SCR/diode combinations shall not be acceptable.

5. Resistor/capacitor snubber networks shall be used to prevent false firing of SCRs due to dV/dT effects.

6. The logic board shall be mounted for ease of testing, service and replacement. It shall have quick disconnect plug-in connectors for current transformer inputs, line and load voltage inputs and SCR gate firing output circuits.

7. The paralleling run bypass contactor shall energize when the motor reaches 90 of full speed and close/open under one (1) times motor current.

8. The paralleling run bypass contactor shall utilize an intelligent coil controller to limit contact bounce and optimize coil voltage during varying system conditions.

9. The coil shall have a lifetime warranty.

10. Starter shall be provided with electronic overload protection as standard and shall be based on inverse time-current algorithm. Overload protection shall be capable of being disabled during ramp start for long acceleration loads via a DIP switch setting on the device keypad.

11. Overload protection shall be adjusted via the device keypad and shall have a motor full load ampere adjustment from 30 to 100% of the maximum continuous ampere rating of the starter.

12. Starter shall have selectable overload class setting of 5, 10, 20 or 30 via a DIP switch setting on the device keypad. Starter shall be capable of either an electronic or mechanical reset after a fault. Units using bimetal overload relays are not acceptable. Over-temperature protection (on heat sink) shall be standard.

13. Starters shall provide protection against improper line-side phase rotation as standard. Starter will shut down if a line-side phase rotation other than A-B-C exists. This feature shall be disableable via a switch on the device keypad.

14. Starters shall provide protection against a phase loss or unbalance condition as standard. Starter will shut down if a 50% current differential between any two phases is encountered. This feature shall be disableable by a switch on the device keypad.

15. Start shall provide protection against a motor stall or jam condition as a standard feature. Starter shall be provided with a Form C normally open (NO), normally closed (NC) contact that shall change state when a fault condition exists. Contacts shall be rated 60 VA (resistive load) and 20 VA (inductive load). In addition, a display on the device keypad shall indicate type of fault (Overtemperature, Phase Loss, Jam, Stall, Phase Reversal and Overload).

16. The following control function adjustments on the device keypad are required:
    a. Selectable Torque Ramp Start or Current Limit Start.
    b. Adjustable Kick Start Time: 0-2 seconds.
    c. Adjustable Kick Start Torque: 0-85%.
    d. Adjustable Ramp Start Time: 0.5-180 seconds.
    e. Adjustable Initial Starting Ramp Torque: 0-85%.
    f. Adjustable Smooth Stop Ramp Time: 0-60 seconds.
    g. Units enclosed in motor control centers shall be of the same manufacturer as that of the circuit breaker and motor control center for coordination and design issues.
    h. Maximum continuous operation shall be at 115% of continuous ampere rating.

17. Each starter shall be equipped with MOV surge protection on the line side of motor starter.
    a. Cutler Hammer model EMS39 or approved equal.
    b. Refer to plans for short circuit rating of starters.

18. Factory testing. Standard factory tests shall be performed on the equipment provided under this section.
    a. All tests shall be in accordance with the latest version of UL and NEMA standards.
    b. The manufacturer shall provide three (3) certified copies of factory test reports.

E. Acceptable Manufacturers:

1. General. The listing of acceptable manufacturers implies acceptance only of those products that meet these specifications in their entirety.

2. Cutler-Hammer.

3. Siemens.

4. Square D.

5. Rockwell Automation / Allen Bradley.

6. Or approved equal.

2.18 Regulated Control Gas. Provide regulated natural gas within each piece of packaged CNG equipment, including compressor skids, priority-valve panel and fast-fill dispenser. Regulators shall be compatible with natural gas, have a primary rating of 5000 PSIG and an adjustable secondary allowing for a pressure range of 80-110 PSIG. Provide 5000 PSI manual ball valve immediately upstream of each regulator and 200 PSIG pressure gauge immediately downstream of each regulator.

2.19 Site Accessories and Equipment.

A. Safety Signs. Contractor shall provide a complete safety sign package per SD drawings. Signs shall be fabricated from metal and all materials and finished surfaces shall be listed for outdoor use and shall be UV resistant.

B. Fire Extinguishers. Provide (1) 4A:80BC fire extinguisher co-located at each ESD button inside the fuel-equipment reserve area. Fire extinguishers do not need to be installed with ESD buttons that are located inside compressor-skid enclosures. See Fire Extinguisher locations on SD plans. Fire extinguishers shall be per specification section 10 44 00, Fire Protection Specialties.

C. Convenience Outlets. Provide (1) convenience outlet at the 'CNG MCC' cabinet. Each receptacle shall be 3-prong twin-outlet type, provide 20A 120v power, be rated for outdoor installation and shall include spring-closed covers over each outlet.

D. Pre-Cast Tubing-Junction Vaults. Provide pre-cast concrete vaults to house tubing junctions per plan and per requirements on sheet DG-104. Vaults shall be 24" x 24" x 30" deep and shall be set so that their finished height is ½" to 1" above finished surrounding grade. Provide 24" cast iron for vault cover. Lids that could be exposed to vehicle traffic shall be rated for H20 traffic loads.

E. Gas Regulator. Provide adjustable 4" gas regulator to limit pressure of gas supply to existing 'Gemini' compressors. Regulator shall be rated for inlet pressure of at least 300 PSIG and shall be installed immediately downstream of new pipe-tee connection

that will supply gas from the utility MSA to the existing CNG system. Provide with 4" schedule 40 CS piping, and a 4" manual ball valve with locking kit between the new piping tee and the regulator. Provide pressure gauge scaled to 300-500 PSIG immediately downstream of the new regulator. Regulator shall be Kimray 4" 'PR-NV' type with no pilot gas or venting required, or approved equal.

3 - EXECUTION

3.01 GENERAL

A. Execution is described in the respective Product description of this section, except as otherwise described within article 3 of this section.

B. All components and equipment shall be installed according to the respective manufacturers' instructions and recommendations. Industry-standard practices shall apply if no manufacturer instructions exist.

C. Contractor shall coordinate location and timing of all excavation and open trench work that may affect the normal movement of vehicles and personnel on the job site. Contractor shall also provide trench plates as required for the traffic they may be exposed to until trenches are repaired to match surrounding grade.

3.02 WORKMANSHIP

A. Labor shall be performed by mechanics skilled in their particular trade. Pipe and equipment shall be installed square and plumb accessible for proper operation and service. Installation shall be consistent with completeness and appearance whether concealed or exposed.

B. Seals and Sealants. Seals and sealants that are exposed to natural gas or CNG shall be compatible with natural gas as well as the diester-type compressor-lube oil as applicable.

3.03 GRADING AND PAVING

A. Not Used.

3.04 PROTECTION OF EQUIPMENT

A. General. CNG compression, storage and dispensing equipment shall be protected against vehicular impact. The CNG equipment compound and dispensers shall be protected by concrete-filled pipe bollards as located on the drawings.

3.05 PIPING AND APPURTENANCES

A. General. Seamless stainless steel tubing, stainless steel pipe, or seamless carbon steel pipe shall be used to conduct CNG. Piping between the buffer valve panel and each CNG dispenser shall be per the Piping & Instrumentation Diagram drawing.

1. Service Pressure. Piping, tubing and appurtenances downstream of compressor discharge shall have a manufacturer-rated working pressure of 5000 PSI, in accordance with ANSI B31.3, *Process Piping*.

2. Shipping. While in transit, all hose and flexible metal hose and tubing, including their connections, shall be protected from wear or injury and shall be capped.

3. 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, material grade, service and working pressure.

4. Dissimilar Metals. Connections between dissimilar metals shall include dielectric insulation. This includes piping and other metallic connections.

5. Blowdown Tees. Within specified equipment, piping and high-pressure tubing systems and sections shall be equipped with blocking ball valves and blowdown tees or needle valves to facilitate equipment maintenance. Blowdown valves shall discharge in a manner that directs the discharging gas safely away from the person using the blowdown valve. Discharge lines on blowdown valves shall be equipped with threaded end caps to seal the line in normal service, so as to prevent accidental line depressurization and gas release. Block valves and blowdown tees shall be provided at all filter locations for safe depressurization of filter housings.

B. Pipe Routing. All gas, CNG and control-air piping shall be located and routed aboveground, unless shown as dashed piping on the plan drawings. Piping may be installed below grade, if it is installed in a pre-cast concrete pipe trench that is covered and rated for traffic and loads to which it may be exposed. Piping shall be ganged on common runs, racks and carriers where appropriate and shall be insulated against cathodic action and contact with dissimilar metals.

C. Piping.

1. Pipe Specification. Pipe containing flammable material shall be seamless carbon steel manufactured in accordance with ASTM A-106 Grade B or C. 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.

2. Cathodic Protection.
   a. Provide magnesium-based sacrificial anode, wiring and test station to protect buried underground CS piping.
   b. Underground CS piping shall be factory coated with 3M Scotchkote or approved equal.
   c. Protect piping that penetrates concrete slabs with PVC pipe sleeves. Seal sleeve openings with exterior-grade hardening sealant to prevent entry of rain water.
   d. Provide insulating kits on flanges joining buried and aboveground piping sections. Include gaskets, washers and bolt sleeves.

3. Connections.

a. Small Pipe Connections. For 2-inch or under nominal pipe size with maximum operation pressure greater than 15 PSIG, the connections shall be socket welded in accordance with ASME/ANSI B31.3, except that twenty five (25) percent random dye-penetrant examination and one hundred (100) percent visual examination is required. Each weld shall be de-scaled and internally cleaned from any welding slag. Documentation of examination shall be transmitted to the Owner within 5 working days of examination. One hundred (100) percent of pipe welds made outside of the CNG-equipment area shall be inspected via dye-penetrant examination.
b. Large Pipe Connections. For over 2-inch nominal pipe size with maximum operation pressure greater than 15 PSIG, the connections shall be butt welded in accordance with ASME/ANSI B31.3 except that twenty five (25) percent random radiographic x-ray examination and one hundred (100) percent visual examination is required. Each weld shall be de-scaled and internally cleaned from any welding slag. Documentation of examination shall be transmitted to the Owner within 5 working days of examination.
c. Flange Joint. Flanges shall be in accordance with ANSI B16.5. Weldneck raised face flanges shall be used unless specified otherwise. Ring-type joints or spiral-wound metallic gaskets with centering ring shall be employed for ANSI class 900 flanges or higher.
d. Sealing. Threaded pipe joints shall be seal welded. However, seal welding is not required on instruments or where disassembly is required for maintenance.
e. Pre-start Pipe Cleaning. All piping sections between packaged components that include piping or tubing shall be blown clean prior to connection to equipment. Blow out shall be achieved by closing the downstream end of pipeline with a 5000 PSI-rated ball valve, connecting a minimum 1650 PSI-source pressure vessel to the upstream end of the pipeline, opening supply valve at source so that minimum 750 PSI accumulates in pipeline, then opening outlet ball valve to atmosphere. Procedure shall be repeated until no solid or particulate matter is discharged from the pipeline.
    1) Personnel opening and closing ball valve at downstream end shall take care to keep clear of the discharge path of the blowout, and shall wear eye and ear protection during procedure.
    2) Direction of blowout flow shall be performed in both directions if possible.
    3) Contractor shall take care to clear area at pipeline discharge to prevent property damage or injury during procedure.
f. Startup Filtration. 'Witch's hat' or similar strainer devices shall be installed where practical at termination of such piping sections prior to system startup and shall be checked, cleaned and replaced by the Contractor as required until all residual pipe debris has been removed.

4. Pipe Fabrication. All internal pipe surfaces of piping between components shall be cleaned over its entire length, removing 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.
5. Field-applied Paint. All aboveground carbon steel pipe and pipe supports shall be painted using a suitable industrial maintenance coating. Surface preparation and selection and application of primer and finish coat shall conform to the paint manufacturer's written instructions.

D. High-Pressure Tubing.

1. Tubing Specification. Gas tubing shall be stainless steel ASTM A-213 or TP 304/316 ASME SA213 cold drawn bright annealed seamless tubing. 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 manufacturer-rated burst-safety factor of safety of at least 4.
2. Installation of Tubing and Tube Fittings. Swagelok, Parker A-Lok, or Hoke tube fittings shall be used. Contractor shall use tube fittings from a single manufacturer throughout a prepackaged component, so as to simplify use and consistency of appropriate repair parts. 300-series stainless steel fittings shall be used with stainless steel tubing. Manufacturers' personnel who install tubing and tube fittings shall be trained and certified by the fitting manufacturer for such activity, and proof shall be provided. Tubing shall be installed neatly and in a workman-like manner as per manufacturer's design and recommendation. All tubing shall be properly anchored, supported or pitched and shall be protected from impact. As CNG tubing dilates and contracts in response to its wide range of operating pressures, Unistrut Cush-a-Clamp assemblies, or approved similar resilient anchors, shall be used to support gas tubing. Tubing shall be from straight "stick" stock and shall not be from rolled stock. Parker Seal-lok fittings shall be used for tube fittings for tubing 3/4" or larger.
3. Valve Clearance. All valves shall be accessible for easy operation and maintenance.

E. Instrument Piping. Provisions shall be made in installation of piping and tubing to accommodate field servicing and calibration of instruments.

F. Valves.
1. General. All valve bodies shall be permanently marked by the manufacturer with their service pressure ratings.
2. Shut-off Valve. A full-port manual ball valve shall be installed immediately downstream from the connection to each compressor-discharge line and the skid outlet line, to facilitate servicing.
3. Compressor Discharge Check Valve. A backflow preventer (check valve) shall be provided at each high-pressure outlet, in order to prevent backflow into the compressors from ancillary equipment. Backflow preventers shall be suitable for use at the maximum pressure to which they are subjected.
4. Pressure Relief Valves. Pressure relief valves installed to protect each isolated piping system shall have sufficient capacity and shall be set to open at a pressure not exceeding 125% of system MAWP or the pressure which produces a hoop stress of 75% of specified minimum yield strength, whichever is lower. Pressure relief valve (PRV) shall be of the following type, or approved equal: Anderson Greenwood Type fabricated with stainless steel, having an orifice size appropriate for the pressure and volume/rate that it is protecting.
5. Stamping. All relief valves shall be ASME rated and stamped with their set pressure and date of setting by manufacturer. Date stamp shall be less than 12 months from date of delivery to site.
6. Control. There shall be no shutoff means in the discharge line of a pressure-limiting device or between the relief valve and the pressure source that it controls.
7. Relief Valve Venting. Each relief valve shall be connected to a vent pipe constructed of schedule 80 carbon steel pipe with primed and epoxy coating, or approved equal coating. The vent pipe shall vent released gas at an elevation 10 feet above grade or another approved, safe location and shall be properly anchored and supported against anticipated vent force. Escaping gas shall not impinge on a vessel, valves or fittings. Except for safety valves that are integral

with service valves, relief-valve vent pipes on tanks shall be installed in a vertical position and shall be fitted weep holes at the low point of the pipe.

8. Relief Valve Vents. Each vent pipes shall be capped with rain caps as a means of preventing the entry of water and debris.
9. Prohibited Pressure Relief Devices. Fusible plugs and/or rupture plugs are prohibited for primary relief devices.
10. Actuated Valves. All valves requiring automatic actuation shall be ball type with port sizes not smaller than the largest line connection. Actuators shall be pneumatic, and matched to valve, subject to Owner approval. Solenoid valves or actuation by regulated gas or electric operators are prohibited unless specifically approved by the Owner during facility design and submittal review.

3.06 LABELING

A. Major Equipment. The manufacturer shall provide a stainless steel or brass nameplate on each major item of equipment. The nameplate shall be mechanically affixed and shall be embossed with the manufacturer's name, address, model number, serial number, pressure rating and flow capacity.

B. Valves. The Contractor shall provide a uniform brass or stainless steel embossed nameplate on or adjacent to valves located as listed below. The nameplate shall be mechanically affixed.
   1. All dryer valves.
   2. Gas and CNG connections at the exterior perimeter of the compressor skid.
   3. CNG valves and connections at the valve panel.
   4. All valves for the control-air system.
   5. CNG connections at the dispensers.

3.07 FIELD-STARTUP SERVICES

A. General. Contractor shall provide field-startup services from manufacturers' authorized representatives and vendors, including on-site assistance as required for the following equipment:

   1. Compressor skid.
   2. Gas dryer.
   3. Dispenser.
   4. Fuel-management terminal.

B. Requirements. Contractor shall initialize and make fully operational the following:

   1. Compressor skid assembly and control panel.
   2. Gas dryer.
   3. Valve panel, CNG dispenser.
   4. Fuel-management terminal.
   5. Emergency-shutdown system.

C. Joint Vendor Meetings. Contractor shall facilitate joint, on-site meeting(s) consisting of technicians from the Contractor, Contractor's electrical subcontractor, Contractor's mechanical-piping subcontractor, CNG-skid manufacturer, dryer manufacturer, valve-panel manufacturer, dispenser manufacturer, and fuel-management vendor. First joint meeting shall be conducted upon completion of all mechanical connections, final terminations and energizing of all systems listed herein, for the purpose of coordinating debugging activities. Contractor shall facilitate as many such joint

meetings as may be required to achieve final acceptance and test compliance as described under article 1.10 and article 3.06.

3.08 ADJUSTING, BALANCING AND TESTING

A. After completion of the installation, start, regulate, adjust and test all equipment and devices.

B. Functional Tests.

1. Leak tests of high-pressure CNG piping sections, systems and appurtenances shall be performed by maintaining a nitrogen charge of 110 percent of its respective working pressure for a duration of 30 minutes with charge source disconnected. The tests shall use a gauge that is scaled to between 110 percent and 300 percent of the test pressure. Piping and tubing shall also be subject to soap-bubble testing.

2. Functional Testing. At minimum, successful completion of the following functional tests shall be required.

a. ESD / emergency shutdown at all button/station locations, including required valve closures.

b. Low suction pressure, each skid (close skid-supply ball valves).

c. Temperature-compensated dispenser fill for each dispenser, including correct dispenser start on button, auto-stop on fill completion, and verify 'settled' fill pressure vs. ambient temperature two hours following fills. Must be within 4% of design-fill pressure, temperature compensated to 70ºF.

d. Correct operation of fuel-management system at each dispenser, including authorization of transaction, energizing of dispenser, and recording of transaction data (fill volume, time/date stamp, event ID, and pump number).

e. Automatic initiation of dryer regeneration based on dew point (generate false positive at hygrometer).

f. Correct annunciation on controller / PLC shall be required for all test events, as appropriate.

g. Observe compressor operation, including stage pressures and temperatures, and verifying function of controller, including triggering selected faults, such as high interstage temperature.

C. Reliability Test. Reliability test shall consist of fueling under normal-use conditions for 5 consecutive work days. System shall have no failures of compressor operation, dryer operation, normal dispenser operation, or operation of the fuel-management system during the test period. If any failure occurs, the test shall be repeated in its entirety. Final acceptance of the facility shall only be declared upon successful completion of the test. Contractor shall be responsible for all onsite coordination of troubleshooting and coordination of suppliers and trades during test.

1. Failure is defined as the occurrence of any of the following:

a. Inability of the CNG system to dispense CNG at the pressures and rate specified, including accounting for temperature compensation at settled conditions.
b. Failure of the dryer to provide dried gas and/or not be able to auto switch or regenerate.
c. Failure of a compressor to start and run within factory-listed operating pressures and temperatures.
d. Failure of the controller/PLC, valve panel, fuel-management system and/or dispensers to operate as specified.
e. Presence of an audible of visible gas or CNG leak.
f. Occurrence of a auto-fault shutdown of either or both CNG compressors, except those caused by ESD-button activation, gas-detection system outside of skids, variations in gas supply pressure, or damage to the facility beyond the Contractor's control.

2. Contractor may take equipment offline for scheduled maintenance during the test period, provided maintenance is consistent with manufacturer's recommendations, and does not impinge on Owner's ability to fuel vehicles during the normal daily fueling window between 7:00AM and 11:00PM. Contractor shall be responsible for maintenance through successful completion of test, including provision of consumables.

3. Corrective work conducted by the Contractor and all subcontractors and suppliers preceding and during the performance test shall be documented at the time of the repair by the technician performing the repair. If the technician suspects a cause of fault that is beyond the scope of his respective firm or responsibility, technician shall notify Owner immediately and shall not implement repairs until condition of failure has been documented and the other firm(s) have been notified and been provided documentation of the condition. Owner shall not pay Contractor for any work or repair that is implemented during testing above of the contract amount, unless the work or condition is beyond the control of the Contractor, the Contractor's subcontractors, or the Contractor's suppliers. Contractor shall notify Owner in writing of intent to perform any work that the Contractor deems to be outside of the contract scope, prior to performance of any such work.

3.09 OPERATION AND MAINTENANCE DATA AND TRAINING

A. Maintenance Manuals: Organize maintenance and operating manual information into suitable sets of manageable size, and bind into individual binders, properly identified and indexed (thumb-tabbed). Examples: Dryer, CNG compressors, compressor drivers, CNG dispensers, etc. Include emergency instructions, safety procedures, spare parts listings, warranties, guarantee, wiring diagrams, recommended maintenance intervals, inspection procedures, shop drawings, product data, and similar applicable information. Use a standard method for highlighting safety procedures. Bind each manual of each set in a heavy-duty 2-inch, three ring vinyl-covered binder and include pocket folders for folded sheet information. Mark identification on both the front and spine of each binder, including "Volume ## of ##" information.

1. Data:

a. Manuals shall cover the CNG facility as a complete system.

b. Include instructions by manufacturer's representatives where installers are not expert in the required procedures.

1) Review of maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning, and similar procedures and facilities for operational equipment to demonstrates start-up, shut-down, emergency adjustments, and similar operations.

2) Review of maintenance and operations in relation to applicable guarantees, warranties, agreements to maintain bonds, and similar continuing commitments.

2. Delivery: Supply (3) complete manuals for approval with the commencement of the delivery of the equipment to the site.

B. CNG Fueling Operation and Maintenance Training.

1. General:
   a. At least 60 days prior to scheduled data for commencement of training, submit training syllabus with time allotments per topic and instructional materials to the Owner for review and approval. Upon review of syllabus, Owner may require additional time be allotted to certain training topics.
   b. Where specified, develop and conduct a program to train selected Owner personnel in the safe operating procedures, and maintenance of equipment and systems furnished during the hours required by the Owner. Also include in the training program key hazards and their protectors, and corrective actions for violation of safety rules.
   c. Furnish instructors, instructional materials and audio-visual aids and equipment.
   d. The Owner is to furnish physical facilities and equipment.
   e. Begin instruction upon successful completion of Testing as specified in this Section.

2. Program content: At a minimum, instruction will include material covered in the operation and maintenance manuals as well as the following:
   a. Theory of operation of CNG system.
   b. Practical aspects of operation.
   c. Description of system, equipment and components.
   d. Functional characteristics of system, equipment and components.
   e. Emergency operating procedures.
   f. Maintenance procedures.
   g. Servicing intervals and schedules.

C. Special tools or equipment.

1. Contractor will supply special tools or equipment.
   a. The special equipment or tools are defined as, other than those nominally found in a mechanic's toolbox, necessary for the general upkeep, maintenance and overhaul of the equipment or products contained in equipment and components delivered under this contract.
   b. A list of special tools or equipment will be provided to Owner. The list must be submitted for approval no later than 60 days after awarding contract.
   c. Any tools not found in the catalogue or over-the-counter of a local supply company is considered a specialty tool or equipment.

D. Duration.
   1. Training for maintenance, facility operation and troubleshooting shall be 8 total hours.
   2. Actual durations for each type of training may be reduced at the discretion of the Owner.

E. Emergency response training.
   1. Contractor shall provide emergency response training and facility familiarization to Fire Department personnel as related to faults that may occur during operation of the CNG system and during the fueling of CNG-fueled vehicles at all dispensers. Contractor shall provide up to two sessions lasting 45 minutes each, and shall include familiarization of overall facility layout and function, location of service disconnects for gas and electrical connections, and demonstration of ESD function.

END OF SECTION 43 01 05

SECTION 46 25 13

COALESCING OIL-WATER SEPARATORS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: 10,000 gal, double-wall, underground, coalescing-type, fiberglass oil-water separator tank and accessories.

B. Related Requirements:

1. Section 05 50 00 - Metal Fabrications: Miscellaneous metalwork and fasteners as required by this Section.
2. Section 40 05 13 - Common Work Results for Process Piping: Piping components, appurtenances, and identification requirements common to process piping systems.
3. Section 46 05 53 - Identification for Water and Wastewater Equipment: Nameplates for equipment specified in this Section.

1.2 REFERENCE STANDARDS

A. ASTM International:

1. ASTM D2996 - Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with plant piping facilities.

1.4 PREINSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.

B. Convene minimum one week prior to commencing Work of this Section.

1.5 SCHEDULING

A. Section 01 30 00 - Administrative Requirements: Requirements for scheduling.

B. Schedule Work of this Section after excavation and aggregate bedding work and prior to connection of piping work.

1.6 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit complete information concerning materials of construction and fabrication.

C. Shop Drawings: Submit detailed certified dimensional Shop Drawings showing tank size, layout of accessories, and anchoring system.

1.7 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout procedures.

B. Project Record Documents: Record actual location and final orientation of tank and accessories.

C. Operation and Maintenance Data: Submit maintenance instructions for tank and accessories.

1.8 QUALITY ASSURANCE

A. Perform Work according to NM APWA standards.

B. Testing:

1. Provide effluent oil-water testing by EPA-certified independent laboratory using EPA Method 1664.
2. Submit certificate of analysis for each analysis performed.

C. Maintain 1copy of each standard affecting the Work of this Section on-Site.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' experience and approved by manufacturer.

C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of NM.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept oil-water separators on-Site and inspect for damage.

C. Storage:

1. Store oil-water separators in areas protected from weather, moisture, and damage.
2. Do not store directly on ground.

D. Protect interior or exterior surfaces when handling.

1.11 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Tank Design Criteria:

1. External Hydrostatic Pressure:
   a. Buried Depth: 10 feet .
   b. Safety Factor: 5:1 against general buckling.
2. Surface Loads: AASHTO H-20 axle loads.
3. Internal Load: 5 psig air pressure test, with 5:1 safety factor.
4. Store liquids with specific gravity.
5. Store grease and oils at temperatures not to exceed 150 degrees F.
6. Chemically inert to petroleum products.
7. Influent Flow Rate: 2500 gpm.
8. Influent Oil and Grease Concentration: Average ppm.
9. Effluent Oil and Grease Concentration: Maximum ppm.

2.2 TANK

A. Manufacturers:

1. Substitutions: Section 01 60 00 - Product Requirements.
2. Furnish materials according to NM APWA standards.

B. Description:

1. Double-wall, fiberglass-reinforced plastic, underground, coalescing-type oil-water separator tank, with fittings and accessories as indicated on Drawings.
2. Construct tank to conform to ASTM D2996, UL 1316, NFPA 30, NFPA 30A, NFPA 70, and MIL-T-52777A.
3. Coalescer Plates:
   a. Corrosion resistant.
   b. Removable through accessway, including internal mounting hardware.
4. Anchor Straps:
   a. Material: Glass-fiber-reinforced plastic.
   b. Capable of withstanding buoyancy load.
5. Fittings: Meet requirements of UL label.
6. Tank Laminate:
   a. Granular inert material.
   b. Moisture Content: Less than 1 percent.
7. Accessway:
   a. Minimum Size: 22 by 29 inches.
   b. Configuration: Oval.

2.3 TURBINE ENCLOSURES AND ACCESSWAY EXTENSIONS

A. Description: Fiberglass-reinforced-plastic secondary containment collar, turbine enclosure, and accessway extensions as indicated on Drawings.

1. Secondary Containment Collar:
   a. Size: 42-inch diameter.
   b. Provide containment around accessway.
2. Enclosure Height
3. Enclosure Top and Lid Assembly:
   a. Watertight.
   b. Grommets for piping or electrical connections are not acceptable.
4. Mate accessway extensions with accessway diameter.

2.4 OIL-WATER SEPARATOR CONTROL SYSTEM

A. Description:

1. Control Panel:
   a. NEMA 250 Type 4.
   b. Material: Epoxy-coated steel.
   c. Electronic Components: UL-listed.
2. Power: 120 VAC.
3. Monitoring Sensor Circuit: Explosion Proof.
4. Number of Monitoring Circuits: Four.
5. Control Panel:
   a. Alarm lights for each circuit.
   b. Warning horn.
   c. Auxiliary dry contacts switch output for each sensing circuit.
   d. Alarm horn silence switch.
6. Locate sensor wires in separate conduit from power wires.

B. Oil-Water Interface Float Sensor:

1. Two separate high-waste oil levels in separator:
   a. Level One: Activate visual alarm.
   b. Level Two: Activate both visual and audible alarms.

C. Tank Leak-Detection System and Reservoir Sensor:

1. Interstitial Space: Between primary and secondary tank walls to allow for free flow of brine-monitoring liquid between tank walls and containment of released product from primary tank.
2. Hydrostatic Tank Leak-Detection System:
   a. Detect breach in inner or outer tank or both under following conditions:
      1) When inner tank is empty.
      2) When inner tank is partially or completely full and ground water table is below tank bottom.
      3) When inner tank is partially or completely full and tank is partially or completely submerged in ground water.
   b. Hydrostatic Monitoring Fluid:

1) Non-toxic brine solution shipped in tank interstitial space from manufacturing plant.
2) Brine: Dyed deep green color to aid in identifying damage to tank.
3) UL-list tank laminate for compatibility with monitoring fluid.

c. Use titanium conductance probes to determine monitoring fluid levels in tank-mounted reservoir.

2.5 ACCESSORIES

A. Inlet and Outlet Tees:

1. Sizes: As indicated on Drawings.
2. Flanges: Standard ANSI Class 125/150 flanges.

B. Manholes:

1. Material: Fiberglass-reinforced plastic.
2. Size: As indicated on Drawings.

C. Vent Cap and Piping:

1. Material: Fiberglass-reinforced plastic.
2. Size: As indicated on Drawings.

D. Oil Draw-Off:

1. Install fitting on tank.
2. Size: As recommended by tank manufacturer.

E. Base Pad:

1. Material: Cast-in-place concrete of type as specified in Section 03 30 00 - Cast-in-Place Concrete.
2. Increase thickness of concrete base to prevent flotation, as approved by Architect/Engineer.
3. Provide anchorage in concrete base.

2.1 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing:

1. Test and verify detection performance of monitoring system using qualified independent consultant.
2. Detecting leaks as small as 0.05 gal.per hour with 99.9 percent probability of detection and 1.2 percent probability of false alarm.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that layout and orientation of tank accessories and piping connections are as indicated on Shop Drawings.

C. Verify that excavation base is ready to receive Work and that excavations, dimensions, and elevations are as indicated on Shop Drawings.

3.2 PREPARATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Correct over-excavation with fine aggregate.

C. Remove large stones or other hard matter impeding consistent backfilling or compaction.

3.3 INSTALLATION

A. Form and place cast-in-place concrete base pad.

B. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

C. Install separator tank where and as indicated on Drawings, and according to manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

B. Testing:

1. Test leak-detection system and verify proper operation.
2. After separator tank is placed into operation for period of not less than 30 days, conduct performance test as follows:
   a. Obtain minimum of four influent and effluent samples equally spaced over eight-hour time period.
   b. Test samples for oil and grease according to EPA Method 1664.
   c. Compare test results with design requirements.
   d. If test results do not meet design requirements, modify installation as recommended by manufacturer and rerun test until acceptable results are obtained.

C. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than

15 days on-Site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.

D. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified, and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

E. Furnish installation certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

3.5 DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 46 25 13

STORMWATER BASIN SOIL INVESTIGATON

of

CNG Fuel Facility Upgrades
2931 Rufina Street
Santa Fe, New Mexico
X8eVinyard Project No.: 15-5-030

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ATTACHMENTS

Attachment 1 Figures

Attachment 2 Laboratory Data Package

Attachment 3 Photographs

1.0 INTRODUCTION

X8eVinyard is pleased to present this report for the investigation and sampling of soil in the storm water basin at 2931 Rufina St. in Santa Fe, New Mexico. X8eVinyard was contracted by Huitt-Zollars, Inc. to conduct this scope of work.

1.1 SITE HISTORY

Two wash pads are planned for construction to the northwest of the current transit yard detention cell as part of the CNG Fuel Facility Upgrades CIP Project. Expansion of the current detention cell is needed to accommodate additional storm-water runoff. Huitt Zollars estimated that the current cell would need to be expanded by approximately two feet in depth to accommodate the additional storm water from the two new wash pads. The current detention cell collects storm-water from the City of Santa Fe Transit Yard. Contaminants from the maintenance of City of Santa Fe transit vehicles may have washed into the storm-water basin. Characterization of the detention cell soil was necessary to assist in determining how to handle soil excavated from the detention cell expansion.

X8e proposed to do the following:

- Divide the detention cell into four quadrants and field screen a composite soil sample at the center point in each of four quadrants with a Photo Ionization Detector (PID). If a reading of greater than 100 units was identified with the PID, which is indicative of possible Volatile Organic Compounds then a soil sample would be submitted for laboratory analysis for Volatile and Semi-Volatile Organic Compounds using EPA methods 8260B and 8270C, respectively.

- Collect eight soil samples, two each in the four quadrants of the detention cell areas, one at the surface and one at the two-foot depth for laboratory analysis for Total Petroleum Hydrocarbons (TPH) gasoline, diesel and oil range organics using EPA method 8015D.

- Collect one composite sample at each quadrant for RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, selenium, and silver analysis using EPA method 6010B, and mercury using EPA method 7471).

- Prepare a report presenting the findings from the site investigation with photos.

2.0 FIELD TASKS FOR STORM WATER BASIN SOIL SAMPLING

X8e Vinyard Environmental Professional David Plante mobilized to the site on October 6, 2015. The storm water basin was divided into four quadrants and sample points were selected in the center of the four quadrants. Sample points were along a line running through the middle of the storm water basin from east to west. A drawing identifying the sample locations is attached.

Mr. Plante then collected a grab sample of soil at the four inch depth from the west end quadrant sample location for TPH laboratory analysis. A hand auger was used to auger down to approximately one foot. Significant resistance from rock was encountered past the one-foot mark. Rock was removed from the hole by hand and with a pry bar down to the two-foot depth. The hand auger was also used to remove rock and soil. Composite samples of soil were collected from soil between the four-inch and two-foot depth and placed in glass jars for RCRA 8 metals laboratory analysis and field analysis using the PID. A grab sample of soil at the two foot level was also collected for TPH laboratory analysis. Soil from the composite sample was field tested, using the field head space method with the PID.

Soil vapors were field screened using a calibrated MiniRAE photoionization detector (PID) with a 10.6 electron volt ultraviolet lamp. The field headspace method consists of approximately half filling a clean mason jar with soil, sealing the top with aluminum foil, and placing it on the dash of the vehicle where it is heated with the defroster. In addition, each soil sample jar is shaken vigorously for a minimum of one minute. After the jar is heated for approximately 15 minutes and shaken, the aluminum foil seal is pierced with the probe of the PID and the peak measurement for vapor phase volatile organic compounds (VOCs) is recorded. See Attachment 1 for PID field screening results.

Each instrument has an inherent range of error, and the PID may have indicated low concentrations of contaminants when those contaminants were not actually present (false positives). Conversely, the field instrument may not have detected low concentrations of vapor phase contaminants (false negatives). Field instruments are normally accurate to within approximately 3% of the reading. PIDs can also be sensitive to a range of compounds and, therefore, several compounds can cause interference patterns with the sensor readings. Since the PID is calibrated with isobutylene and VOCs detected in the field are likely to have a different ionization potential, PID measurements are recorded in "meter units" (mu) that vary relative to a compounds ionization potential. Since VOCs detected by a PID are not specifically identified, no conversions to parts per million (ppm) are made. PIDs are more sensitive to gasoline range vapor phase hydrocarbons than they are to heavier (diesel fuel, kerosene, motor oil, etc.) hydrocarbons, since heavier hydrocarbon molecules are not as easily ionized with the 10.6 electron volt lamp.

The field test sample with the PID for Soil Boring No. 1 found greater than 100 meter units. An additional composite soil sample was collected for laboratory analysis for

Volatile and Semi-Volatile Organic Compounds using EPA methods 8260B and 8270C. Upon completion of sample collection soil and rock from Soil Boring No. 1 was placed back in the hole. The hole was marked using an orange flag.

After completion of excavation and sampling for Soil Boring No. 1 was completed, Soil Boring No. 2 and No. 3 were investigated as to the extent of rock. Samples of soil at the four inch depth were collected for TPH laboratory analysis at each of the three remaining sample locations. It was decided that due to the significant amount of rock found at these locations, a mini excavator would be needed to obtain samples at the two foot depth in a reasonable time frame.

On October 9, 2015, X8e Vinyard Environmental Professional, David Plante and Equipment Operator, Alex Abeyta mobilized to the site with a mini excavator. Pot holes were dug down to two feet at the three remaining sample locations. Grab samples were collected at the two-foot depth for TPH laboratory analysis. Composite soil samples were collected for RCRA 8 metals laboratory analysis and field analysis for VOCs with the PID. Field analysis of composite soil samples with the PID from Soil Borings No. 2, 3 and 4 found less than 100 meter units (see Table 1 PID Field Screening Results). Therefore, composite samples were not collected for laboratory analysis for Volatiles or Semi-Volatiles from these locations. Excavated soil was replaced and compacted at each of the sample locations. Samples were placed in glass jars, labeled and placed in a container with blue ice.

Table 1 PID Field Screening Results

Location	Date and Time Collected	Field PID VOCs (meter units)
Soil Boring No. 1	October 6,2015 11:46 am	110 mu
Soil Boring No. 2	October 9, 2015 10:29 am	0.2 mu
Soil Boring No. 3	October 9, 2015 10:00 am	0.0 mu
Soil Boring No. 4	October 9, 2015 10:05 am	0.0 mu

3.0 QUALITY ASSURANCE / QUALITY CONTROL

Samples were placed in the appropriate, clean sampling containers provided by the analytical laboratory, cooled with blue ice, and transported to Hall Environmental Laboratory in Albuquerque, New Mexico under chain-of-custody.

Sampling personnel wore appropriate personal protection equipment such as disposable nitrile gloves during the sampling task. Disposable equipment was properly disposed and other equipment appropriately decontaminated, washed with non-

phosphate detergent and rinsed with deionized water, to reduce the potential for cross-contamination of the samples.

No laboratory, equipment blank, or split samples were collected during the storm water basin soil sampling.

The laboratory used in this investigation was National Environmental Laboratory Accreditation Program (NELAP)-certified. This provides an additional level of assurance that the data produced in the investigation are valid.

4.0 RESULTS AND DISCUSSION

One composite soil sample from Soil Boring No. 1 (west end of detention cell) was analyzed for VOCs, using EPA Method 8260B and semi-volatiles using EPA Method 8270C. Eight grab samples were analyzed for TPH diesel range organics (DRO) and gasoline range organics (GRO) using EPA Method 8015C. Four composite samples were analyzed for RCRA 8 total metals using EPA methods 6010B and 7471. Sample results for laboratory analytical samples can be found in Table 2 below.

Table 2 Laboratory Analytical Results (TPH and RCRA 8 Metals)

Location	Date Collected	TPH @ 4" (DRO, MRO, GRO) ND=Non-Detect	TPH @ 2' (DRO, MRO, GRO)	NMED Petroleum Contaminated Soil (PCS)	Total RCRA 8 Metals Lab Analytical Results (mg/Kg)	EPA RCRA TCLP Standard (mg/Kg)
Soil Boring No. 1	October 6, 2015	10 mg/Kg 72 mg/Kg ND	ND 83 mg/Kg ND	TPH-100 mg/Kg	Barium 100 Chrom. 8.1 Lead 7.1	Barium 100 Chrom. 5.0 Lead 5.0
Soil Boring No. 2	October 6 (4" TPH) and 9, 2015	280 mg/Kg 1400 mg/Kg ND	87 mg/Kg 300 mg/Kg ND	TPH-100 mg/Kg	Barium 120 Chrom.13.0 Lead 22.0	Barium 100 Chrom. 5.0 Lead 5.0
Soil Boring No. 3	October 6 (4" TPH) and 9, 2015	1300 mg/Kg 6500 mg/Kg ND	30 mg/Kg 120 mg/Kg ND	TPH-100 mg/Kg	Barium 29 Chrom. 2.7 Lead 4.1	Barium 100 Chrom. 5.0 Lead 5.0
Soil Boring No. 4	October 6 (4" TPH) and 9, 2015	ND 77 mg/Kg ND	ND ND ND	TPH-100 mg/Kg	Barium 99 Chrom. 6.6 Lead 4.7	Barium 100 Chrom. 5.0 Lead 5.0

TPHs were detected in seven of the eight soil samples submitted for TPH analysis. Diesel and motor oil range organics were identified in five of the seven samples which found TPH. No samples were found to contain TPH-Gasoline Range Organics (GRO). Sample results for TPH found that samples taken from the two soil borings (No. 1 and 4) on the edge of the basin were below the NMED standard of 100 mg/Kg and would

not meet the definition of Petroleum Contaminated Soil (PCS). Sample results for TPH for soil borings No. 2 and 3 were well above the PCS standard of 100 mg/Kg, particularly at the 4" depth. The sample result for TPH declined significantly at the two-foot level for soil borings No. 2 and 3 but still exceeded the PCS standard of 100 mg/Kg.

RCRA 8 metals (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver and Mercury) were analyzed in one composite sample from each of the soil borings. Only those metals identified in the analytical results are reported in Table 2. All other metals that were analyzed for were found to be not-detected (ND). The laboratory analytical results for each of the RCRA eight metals are reported as "totals" numbers for that substance in the sample.

In order to determine if the soil from each of the sample locations where the composite sample was taken would need to be considered hazardous waste for purpose of disposal under the Resource Conservation and Recovery Act (RCRA) a sample would have to undergo toxicity characteristic leaching procedure (TCLP) analysis. EPA does allow totals analysis to determine if TCLP analysis should be run to fully characterize a waste. If a total analysis of the waste demonstrates that individual constituents are not present in the waste or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run. A 100% solid sample can be evaluated by dividing each total constituent concentration by 20 and then comparing the resulting maximum theoretical concentration to the appropriate regulatory limit.

The EPA RCRA TCLP limits for the three metals identified from the totals analysis are: Barium-100 mg/Kg, Chromium-5.0 mg/Kg and Lead-5.0 mg/Kg. Soil Boring No. 1 RCRA 8 metals totals results are equal or slightly above the TCLP limits but would not be expected to fail TCLP analysis. Soil Boring No. 2 RCRA 8 metals totals results are above the TCLP limits but would not be expected to fail TCLP analysis. Soil Boring No. 3 RCRA 8 metals totals results were each below the RCRA TCLP limits. Soil Boring No. 4 RCRA 8 metals totals results were below the RCRA TCLP limits for Barium and Lead and slightly above the RCRA TCLP limit for Chromium and would not be expected to fail the RCRA TCLP analysis. Contractors should be made aware of these analytical results for worker protection purposes.

Volatile organics and semi-volatile organics were analyzed for one sample. The one sample was a composite sample from Soil Boring No. 1. This sample was found to be non-detect (ND) for volatile organics. Sample results for semi-volatile compounds were also ND with the exception of seven compounds (Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Fluoranthene, Indeno(1,2,3-cd)pyrene, and Pyrene). Sample results for the seven compounds identified were each at or slightly above the reporting detection limit (RL) for that particular constituent and significantly below the New Mexico Environment Department (NMED) Soil Screening Levels. See Table 3 below

Table 3 Laboratory Analytical Results (Semi-Volatiles)

Semi-Volatile Compound	Semi-Volatile Laboratory Analytical Result EPA Method 8270 C	Laboratory Analytical Reporting Detection Limit	NMED Soil Screening Level
Benzo(a)pyrene	0.20 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Benzo(b)fluoranthene	0.56 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Benzo(g,h,i)perylene	0.33 mg/Kg	0.20 mg/Kg	None Identified
Chrysene	0.27 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Fluoranthene	0.24 mg/Kg	0.24 mg/Kg	2.32 mg/Kg
Indeno(1,2,3-cd)pyrene	0.32 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Pyrene	0.21 mg/Kg	0.20 mg/Kg	None Identified

A USGS well approximately two miles east of the transit yard identified groundwater was 160.78 feet deep in October of 2015. Another USGS well approximately two miles south of the transit yard identified groundwater was 207.78 feet deep in October of 2015. It is unlikely that groundwater would be impacted by contaminants in the storm water basin.

5.0 CONCLUSIONS AND RECOMMENDATIONS

It is X8e Vinyard's opinion that, based upon the storm water basin analytical results, there is evidence of PCS in the lower bottom area of the storm water basin soil. This is the area where storm water drains in and collects in the basin to the west of the curb opening. The petroleum hydrocarbons are possibly from many years of storm water runoff, from the de minimis petroleum stains scattered around the transit yard, leaks, drips and spills and the operation of the transit yard maintenance shop in this area for many years. The soil excavated from the bottom of the basin from where it drains in at and to the west end would need to be sent to a New Mexico Special Waste landfill.

The owners may want to consider installation of a second oil/water separator where water from the transit yard drains into the storm water basin. Installation of silt screen across the opening in the curb would also help decrease contaminants from the transit yard from entering the storm water basin if a second oil/water separator is not feasible. The silt screen would have to be actively managed (cleaned out) after moisture events.

No further investigation is warranted at this time.

6.0 LIMITATIONS AND CLOSURE

This report has been prepared for the use of the City of Santa Fe Transit Yard and assigned parties to assist in an investigation of soil in a storm water basin at 2931

Rufina St. in Santa Fe, NM. Use of this report and/or its contents without the express written permission of X8eVinyard is prohibited.

Project tasks were performed in accordance with generally accepted environmental investigation and assessment practices within New Mexico. This report's conclusions and recommendations are based on field screening results, laboratory data, the observations of the Environmental Professional at the time of the site visits, and on information provided by persons familiar with the property. The information and conclusions in this report are subject to the accuracy, completeness, and availability of the information obtained during the project. This report is specific to the locations, depths, and times that samples were collected during this Investigation. This information may not be appropriate for assessing conditions at other locations or at other times.

Contaminant concentrations may vary between data points and with time. If conditions are encountered during development of this property which differ from those presented herein, this office should be contacted for additional evaluation and recommendations. The staff of X8eVinyard is available for additional consultation as necessary.

Decisions made in regard to the site are based upon the environmental data provided, are at the sole discretion of the Client and associates. No other warranty, expressed or implied, is given.

Thank You for the opportunity to assist Huitt-Zollars, Inc. with this project. Should you have any questions, please contact me at 505-797-9743.

X8eVinyard
Prepared by

David Plante
Environmental Professional

Reviewed by

Clifford K. Hillin, P.G.
Senior Geoscientist
Texas Professional Geologist #10500
Texas LPST CAPM #PM0000408

APPENDIX 1

FIGURES

8916-A Adams Street NE
Albuquerque, NM 87113
contactus@x8evinyard.com
Phone: 505.797.9743
Fax: 505.797.9749

Site Location Map

⊕ Soil Boring Locations

Storm Water Basin Soil Investigation, SF Transit Yard N
Site: 2931 Rufina St.
Santa Fe, New Mexico
Source: Google Earth Map

Client: Huitt-Zollars, Inc.
X8e Vinyard Project No. 15-5-030
Approximate Scale: No Scale
Figure 1

APPENDIX 2
LABORATORY DATA PACKAGE

8916-A Adams Street NE
Albuquerque, NM 87113
contactus@x8evinyard.com
Phone: 505.797.9743
Fax: 505.797.9749

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

October 22, 2015

David Plante
X8E Vinyard
8916 A Adams NE
Albuquerque, NM 87113
TEL: (505) 797-9743
FAX

RE: CNG Fuel Facility Upgrades OrderNo.: 1510297

Dear David Plante:

Hall Environmental Analysis Laboratory received 8 sample(s) on 10/7/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1510297**
Date Reported: **10/22/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-001 **Matrix:** SOIL

Client Sample ID: Hole #1-01-4"
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	10	10		mg/Kg	1	10/14/2015 9:41:08 AM	21759
Motor Oil Range Organics (MRO)	72	50		mg/Kg	1	10/14/2015 9:41:08 AM	21759
Surr: DNOP	118	57.9-140		%REC	1	10/14/2015 9:41:08 AM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	10/9/2015 12:40:35 PM	21739
Surr: BFB	88.6	75.4-113		%REC	1	10/9/2015 12:40:35 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-002 **Matrix:** SOIL

Client Sample ID: Hole#1-02
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.032		mg/Kg	1	10/14/2015 4:51:36 PM	21825
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	13		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Barium	100	0.50		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Cadmium	ND	0.50		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Chromium	8.1	1.5		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Lead	7.1	1.3		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Selenium	ND	13		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Silver	ND	1.3		mg/Kg	5	10/15/2015 1:26:14 PM	21787

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-003 **Matrix:** SOIL

Client Sample ID: Hole#1-03
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**DJF**
Benzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Toluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Ethylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Methyl tert-butyl ether (MTBE)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,4-Trimethylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,3,5-Trimethylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dichloroethane (EDC)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dibromoethane (EDB)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Naphthalene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1-Methylnaphthalene	ND	0.20		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Methylnaphthalene	ND	0.20		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Acetone	ND	0.74		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromodichloromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromoform	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromomethane	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Butanone	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Carbon disulfide	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Carbon tetrachloride	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chloroethane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chloroform	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chloromethane	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Chlorotoluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
4-Chlorotoluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
cis-1,2-DCE	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
cis-1,3-Dichloropropene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dibromo-3-chloropropane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Dibromochloromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Dibromomethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,3-Dichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,4-Dichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Dichlorodifluoromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1-Dichloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1-Dichloroethene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dichloropropane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,3-Dichloropropane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2,2-Dichloropropane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-003 **Matrix:** SOIL

Client Sample ID: Hole#1-03
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**DJF**
1,1-Dichloropropene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Hexachlorobutadiene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Hexanone	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Isopropylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
4-Isopropyltoluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
4-Methyl-2-pentanone	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Methylene chloride	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
n-Butylbenzene	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
n-Propylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
sec-Butylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Styrene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
tert-Butylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,1,2-Tetrachloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,2,2-Tetrachloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Tetrachloroethene (PCE)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
trans-1,2-DCE	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
trans-1,3-Dichloropropene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,3-Trichlorobenzene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,4-Trichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,1-Trichloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,2-Trichloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Trichloroethene (TCE)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Trichlorofluoromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,3-Trichloropropane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Vinyl chloride	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Xylenes, Total	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Surr: Dibromofluoromethane	110	70-130		%REC	1	10/9/2015 1:04:23 PM	21739
Surr: 1,2-Dichloroethane-d4	96.6	70-130		%REC	1	10/9/2015 1:04:23 PM	21739
Surr: Toluene-d8	94.3	70-130		%REC	1	10/9/2015 1:04:23 PM	21739
Surr: 4-Bromofluorobenzene	106	70-130		%REC	1	10/9/2015 1:04:23 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-004 **Matrix:** SOIL

Client Sample ID: Hole#1-04
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst:	**DAM**
Acenaphthene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Acenaphthylene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Aniline	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Anthracene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Azobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benz(a)anthracene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(a)pyrene	0.20	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(b)fluoranthene	0.56	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(g,h,i)perylene	0.33	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(k)fluoranthene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzoic acid	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzyl alcohol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-chloroethoxy)methane	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-chloroethyl)ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-chloroisopropyl)ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-ethylhexyl)phthalate	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Bromophenyl phenyl ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Butyl benzyl phthalate	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Carbazole	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Chloro-3-methylphenol	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Chloroaniline	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Chloronaphthalene	ND	0.25		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Chlorophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Chlorophenyl phenyl ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Chrysene	0.27	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Di-n-butyl phthalate	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Di-n-octyl phthalate	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Dibenz(a,h)anthracene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Dibenzofuran	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,2-Dichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,3-Dichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,4-Dichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
3,3'-Dichlorobenzidine	ND	0.25		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Diethyl phthalate	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Dimethyl phthalate	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4-Dichlorophenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4-Dimethylphenol	ND	0.30		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4,6-Dinitro-2-methylphenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4-Dinitrophenol	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-004 **Matrix:** SOIL

Client Sample ID: Hole#1-04
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst:	**DAM**
2,4-Dinitrotoluene	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,6-Dinitrotoluene	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Fluoranthene	0.24	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Fluorene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachlorobutadiene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachlorocyclopentadiene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachloroethane	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Indeno(1,2,3-cd)pyrene	0.32	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Isophorone	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1-Methylnaphthalene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Methylnaphthalene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Methylphenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
3+4-Methylphenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
N-Nitrosodi-n-propylamine	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
N-Nitrosodiphenylamine	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Naphthalene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Nitroaniline	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
3-Nitroaniline	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Nitroaniline	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Nitrobenzene	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Nitrophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Nitrophenol	ND	0.25		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Pentachlorophenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Phenanthrene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Phenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Pyrene	0.21	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Pyridine	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,2,4-Trichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4,5-Trichlorophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4,6-Trichlorophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Surr: 2-Fluorophenol	69.3	9.93-124		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: Phenol-d5	82.4	28-119		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: 2,4,6-Tribromophenol	88.8	11.7-134		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: Nitrobenzene-d5	85.0	25-123		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: 2-Fluorobiphenyl	81.5	31.2-117		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: 4-Terphenyl-d14	48.2	5.82-129		%REC	1	10/16/2015 3:52:08 PM	21817

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-005 **Matrix:** SOIL

Client Sample ID: Hole#1-05
Collection Date: 10/6/2015 10:30:00 AM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	10/14/2015 4:13:12 PM	21759
Motor Oil Range Organics (MRO)	83	51		mg/Kg	1	10/14/2015 4:13:12 PM	21759
Surr: DNOP	111	57.9-140		%REC	1	10/14/2015 4:13:12 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	10/9/2015 1:50:11 PM	21739
Surr: BFB	88.4	75.4-113		%REC	1	10/9/2015 1:50:11 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-006 **Matrix:** SOIL

Client Sample ID: Hole#2-01-4"
Collection Date: 10/6/2015 12:00:00 PM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	280	97		mg/Kg	10	10/14/2015 4:56:12 PM	21759
Motor Oil Range Organics (MRO)	1400	490		mg/Kg	10	10/14/2015 4:56:12 PM	21759
Surr: DNOP	0	57.9-140	S	%REC	10	10/14/2015 4:56:12 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	10/9/2015 2:13:25 PM	21739
Surr: BFB	89.1	75.4-113		%REC	1	10/9/2015 2:13:25 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1510297**
Date Reported: **10/22/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-007 **Matrix:** SOIL

Client Sample ID: Hole#3-01-4"
Collection Date: 10/6/2015 1:30:00 PM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	1300	100		mg/Kg	10	10/14/2015 5:39:11 PM	21759
Motor Oil Range Organics (MRO)	6500	510		mg/Kg	10	10/14/2015 5:39:11 PM	21759
Surr: DNOP	0	57.9-140	S	%REC	10	10/14/2015 5:39:11 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	10/9/2015 2:36:39 PM	21739
Surr: BFB	88.1	75.4-113		%REC	1	10/9/2015 2:36:39 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510297-008 **Matrix:** SOIL

Client Sample ID: Hole #4-01-4"
Collection Date: 10/6/2015 1:45:00 PM
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	10/14/2015 6:22:09 PM	21759
Motor Oil Range Organics (MRO)	77	50		mg/Kg	1	10/14/2015 6:22:09 PM	21759
Surr: DNOP	89.5	57.9-140		%REC	1	10/14/2015 6:22:09 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	10/9/2015 2:59:44 PM	21739
Surr: BFB	86.5	75.4-113		%REC	1	10/9/2015 2:59:44 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21759** SampType: **MBLK** TestCode: **EPA Method 8015M/D: Diesel Range Organics**

Client ID: **PBS** Batch ID: **21759** RunNo: **29495**

Prep Date: **10/9/2015** Analysis Date: **10/13/2015** SeqNo: **897466** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	9.8		10.00		98.2	57.9	140			

Sample ID **LCS-21759** SampType: **LCS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**

Client ID: **LCSS** Batch ID: **21759** RunNo: **29495**

Prep Date: **10/9/2015** Analysis Date: **10/13/2015** SeqNo: **897468** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	45	10	50.00	0	90.1	57.4	139			
Surr: DNOP	4.9		5.000		97.6	57.9	140			

Sample ID **1510297-001AMS** SampType: **MS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**

Client ID: **Hole #1-01-4"** Batch ID: **21759** RunNo: **29524**

Prep Date: **10/9/2015** Analysis Date: **10/14/2015** SeqNo: **898989** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	39	9.7	48.69	10.16	59.6	42.3	146			
Surr: DNOP	5.7		4.869		117	57.9	140			

Sample ID **1510297-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015M/D: Diesel Range Organics**

Client ID: **Hole #1-01-4"** Batch ID: **21759** RunNo: **29524**

Prep Date: **10/9/2015** Analysis Date: **10/14/2015** SeqNo: **898990** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	40	10	50.92	10.16	57.8	42.3	146	1.09	28.9	
Surr: DNOP	6.0		5.092		117	57.9	140	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21739** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **PBS** Batch ID: **21739** RunNo: **29422**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895535** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	860		1000		85.9	75.4	113			

Sample ID **LCS-21739** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **LCSS** Batch ID: **21739** RunNo: **29422**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895536** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	97.8	79.6	122			
Surr: BFB	940		1000		94.1	75.4	113			

Sample ID **1510297-001AMS** SampType: **MS** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **Hole #1-01-4"** Batch ID: **21739** RunNo: **29422**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895538** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	28	4.8	23.76	0	117	62.5	151			
Surr: BFB	930		950.6		97.3	75.4	113			

Sample ID **1510297-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **Hole #1-01-4"** Batch ID: **21739** RunNo: **29422**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895539** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	28	4.8	23.76	0	117	62.5	151	0.205	22.1	
Surr: BFB	920		950.6		96.5	75.4	113	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21739**	SampType: **MBLK**		TestCode: **EPA Method 8260B: Volatiles**		
Client ID: **PBS**	Batch ID: **21739**		RunNo: **29456**		
Prep Date: **10/8/2015**	Analysis Date: **10/9/2015**		SeqNo: **895576**	Units: **mg/Kg**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.050								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Methyl tert-butyl ether (MTBE)	ND	0.050								
1,2,4-Trimethylbenzene	ND	0.050								
1,3,5-Trimethylbenzene	ND	0.050								
1,2-Dichloroethane (EDC)	ND	0.050								
1,2-Dibromoethane (EDB)	ND	0.050								
Naphthalene	ND	0.10								
1-Methylnaphthalene	ND	0.20								
2-Methylnaphthalene	ND	0.20								
Acetone	ND	0.75								
Bromobenzene	ND	0.050								
Bromodichloromethane	ND	0.050								
Bromoform	ND	0.050								
Bromomethane	ND	0.15								
2-Butanone	ND	0.50								
Carbon disulfide	ND	0.50								
Carbon tetrachloride	ND	0.050								
Chlorobenzene	ND	0.050								
Chloroethane	ND	0.10								
Chloroform	ND	0.050								
Chloromethane	ND	0.15								
2-Chlorotoluene	ND	0.050								
4-Chlorotoluene	ND	0.050								
cis-1,2-DCE	ND	0.050								
cis-1,3-Dichloropropene	ND	0.050								
1,2-Dibromo-3-chloropropane	ND	0.10								
Dibromochloromethane	ND	0.050								
Dibromomethane	ND	0.050								
1,2-Dichlorobenzene	ND	0.050								
1,3-Dichlorobenzene	ND	0.050								
1,4-Dichlorobenzene	ND	0.050								
Dichlorodifluoromethane	ND	0.050								
1,1-Dichloroethane	ND	0.050								
1,1-Dichloroethene	ND	0.050								
1,2-Dichloropropane	ND	0.050								
1,3-Dichloropropane	ND	0.050								
2,2-Dichloropropane	ND	0.10								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21739** SampType: **MBLK** TestCode: **EPA Method 8260B: Volatiles**

Client ID: **PBS** Batch ID: **21739** RunNo: **29456**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895576** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	0.10								
Hexachlorobutadiene	ND	0.10								
2-Hexanone	ND	0.50								
Isopropylbenzene	ND	0.050								
4-Isopropyltoluene	ND	0.050								
4-Methyl-2-pentanone	ND	0.50								
Methylene chloride	ND	0.15								
n-Butylbenzene	ND	0.15								
n-Propylbenzene	ND	0.050								
sec-Butylbenzene	ND	0.050								
Styrene	ND	0.050								
tert-Butylbenzene	ND	0.050								
1,1,1,2-Tetrachloroethane	ND	0.050								
1,1,2,2-Tetrachloroethane	ND	0.050								
Tetrachloroethene (PCE)	ND	0.050								
trans-1,2-DCE	ND	0.050								
trans-1,3-Dichloropropene	ND	0.050								
1,2,3-Trichlorobenzene	ND	0.10								
1,2,4-Trichlorobenzene	ND	0.050								
1,1,1-Trichloroethane	ND	0.050								
1,1,2-Trichloroethane	ND	0.050								
Trichloroethene (TCE)	ND	0.050								
Trichlorofluoromethane	ND	0.050								
1,2,3-Trichloropropane	ND	0.10								
Vinyl chloride	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: Dibromofluoromethane	0.55		0.5000		110	70	130			
Surr: 1,2-Dichloroethane-d4	0.46		0.5000		92.9	70	130			
Surr: Toluene-d8	0.48		0.5000		95.7	70	130			
Surr: 4-Bromofluorobenzene	0.50		0.5000		100	70	130			

Sample ID **LCS-21739** SampType: **LCS** TestCode: **EPA Method 8260B: Volatiles**

Client ID: **LCSS** Batch ID: **21739** RunNo: **29456**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895577** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.95	0.050	1.000	0	95.2	70	130			
Toluene	0.96	0.050	1.000	0	95.7	70	130			
Chlorobenzene	0.98	0.050	1.000	0	98.4	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **LCS-21739** SampType: **LCS** TestCode: **EPA Method 8260B: Volatiles**

Client ID: **LCSS** Batch ID: **21739** RunNo: **29456**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895577** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloroethene	1.0	0.050	1.000	0	104	70	130			
Trichloroethene (TCE)	0.94	0.050	1.000	0	93.6	70	130			
Surr: Dibromofluoromethane	0.55		0.5000		109	70	130			
Surr: 1,2-Dichloroethane-d4	0.51		0.5000		101	70	130			
Surr: Toluene-d8	0.48		0.5000		95.6	70	130			
Surr: 4-Bromofluorobenzene	0.49		0.5000		97.4	70	130			

Sample ID **1510297-003ams** SampType: **MS** TestCode: **EPA Method 8260B: Volatiles**

Client ID: **Hole#1-03** Batch ID: **21739** RunNo: **29456**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895579** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.1	0.050	0.9921	0	106	70	130			
Toluene	1.1	0.050	0.9921	0	106	65	138			
Chlorobenzene	1.1	0.050	0.9921	0	108	70	130			
1,1-Dichloroethene	1.1	0.050	0.9921	0	113	72.6	149			
Trichloroethene (TCE)	1.1	0.050	0.9921	0	109	62.4	139			
Surr: Dibromofluoromethane	0.56		0.4960		113	70	130			
Surr: 1,2-Dichloroethane-d4	0.49		0.4960		99.5	70	130			
Surr: Toluene-d8	0.47		0.4960		94.6	70	130			
Surr: 4-Bromofluorobenzene	0.49		0.4960		98.5	70	130			

Sample ID **1510297-003amsd** SampType: **MSD** TestCode: **EPA Method 8260B: Volatiles**

Client ID: **Hole#1-03** Batch ID: **21739** RunNo: **29456**

Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895580** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.1	0.050	0.9940	0	106	70	130	0.163	20	
Toluene	1.0	0.050	0.9940	0	105	65	138	0.816	20	
Chlorobenzene	1.1	0.050	0.9940	0	112	70	130	4.00	20	
1,1-Dichloroethene	1.1	0.050	0.9940	0	108	72.6	149	4.22	20	
Trichloroethene (TCE)	1.0	0.050	0.9940	0	104	62.4	139	4.05	20	
Surr: Dibromofluoromethane	0.55		0.4970		110	70	130	0	0	
Surr: 1,2-Dichloroethane-d4	0.48		0.4970		97.4	70	130	0	0	
Surr: Toluene-d8	0.47		0.4970		94.5	70	130	0	0	
Surr: 4-Bromofluorobenzene	0.49		0.4970		98.7	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **mb-21817**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**	
Client ID: **PBS**	Batch ID: **21817**	RunNo: **29617**	
Prep Date: **10/13/2015**	Analysis Date: **10/16/2015**	SeqNo: **901588**	Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	0.20								
Acenaphthylene	ND	0.20								
Aniline	ND	0.20								
Anthracene	ND	0.20								
Azobenzene	ND	0.20								
Benz(a)anthracene	ND	0.20								
Benzo(a)pyrene	ND	0.20								
Benzo(b)fluoranthene	ND	0.20								
Benzo(g,h,i)perylene	ND	0.20								
Benzo(k)fluoranthene	ND	0.20								
Benzoic acid	ND	0.50								
Benzyl alcohol	ND	0.20								
Bis(2-chloroethoxy)methane	ND	0.20								
Bis(2-chloroethyl)ether	ND	0.20								
Bis(2-chloroisopropyl)ether	ND	0.20								
Bis(2-ethylhexyl)phthalate	ND	0.50								
4-Bromophenyl phenyl ether	ND	0.20								
Butyl benzyl phthalate	ND	0.20								
Carbazole	ND	0.20								
4-Chloro-3-methylphenol	ND	0.50								
4-Chloroaniline	ND	0.50								
2-Chloronaphthalene	ND	0.25								
2-Chlorophenol	ND	0.20								
4-Chlorophenyl phenyl ether	ND	0.20								
Chrysene	ND	0.20								
Di-n-butyl phthalate	ND	0.40								
Di-n-octyl phthalate	ND	0.40								
Dibenz(a,h)anthracene	ND	0.20								
Dibenzofuran	ND	0.20								
1,2-Dichlorobenzene	ND	0.20								
1,3-Dichlorobenzene	ND	0.20								
1,4-Dichlorobenzene	ND	0.20								
3,3'-Dichlorobenzidine	ND	0.25								
Diethyl phthalate	ND	0.20								
Dimethyl phthalate	ND	0.20								
2,4-Dichlorophenol	ND	0.40								
2,4-Dimethylphenol	ND	0.30								
4,6-Dinitro-2-methylphenol	ND	0.40								
2,4-Dinitrophenol	ND	0.50								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **mb-21817**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**	
Client ID: **PBS**	Batch ID: **21817**	RunNo: **29617**	
Prep Date: **10/13/2015**	Analysis Date: **10/16/2015**	SeqNo: **901588**	Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	ND	0.50								
2,6-Dinitrotoluene	ND	0.50								
Fluoranthene	ND	0.20								
Fluorene	ND	0.20								
Hexachlorobenzene	ND	0.20								
Hexachlorobutadiene	ND	0.20								
Hexachlorocyclopentadiene	ND	0.20								
Hexachloroethane	ND	0.20								
Indeno(1,2,3-cd)pyrene	ND	0.20								
Isophorone	ND	0.40								
1-Methylnaphthalene	ND	0.20								
2-Methylnaphthalene	ND	0.20								
2-Methylphenol	ND	0.40								
3+4-Methylphenol	ND	0.20								
N-Nitrosodi-n-propylamine	ND	0.20								
N-Nitrosodiphenylamine	ND	0.20								
Naphthalene	ND	0.20								
2-Nitroaniline	ND	0.20								
3-Nitroaniline	ND	0.20								
4-Nitroaniline	ND	0.40								
Nitrobenzene	ND	0.40								
2-Nitrophenol	ND	0.20								
4-Nitrophenol	ND	0.25								
Pentachlorophenol	ND	0.40								
Phenanthrene	ND	0.20								
Phenol	ND	0.20								
Pyrene	ND	0.20								
Pyridine	ND	0.40								
1,2,4-Trichlorobenzene	ND	0.20								
2,4,5-Trichlorophenol	ND	0.20								
2,4,6-Trichlorophenol	ND	0.20								
Surr: 2-Fluorophenol	2.5		3.330		74.1	9.93	124			
Surr: Phenol-d5	2.9		3.330		88.2	28	119			
Surr: 2,4,6-Tribromophenol	2.8		3.330		82.9	11.7	134			
Surr: Nitrobenzene-d5	1.4		1.670		85.5	25	123			
Surr: 2-Fluorobiphenyl	1.4		1.670		83.7	31.2	117			
Surr: 4-Terphenyl-d14	0.84		1.670		50.4	5.82	129			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **lcs-21817** SampType: **LCS** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **LCSS** Batch ID: **21817** RunNo: **29617**

Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901589** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	1.3	0.20	1.670	0	76.4	45.8	114			
4-Chloro-3-methylphenol	3.1	0.50	3.330	0	91.8	52.3	122			
2-Chlorophenol	3.1	0.20	3.330	0	92.3	49.9	115			
1,4-Dichlorobenzene	1.5	0.20	1.670	0	89.2	43.7	107			
2,4-Dinitrotoluene	1.1	0.50	1.670	0	64.6	36	106			
N-Nitrosodi-n-propylamine	1.5	0.20	1.670	0	89.4	39.5	110			
4-Nitrophenol	2.3	0.25	3.330	0	69.4	45.1	121			
Pentachlorophenol	2.4	0.40	3.330	0	72.0	23.7	111			
Phenol	3.1	0.20	3.330	0	92.5	52.7	119			
Pyrene	1.3	0.20	1.670	0	77.0	50.4	116			
1,2,4-Trichlorobenzene	1.6	0.20	1.670	0	98.4	40.1	114			
Surr: 2-Fluorophenol	2.9		3.330		86.9	9.93	124			
Surr: Phenol-d5	3.3		3.330		100	28	119			
Surr: 2,4,6-Tribromophenol	3.2		3.330		96.2	11.7	134			
Surr: Nitrobenzene-d5	1.6		1.670		96.5	25	123			
Surr: 2-Fluorobiphenyl	1.5		1.670		88.7	31.2	117			
Surr: 4-Terphenyl-d14	0.96		1.670		57.4	5.82	129			

Sample ID **1510297-004ams** SampType: **MS** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **Hole#1-04** Batch ID: **21817** RunNo: **29617**

Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901593** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	1.0	0.20	1.668	0	60.4	27.5	117			
4-Chloro-3-methylphenol	2.3	0.50	3.327	0	69.0	26.3	116			
2-Chlorophenol	2.4	0.20	3.327	0	71.2	21.4	113			
1,4-Dichlorobenzene	1.1	0.20	1.668	0	64.7	25	105			
2,4-Dinitrotoluene	0.85	0.50	1.668	0	50.9	21.1	119			
N-Nitrosodi-n-propylamine	1.2	0.20	1.668	0	71.2	21.3	126			
4-Nitrophenol	2.1	0.25	3.327	0	62.2	21.3	120			
Pentachlorophenol	2.0	0.40	3.327	0	58.9	11.5	115			
Phenol	2.2	0.20	3.327	0	66.9	23	118			
Pyrene	1.1	0.20	1.668	0.2093	53.2	25.7	110			
1,2,4-Trichlorobenzene	1.4	0.20	1.668	0	81.0	31.1	107			
Surr: 2-Fluorophenol	2.2		3.327		65.6	9.93	124			
Surr: Phenol-d5	2.5		3.327		74.2	28	119			
Surr: 2,4,6-Tribromophenol	2.6		3.327		77.0	11.7	134			
Surr: Nitrobenzene-d5	1.3		1.668		80.7	25	123			
Surr: 2-Fluorobiphenyl	1.2		1.668		73.5	31.2	117			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **1510297-004ams** SampType: **MS** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **Hole#1-04** Batch ID: **21817** RunNo: **29617**

Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901593** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Terphenyl-d14	0.70		1.668		41.9	5.82	129			

Sample ID **1510297-004AMSD** SampType: **MSD** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **Hole#1-04** Batch ID: **21817** RunNo: **29617**

Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901594** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	0.88	0.20	1.659	0	52.9	27.5	117	13.7	25.4	
4-Chloro-3-methylphenol	2.0	0.50	3.309	0	60.2	26.3	116	14.1	30.4	
2-Chlorophenol	2.1	0.20	3.309	0	62.0	21.4	113	14.4	33.4	
1,4-Dichlorobenzene	0.91	0.20	1.659	0	55.0	25	105	16.7	20.9	
2,4-Dinitrotoluene	0.74	0.50	1.659	0	44.6	21.1	119	13.7	27.9	
N-Nitrosodi-n-propylamine	1.0	0.20	1.659	0	63.1	21.3	126	12.5	27.5	
4-Nitrophenol	1.8	0.25	3.309	0	54.6	21.3	120	13.6	33.7	
Pentachlorophenol	1.8	0.40	3.309	0	54.9	11.5	115	7.64	39.7	
Phenol	2.0	0.20	3.309	0	60.8	23	118	10.1	30.1	
Pyrene	0.92	0.20	1.659	0.2093	43.0	25.7	110	17.3	22.7	
1,2,4-Trichlorobenzene	1.2	0.20	1.659	0	70.3	31.1	107	14.7	27.8	
Surr: 2-Fluorophenol	1.9		3.309		56.0	9.93	124	0	0	
Surr: Phenol-d5	2.3		3.309		69.2	28	119	0	0	
Surr: 2,4,6-Tribromophenol	2.3		3.309		70.4	11.7	134	0	0	
Surr: Nitrobenzene-d5	1.2		1.659		70.3	25	123	0	0	
Surr: 2-Fluorobiphenyl	1.1		1.659		63.3	31.2	117	0	0	
Surr: 4-Terphenyl-d14	0.62		1.659		37.5	5.82	129	0	0	

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21825**	SampType: **MBLK**		TestCode: **EPA Method 7471: Mercury**		
Client ID: **PBS**	Batch ID: **21825**		RunNo: **29545**		
Prep Date: **10/13/2015**	Analysis Date: **10/14/2015**		SeqNo: **899031**	Units: **mg/Kg**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID **LCS-21825**	SampType: **LCS**		TestCode: **EPA Method 7471: Mercury**		
Client ID: **LCSS**	Batch ID: **21825**		RunNo: **29545**		
Prep Date: **10/13/2015**	Analysis Date: **10/14/2015**		SeqNo: **899032**	Units: **mg/Kg**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.16	0.033	0.1667	0	97.4	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**

22-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21787** SampType: **MBLK** TestCode: **EPA Method 6010B: Soil Metals**

Client ID: **PBS** Batch ID: **21787** RunNo: **29499**

Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897295** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	2.5								
Barium	ND	0.10								
Cadmium	ND	0.10								
Chromium	ND	0.30								
Lead	ND	0.25								
Selenium	ND	2.5								
Silver	ND	0.25								

Sample ID **LCS-21787** SampType: **LCS** TestCode: **EPA Method 6010B: Soil Metals**

Client ID: **LCSS** Batch ID: **21787** RunNo: **29499**

Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897296** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	26	2.5	25.00	0	104	80	120			
Barium	26	0.10	25.00	0	106	80	120			
Cadmium	27	0.10	25.00	0	106	80	120			
Chromium	27	0.30	25.00	0	107	80	120			
Lead	26	0.25	25.00	0	104	80	120			
Selenium	25	2.5	25.00	0	98.3	80	120			
Silver	5.3	0.25	5.000	0	105	80	120			

Sample ID **MB-21787** SampType: **MBLK** TestCode: **EPA Method 6010B: Soil Metals**

Client ID: **PBS** Batch ID: **21787** RunNo: **29499**

Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897315** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Silver	ND	0.25								

Sample ID **LCS-21787** SampType: **LCS** TestCode: **EPA Method 6010B: Soil Metals**

Client ID: **LCSS** Batch ID: **21787** RunNo: **29499**

Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897316** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Silver	4.9	0.25	5.000	0	97.9	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: X8E VINYARD Work Order Number: 1510297 RcptNo: 1

Received by/date: 10/07/15

Logged By: Lindsay Mangin 10/7/2015 10:19:00 AM

Completed By: Lindsay Mangin 10/7/2015 10:27:12 AM

Reviewed By: CS 10/07/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)
Adjusted? _____
Checked by: _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____
By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: _____
Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.9	Good	Not Present			

Chain-of-Custody Record

Client: X8e Vinyard

Mailing Address: 8916-A Adams St.
Albuq., NM 87113

Phone #: 505-797-9743

email or Fax#: dplante@x8evinyard.com

QA/QC Package:
X Standard ☐ Level 4 (Full Validation)

Accreditation:
☒ NELAP ☐ Other _____
☐ EDD (Type) _____

Turn-Around Time:
☒ Standard ☐ Rush _____

Project Name: CNG Fuel Facility Upgrades

Project #: 15-5-029

Project Manager: David Plante

Sampler: D Plante

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.9-1.0cf=1.9

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1510297	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles (Y or N)
10/6/15	10:30	Soil	Hole #1-01-4"	Glass	N/A	-001			X													
10/6/15	10:30	Soil	Hole #1-02	Glass	N/A	-002							X									
10/6/15	10:30	Soil	Hole #1-03	Glass	N/A	-003										X						
10/6/15	10:30	Soil	Hole #1-04	Glass	N/A	-004											X					
10/6/15	10:30	Soil	Hole #1-05	Glass	N/A	-005			X													
10/6/15	12:00	Soil	Hole #2-01-4"	Glass	N/A	-006			X													
10/6/15	1:30	Soil	Hole #3-01-4"	Glass	N/A	-007			X													
10/6/15	1:45	Soil	Hole #4-01-4"	Glass	N/A	-008			X													

Date	Time	Relinquished by	Received by	Date	Time
10/7/15	10:19	D Plante	[illegible]	10/07/15	1019

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

October 28, 2015

David Plante
X8E Vinyard
8916 A Adams NE
Albuquerque, NM 87113
TEL: (505) 797-9743
FAX

RE: CNG Fuel Facility Upgrades OrderNo.: 1510515

Dear David Plante:

Hall Environmental Analysis Laboratory received 6 sample(s) on 10/9/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1510515**
Date Reported: **10/28/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510515-001 **Matrix:** SOIL

Client Sample ID: Hole #4-02-2'
Collection Date: 10/9/2015 9:30:00 AM
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	10/13/2015 6:21:36 PM	21759
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	10/13/2015 6:21:36 PM	21759
Surr: DNOP	103	57.9-140		%REC	1	10/13/2015 6:21:36 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	10/14/2015 1:47:03 AM	21799
Surr: BFB	90.0	75.4-113		%REC	1	10/14/2015 1:47:03 AM	21799

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510515-002 **Matrix:** SOIL

Client Sample ID: Hole #4-03
Collection Date: 10/9/2015 9:20:00 AM
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.032		mg/Kg	1	10/14/2015 10:39:08 AM	21824
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	4.9		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Barium	99	0.20		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Cadmium	ND	0.20		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Chromium	6.6	0.59		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Lead	4.7	0.49		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Selenium	ND	4.9		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Silver	ND	0.49		mg/Kg	2	10/19/2015 4:26:21 PM	21860

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510515-003 **Matrix:** SOIL

Client Sample ID: Hole #3-02-2'
Collection Date: 10/9/2015 10:00:00 AM
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **KJH**	
Diesel Range Organics (DRO)	30	9.5		mg/Kg	1	10/14/2015 11:25:13 AM	21759
Motor Oil Range Organics (MRO)	120	48		mg/Kg	1	10/14/2015 11:25:13 AM	21759
Surr: DNOP	109	57.9-140		%REC	1	10/14/2015 11:25:13 AM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	10/14/2015 2:56:16 AM	21799
Surr: BFB	89.9	75.4-113		%REC	1	10/14/2015 2:56:16 AM	21799

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510515-004 **Matrix:** SOIL

Client Sample ID: Hole #3-03
Collection Date: 10/9/2015 10:15:00 AM
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst: **JLF**	
Mercury	ND	0.033		mg/Kg	1	10/14/2015 10:40:55 AM	21824
EPA METHOD 6010B: SOIL METALS						Analyst: **MED**	
Arsenic	ND	2.5		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Barium	29	0.10		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Cadmium	ND	0.10		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Chromium	2.7	0.30		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Lead	4.1	0.25		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Selenium	ND	2.5		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Silver	ND	0.25		mg/Kg	1	10/19/2015 4:22:38 PM	21860

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510515-005 **Matrix:** SOIL

Client Sample ID: Hole #2-02-2'
Collection Date: 10/9/2015 10:30:00 AM
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	87	10		mg/Kg	1	10/14/2015 1:44:36 PM	21759
Motor Oil Range Organics (MRO)	300	50		mg/Kg	1	10/14/2015 1:44:36 PM	21759
Surr: DNOP	189	57.9-140	S	%REC	1	10/14/2015 1:44:36 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	10/14/2015 3:19:21 AM	21799
Surr: BFB	89.5	75.4-113		%REC	1	10/14/2015 3:19:21 AM	21799

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: CNG Fuel Facility Upgrades
Lab ID: 1510515-006 **Matrix:** SOIL

Client Sample ID: Hole #2-03
Collection Date: 10/9/2015 10:30:00 AM
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.033		mg/Kg	1	10/14/2015 4:49:50 PM	21825
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	5.0		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Barium	120	0.20		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Cadmium	ND	0.20		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Chromium	13	0.60		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Lead	22	0.50		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Selenium	ND	5.0		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Silver	ND	0.50		mg/Kg	2	10/19/2015 4:34:44 PM	21860

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**

28-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21759** SampType: **MBLK** TestCode: **EPA Method 8015M/D: Diesel Range Organics**

Client ID: **PBS** Batch ID: **21759** RunNo: **29495**

Prep Date: **10/9/2015** Analysis Date: **10/13/2015** SeqNo: **897466** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	9.8		10.00		98.2	57.9	140			

Sample ID **LCS-21759** SampType: **LCS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**

Client ID: **LCSS** Batch ID: **21759** RunNo: **29495**

Prep Date: **10/9/2015** Analysis Date: **10/13/2015** SeqNo: **897468** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	45	10	50.00	0	90.1	57.4	139			
Surr: DNOP	4.9		5.000		97.6	57.9	140			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**

28-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21799** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **PBS** Batch ID: **21799** RunNo: **29502**

Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897743** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	890		1000		88.8	75.4	113			

Sample ID **LCS-21799** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **LCSS** Batch ID: **21799** RunNo: **29502**

Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897744** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	5.0	25.00	0	101	79.6	122			
Surr: BFB	970		1000		96.8	75.4	113			

Sample ID **1510515-001AMS** SampType: **MS** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **Hole #4-02-2'** Batch ID: **21799** RunNo: **29502**

Prep Date: **10/12/2015** Analysis Date: **10/14/2015** SeqNo: **897751** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	4.9	24.73	0	98.7	62.5	151			
Surr: BFB	950		989.1		96.5	75.4	113			

Sample ID **1510515-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **Hole #4-02-2'** Batch ID: **21799** RunNo: **29502**

Prep Date: **10/12/2015** Analysis Date: **10/14/2015** SeqNo: **897752** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	4.9	24.41	0	102	62.5	151	2.03	22.1	
Surr: BFB	950		976.6		97.4	75.4	113	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**

28-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21824** SampType: **MBLK** TestCode: **EPA Method 7471: Mercury**

Client ID: **PBS** Batch ID: **21824** RunNo: **29521**

Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **898146** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID **LCS-21824** SampType: **LCS** TestCode: **EPA Method 7471: Mercury**

Client ID: **LCSS** Batch ID: **21824** RunNo: **29521**

Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **898147** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.17	0.033	0.1667	0	102	80	120			

Sample ID **MB-21825** SampType: **MBLK** TestCode: **EPA Method 7471: Mercury**

Client ID: **PBS** Batch ID: **21825** RunNo: **29545**

Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **899031** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID **LCS-21825** SampType: **LCS** TestCode: **EPA Method 7471: Mercury**

Client ID: **LCSS** Batch ID: **21825** RunNo: **29545**

Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **899032** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.16	0.033	0.1667	0	97.4	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**

28-Oct-15

Client: X8E Vinyard

Project: CNG Fuel Facility Upgrades

Sample ID **MB-21860** SampType: **MBLK** TestCode: **EPA Method 6010B: Soil Metals**

Client ID: **PBS** Batch ID: **21860** RunNo: **29643**

Prep Date: **10/14/2015** Analysis Date: **10/19/2015** SeqNo: **902568** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	2.5								
Barium	ND	0.10								
Cadmium	ND	0.10								
Chromium	ND	0.30								
Lead	ND	0.25								
Selenium	ND	2.5								
Silver	ND	0.25								

Sample ID **LCS-21860** SampType: **LCS** TestCode: **EPA Method 6010B: Soil Metals**

Client ID: **LCSS** Batch ID: **21860** RunNo: **29643**

Prep Date: **10/14/2015** Analysis Date: **10/19/2015** SeqNo: **902569** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	25	2.5	25.00	0	102	80	120			
Barium	26	0.10	25.00	0	105	80	120			
Cadmium	26	0.10	25.00	0	105	80	120			
Chromium	27	0.30	25.00	0	106	80	120			
Lead	25	0.25	25.00	0	101	80	120			
Selenium	25	2.5	25.00	0	99.9	80	120			
Silver	5.2	0.25	5.000	0	104	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: X8E VINYARD Work Order Number: 1510515 RcptNo: 1

Received by/date: CS 10/09/15

Logged By: Ashley Gallegos 10/9/2015 2:00:00 PM

Completed By: Ashley Gallegos 10/9/2015 4:12:11 PM

Reviewed By: 10/12/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Samples were collected the same day and chilled.
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)
Adjusted? _____
Checked by: _____

Special Handling (If applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date: _____
By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: _____
Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	13.2	Good	Not Present			

Chain-of-Custody Record

Client: X8e Vinyard

Mailing Address: 8916 A Adams St.

Phone #: 505-797-9743

email or Fax#: dplante@x8evinyard.com

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

☐ Standard ☐ Rush _____

Project Name: CNG Fuel Facility Upgrades

Project #: 15-5-029

Project Manager: David Plante

Sampler: David Plante

On Ice: X Yes ☐ No

Sample Temperature: 13.2°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1510515	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel) MRO	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles (Y or N)
10/9/15	9:30	Soil	Hole #4-02-2'	Glass	N/A	-001			X													
10/9/15	9:20	Soil	Hole #4-03	Glass	N/A	-002							X									
10/9/15	10:00	Soil	Hole #3-02-2'	Glass	N/A	-003			X													
10/9/15	10:15	Soil	Hole #3-03	Glass	N/A	-004							X									
10/9/15	10:30	Soil	Hole #2-02-2'	Glass	N/A	-005			X													
10/9/15	10:30	Soil	Hole #2-03	Glass	N/A	-006							X									

Date:	Time:	Relinquished by:	Received by:	Date	Time
10/9/15	0710 am	[signature]	Celina Sanchez	10/09/15	1400
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

APPENDIX 3
PHOTOGRAPHS

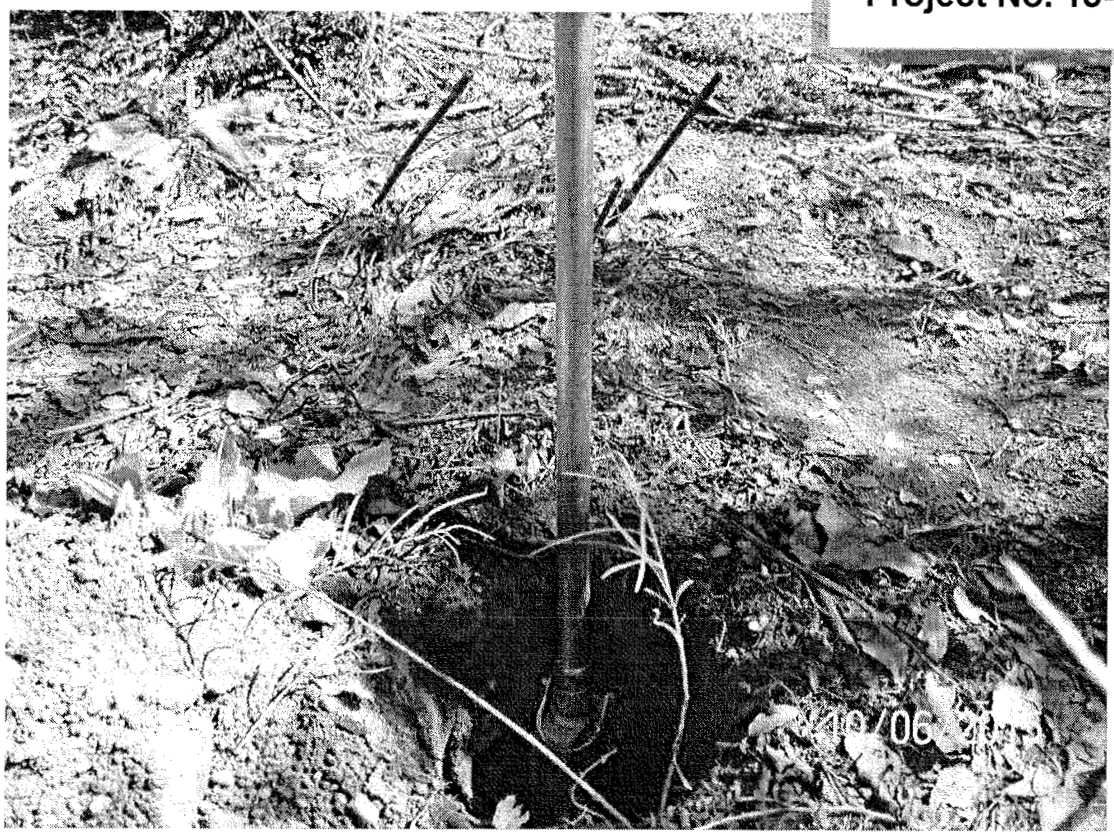
Project No. 15-5-030

Santa Fe Transit storm water basin looking east

Santa Fe Transit storm water basin looking west with flag for boring Number 3

Figure 2

Project No. 15-5-030



Hand auger in soil boring Number 1

Soil boring Number 1

Figure 3

Project No. 15-5-030

Soil boring Number 1 completed

Soil boring Number 2 with exposed rock

Figure 4

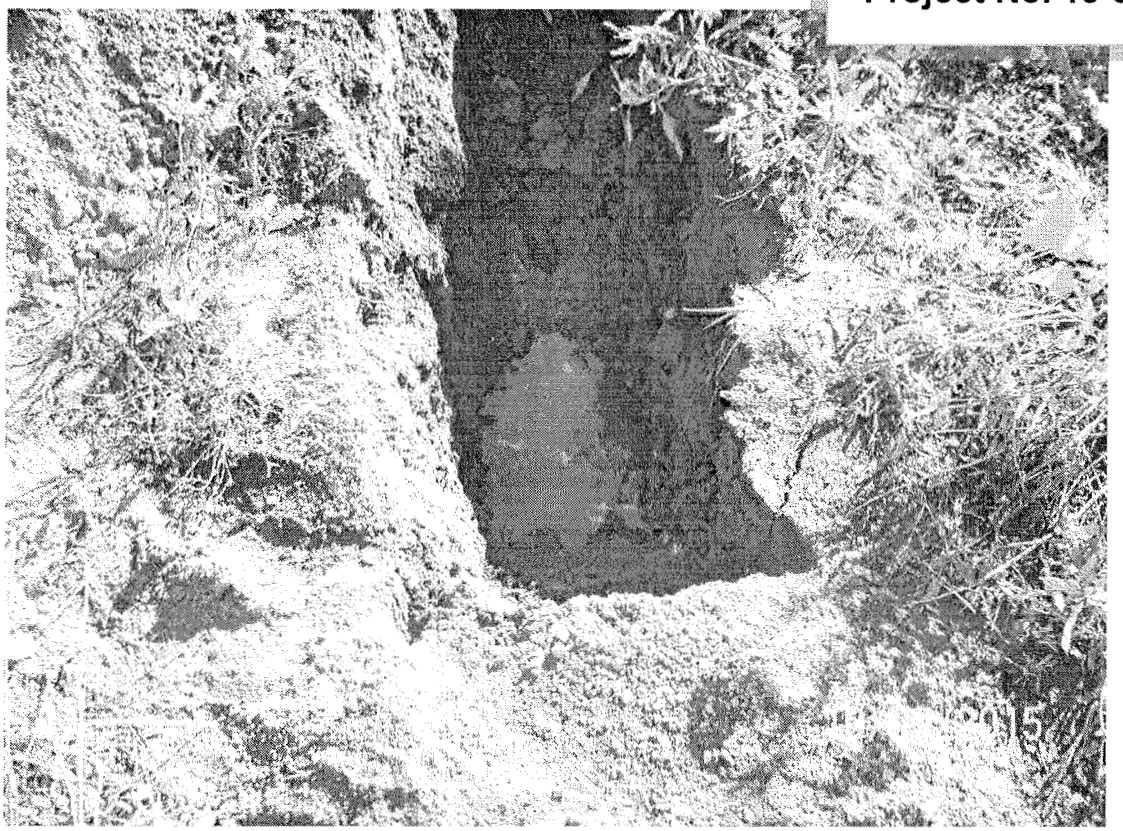
Project No. 15-5-030

Soil boring Number 2 at 1 foot depth

Soil boring Number 3 at 1 foot depth, extensive rock

Figure 5

Project No. 15-5-030



Pot hole for sample location Number 2

Sample location Number 3 at two foot depth

Figure 6

Project No. 15-5-030

Sample location Number 4 at two foot depth

Figure 7

Geotechnical Investigation

Santa Fe CNG Facility
Santa Fe, New Mexico

Prepared for:
Huitt-Zollars

Project No.: 15-1-036

June 18, 2015

8916-A ADAMS ST., NE
ALBUQUERQUE, NM 87113
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CONTACTUS@X8EVINYARD.COM

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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for improvements to the Santa Fe CNG Facility located in Santa Fe, New Mexico. The improvements represent upgrades necessary to increase the capacity of the CNG fueling facility.

The investigation was performed to determine site subsurface conditions and, based upon the conditions observed in the test holes, to develop geotechnical recommendations for:

Shallow Foundation Design;
Foundation Bearing Pressures;
Site Grading; and
Drainage.

The conclusions and recommendations presented are based on information provided to us regarding the proposed development, on subsurface conditions disclosed by the test holes, on laboratory testing, and upon the local standards of our profession at the time this report was prepared.

This investigation was not performed to determine the presence of potentially hazardous waste or radon gas. Determination of the presence of potentially hazardous materials was beyond the scope of this investigation and requires the use of exploration techniques and analytic testing which were not appropriate for this investigation. If desired, X8e Vinyard will perform an environmental audit of the site.

2.0 PROPOSED CONSTRUCTION

We anticipate construction will include a small single story addition to the existing CNG Equipment Station at the Public Fast-Fill Area, a pre-engineered steel canopy structure to cover the new Transit Time-Fill (TF) Fueling Area, and a future pre-engineered steel canopy structure at both new Solid Waste TF Areas. Additionally, we understand that the existing detention pond is to be deepened as the new improvements are envisioned to increase run-off within the facility. The addition to the CNG Equipment Station will consist of CMU exterior walls with a pitched metal roof and steel truss support. A canopy supported on columns will be located in the drive aisle to the east of the station. Additionally, there will be equipment skids in that area, each weighing approximately 18,000 pounds, which will require a structural foundation. The new Transit TF Fueling Area will be located within the center of the site and will consist of a pre-engineered steel canopy structure to cover the new fueling area. The structure will have an open wall and a low slope metal roof designed to provide future solar panel installation. Additionally, the structure for the new Transit TF Fueling Area is anticipated to have a maximum column load of approximately 29 kips and a maximum uplift load of 7.1 kips. The two new Solid Waste TF Areas will each be divided into two islands and will have a pre-engineered steel canopy structure that covers a central walkway area and a portion of the parking stalls. The canopy will be designed similarly as that for the new Transit TF Fueling Area so as to accommodate future solar panel installation. The fueling islands will include a concrete surface. The Solid Waste TF Areas will be provided for up to approximately forty (40) refuse trucks, which when empty are approximately 35,000 pounds and when fully laden,

approximately 80,000 pounds. We understand that the refuse trucks are generally empty before returning to the yard where the trucks are parked overnight.

3.0 SITE CONDITIONS

The project is situated within the existing City of Santa Fe CNG Facility located at 2931 Rufina Street in Santa Fe, New Mexico. There are six existing buildings, two existing transit fuel canopies, existing parking lots fronting Rufina Street, asphalt pavement around the existing transit fuel canopies and throughout the fenced in area behind the three buildings which front Rufina Street. Other than a few localized areas of landscaping fronting Rufina Street, much of the ground surface consists of asphalt pavement, except beyond the north fence line and detention pond. Beyond the improved areas, there is an existing stockpile of cold millings, an asphalt paved road along the east edge of the property, and an undulating ground surface characterized by sparse grasses, weeds, shrubs, trees and random piles of construction debris and trash. Drainage appears to largely slope towards the existing detention basin. Configuration of the site is indicated on the Site Plan, Figure 1.

4.0 SITE SUBSURFACE CONDITIONS

To explore the site subsurface conditions, eleven test holes, one of which was a percolation test hole, were drilled at the approximate locations shown on the Site Plan, Figure 1. The soils encountered in the test holes are summarized in the following table for ease of reference. The table presents the depth intervals in feet in which each of the major soil types were encountered in each of the test holes.

Test Hole No.	Asphalt Pavement/ Base Course	Gravel	Silty Sand	Clayey Sand or Silty, Clayey Sand	Silt	Lean Clay
1	0.42/0.25	-	2.0–15.5	-	-	0.7–2.0, 15.5–21.5
2	0.42/0.42	-	2.0–11.0	0.8–2.0, 11.0–21.5	-	-
3	0.42/0.29	-	2.0–5.0, 10.5–16.5	5.0–10.5	-	0.7–2.0
4	0.38/0.38	-	-	2.0–16.5	-	0.7–2.0
5	-	5.0–10.0	0-5.0, 10.0-15.5	15.5–16.5	-	-
6	0.42/0.58	-	1.0–5.0, 10.0-11.5	5.0–10.0	-	-
P7	0.42/0.58	-	0–3.0	3.0–5.0	-	-
8	-	-	0–6.0	-	-	-
9	-	-	2.0–15.0	0–2.0	-	15.0–16.5
10	-	-	15.0–16.5	0–5.0, 10.0–15.0	5.0–10.0	-
11	0.42/0.25	-	-	0.7–5.5	-	-

Overburden soils encountered in the test holes consisted of poorly-graded gravel (GP-GM) with silt and sand, well-graded sand (SW-SM) with silt and gravel, poorly graded sand (SP-SM) with

silt, silty, clayey sand (SC-SM) with varying amounts of gravel, silty sand (SM) with varying amounts of gravel, clayey sand (SC) with varying amounts of gravel, sandy silt (ML), and lean clay (CL) with varying amounts of sand. The poorly graded gravel with silt and sand stratum was described as dense and slightly moist. The silty sands included both the well-graded and poorly graded sands, were generally described as medium dense to very dense and slightly moist to very moist, except that in Test Hole #9, between a depth of 2.0 feet and 10.0 feet, the silty sands were described as loose. The sandy silt stratum was described as very stiff and moist. The lean clays were generally described as medium stiff to hard and moist to very moist.

Neither flowing groundwater nor bedrock was encountered in the test holes to a depth of twenty one and one half (21.5) feet, the maximum depth of exploration. However, groundwater conditions may change with time due to precipitation, variations in groundwater level, seepage from ponding areas, or leaking utilities.

Most of the soils encountered in the test holes exhibit low to moderate consolidation potential under the anticipated structural loads. Slight to moderate consolidation (collapse) occurs when site soils increase in moisture content. Refer to Figures 14 through 19.

The test holes allow observation of a very small portion of the soils below the site. Significant variations in subsurface conditions may occur across the site, which were not disclosed by the test holes.

5.0 LABORATORY TESTING

A laboratory testing program was performed on samples obtained during the field investigation which appeared representative of the soils encountered in the test holes. The laboratory testing program was structured to determine the physical properties of the soils encountered in the test holes necessary for development of geotechnical recommendations.

The laboratory testing program included:

- Moisture Content;
- Dry Density;
- Sieve Analysis;
- Atterberg Limits; and
- Consolidation/Collapse.

Moisture Content and Dry Density tests were performed to evaluate the in-place soil density and moisture content. Test results help to evaluate settlement potential. Test results indicate the soils encountered in the test holes have an average dry density of approximately 118 pcf. Natural moisture content averaged approximately 9.1 percent. Test results are presented on the Logs of Test Holes, Figures 2 through 12, and are summarized on Table 1.

Sieve Analysis and Atterberg Limits tests were performed to confirm field soil classifications and to provide information on general physical soil properties. Test results are presented on Table 1.

Consolidation/Collapse tests were performed to evaluate structure settlement and to determine the effect of water on site soils. The results indicate that the tested soils exhibited low to moderate compressibility under anticipated loads. Slight to moderate additional settlement (collapse) occurred when the tested soil increased in moisture content. Test results are presented on Figures 14 through 19.

6.0 FOUNDATIONS

If the recommendations presented in this report are implemented particularly those regarding site grading and drainage, the proposed structures may be supported on either conventional spread and strip footings, or a monolithic slab on grade with turned down edges. Foundations should bear on a minimum of three (3.0) feet of structural fill. Structural fill should extend a minimum of three feet laterally beyond the edge of all footings. Foundations may be designed for an allowable bearing pressure of 2,000 pounds per square foot. This value may be increased by one-third for short-term loads due to wind and earthquakes. If it is not feasible to implement the site grading, drainage, and landscaping recommendations presented herein, an alternate foundation system may be required. This office should be contacted for additional recommendations.

The base of exterior footings should be embedded a minimum of twenty-four inches below lowest adjacent grade. The base of interior footings should be embedded a minimum of twelve inches below finish pad grade. Spread and strip footings should be a minimum of twenty-four and eighteen inches wide, respectively. Turned down edges should be a minimum of twelve inches wide. However, local building codes may require greater dimensions.

Lateral foundation loads will be resisted by a combination of passive soil pressure against the sides of footings and friction along the base. A passive soil resistance of 300 pounds per cubic foot may be utilized for design. Frictional resistance may be determined by multiplying foundation dead load by a coefficient of friction of 0.40.

Prior to fill placement and following footing excavation, the natural soils should be scarified to a depth of eight inches and moistened to near optimum moisture content (±3%). The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below structures should be placed and compacted as detailed in the attached Appendix. Prior to pouring concrete footing excavations should be cleaned of any slough, loose soil, or debris. Footing excavations should be compacted as detailed in the attached Appendix.

Foundations designed and constructed as described herein are not anticipated to settle more than one inch. Differential settlement between adjacent column footings should not exceed one-half of the above value. Foundations should be designed and constructed to tolerate the above settlement. Foundations should be designed by a qualified structural engineer.

The site soils will consolidate if allowed to increase in moisture content. With appropriate landscape irrigation and site grading and drainage as detailed in this report the moisture content of the soils within five to seven feet of the ground surface may increase. The recommendations presented in this report for site preparation are the minimum we consider prudent to address this degree of moisture penetration. In the event moisture penetration to depths greater than seven feet

occurs, movement substantially greater than quoted above will occur.

To reduce the effect of settlement on the structure, we suggest that all stucco be fiberglass reinforced. Periodic control joints should be utilized in the stucco particularly at window and door corners. Periodic control joints should also be utilized in masonry walls.

Based upon the results of this investigation and our previous experience in the site vicinity, an International Building Code Site Classification of "D" may be utilized for design.

7.0 CONCRETE SLABS-ON-GRADE

Concrete slabs-on-grade may be utilized. Slabs should bear on a minimum of three (3.0) feet of structural fill. Minimum floor slab thickness, overall slab reinforcement, and sawed joints or control joints should be determined by a qualified structural engineer. Conventional slabs should be isolated from all foundations, stem walls, and utility lines. Monolithic slabs should be isolated from all utilities. Frequent joints should be scored or cut in slabs to control the location of cracks.

Slabs should be adequately reinforced with steel. Slab reinforcement should be turned down into turned down edges.

For structural design of the floor slab, a modulus of subgrade reaction of 400 kips per cubic foot may be utilized. This value is for a 1' x 1' square or a 1' wide strip. The above value may be modified for various effective widths based upon the following equation:

$$K_s = 400\left[\frac{B+1}{2B}\right]^2$$

K_s = Modulus of subgrade reaction (kips per cubic foot)

B = Effective width of loaded area (feet)

If moisture-sensitive floor covering is utilized, the flooring manufacturer should be contacted to determine the necessity of a vapor barrier. The moisture barrier may consist of a 6-mil polyethylene film or equivalent. The barrier may be overlain with one or two inches of clean sand to provide a working surface and reduce shrinkage cracking.

Slabs should bear on a minimum of three (3.0) feet of structural fill. Prior to placing slabs or structural fill, the natural soils should be stripped of vegetation, scarified to a depth of eight inches, and moistened to a near optimum (±3%) moisture content. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below slabs should be placed and compacted as detailed in the attached Appendix.

8.0 PERCOLATION TESTING

A percolation test was performed to determine the percolation rate of the on-site soils. The percolation test was performed near the south edge of the existing detention basin as the detention basin was enclosed by a perimeter wire fence. The test location is indicated as Boring #7 on the

attached Site Plan. A percolation rate of 10.7 minutes/inch was obtained at a test depth of approximately 3 feet below the top of the pavement. Results of the percolation test are shown in Appendix B.

9.0 SULFATE TESTING

Two near surface soil samples recovered from test holes drilled at this site were obtained to determine the sulfate content. Results of sulfate tests indicate that the samples exhibited 4.9 to 66 mg/Kg of sulfate. The results indicate negligible sulfate exposure to concrete; therefore, no special concrete requirements apply for this site. Results of sulfate testing are shown in Appendix B.

10.0 EARTHWORK

10.1 General

The settlement estimates presented in this report are based upon the assumption that site earthwork will be performed as recommended in this report and the attached Appendix. Presented below is a summary of the site earthwork recommendations. Detailed earthwork procedures are presented in the attached Appendix.

Prior to commencing earthwork the Contractor should obtain appropriate Proctor tests. Field density testing and evaluation of the suitability of the proposed materials performed prior to completion of the Proctor is "Preliminary" and may change based upon the results of the Proctor testing.

10.2 Clearing and Grubbing

Prior to placing structural fill, all borrow and fill areas should be stripped of vegetation and deleterious materials. All strippings should be hauled off-site or utilized in landscaped areas.

All existing utilities, septic tanks, leach fields, and disturbed soil should be removed from below the proposed amenities. The resulting excavations should be backfilled with compacted fill as detailed in the attached Appendix.

10.3 Excavation

We anticipate that on-site soils can be excavated with conventional earthwork equipment. Cobbles or boulders may be encountered during excavation. Cobbles and boulders should be disposed of off-site or utilized for landscaping. Cobbles and boulders should not be placed within structural fills. Cobbles and boulders as defined in ASTM D-2487.

10.4 Natural Ground Preparation

Prior to placing structural fill and subsequent to final grading in cut areas, the exposed soils should be scarified to a depth of eight inches and moisture conditioned to a near optimum (±3%) moisture content. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. If vibratory compaction poses a threat to nearby structures, static compaction should be utilized.

10.5 Fill Placement and Compaction

Structural fill should be placed in horizontal lifts a maximum of eight inches in loose thickness, moisture conditioned to near optimum moisture content, and mechanically compacted. Fill below footings and slabs should be compacted to a minimum of 95% of maximum dry density as determined by ASTM D-1557. There are localized areas where the on-site soils do not appear to be suitable for re-use as structural fill. It is anticipated that the on-site soils may be blended with import materials coarser than the existing soils encountered within the project area. The resulting blended materials should be tested for conformance with the structural fill criteria.

10.6 Observation and Testing

Placement and compaction of structural fill should be observed and tested by a qualified geotechnical engineer or his representative. The purpose of the observation and testing is to confirm that the recommendations presented herein are followed and to provide supplemental recommendations, if subsurface conditions differ from those anticipated.

Foundation excavations should be observed by a qualified geotechnical engineer, or his representative, prior to placement of reinforcement or concrete. The purpose of the observation is to determine if the exposed soils are similar to those anticipated.

10.7 Frequency of Testing

Earthwork should be tested periodically to confirm the fill is compacted to the criteria presented in this report. Prior to placing fill, the natural ground should be moisture conditioned, compacted, and tested to confirm it is properly compacted. Fill should be placed in maximum eight-inch thick loose lifts, but in no case thicker than can be compacted with the equipment being utilized. Fill should be moisture conditioned and compacted as detailed in this report. Fill areas should be tested at maximum one-foot vertical intervals. If fill areas are worked at different times, each individual area should be tested. Following finish grading, the final surface should be tested. Following foundation excavation, the footing excavations should be tested. Utility trench backfill should be tested as necessary.

11.0 SITE GRADING AND DRAINAGE

The settlement estimates presented in this report assume the site will be graded to drain properly. If the site does not drain properly, structure settlement substantially greater than quoted in this report will occur.

To reduce the risk of structure settlement the site should be graded to rapidly drain away from amenities. Splash blocks should be utilized below down spouts and canales.

If ponding areas are required, they should be located as far away from amenities as possible, a minimum of ten feet. If this criteria cannot be met, this office should be contacted for supplemental recommendations.

Roof gutters and downspouts should be utilized. Roof gutters should discharge to a hard surface. Water should run off rapidly.

12.0 LANDSCAPING

Landscaping adjacent to amenities should be designed and constructed to minimize the potential for wetting of soils supporting the proposed facilities. If soils supporting the proposed facilities are allowed to increase in moisture content to a depth greater than seven feet settlement greater than quoted in this report will occur.

Trees and shrubs within five feet of amenities should be hand watered or watered using controlled drip irrigation. If drip irrigation is used, emitters should discharge no more than one gallon per hour. If grass must be planted within five feet of structures, watering should be carefully controlled to prevent overwatering. Grassed areas adjacent to structures should be sloped so that excess irrigation water will run off promptly. Sprinkler lines and drip irrigation mains should be located a minimum of five feet away from foundations.

Mowing strips, planters and sidewalks should not "dam" water adjacent to structures. If necessary, mowing strips should be perforated to allow water to flow away from structures.

All amenities' planters should be closed bottom and watertight.

13.0 UTILITIES

The site soils are collapsible if allowed to increase in moisture content. If post-construction water or sewer line leaks occur, localized settlement will occur. Following installation, all water and sewer lines should be pressure checked for leaks. Any leaks found should be repaired.

Backfill in utility line trenches below slabs, driveways, and pavement should be compacted to a minimum of 90% of maximum density as determined by ASTM D-1557. Utility trenches should be as narrow as can be properly compacted. To reduce the possibility of breaking utility lines with compaction equipment, heavy compactors should not be utilized.

Utility trenches may not be compacted to the same degree as the remainder of the building pad. Therefore, wall footings, interior walls and thickened slabs should not be placed longitudinally over utility trenches. Column footings should not be placed over utility trenches.

14.0 TRENCHES AND EXCAVATIONS

All trenches greater than four feet in depth must be sloped, shored or braced or otherwise supported according to OSHA Construction and Safety Standards. Material excavated from the trench or spoil must be placed a minimum of two feet from the edge of the excavation. The spoil should be retained in an effective manner such that no loose material can fall into the excavation.

Temporary construction excavations less than eight feet deep should be sloped no steeper than 1½:1 (horizontal:vertical). If deeper excavations are required, this office should be contacted for supplemental recommendations. Limited raveling of slopes will occur particularly as the exposed soils dry out. Heavy equipment and material stockpiles should be located a minimum of five feet from the top of slope.

15.0 ASPHALTIC CONCRETE PAVEMENT

The pavement recommendations presented herein are based upon New Mexico State Highway and Transportation Department design procedures.

Traffic within the new parking and drive areas is anticipated to consist primarily of transit and refuse vehicles. For design purposes, we have assumed an EDLA (Equivalent Daily 18 kip Load Applications) of 20 for transit vehicle parking areas and 40 for transit vehicle access driveways. We understand that the City of Santa Fe plans to use a 6-inch thickness of cold millings on a prepared subgrade in lieu of an asphalt pavement within the Solid Waste TF Area. Should the City of Santa Fe plan to replace the cold millings with either an asphaltic concrete or Portland cement concrete pavement within the very near future, we have assumed a conservative EDLA (Equivalent Daily 18 kip Load Applications) of 20 for refuse vehicle parking and 40 for refuse vehicle access driveways. We have also assumed a conservative R-value of 13 within the Solid Waste TF Area and a conservative R-value of 36 south of the fence line which separates the existing facility from the proposed Solid Waste TF Area. The clayey sand within the Solid Waste TF Area classifies as an A-6 soil according to the AASHTO soil classification system. The clayey sand encountered in Test Hole #4 is an A-2-4 soil per the AASHTO soil classification system. If traffic conditions will vary from the assumed values, this office should be contacted.

Additional design coefficients utilized in our analysis are:

Design Period*	20 years
Regional Factor	1.5
Serviceability Index	2.5

*Periodic pavement maintenance will be required during this period.

To evaluate the required pavement section, the following structural coefficients were utilized in our analysis.

Material	Coefficient
Asphaltic Concrete	0.40
Aggregate Base Course	0.10

Based upon the above criteria, we recommend the following asphaltic concrete pavement sections for transit and refuse vehicle parking areas and driveway areas:

	Asphaltic Concrete	Aggregate Base Course
Transit Vehicle Parking	5"	3"
Transit Vehicle Access Driveways	5"	5"
Refuse Vehicle Parking	6"	6"
Refuse Vehicle Access Driveways	6"	9"

Pavement subgrade and all fill below paved areas should be placed and compacted as detailed in the attached Appendix. Aggregate Base Course should consist of Class I or Class II material as specified in "New Mexico State Department of Transportation". Base course should be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Asphaltic concrete shall be Class SP-B as described in Section 116 of the "New Mexico Standard Specifications for Public Works Construction." Class SP-C Asphaltic Concrete may be utilized if a very smooth surface is desired. However, Class SP-C Asphaltic Concrete tends to be less durable than Class SP-B. Asphaltic concrete shall be compacted to a range of 93-97% of the maximum Theoretical Unit Weight (ASTM D-2041).

Prior to placing cold millings within the proposed Solid Waste TF Area, the existing soils should be removed to such depth as to provide not less than 12 inches of suitable subgrade materials moisture conditioned to within 2 percent of optimum, compacted to not less than 95 percent of maximum density as determined in accordance with ASTM D 1557, and placed in 6-inch maximum lifts.

Prior to placing Aggregate Base Course or Asphaltic Concrete, a soil sterilant may be applied. The sterilant should be applied as per the manufacturer's recommendations.

The above pavement recommendations assume the pavement subgrade will consist of on-site soils comparable to the silty sand encountered within the upper 5 feet. If milling of existing pavement is anticipated for re-use where base course is required, it is recommended that the existing asphaltic concrete and existing base course materials be crushed and blended with imported granular materials. The resulting blended mixture shall be tested for conformance with the requirements associated with either Class I or Class II material as stated hereinbefore. If the subgrade consists of imported soil, the import should be more granular than the on-site soils. Should the subgrade consist of imported soil that is much more granular than the on-site soils, modification, including reduction, of the above pavement sections may be possible. If the subgrade consists of uncontrolled fill, the uncontrolled fill should be more granular than the on-site soils and not less than 12 inches of subgrade shall be moisture conditioned and compacted to a minimum of 95% of maximum density as determined in accordance with ASTM D-1557. If this is not possible, modification of the above pavement sections may be necessary.

Fill in utility line trenches below the pavement must be properly compacted to prevent localized pavement settlement. To minimize settlement and maintenance of the pavement, all trenches should be backfilled with compacted fill as detailed in the attached Appendix.

The site should be graded to prevent saturation of pavement subgrade soils. If soils supporting the proposed pavement increase in moisture content, their ability to support the proposed pavement is significantly reduced.

The area in front of refuse dumpsters should be paved with Portland Cement Concrete.

Periodic pavement maintenance consisting of crack cleaning and sealing should be performed to extend pavement life. Seal coating may also be desired after the pavement has been in service for several years to improve appearances and increase pavement life.

16.0 PORTLAND CEMENT CONCRETE PAVEMENT

We recommend a minimum pavement thickness of six inches of Portland Cement Concrete for either unreinforced or reinforced concrete pavements. The concrete shall exhibit a minimum 28-day modulus of rupture of 600 psi[1] and a minimum 28-day compressive strength of 4,000 psi. Concrete shall contain a minimum of 520 pounds of cement per cubic yard. Slump shall not exceed four inches. Concrete shall contain a minimum of five percent entrained air. Concrete shall conform to the requirements detailed in State of New Mexico Transportation Department Design recommendations except as modified above.

If a reinforced pavement is utilized, the reinforcement shall be designed by a structural engineer.

Pavement subgrade and all fill below the pavement shall be prepared as detailed in the attached Appendix. Traffic shall not be permitted on the pavement until the concrete has attained a minimum of 70% of design strength. Heavy truck traffic or construction equipment shall not be permitted on the pavement until the concrete has attained 100% of design strength.

Prior to concrete placement, the contractor shall submit a concrete mix design to the owner indicating the proposed mix will yield the above strengths. The mix design shall be prepared by a qualified laboratory and shall be signed by a registered professional engineer.

Control joint spacing shall not exceed fourteen feet and shall be laid out to form square panels to the extent possible. Control joints shall have a depth of two inches and, if sawn, shall be cut as soon as possible without raveling the concrete. Joints shall line up with the corners of the structures. Isolation joints shall extend the full depth and shall be used only to isolate fixed objects abutting or within the paved areas. Jointing shall conform to the recommendations of the Portland Cement Association.

All fill below the proposed pavement shall be placed and compacted as detailed in the attached Appendix. To minimize settlement and maintenance of the pavement all fill over utility lines shall also be placed and compacted as detailed in the attached Appendix.

17.0 CLOSURE

This report was prepared for the exclusive use of our Client. The recommendations presented in this report are based upon the subsurface conditions disclosed by the test holes. Soil and groundwater conditions may vary between test holes and with time.

This report reflects our interpretation of the site subsurface conditions. We strongly recommend that prior to bidding all contractors perform their own subsurface investigation to form their own opinion of the site soil, rock, and groundwater conditions. Should contractors elect to use this report for construction, bidding or estimating purposes, they do so at their own risk.

In a southwest climate it is particularly important to protect the soils supporting the proposed structure from an increase in moisture content. If soils supporting the structure increase in moisture

[1] Third Point Test Method ASTM C78.

content due to any cause such as poor site drainage, ponding areas, or leaking utility lines, significant structural settlement and distress may occur.

If conditions are encountered during construction which differ from those presented herein, this office should be contacted for supplemental recommendations. The staff of X8e Vinyard is available for supplemental consultation as necessary.

This office would be pleased to review site grading and drainage plans to evaluate conformance with the recommendations presented herein. All site earthwork should be observed by a qualified geotechnical engineer or his representative. X8e Vinyard would be pleased to provide these services.

X8e Vinyard,

RALPH L. ABEYTA
NEW MEXICO
10852
REGISTERED PROFESSIONAL ENGINEER

06/18/15

Ralph L. Abeyta, P.E., M. ASCE

'roject No.: 15-1-036

SITE PLAN
*Scale Unknown

FIGURE 1

LOG OF TEST HOLE NO. 1

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 3" base course
		B		13.1		CL	CLAY, sandy lean, medium stiff, moist, brown/dark brown
	26	R	124	6.1	1	SM	SAND, silty with gravel, fine to coarse grained, medium dense, slightly moist, gray and brown
5	41	R	128	6.4	1,2,5		Orange-brown
10	44	S					No recovery
15	65	S		11.0		CL	CLAY, lean with sand, hard, moist, brown
20	41	S		19.9	1,2		Very moist
25							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 2

LOG OF TEST HOLE NO. 2

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 5" base course
		B		14.7	1,2	SC	SAND, clayey, fine to medium grained, moist, light brow
5	21	R	121	16.7	1,2,5	SM	SAND, silty with gravel, fine to medium grained, medium dense, moist, greenish gray
10	90	R	139	3.5	1	SW-SM	SAND, well-graded with silt and gravel, fine to coarse grained, very dense, slightly moist, orangish brow
	43	S		8.6			
15						SC	SAND, clayey, fine to medium grained, dense, moist, ligh brown
	86	S		10.2			Very dense
20	33	S		10.8			Dense, brown and pink
25							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 3

LOG OF TEST HOLE NO. 3

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 3.5" base course
		B		10.6		CL	CLAY, sandy lean, stiff, moist, brown
5	41	R	118	8.3		SP-SM	SAND, poorly graded with silt, fine to medium grained, dense, moist, dark brown/black
10	19	R	109	15.2	1,2,5	SC	SAND, clayey, fine grained, medium dense, moist, brown
	55	S		2.5	1,2	SM	SAND, silty with gravel, fine to coarse grained, dense, slightly moist, white and orange
15	77	S		7.2			Moist
20 25 30 35							Bottom of hole at 16½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 4

LOG OF TEST HOLE NO. 4

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 4.5" asphalt concrete - 4.5" base course
						CL	CLAY, lean with sand, medium stiff, moist, brown
	18	R	121	7.7	1,2,5	SC	SAND, clayey, fine to medium grained, trace gravel, medium dense, moist, brown
5	12	R	103	9.6	1		Light brown
10	88	S		6.6			Gravelly, very dense, slightly moist, white and orange
15	43	S		9.8	1,2		Dense, moist, brown and orange
20							Bottom of hole at 16½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 5

LOG OF TEST HOLE NO. 5

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
5	33	R	135	2.3	1	SM	SAND, silty with gravel, fine to coarse grained, dense, slightly moist, white and brown
10	49	R	14	1.1	1	GP-GM	GRAVEL, poorly graded with silt and sand, fine to coarse grained, dense, slightly moist, white and brown
15	49	S		3.6	1	SM	SAND, silty with gravel, fine to coarse grained, dense, slightly moist, dark green, orange, and light brown
	39	S		7.0		SC	SAND, clayey with gravel, fine to coarse grained, dense, slightly moist, light brown/black
20							Bottom of hole 16½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 6

LOG OF TEST HOLE NO. 6

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 7" base course
5	62	S		3.0	1	SM	SAND, silty with gravel, fine to coarse grained, very dense, slightly moist, white and brown
10	56	S		5.0	1	SC-SM	SAND, silty, clayey with gravel, fine to coarse grained, very dense, slightly moist, white and orange-brown
	31	S		8.4	1,2	SM	SAND, silty with gravel, fine to coarse grained, dense, moist, white and orange-brown
15 20 25 30 35							Bottom of hole 11½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 7

LOG OF PERCOLATION TEST HOLE NO. P7

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 7" base course
1 2 3		B		7.4	1,2	SM	SAND, silty with gravel, fine to medium grained, medium dense, slightly moist, brown
4 5						SC	SAND, clayey with gravel, fine to medium grained, medium dense, slightly moist, brown
6							Bottom of hole 5'- 0"

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 8

LOG OF TEST HOLE NO. 8

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, silty with gravel, fine to medium grained, very moist, brown
		B		9.7			
	30	S		1.2	1,2		Dense, slightly moist, brown and white
5							
	22	R					No recovery, auger refusal, binding on gravel
							Bottom of hole 6'
10							
15							
20							
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 9

LOG OF TEST HOLE NO. 9

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description Milled asphalt concrete - very thin at surface
						SC	SAND, clayey, fine grained, slight gravel, loose, moist, brow
	8	R	107	13.9	1,2,5	SM	SAND, silty, fine to medium grained, loose, moist, brown
5	9	R	106	17.3	1,2,5		
10	58	S		3.0			Fine to coarse grained, very dense, slightly moist, gray and yellowish brown
15							
	23	S		18.8	1,2	CL	CLAY, sandy lean, medium plasticity, very stiff, moist, yellowish brown
20							Bottom of hole at 16½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 10

LOG OF TEST HOLE NO. 10

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description Milled asphalt concrete - very thin at surface
5	9	R	108	15.9	1,2	SC	SAND, clayey, fine to coarse grained, slight gravel, loose, moist, brown
10	24	R	91	18.5	1,2	ML	SILT, sandy, fine grained, slight gravel, very stiff, moist, brown
15	52	S		4.3		SC-SM	SAND, silty, clayey, fine to coarse grained, very dense, slightly moist, orange-brown and yellowish brown
	31	S		11.4	1,2	SM	SAND, silty, fine to medium grained, slight gravel, dense, moist, orange, pink and light brown
20 25 30 35							Bottom of hole at 16½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 11

LOG OF TEST HOLE NO. 11

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 3" base course
1	28	S		11.4	1,2	SC	SAND, clayey, fine grained, medium dense, moist, brown/dark brown
2							
3							
4	50/5.5"	S		3.1			Very dense, slightly moist
5							
6							Bottom of hole 5½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 12

NOTES - LOGS OF TEST HOLES

Test hole locations were determined by compass bearing and pacing distances from known topographic points.

"Drilling Method" refers to the equipment utilized to advance the test hole. A seven-inch outside diameter, continuous flight, hollowstem auger was utilized.

"S" under "Sample Type" indicates a Standard Penetration test (ASTM D-1586). The Standard Penetration sampler is 2 inches in outside diameter and 1 3/8 inches inside diameter.

"R" under "Sample Type" indicates a 3-inch outside diameter by 2.5-inch inside diameter sampler. The sampler is lined with 1-inch high brass rings.

"B" under "Sample Type" indicates a bulk sample.

"Blows Per Foot" indicates the number of blows of a 140-pound hammer falling 30 inches required to drive the indicated sampler 12 inches.

"NR" under "Blows/Foot" indicates that no sample was recovered.

"Dry Density PCF" indicates the laboratory determined soil dry density in pounds per cubic foot.

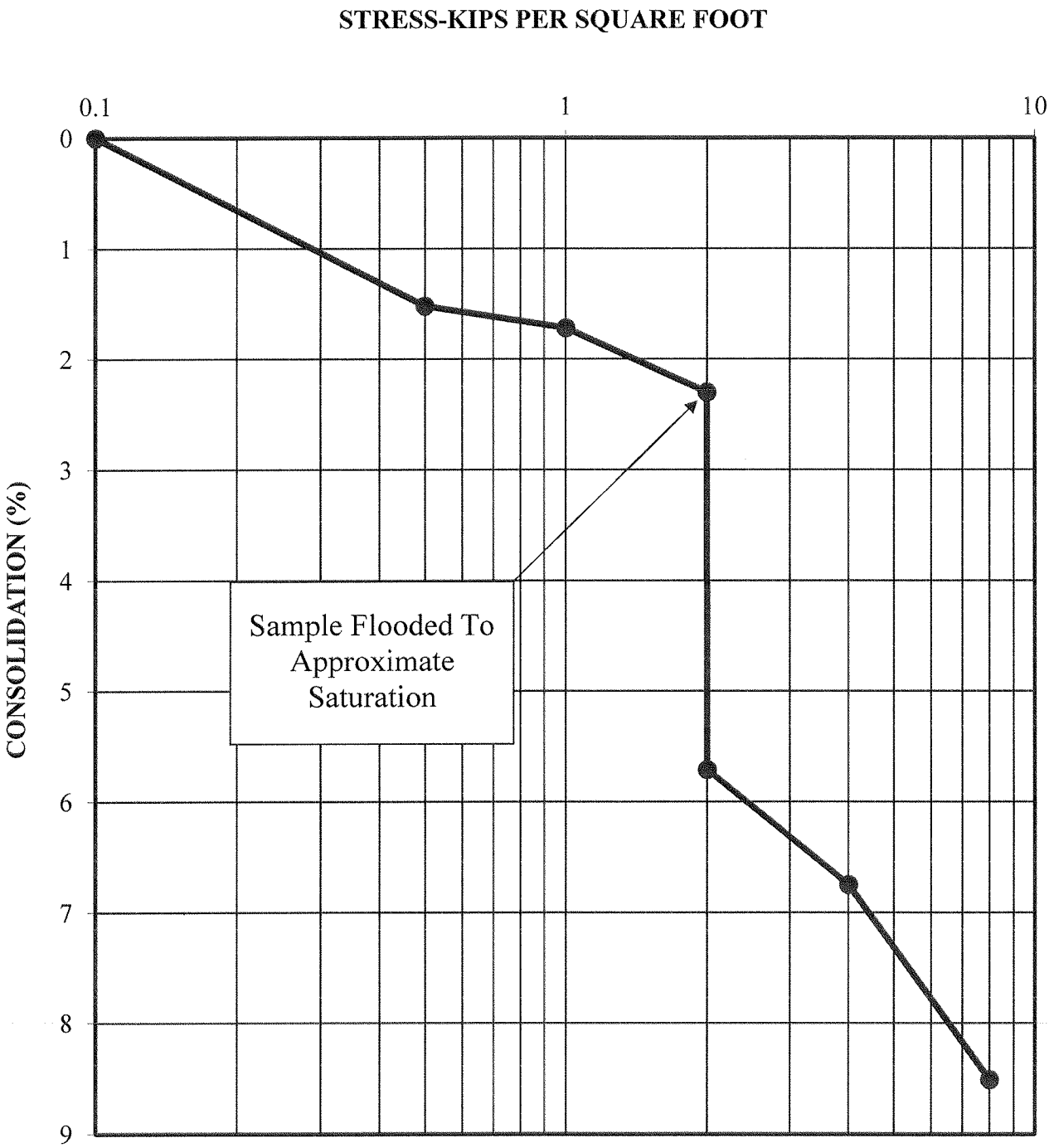
"Water Content %" indicates the laboratory determined soil moisture content in percent (ASTM D-2216).

"Unified Classification" indicates the field soil classification as per ASTM D-2488. When appropriate, the field classification is modified based upon subsequent laboratory tests.

Variations in soil profile, consistency, and moisture content may occur between test holes. Subsurface conditions may also vary between test holes and with time.

Figure No.: 13

CONSOLIDATION TEST RESULTS

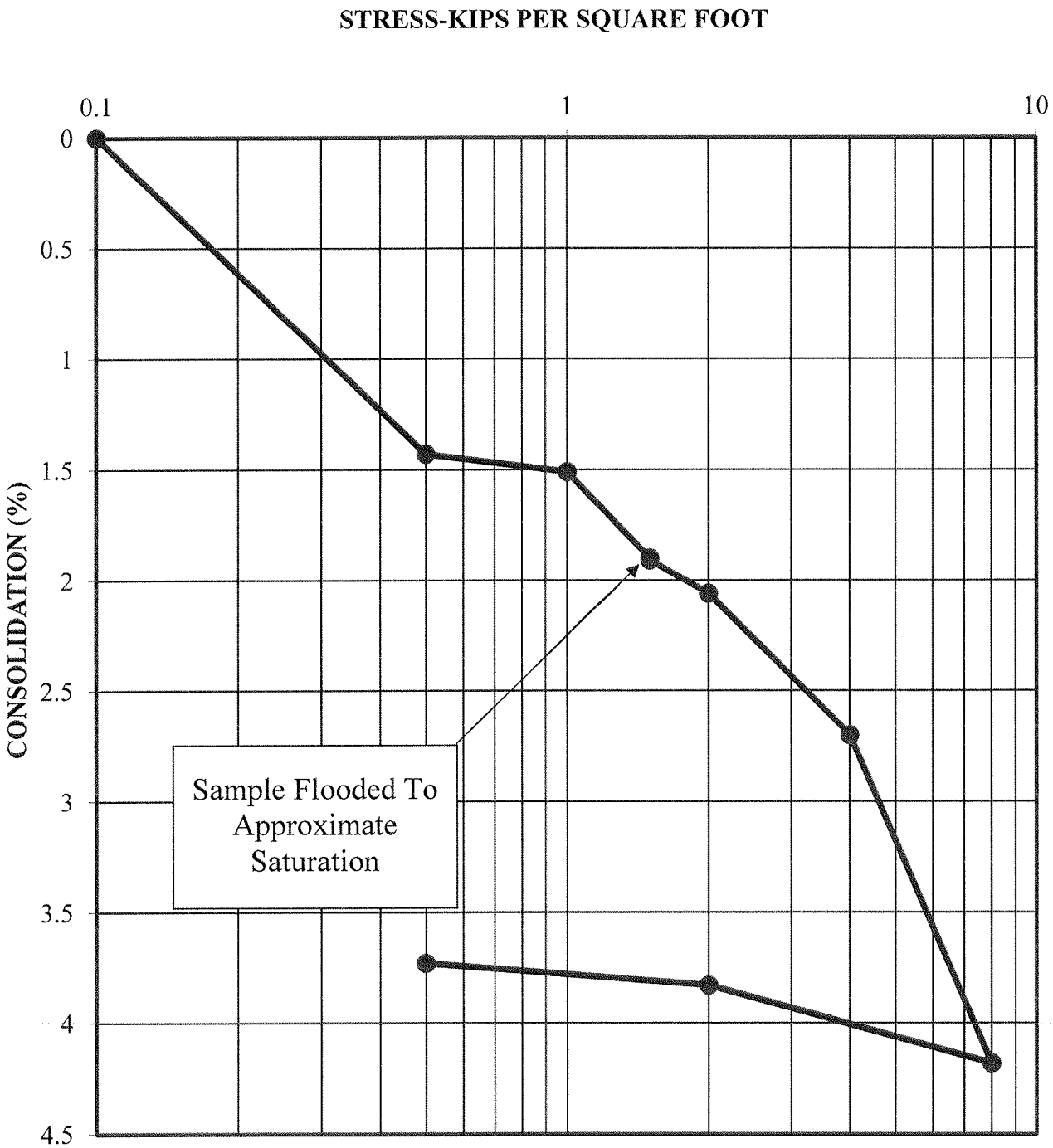


TEST HOLE NUMBER: 1
SAMPLE DEPTH: 5 FEET
SOIL DESCRIPTION: Silty SAND (SM) w/gravel
MOISTURE CONTENT: 6.4 %
BULK UNIT WEIGHT: 128 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 14

CONSOLIDATION TEST RESULTS

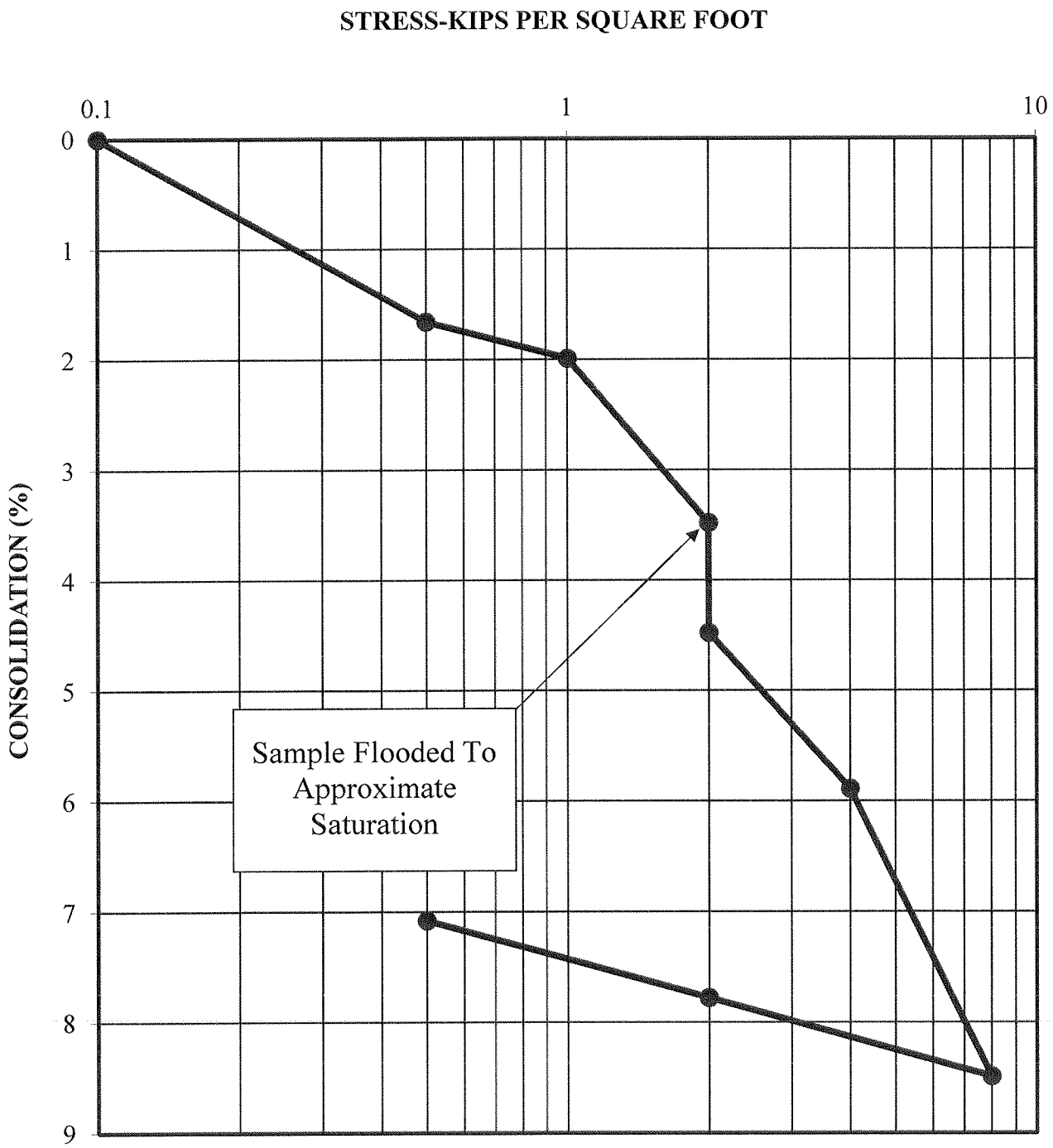


TEST HOLE NUMBER: 2
SAMPLE DEPTH: 2 FEET
SOIL DESCRIPTION: Silty SAND (SM) w/gravel
MOISTURE CONTENT: 16.7 %
BULK UNIT WEIGHT: 121 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 15

CONSOLIDATION TEST RESULTS

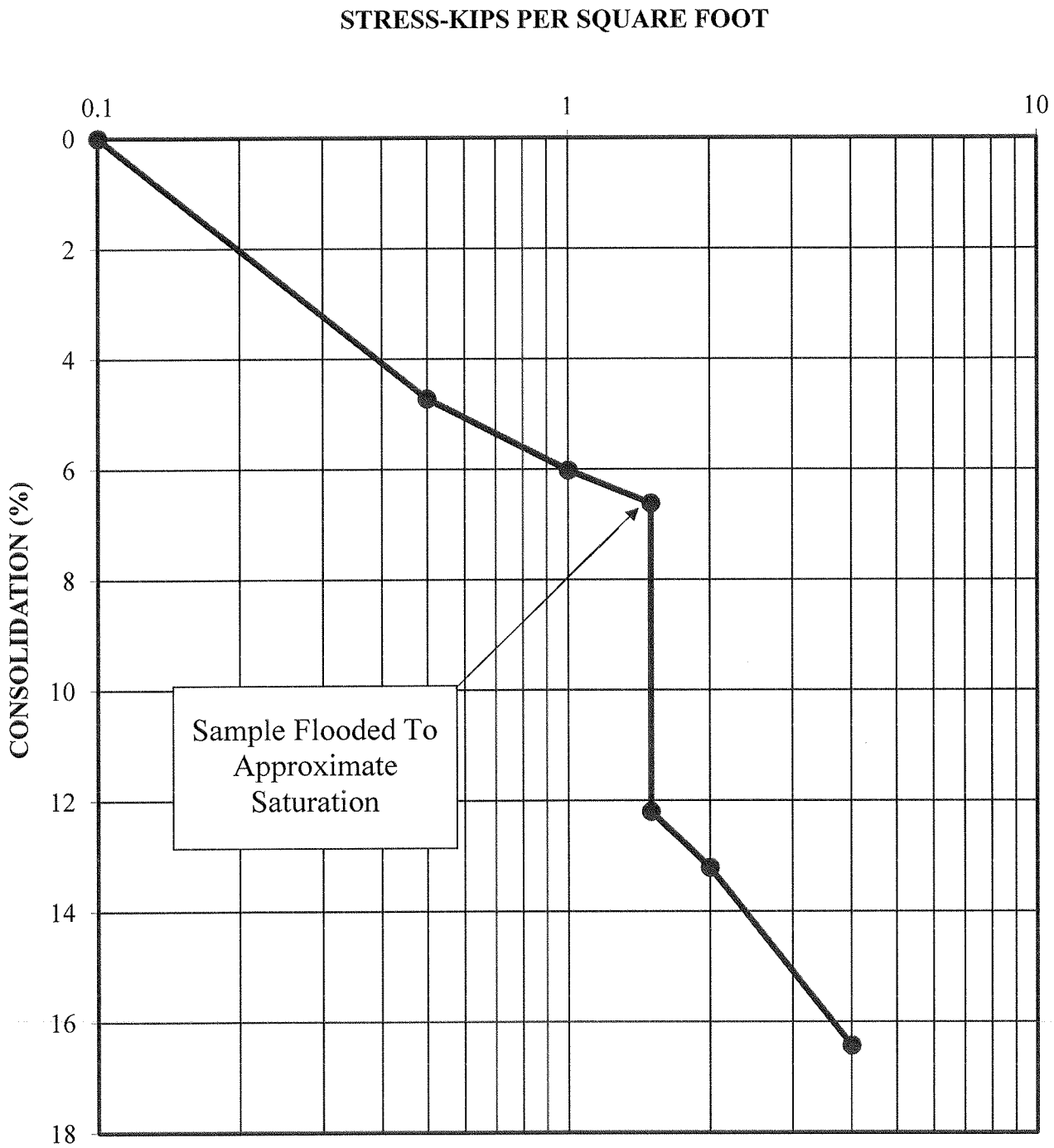


TEST HOLE NUMBER: 3
SAMPLE DEPTH: 5 FEET
SOIL DESCRIPTION: Clayey SAND (SC)
MOISTURE CONTENT: 15.2 %
BULK UNIT WEIGHT: 109 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 16

CONSOLIDATION TEST RESULTS

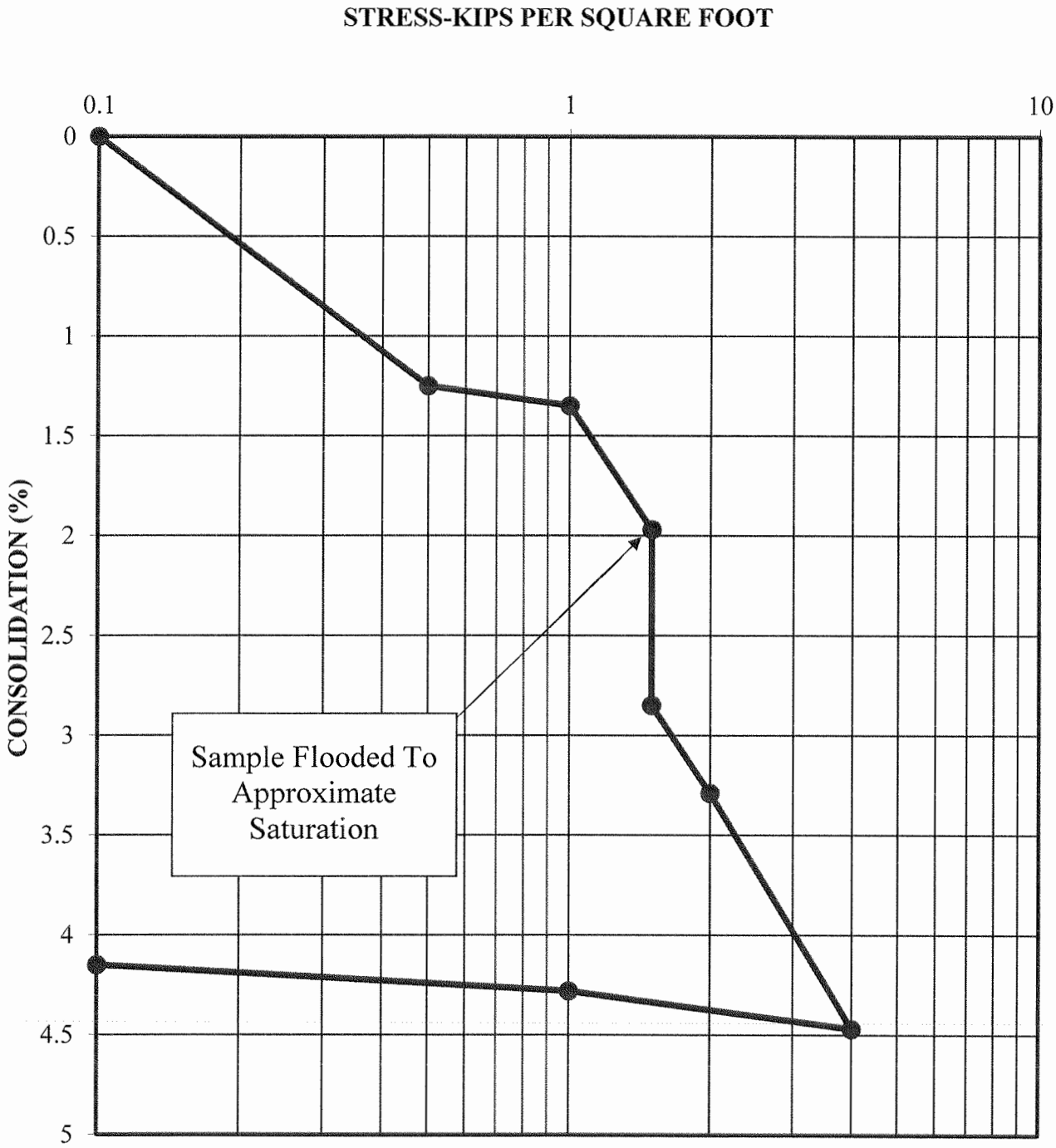


TEST HOLE NUMBER: 4
SAMPLE DEPTH: 2 FEET
SOIL DESCRIPTION: Clayey SAND (SC)
MOISTURE CONTENT: 7.7 %
BULK UNIT WEIGHT: 121 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 17

CONSOLIDATION TEST RESULTS

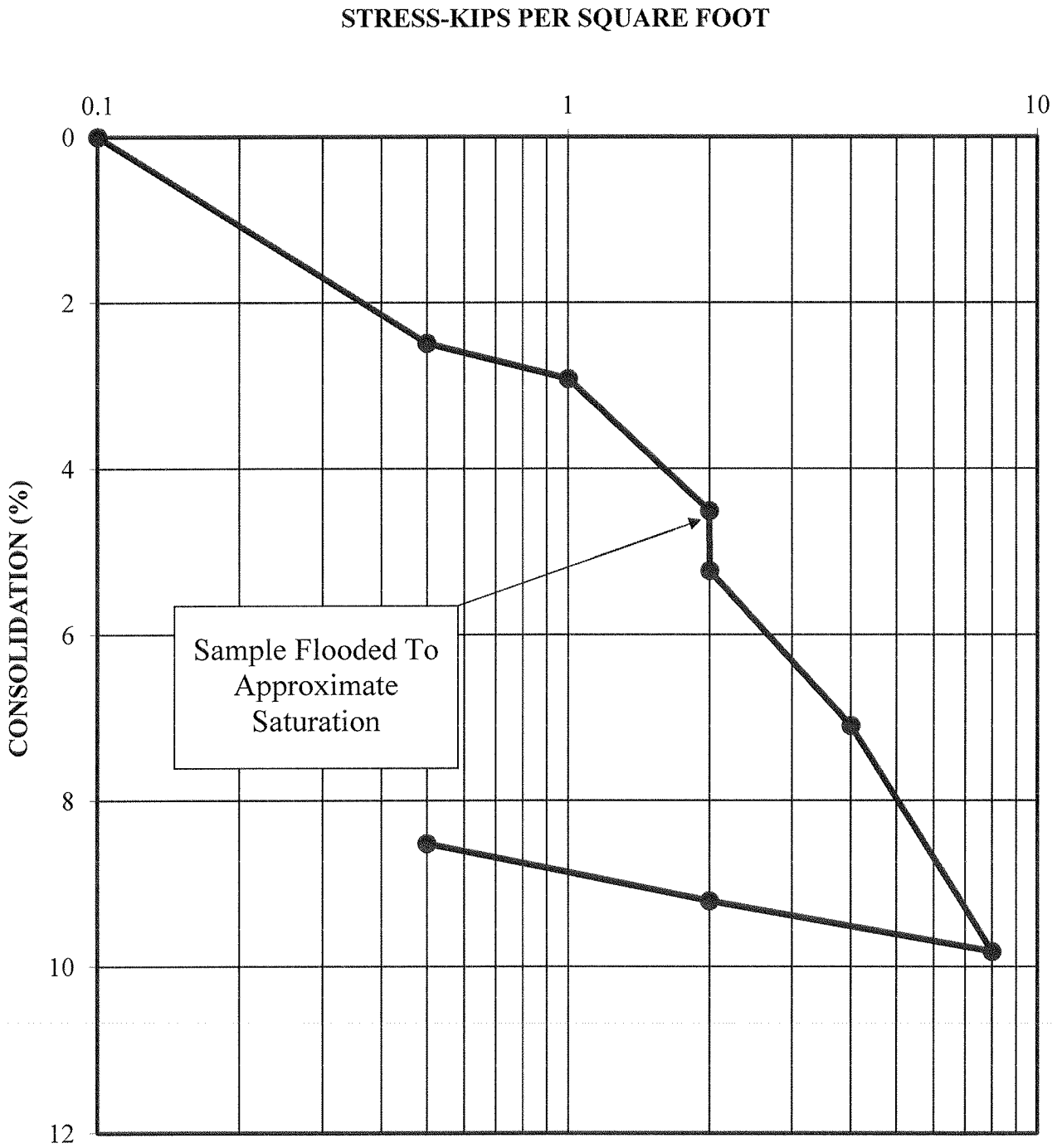


TEST HOLE NUMBER: 9
SAMPLE DEPTH: 2 FEET
SOIL DESCRIPTION: Silty SAND (SM)
MOISTURE CONTENT: 13.9 %
BULK UNIT WEIGHT: 107 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 18

CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER: 9
SAMPLE DEPTH: 5 FEET
SOIL DESCRIPTION: Silty SAND (SM)
MOISTURE CONTENT: 17.3 %
BULK UNIT WEIGHT: 106 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 19

[MARY OF LABORATORY TEST DATA

al re nt	Atterberg Limits		SIEVE ANALYSIS-% PASSING BY WEIGHT										Description
	LL	PI	1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
				100	91	72	54	39	30	23	18	14.1	Silty SAND with gravel
	NV	NP		100	83	69	57	46	36	25	17	13.0	Silty SAND with gravel
	37	23					100	99	98	94	88	78.5	Lean CLAY with sand
	25	11		100	93	92	88	83	76	67	57	49.3	Clayey SAND
	NV	NP		100	81	76	73	67	59	49	39	30.0	Silty SAND with gravel
				100	91	76	62	48	36	23	14	9.7	Well-graded SAND with silt and gravel
	35	21		100	99	97	95	92	89	83	78	71.2	Clayey SAND
	NV	NP		100	90	81	71	60	48	37	27	20.0	Silty SAND with gravel
	23	8		100	90	86	81	73	63	51	51	31.9	Clayey SAND
				100	99	97	93	89	82	66	47	34.8	Clayey SAND
	31	8			100	96	86	73	61	50	40	31.1	Clayey SAND

[MARY OF LABORATORY TEST DATA

al re nt	Atterberg Limits		SIEVE ANALYSIS-% PASSING BY WEIGHT										Description
	LL	PI	1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
			100	96	84	72	59	44	33	24	18	12.8	Silty SAND with gravel
			100	90	63	53	43	36	29	20	13	9.4	Poorly graded GRAVEL with silt and sand
				100	86	78	71	62	52	37	26	18.3	Silty SAND with gravel
				100	95	76	64	49	37	27	19	13.9	Silty SAND with gravel
				100	96	85	76	63	50	36	24	17.1	Silty, clayey SAND with gravel
	NV	NP		100	87	76	64	52	42	33	24	17.5	Silty SAND with gravel
	16	2		100	84	76	68	60	52	44	36	29.4	Silty SAND with gravel
	NV	NP		100	86	73	63	53	41	28	20	15.4	Silty SAND with gravel
	NV	NP		100	94	92	89	85	78	69	57	46.1	Silty SAND
	NV	NP		100	95	92	90	86	79	68	56	43.4	Silty SAND
	37	22			100	97	93	89	86	81	76	68.6	Sandy lean CLAY
	29	13		100	93	88	82	77	74	68	56	44.0	Clayey SAND
	49	16		100	96	93	90	87	84	80	74	66.9	Sandy SILT
	NV	NP		100	97	96	88	75	61	49	38	29.4	Silty SAND
	23	8		100	90	86	82	77	72	63	53	43.9	Clayey SAND

-1-036

ity - Santa Fe, NM

Table No.: 1

APPENDIX A
EARTHWORK PROCEDURES

APPENDIX
EARTHWORK PROCEDURES

General

The Geotechnical Engineer shall be the Owner's representative to observe and evaluate the earthwork operations. The Contractor shall cooperate with the Geotechnical Engineer in the performance of the Engineer's duties.

Clearing and Grubbing

Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled off-site or stockpiled for subsequent use in landscaped areas or nonstructural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

Site Preparation - Fill Areas

Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557. If vibratory compaction techniques pose a threat to the structural integrity of nearby facilities a static compactor shall be used. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.

Site Preparation - Cut Areas

Following excavation to rough grade, all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557. If vibratory compaction techniques pose a threat to the structural integrity of nearby facilities, a static compactor shall be used. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.

Foundation, Slab and Pavement Subgrade Preparation

Prior to placing reinforcement, footings, slabs, or pavement, the supporting soils shall be prepared, moisture conditioned, and compacted as described herein.

Structural Fill Material

Structural fill material shall be nonexpansive soil which may be gravel, sand, silt or clay, or a combination there of.

Sieve Size	Percent Passing By Weight
4"	100
1"	90-100
No. 4	70-100
No. 200	10-40

Structural fill material shall exhibit a plasticity index of ten or less. No organic, frozen or

decomposable material shall be utilized. All structural fill material shall be approved by the Geotechnical Engineer.

Structural Fill Placement

Structural fill material shall be blended as necessary to produce a homogeneous material. Fill material shall be spread in horizontal lifts no greater than eight inches in uncompacted thickness, but in no case thicker than can be properly compacted with the equipment to be utilized. If structural fill is to be placed on slopes steeper than 5:1 (horizontal:vertical) the natural ground shall be benched with minimum three foot wide benches at maximum two foot vertical intervals.

Moisture Conditioning

Structural fill material shall be dried or moistened as necessary, prior to compacting, to within ± three percent of optimum moisture content as determined by ASTM D-1557. Moisture shall be distributed uniformly throughout each lift.

Compaction

Structural fill shall be mechanically compacted to the following:

	Minimum Compaction ASTM D-1557
Foundation Support	95%
Slab Support	95%
Below Slab Utility Trenches	90%
General Site Grading	90%
Pavement Support	-
Upper 8" of Subgrade	95%
All other fill below pavement	90%

Aggregate Base Course shall be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Asphaltic concrete shall be compacted to a range of 93% to 97% of the maximum Theoretical Unit Weight in accordance with ASTM D2041.

Compaction by flooding and jetting is specifically prohibited unless authorized in advance by the Owner or his representative and the Geotechnical Engineer.

Observation and Testing

The Geotechnical Engineer or his representative shall perform field density tests with a frequency and at the locations he feels appropriate. The Geotechnical Engineer or his representative will perform Proctor tests on representative samples of all structural fill material for compliance to structural fill requirements on page A-1. To minimize delays, the Earthwork Contractor is encouraged to submit soil samples prior to use for proctor testing.

APPENDIX B
PERCOLATION TEST RESULTS

Environmental • Geotechnical • Materials Testing • Geosciences • Engineering

June 8, 2015

Huitt-Zollars, Inc.
6501 Americas Parkway, Suite 550
Albuquerque, New Mexico 87110

Attention: Mr. Innes R. Henderson, AIA, RIBA, LEED-AP BD+C

Subject: Percolation Rates at the CNG Facility in Santa Fe, New Mexico
X8e Vinyard Project No.: 15-1-036

Dear Mr. Henderson:

X8e Vinyard performed one percolation test to determine the percolation rate of the on-site soils. The percolation test was performed in the area where the proposed detention area will be constructed.

The following percolation rates were measured:

Boring	Percolation Rate (minutes/inch)	Approximate Depth (feet)
7	10.7	3

The State of New Mexico Environmental Department should be contacted for specific regulations affecting this site.

Should you have any questions regarding this letter or if we may be of further service, please call.

Sincerely,
X8e Vinyard

Andrew F. Brenner, E.I.T.

Ralph L. Abeyta, P.E., M. ASCE

APPENDIX C
SULFATE TEST RESULTS

8916-A Adams Street NE
Albuquerque, NM 87113
contactus@x8evinyard.com
Phone: 505.797.9743
Fax: 505.797.9749

Analytical Report
Lab Order: **1506449**
Date Reported: **6/15/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Project: Santa Fe CNG Facility
Lab Order: 1506449

Lab ID: 1506449-001
Client Sample ID: 1 at 2ft, 15-1-036
Collection Date: 6/2/2015
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Sulfate	4.9	1.5		mg/Kg	1	6/11/2015 12:11:59 PM	19681

Lab ID: 1506449-002
Client Sample ID: 3 at 2ft, 15-1-036
Collection Date: 6/2/2015
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Sulfate	66	1.5		mg/Kg	1	6/11/2015 12:36:48 PM	19681

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1506449**

15-Jun-15

Client: X8E Vinyard

Project: Santa Fe CNG Facility

Sample ID	MB-19681	SampType:	MBLK	TestCode:	EPA Method 300.0: Anions						
Client ID:	PBS	Batch ID:	19681	RunNo:	26791						
Prep Date:	6/11/2015	Analysis Date:	6/11/2015	SeqNo:	799000	Units:	mg/Kg				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		ND	1.5								

Sample ID	LCS-19681	SampType:	LCS	TestCode:	EPA Method 300.0: Anions						
Client ID:	LCSS	Batch ID:	19681	RunNo:	26791						
Prep Date:	6/11/2015	Analysis Date:	6/11/2015	SeqNo:	799001	Units:	mg/Kg				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		30	1.5	30.00	0	99.1	90	110			

Sample ID	1506449-002AMS	SampType:	MS	TestCode:	EPA Method 300.0: Anions						
Client ID:	3 at 2ft, 15-1-036	Batch ID:	19681	RunNo:	26791						
Prep Date:	6/11/2015	Analysis Date:	6/11/2015	SeqNo:	799012	Units:	mg/Kg				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		100	1.5	30.00	65.85	118	37.4	146			

Sample ID	1506449-002AMSD	SampType:	MSD	TestCode:	EPA Method 300.0: Anions						
Client ID:	3 at 2ft, 15-1-036	Batch ID:	19681	RunNo:	26791						
Prep Date:	6/11/2015	Analysis Date:	6/11/2015	SeqNo:	799013	Units:	mg/Kg				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		73	1.5	30.00	65.85	24.2	37.4	146	32.3	20	RS

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: X8E VINYARD Work Order Number: 1506449 RcptNo: 1

Received by/date: AT 06/10/15

Logged By: Celina Sessa 6/10/2015 9:15:00 AM Celina Sessa

Completed By: Celina Sessa 6/10/2015 10:06:56 AM Celina Sessa

Reviewed By: AT 06/10/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐ Not required
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by. _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	23.0	Good	Not Present			

Chain-of-Custody Record

Client: X8e Vinyards

Mailing Address: 8916-A Adams St. NE
Albuquerque, NM 87113

Phone #: 505-797-9743

email or Fax#: rlabeyta@X8eVinyard.com

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☐ Standard ☒ Rush 3 day

Project Name: Santa Fe CNG Facility

Project #: 15-1-036

Project Manager: Ralph Abeyta

Sampler:

On Ice: ☐ Yes ☒ No

Sample Temperature: 23.0°

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1506449	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Sulfates				Air Bubbles (Y or N)
6/2/15	—	soil	1 at 2ft, 15-1-036	bag	—	— 001												X				
6/2/15	—	soil	3 at 2ft, 15-1-036	bag	—	— 002												X				

Date	Time	Relinquished by:	Received by:	Date	Time
6/10/15	0915	Andrew F Brenner	[signature]	6/11/15	0915
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Geotechnical Investigation

Santa Fe CNG Facility
Santa Fe, New Mexico

Prepared for:
Huitt-Zollars

Project No.: 15-1-036

June 18, 2015

8916-A ADAMS ST., NE
ALBUQUERQUE, NM 87113
OFFICE: 505.797.9743
CONTACTUS@X8EVINYARD.COM

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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for improvements to the Santa Fe CNG Facility located in Santa Fe, New Mexico. The improvements represent upgrades necessary to increase the capacity of the CNG fueling facility.

The investigation was performed to determine site subsurface conditions and, based upon the conditions observed in the test holes, to develop geotechnical recommendations for:

Shallow Foundation Design;
Foundation Bearing Pressures;
Site Grading; and
Drainage.

The conclusions and recommendations presented are based on information provided to us regarding the proposed development, on subsurface conditions disclosed by the test holes, on laboratory testing, and upon the local standards of our profession at the time this report was prepared.

This investigation was not performed to determine the presence of potentially hazardous waste or radon gas. Determination of the presence of potentially hazardous materials was beyond the scope of this investigation and requires the use of exploration techniques and analytic testing which were not appropriate for this investigation. If desired, X8e Vinyard will perform an environmental audit of the site.

2.0 PROPOSED CONSTRUCTION

We anticipate construction will include a small single story addition to the existing CNG Equipment Station at the Public Fast-Fill Area, a pre-engineered steel canopy structure to cover the new Transit Time-Fill (TF) Fueling Area, and a future pre-engineered steel canopy structure at both new Solid Waste TF Areas. Additionally, we understand that the existing detention pond is to be deepened as the new improvements are envisioned to increase run-off within the facility. The addition to the CNG Equipment Station will consist of CMU exterior walls with a pitched metal roof and steel truss support. A canopy supported on columns will be located in the drive aisle to the east of the station. Additionally, there will be equipment skids in that area, each weighing approximately 18,000 pounds, which will require a structural foundation. The new Transit TF Fueling Area will be located within the center of the site and will consist of a pre-engineered steel canopy structure to cover the new fueling area. The structure will have an open wall and a low slope metal roof designed to provide future solar panel installation. Additionally, the structure for the new Transit TF Fueling Area is anticipated to have a maximum column load of approximately 29 kips and a maximum uplift load of 7.1 kips. The two new Solid Waste TF Areas will each be divided into two islands and will have a pre-engineered steel canopy structure that covers a central walkway area and a portion of the parking stalls. The canopy will be designed similarly as that for the new Transit TF Fueling Area so as to accommodate future solar panel installation. The fueling islands will include a concrete surface. The Solid Waste TF Areas will be provided for up to approximately forty (40) refuse trucks, which when empty are approximately 35,000 pounds and when fully laden,

approximately 80,000 pounds. We understand that the refuse trucks are generally empty before returning to the yard where the trucks are parked overnight.

3.0 SITE CONDITIONS

The project is situated within the existing City of Santa Fe CNG Facility located at 2931 Rufina Street in Santa Fe, New Mexico. There are six existing buildings, two existing transit fuel canopies, existing parking lots fronting Rufina Street, asphalt pavement around the existing transit fuel canopies and throughout the fenced in area behind the three buildings which front Rufina Street. Other than a few localized areas of landscaping fronting Rufina Street, much of the ground surface consists of asphalt pavement, except beyond the north fence line and detention pond. Beyond the improved areas, there is an existing stockpile of cold millings, an asphalt paved road along the east edge of the property, and an undulating ground surface characterized by sparse grasses, weeds, shrubs, trees and random piles of construction debris and trash. Drainage appears to largely slope towards the existing detention basin. Configuration of the site is indicated on the Site Plan, Figure 1.

4.0 SITE SUBSURFACE CONDITIONS

To explore the site subsurface conditions, eleven test holes, one of which was a percolation test hole, were drilled at the approximate locations shown on the Site Plan, Figure 1. The soils encountered in the test holes are summarized in the following table for ease of reference. The table presents the depth intervals in feet in which each of the major soil types were encountered in each of the test holes.

Test Hole No.	Asphalt Pavement/ Base Course	Gravel	Silty Sand	Clayey Sand or Silty, Clayey Sand	Silt	Lean Clay
1	0.42/0.25	-	2.0–15.5	-	-	0.7–2.0, 15.5–21.5
2	0.42/0.42	-	2.0–11.0	0.8–2.0, 11.0–21.5	-	-
3	0.42/0.29	-	2.0–5.0, 10.5–16.5	5.0–10.5	-	0.7–2.0
4	0.38/0.38	-	-	2.0–16.5	-	0.7–2.0
5	-	5.0–10.0	0-5.0, 10.0-15.5	15.5–16.5	-	-
6	0.42/0.58	-	1.0–5.0, 10.0-11.5	5.0–10.0	-	-
P7	0.42/0.58	-	0–3.0	3.0–5.0	-	-
8	-	-	0–6.0	-	-	-
9	-	-	2.0–15.0	0–2.0	-	15.0–16.5
10	-	-	15.0–16.5	0–5.0, 10.0–15.0	5.0–10.0	-
11	0.42/0.25	-	-	0.7–5.5	-	-

Overburden soils encountered in the test holes consisted of poorly-graded gravel (GP-GM) with silt and sand, well-graded sand (SW-SM) with silt and gravel, poorly graded sand (SP-SM) with

silt, silty, clayey sand (SC-SM) with varying amounts of gravel, silty sand (SM) with varying amounts of gravel, clayey sand (SC) with varying amounts of gravel, sandy silt (ML), and lean clay (CL) with varying amounts of sand. The poorly graded gravel with silt and sand stratum was described as dense and slightly moist. The silty sands included both the well-graded and poorly graded sands, were generally described as medium dense to very dense and slightly moist to very moist, except that in Test Hole #9, between a depth of 2.0 feet and 10.0 feet, the silty sands were described as loose. The sandy silt stratum was described as very stiff and moist. The lean clays were generally described as medium stiff to hard and moist to very moist.

Neither flowing groundwater nor bedrock was encountered in the test holes to a depth of twenty one and one half (21.5) feet, the maximum depth of exploration. However, groundwater conditions may change with time due to precipitation, variations in groundwater level, seepage from ponding areas, or leaking utilities.

Most of the soils encountered in the test holes exhibit low to moderate consolidation potential under the anticipated structural loads. Slight to moderate consolidation (collapse) occurs when site soils increase in moisture content. Refer to Figures 14 through 19.

The test holes allow observation of a very small portion of the soils below the site. Significant variations in subsurface conditions may occur across the site, which were not disclosed by the test holes.

5.0 LABORATORY TESTING

A laboratory testing program was performed on samples obtained during the field investigation which appeared representative of the soils encountered in the test holes. The laboratory testing program was structured to determine the physical properties of the soils encountered in the test holes necessary for development of geotechnical recommendations.

The laboratory testing program included:

- Moisture Content;
- Dry Density;
- Sieve Analysis;
- Atterberg Limits; and
- Consolidation/Collapse.

Moisture Content and Dry Density tests were performed to evaluate the in-place soil density and moisture content. Test results help to evaluate settlement potential. Test results indicate the soils encountered in the test holes have an average dry density of approximately 118 pcf. Natural moisture content averaged approximately 9.1 percent. Test results are presented on the Logs of Test Holes, Figures 2 through 12, and are summarized on Table 1.

Sieve Analysis and Atterberg Limits tests were performed to confirm field soil classifications and to provide information on general physical soil properties. Test results are presented on Table 1.

Consolidation/Collapse tests were performed to evaluate structure settlement and to determine the effect of water on site soils. The results indicate that the tested soils exhibited low to moderate compressibility under anticipated loads. Slight to moderate additional settlement (collapse) occurred when the tested soil increased in moisture content. Test results are presented on Figures 14 through 19.

6.0 FOUNDATIONS

If the recommendations presented in this report are implemented particularly those regarding site grading and drainage, the proposed structures may be supported on either conventional spread and strip footings, or a monolithic slab on grade with turned down edges. Foundations should bear on a minimum of three (3.0) feet of structural fill. Structural fill should extend a minimum of three feet laterally beyond the edge of all footings. Foundations may be designed for an allowable bearing pressure of 2,000 pounds per square foot. This value may be increased by one-third for short-term loads due to wind and earthquakes. If it is not feasible to implement the site grading, drainage, and landscaping recommendations presented herein, an alternate foundation system may be required. This office should be contacted for additional recommendations.

The base of exterior footings should be embedded a minimum of twenty-four inches below lowest adjacent grade. The base of interior footings should be embedded a minimum of twelve inches below finish pad grade. Spread and strip footings should be a minimum of twenty-four and eighteen inches wide, respectively. Turned down edges should be a minimum of twelve inches wide. However, local building codes may require greater dimensions.

Lateral foundation loads will be resisted by a combination of passive soil pressure against the sides of footings and friction along the base. A passive soil resistance of 300 pounds per cubic foot may be utilized for design. Frictional resistance may be determined by multiplying foundation dead load by a coefficient of friction of 0.40.

Prior to fill placement and following footing excavation, the natural soils should be scarified to a depth of eight inches and moistened to near optimum moisture content (±3%). The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below structures should be placed and compacted as detailed in the attached Appendix. Prior to pouring concrete footing excavations should be cleaned of any slough, loose soil, or debris. Footing excavations should be compacted as detailed in the attached Appendix.

Foundations designed and constructed as described herein are not anticipated to settle more than one inch. Differential settlement between adjacent column footings should not exceed one-half of the above value. Foundations should be designed and constructed to tolerate the above settlement. Foundations should be designed by a qualified structural engineer.

The site soils will consolidate if allowed to increase in moisture content. With appropriate landscape irrigation and site grading and drainage as detailed in this report the moisture content of the soils within five to seven feet of the ground surface may increase. The recommendations presented in this report for site preparation are the minimum we consider prudent to address this degree of moisture penetration. In the event moisture penetration to depths greater than seven feet

occurs, movement substantially greater than quoted above will occur.

To reduce the effect of settlement on the structure, we suggest that all stucco be fiberglass reinforced. Periodic control joints should be utilized in the stucco particularly at window and door corners. Periodic control joints should also be utilized in masonry walls.

Based upon the results of this investigation and our previous experience in the site vicinity, an International Building Code Site Classification of "D" may be utilized for design.

7.0 CONCRETE SLABS-ON-GRADE

Concrete slabs-on-grade may be utilized. Slabs should bear on a minimum of three (3.0) feet of structural fill. Minimum floor slab thickness, overall slab reinforcement, and sawed joints or control joints should be determined by a qualified structural engineer. Conventional slabs should be isolated from all foundations, stem walls, and utility lines. Monolithic slabs should be isolated from all utilities. Frequent joints should be scored or cut in slabs to control the location of cracks.

Slabs should be adequately reinforced with steel. Slab reinforcement should be turned down into turned down edges.

For structural design of the floor slab, a modulus of subgrade reaction of 400 kips per cubic foot may be utilized. This value is for a 1' x 1' square or a 1' wide strip. The above value may be modified for various effective widths based upon the following equation:

$$K_s = 400\left[\frac{B+1}{2B}\right]^2$$

K_s = Modulus of subgrade reaction (kips per cubic foot)

B = Effective width of loaded area (feet)

If moisture-sensitive floor covering is utilized, the flooring manufacturer should be contacted to determine the necessity of a vapor barrier. The moisture barrier may consist of a 6-mil polyethylene film or equivalent. The barrier may be overlain with one or two inches of clean sand to provide a working surface and reduce shrinkage cracking.

Slabs should bear on a minimum of three (3.0) feet of structural fill. Prior to placing slabs or structural fill, the natural soils should be stripped of vegetation, scarified to a depth of eight inches, and moistened to a near optimum (±3%) moisture content. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below slabs should be placed and compacted as detailed in the attached Appendix.

8.0 PERCOLATION TESTING

A percolation test was performed to determine the percolation rate of the on-site soils. The percolation test was performed near the south edge of the existing detention basin as the detention basin was enclosed by a perimeter wire fence. The test location is indicated as Boring #7 on the

attached Site Plan. A percolation rate of 10.7 minutes/inch was obtained at a test depth of approximately 3 feet below the top of the pavement. Results of the percolation test are shown in Appendix B.

9.0 SULFATE TESTING

Two near surface soil samples recovered from test holes drilled at this site were obtained to determine the sulfate content. Results of sulfate tests indicate that the samples exhibited 4.9 to 66 mg/Kg of sulfate. The results indicate negligible sulfate exposure to concrete; therefore, no special concrete requirements apply for this site. Results of sulfate testing are shown in Appendix B.

10.0 EARTHWORK

10.1 General

The settlement estimates presented in this report are based upon the assumption that site earthwork will be performed as recommended in this report and the attached Appendix. Presented below is a summary of the site earthwork recommendations. Detailed earthwork procedures are presented in the attached Appendix.

Prior to commencing earthwork the Contractor should obtain appropriate Proctor tests. Field density testing and evaluation of the suitability of the proposed materials performed prior to completion of the Proctor is “Preliminary” and may change based upon the results of the Proctor testing.

10.2 Clearing and Grubbing

Prior to placing structural fill, all borrow and fill areas should be stripped of vegetation and deleterious materials. All strippings should be hauled off-site or utilized in landscaped areas.

All existing utilities, septic tanks, leach fields, and disturbed soil should be removed from below the proposed amenities. The resulting excavations should be backfilled with compacted fill as detailed in the attached Appendix.

10.3 Excavation

We anticipate that on-site soils can be excavated with conventional earthwork equipment. Cobbles or boulders may be encountered during excavation. Cobbles and boulders should be disposed of off-site or utilized for landscaping. Cobbles and boulders should not be placed within structural fills. Cobbles and boulders as defined in ASTM D-2487.

10.4 Natural Ground Preparation

Prior to placing structural fill and subsequent to final grading in cut areas, the exposed soils should be scarified to a depth of eight inches and moisture conditioned to a near optimum (±3%) moisture content. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. If vibratory compaction poses a threat to nearby structures, static compaction should be utilized.

10.5 Fill Placement and Compaction

Structural fill should be placed in horizontal lifts a maximum of eight inches in loose thickness, moisture conditioned to near optimum moisture content, and mechanically compacted. Fill below footings and slabs should be compacted to a minimum of 95% of maximum dry density as determined by ASTM D-1557. There are localized areas where the on-site soils do not appear to be suitable for re-use as structural fill. It is anticipated that the on-site soils may be blended with import materials coarser than the existing soils encountered within the project area. The resulting blended materials should be tested for conformance with the structural fill criteria.

10.6 Observation and Testing

Placement and compaction of structural fill should be observed and tested by a qualified geotechnical engineer or his representative. The purpose of the observation and testing is to confirm that the recommendations presented herein are followed and to provide supplemental recommendations, if subsurface conditions differ from those anticipated.

Foundation excavations should be observed by a qualified geotechnical engineer, or his representative, prior to placement of reinforcement or concrete. The purpose of the observation is to determine if the exposed soils are similar to those anticipated.

10.7 Frequency of Testing

Earthwork should be tested periodically to confirm the fill is compacted to the criteria presented in this report. Prior to placing fill, the natural ground should be moisture conditioned, compacted, and tested to confirm it is properly compacted. Fill should be placed in maximum eight-inch thick loose lifts, but in no case thicker than can be compacted with the equipment being utilized. Fill should be moisture conditioned and compacted as detailed in this report. Fill areas should be tested at maximum one-foot vertical intervals. If fill areas are worked at different times, each individual area should be tested. Following finish grading, the final surface should be tested. Following foundation excavation, the footing excavations should be tested. Utility trench backfill should be tested as necessary.

11.0 SITE GRADING AND DRAINAGE

The settlement estimates presented in this report assume the site will be graded to drain properly. If the site does not drain properly, structure settlement substantially greater than quoted in this report will occur.

To reduce the risk of structure settlement the site should be graded to rapidly drain away from amenities. Splash blocks should be utilized below down spouts and canales.

If ponding areas are required, they should be located as far away from amenities as possible, a minimum of ten feet. If this criteria cannot be met, this office should be contacted for supplemental recommendations.

Roof gutters and downspouts should be utilized. Roof gutters should discharge to a hard surface. Water should run off rapidly.

12.0 LANDSCAPING

Landscaping adjacent to amenities should be designed and constructed to minimize the potential for wetting of soils supporting the proposed facilities. If soils supporting the proposed facilities are allowed to increase in moisture content to a depth greater than seven feet settlement greater than quoted in this report will occur.

Trees and shrubs within five feet of amenities should be hand watered or watered using controlled drip irrigation. If drip irrigation is used, emitters should discharge no more than one gallon per hour. If grass must be planted within five feet of structures, watering should be carefully controlled to prevent overwatering. Grassed areas adjacent to structures should be sloped so that excess irrigation water will run off promptly. Sprinkler lines and drip irrigation mains should be located a minimum of five feet away from foundations.

Mowing strips, planters and sidewalks should not "dam" water adjacent to structures. If necessary, mowing strips should be perforated to allow water to flow away from structures.

All amenities' planters should be closed bottom and watertight.

13.0 UTILITIES

The site soils are collapsible if allowed to increase in moisture content. If post-construction water or sewer line leaks occur, localized settlement will occur. Following installation, all water and sewer lines should be pressure checked for leaks. Any leaks found should be repaired.

Backfill in utility line trenches below slabs, driveways, and pavement should be compacted to a minimum of 90% of maximum density as determined by ASTM D-1557. Utility trenches should be as narrow as can be properly compacted. To reduce the possibility of breaking utility lines with compaction equipment, heavy compactors should not be utilized.

Utility trenches may not be compacted to the same degree as the remainder of the building pad. Therefore, wall footings, interior walls and thickened slabs should not be placed longitudinally over utility trenches. Column footings should not be placed over utility trenches.

14.0 TRENCHES AND EXCAVATIONS

All trenches greater than four feet in depth must be sloped, shored or braced or otherwise supported according to OSHA Construction and Safety Standards. Material excavated from the trench or spoil must be placed a minimum of two feet from the edge of the excavation. The spoil should be retained in an effective manner such that no loose material can fall into the excavation.

Temporary construction excavations less than eight feet deep should be sloped no steeper than 1½:1 (horizontal:vertical). If deeper excavations are required, this office should be contacted for supplemental recommendations. Limited raveling of slopes will occur particularly as the exposed soils dry out. Heavy equipment and material stockpiles should be located a minimum of five feet from the top of slope.

15.0 ASPHALTIC CONCRETE PAVEMENT

The pavement recommendations presented herein are based upon New Mexico State Highway and Transportation Department design procedures.

Traffic within the new parking and drive areas is anticipated to consist primarily of transit and refuse vehicles. For design purposes, we have assumed an EDLA (Equivalent Daily 18 kip Load Applications) of 20 for transit vehicle parking areas and 40 for transit vehicle access driveways. We understand that the City of Santa Fe plans to use a 6-inch thickness of cold millings on a prepared subgrade in lieu of an asphalt pavement within the Solid Waste TF Area. Should the City of Santa Fe plan to replace the cold millings with either an asphaltic concrete or Portland cement concrete pavement within the very near future, we have assumed a conservative EDLA (Equivalent Daily 18 kip Load Applications) of 20 for refuse vehicle parking and 40 for refuse vehicle access driveways. We have also assumed a conservative R-value of 13 within the Solid Waste TF Area and a conservative R-value of 36 south of the fence line which separates the existing facility from the proposed Solid Waste TF Area. The clayey sand within the Solid Waste TF Area classifies as an A-6 soil according to the AASHTO soil classification system. The clayey sand encountered in Test Hole #4 is an A-2-4 soil per the AASHTO soil classification system. If traffic conditions will vary from the assumed values, this office should be contacted.

Additional design coefficients utilized in our analysis are:

Design Period*	20 years
Regional Factor	1.5
Serviceability Index	2.5

*Periodic pavement maintenance will be required during this period.

To evaluate the required pavement section, the following structural coefficients were utilized in our analysis.

Material	Coefficient
Asphaltic Concrete	0.40
Aggregate Base Course	0.10

Based upon the above criteria, we recommend the following asphaltic concrete pavement sections for transit and refuse vehicle parking areas and driveway areas:

	Asphaltic Concrete	Aggregate Base Course
Transit Vehicle Parking	5”	3”
Transit Vehicle Access Driveways	5”	5”
Refuse Vehicle Parking	6”	6”
Refuse Vehicle Access Driveways	6”	9”

Pavement subgrade and all fill below paved areas should be placed and compacted as detailed in the attached Appendix. Aggregate Base Course should consist of Class I or Class II material as specified in “New Mexico State Department of Transportation”. Base course should be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Asphaltic concrete shall be Class SP-B as described in Section 116 of the “New Mexico Standard Specifications for Public Works Construction.” Class SP-C Asphaltic Concrete may be utilized if a very smooth surface is desired. However, Class SP-C Asphaltic Concrete tends to be less durable than Class SP-B. Asphaltic concrete shall be compacted to a range of 93-97% of the maximum Theoretical Unit Weight (ASTM D-2041).

Prior to placing cold millings within the proposed Solid Waste TF Area, the existing soils should be removed to such depth as to provide not less than 12 inches of suitable subgrade materials moisture conditioned to within 2 percent of optimum, compacted to not less than 95 percent of maximum density as determined in accordance with ASTM D 1557, and placed in 6-inch maximum lifts.

Prior to placing Aggregate Base Course or Asphaltic Concrete, a soil sterilant may be applied. The sterilant should be applied as per the manufacturer's recommendations.

The above pavement recommendations assume the pavement subgrade will consist of on-site soils comparable to the silty sand encountered within the upper 5 feet. If milling of existing pavement is anticipated for re-use where base course is required, it is recommended that the existing asphaltic concrete and existing base course materials be crushed and blended with imported granular materials. The resulting blended mixture shall be tested for conformance with the requirements associated with either Class I or Class II material as stated hereinbefore. If the subgrade consists of imported soil, the import should be more granular than the on-site soils. Should the subgrade consist of imported soil that is much more granular than the on-site soils, modification, including reduction, of the above pavement sections may be possible. If the subgrade consists of uncontrolled fill, the uncontrolled fill should be more granular than the on-site soils and not less than 12 inches of subgrade shall be moisture conditioned and compacted to a minimum of 95% of maximum density as determined in accordance with ASTM D-1557. If this is not possible, modification of the above pavement sections may be necessary.

Fill in utility line trenches below the pavement must be properly compacted to prevent localized pavement settlement. To minimize settlement and maintenance of the pavement, all trenches should be backfilled with compacted fill as detailed in the attached Appendix.

The site should be graded to prevent saturation of pavement subgrade soils. If soils supporting the proposed pavement increase in moisture content, their ability to support the proposed pavement is significantly reduced.

The area in front of refuse dumpsters should be paved with Portland Cement Concrete.

Periodic pavement maintenance consisting of crack cleaning and sealing should be performed to extend pavement life. Seal coating may also be desired after the pavement has been in service for several years to improve appearances and increase pavement life.

16.0 PORTLAND CEMENT CONCRETE PAVEMENT

We recommend a minimum pavement thickness of six inches of Portland Cement Concrete for either unreinforced or reinforced concrete pavements. The concrete shall exhibit a minimum 28-day modulus of rupture of 600 psi[1] and a minimum 28-day compressive strength of 4,000 psi. Concrete shall contain a minimum of 520 pounds of cement per cubic yard. Slump shall not exceed four inches. Concrete shall contain a minimum of five percent entrained air. Concrete shall conform to the requirements detailed in State of New Mexico Transportation Department Design recommendations except as modified above.

If a reinforced pavement is utilized, the reinforcement shall be designed by a structural engineer.

Pavement subgrade and all fill below the pavement shall be prepared as detailed in the attached Appendix. Traffic shall not be permitted on the pavement until the concrete has attained a minimum of 70% of design strength. Heavy truck traffic or construction equipment shall not be permitted on the pavement until the concrete has attained 100% of design strength.

Prior to concrete placement, the contractor shall submit a concrete mix design to the owner indicating the proposed mix will yield the above strengths. The mix design shall be prepared by a qualified laboratory and shall be signed by a registered professional engineer.

Control joint spacing shall not exceed fourteen feet and shall be laid out to form square panels to the extent possible. Control joints shall have a depth of two inches and, if sawn, shall be cut as soon as possible without raveling the concrete. Joints shall line up with the corners of the structures. Isolation joints shall extend the full depth and shall be used only to isolate fixed objects abutting or within the paved areas. Jointing shall conform to the recommendations of the Portland Cement Association.

All fill below the proposed pavement shall be placed and compacted as detailed in the attached Appendix. To minimize settlement and maintenance of the pavement all fill over utility lines shall also be placed and compacted as detailed in the attached Appendix.

17.0 CLOSURE

This report was prepared for the exclusive use of our Client. The recommendations presented in this report are based upon the subsurface conditions disclosed by the test holes. Soil and groundwater conditions may vary between test holes and with time.

This report reflects our interpretation of the site subsurface conditions. We strongly recommend that prior to bidding all contractors perform their own subsurface investigation to form their own opinion of the site soil, rock, and groundwater conditions. Should contractors elect to use this report for construction, bidding or estimating purposes, they do so at their own risk.

In a southwest climate it is particularly important to protect the soils supporting the proposed structure from an increase in moisture content. If soils supporting the structure increase in moisture

[1] Third Point Test Method ASTM C78.

content due to any cause such as poor site drainage, ponding areas, or leaking utility lines, significant structural settlement and distress may occur.

If conditions are encountered during construction which differ from those presented herein, this office should be contacted for supplemental recommendations. The staff of X8e Vinyard is available for supplemental consultation as necessary.

This office would be pleased to review site grading and drainage plans to evaluate conformance with the recommendations presented herein. All site earthwork should be observed by a qualified geotechnical engineer or his representative. X8e Vinyard would be pleased to provide these services.

X8e Vinyard,

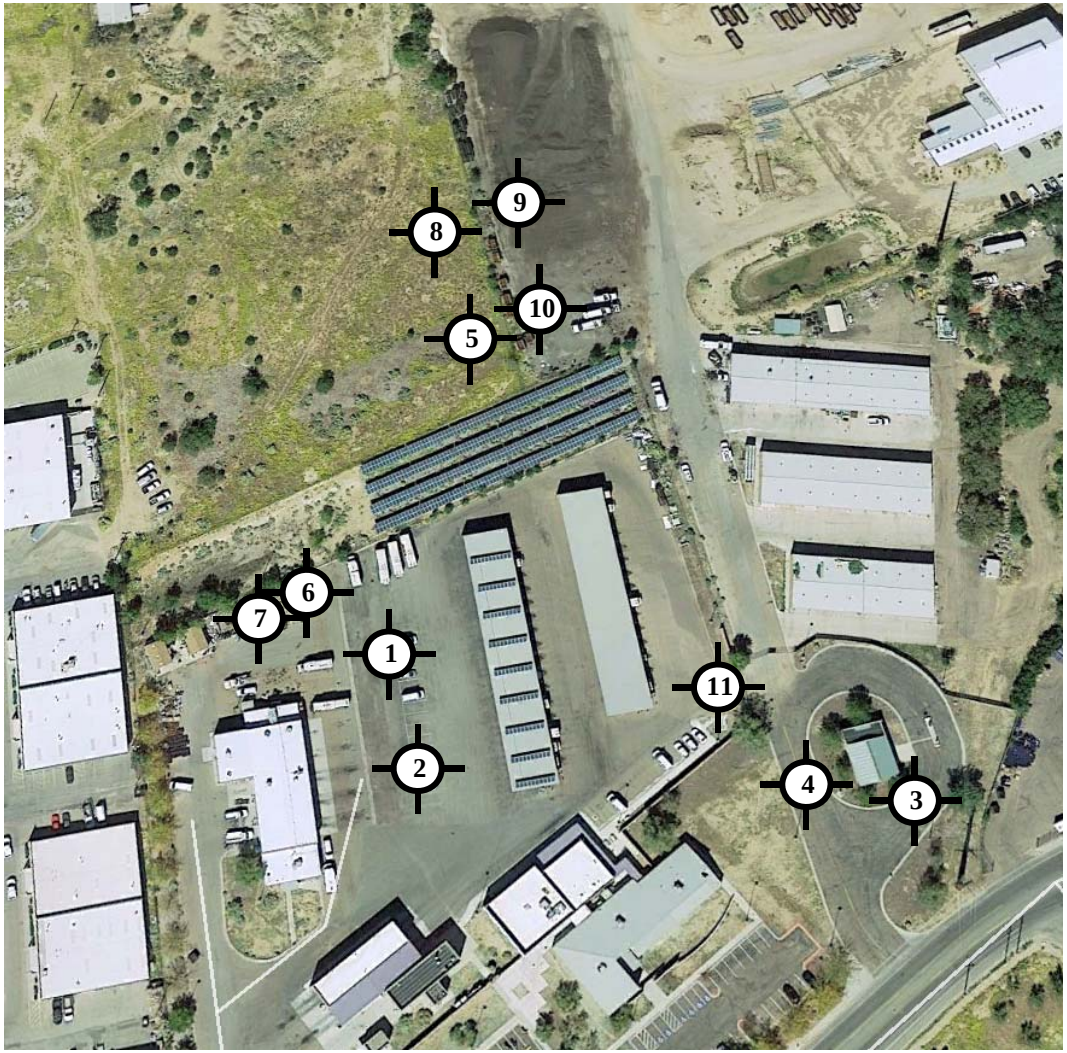
RALPH L. ABEYTA
NEW MEXICO
10852
REGISTERED PROFESSIONAL ENGINEER

06/18/15

Ralph L. Abeyta, P.E., M. ASCE

X8e Vinyard Project No.: 15-1-036

SITE PLAN
***Scale Unknown**



Boring Location

FIGURE 1

LOG OF TEST HOLE NO. 1

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 3" base course
		B		13.1		CL	CLAY, sandy lean, medium stiff, moist, brown/dark brown
	26	R	124	6.1	1	SM	SAND, silty with gravel, fine to coarse grained, medium dense, slightly moist, gray and brown
5	41	R	128	6.4	1,2,5		Orange-brown
10	44	S					No recovery
15	65	S		11.0		CL	CLAY, lean with sand, hard, moist, brown
20	41	S		19.9	1,2		Very moist
25							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 2

LOG OF TEST HOLE NO. 2

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 5" base course
		B		14.7	1,2	SC	SAND, clayey, fine to medium grained, moist, light brow
5	21	R	121	16.7	1,2,5	SM	SAND, silty with gravel, fine to medium grained, medium dense, moist, greenish gray
10	90	R	139	3.5	1	SW-SM	SAND, well-graded with silt and gravel, fine to coarse grained, very dense, slightly moist, orangish brow
	43	S		8.6			
15						SC	SAND, clayey, fine to medium grained, dense, moist, ligh brown
	86	S		10.2			Very dense
20	33	S		10.8			Dense, brown and pink
25							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 3

LOG OF TEST HOLE NO. 3

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 3.5" base course
		B		10.6		CL	CLAY, sandy lean, stiff, moist, brown
5	41	R	118	8.3		SP-SM	SAND, poorly graded with silt, fine to medium grained, dense, moist, dark brown/black
10	19	R	109	15.2	1,2,5	SC	SAND, clayey, fine grained, medium dense, moist, brown
	55	S		2.5	1,2	SM	SAND, silty with gravel, fine to coarse grained, dense, slightly moist, white and orange
15	77	S		7.2			Moist
20							Bottom of hole at 16½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 4

LOG OF TEST HOLE NO. 4

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 4.5" asphalt concrete - 4.5" base course
						CL	CLAY, lean with sand, medium stiff, moist, brown
	18	R	121	7.7	1,2,5	SC	SAND, clayey, fine to medium grained, trace gravel, medium dense, moist, brown
5							
	12	R	103	9.6	1		Light brown
10							
	88	S		6.6			Gravelly, very dense, slightly moist, white and orange
15							
	43	S		9.8	1,2		Dense, moist, brown and orange
							Bottom of hole at 16½'
20							
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 5

LOG OF TEST HOLE NO. 5

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
5	33	R	135	2.3	1	SM	SAND, silty with gravel, fine to coarse grained, dense, slightly moist, white and brown
10	49	R	14	1.1	1	GP-GM	GRAVEL, poorly graded with silt and sand, fine to coarse grained, dense, slightly moist, white and brown
15	49	S		3.6	1	SM	SAND, silty with gravel, fine to coarse grained, dense, slightly moist, dark green, orange, and light brown
	39	S		7.0		SC	SAND, clayey with gravel, fine to coarse grained, dense, slightly moist, light brown/black
20							Bottom of hole 16½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 6

LOG OF TEST HOLE NO. 6

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 7" base course
5	62	S		3.0	1	SM	SAND, silty with gravel, fine to coarse grained, very dense, slightly moist, white and brown
10	56	S		5.0	1	SC-SM	SAND, silty, clayey with gravel, fine to coarse grained, very dense, slightly moist, white and orange-brown
	31	S		8.4	1,2	SM	SAND, silty with gravel, fine to coarse grained, dense, moist, white and orange-brown
15 20 25 30 35							Bottom of hole 11½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 7

LOG OF PERCOLATION TEST HOLE NO. P7

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 7" base course
1 2 3		B		7.4	1,2	SM	SAND, silty with gravel, fine to medium grained, medium dense, slightly moist, brown
4 5						SC	SAND, clayey with gravel, fine to medium grained, medium dense, slightly moist, brown
6							Bottom of hole 5'- 0"

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 8

LOG OF TEST HOLE NO. 8

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, silty with gravel, fine to medium grained, very moist, brown
		B		9.7			
	30	S		1.2	1,2		Dense, slightly moist, brown and white
5							
	22	R					No recovery, auger refusal, binding on gravel
							Bottom of hole 6'
10							
15							
20							
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 9

LOG OF TEST HOLE NO. 9

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description Milled asphalt concrete - very thin at surface
						SC	SAND, clayey, fine grained, slight gravel, loose, moist, brown
	8	R	107	13.9	1,2,5	SM	SAND, silty, fine to medium grained, loose, moist, brown
5	9	R	106	17.3	1,2,5		
10	58	S		3.0			Fine to coarse grained, very dense, slightly moist, gray and yellowish brown
15							
	23	S		18.8	1,2	CL	CLAY, sandy lean, medium plasticity, very stiff, moist, yellowish brown
20							Bottom of hole at 16½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 10

LOG OF TEST HOLE NO. 10

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description Milled asphalt concrete - very thin at surface
5	9	R	108	15.9	1,2	SC	SAND, clayey, fine to coarse grained, slight gravel, loose, moist, brown
10	24	R	91	18.5	1,2	ML	SILT, sandy, fine grained, slight gravel, very stiff, moist, brown
15	52	S		4.3		SC-SM	SAND, silty, clayey, fine to coarse grained, very dense, slightly moist, orange-brown and yellowish brown
	31	S		11.4	1,2	SM	SAND, silty, fine to medium grained, slight gravel, dense, moist, orange, pink and light brown
20 25 30 35							Bottom of hole at 16½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 11

LOG OF TEST HOLE NO. 11

Project: Santa Fe CNG Facility
Elevation: N/A
Depth to Groundwater: Not Encountered

Project No.: 15-1-036
Date Drilled: 6/2/15
Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description 5" asphalt concrete - 3" base course
1						SC	SAND, clayey, fine grained, medium dense, moist, brown/dark brown
2	28	S		11.4	1,2		
3							
4							
5	50/5.5"	S		3.1			Very dense, slightly moist
6							Bottom of hole 5½'

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 12

NOTES - LOGS OF TEST HOLES

Test hole locations were determined by compass bearing and pacing distances from known topographic points.

"Drilling Method" refers to the equipment utilized to advance the test hole. A seven-inch outside diameter, continuous flight, hollowstem auger was utilized.

"S" under "Sample Type" indicates a Standard Penetration test (ASTM D-1586). The Standard Penetration sampler is 2 inches in outside diameter and 1 3/8 inches inside diameter.

"R" under "Sample Type" indicates a 3-inch outside diameter by 2.5-inch inside diameter sampler. The sampler is lined with 1-inch high brass rings.

"B" under "Sample Type" indicates a bulk sample.

"Blows Per Foot" indicates the number of blows of a 140-pound hammer falling 30 inches required to drive the indicated sampler 12 inches.

"NR" under "Blows/Foot" indicates that no sample was recovered.

"Dry Density PCF" indicates the laboratory determined soil dry density in pounds per cubic foot.

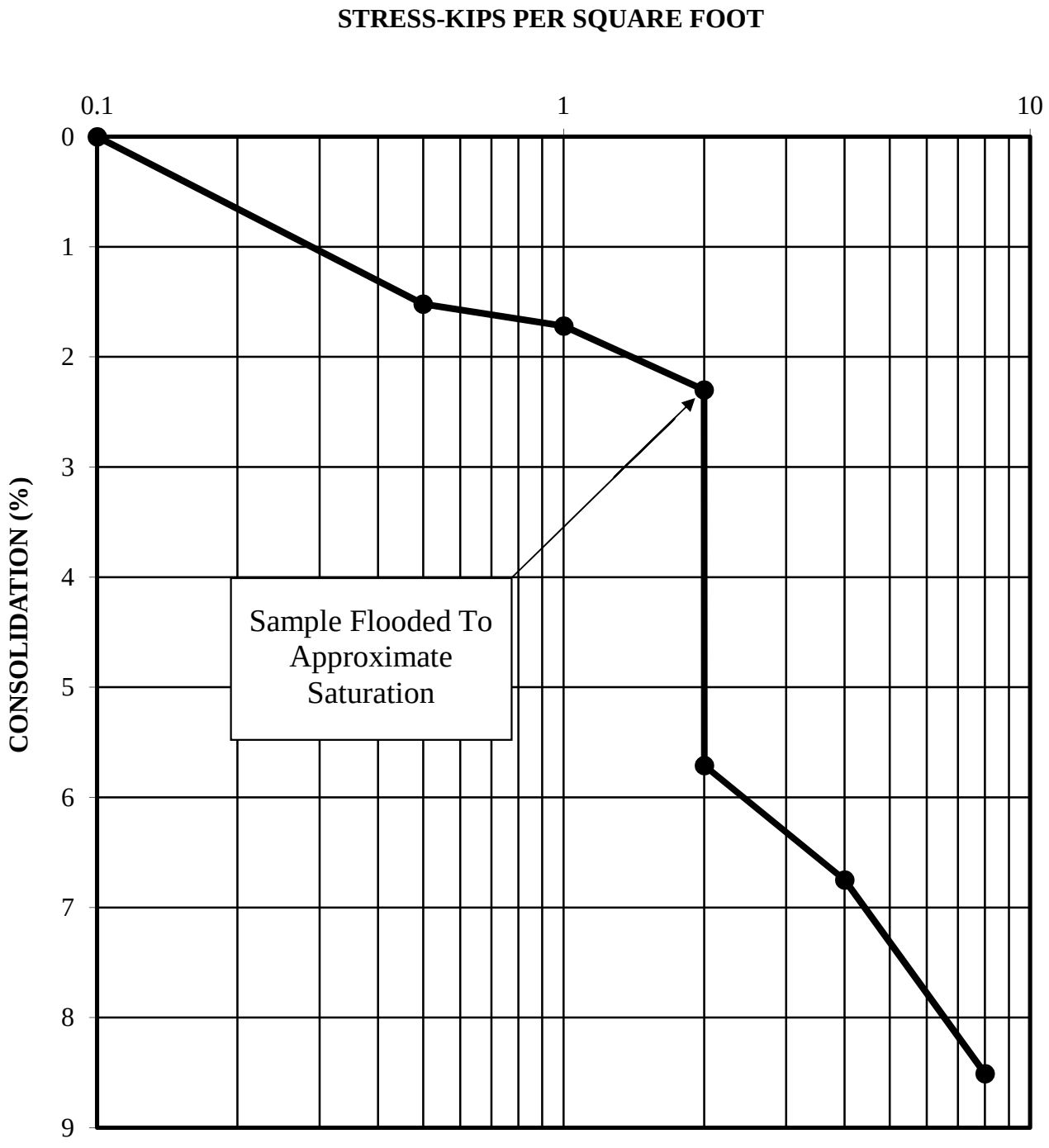
"Water Content %" indicates the laboratory determined soil moisture content in percent (ASTM D-2216).

"Unified Classification" indicates the field soil classification as per ASTM D-2488. When appropriate, the field classification is modified based upon subsequent laboratory tests.

Variations in soil profile, consistency, and moisture content may occur between test holes. Subsurface conditions may also vary between test holes and with time.

Figure No.: 13

CONSOLIDATION TEST RESULTS

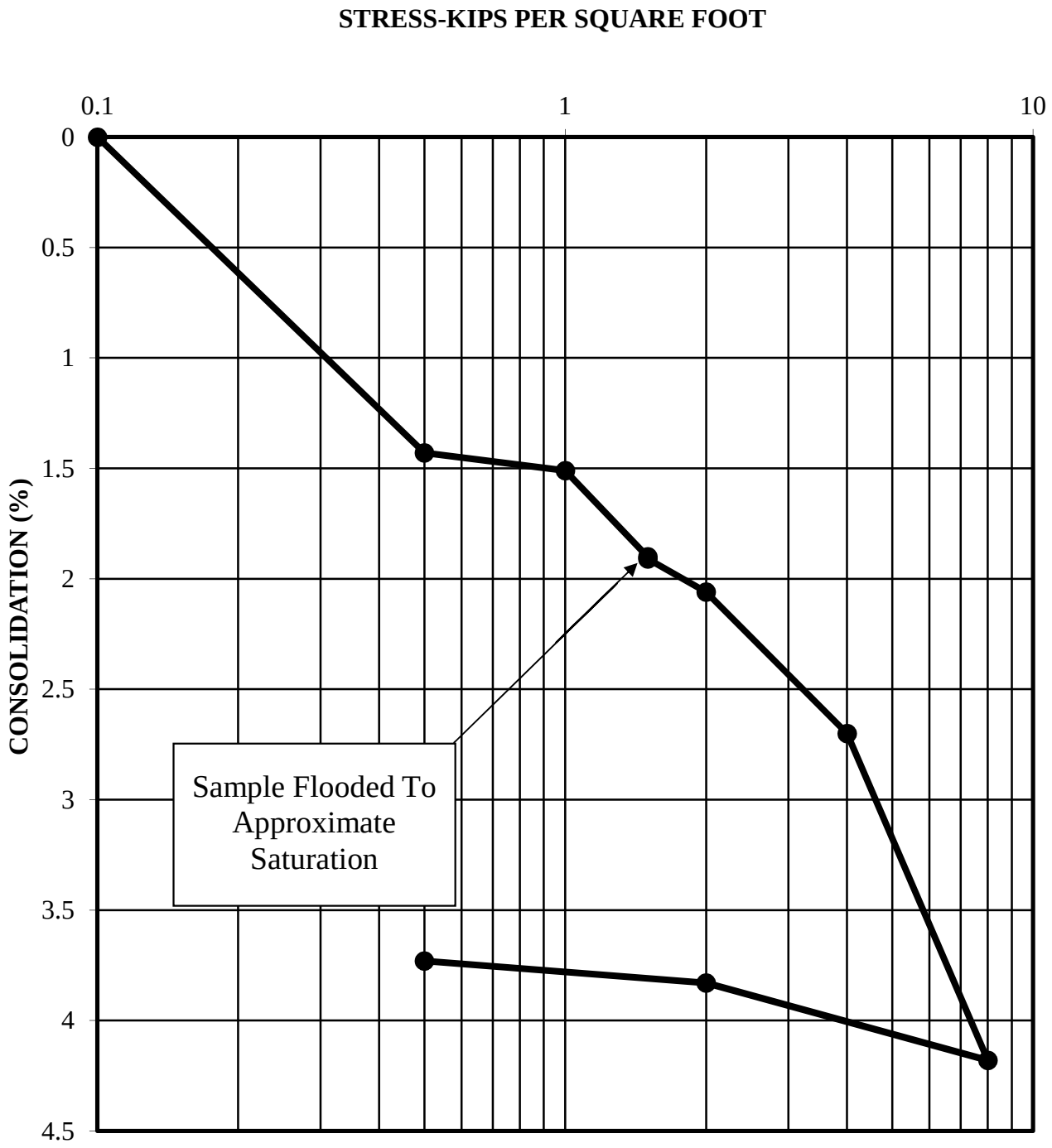


TEST HOLE NUMBER: 1
SAMPLE DEPTH: 5 FEET
SOIL DESCRIPTION: Silty SAND (SM) w/gravel
MOISTURE CONTENT: 6.4 %
BULK UNIT WEIGHT: 128 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 14

CONSOLIDATION TEST RESULTS

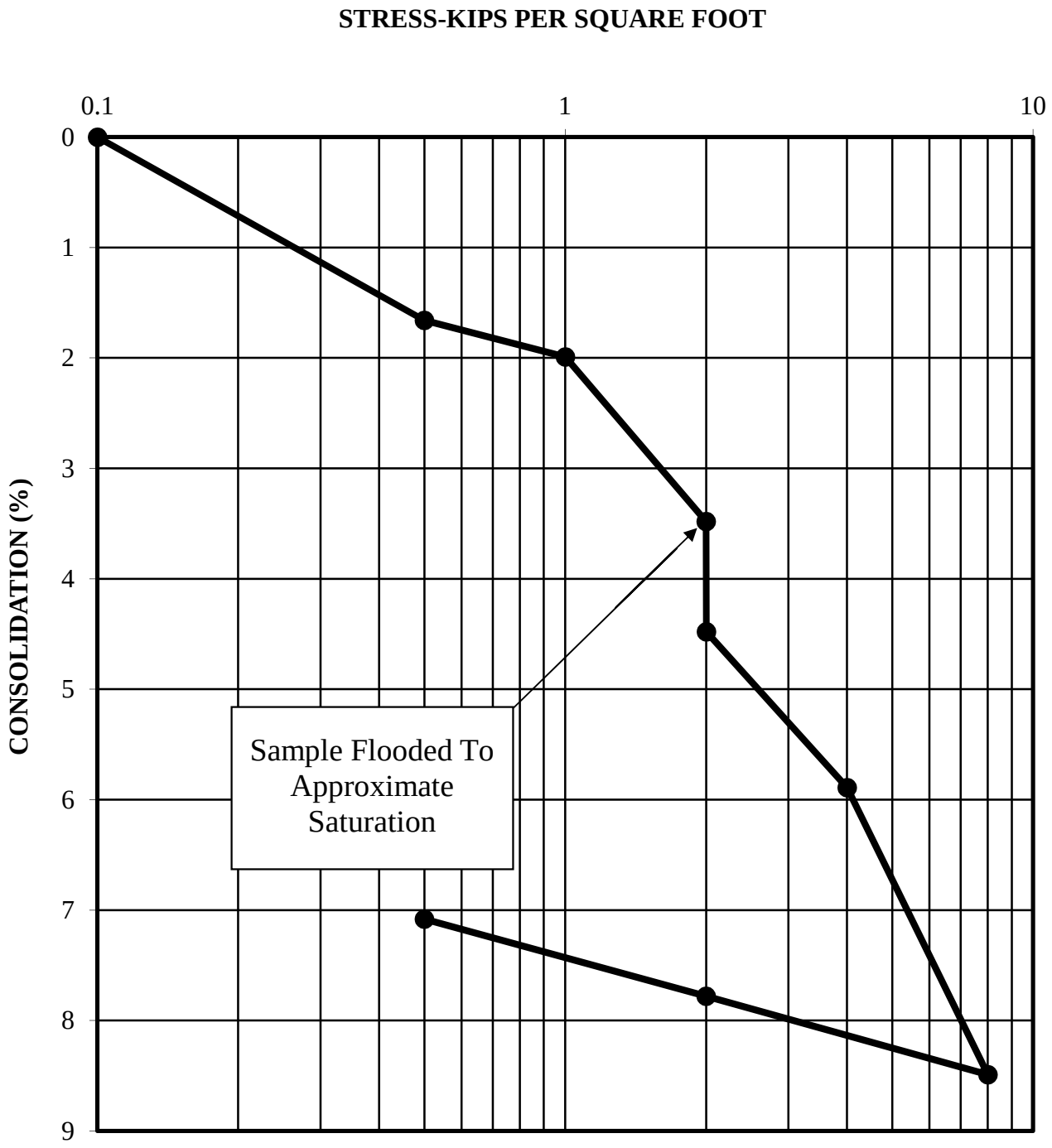


TEST HOLE NUMBER: 2
SAMPLE DEPTH: 2 FEET
SOIL DESCRIPTION: Silty SAND (SM) w/gravel
MOISTURE CONTENT: 16.7 %
BULK UNIT WEIGHT: 121 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 15

CONSOLIDATION TEST RESULTS

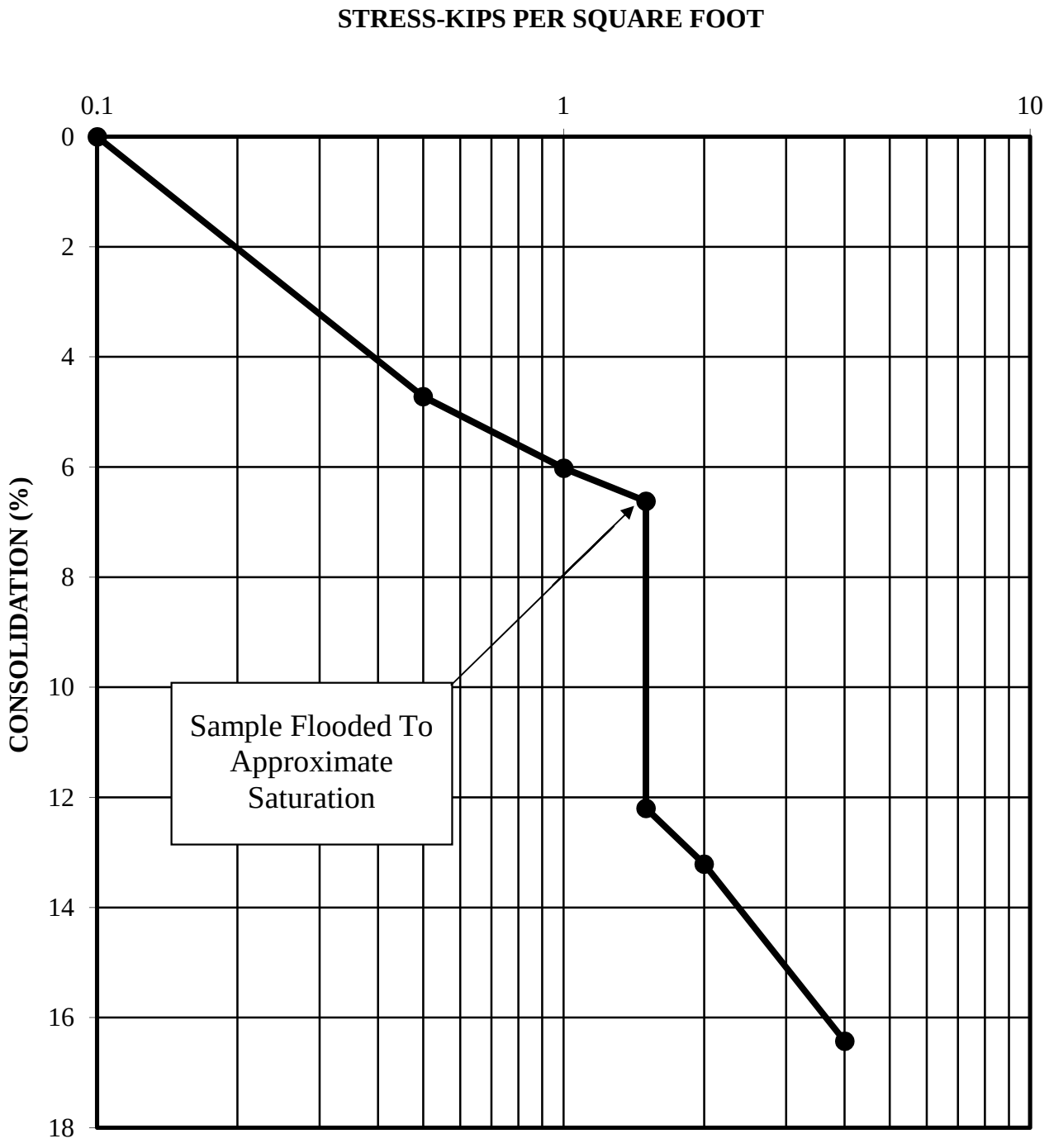


TEST HOLE NUMBER: 3
SAMPLE DEPTH: 5 FEET
SOIL DESCRIPTION: Clayey SAND (SC)
MOISTURE CONTENT: 15.2 %
BULK UNIT WEIGHT: 109 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 16

CONSOLIDATION TEST RESULTS

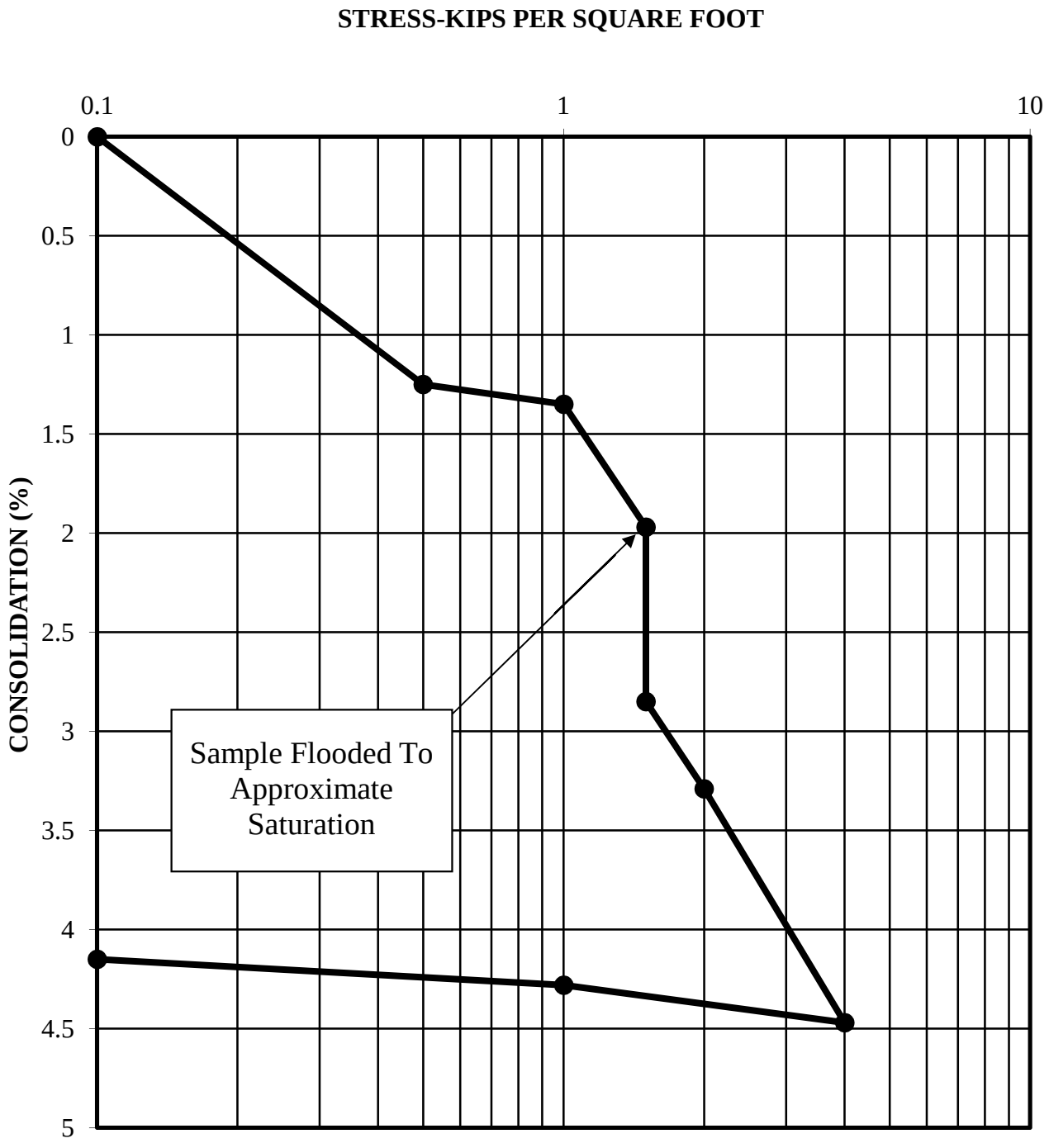


TEST HOLE NUMBER: 4
SAMPLE DEPTH: 2 FEET
SOIL DESCRIPTION: Clayey SAND (SC)
MOISTURE CONTENT: 7.7 %
BULK UNIT WEIGHT: 121 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 17

CONSOLIDATION TEST RESULTS

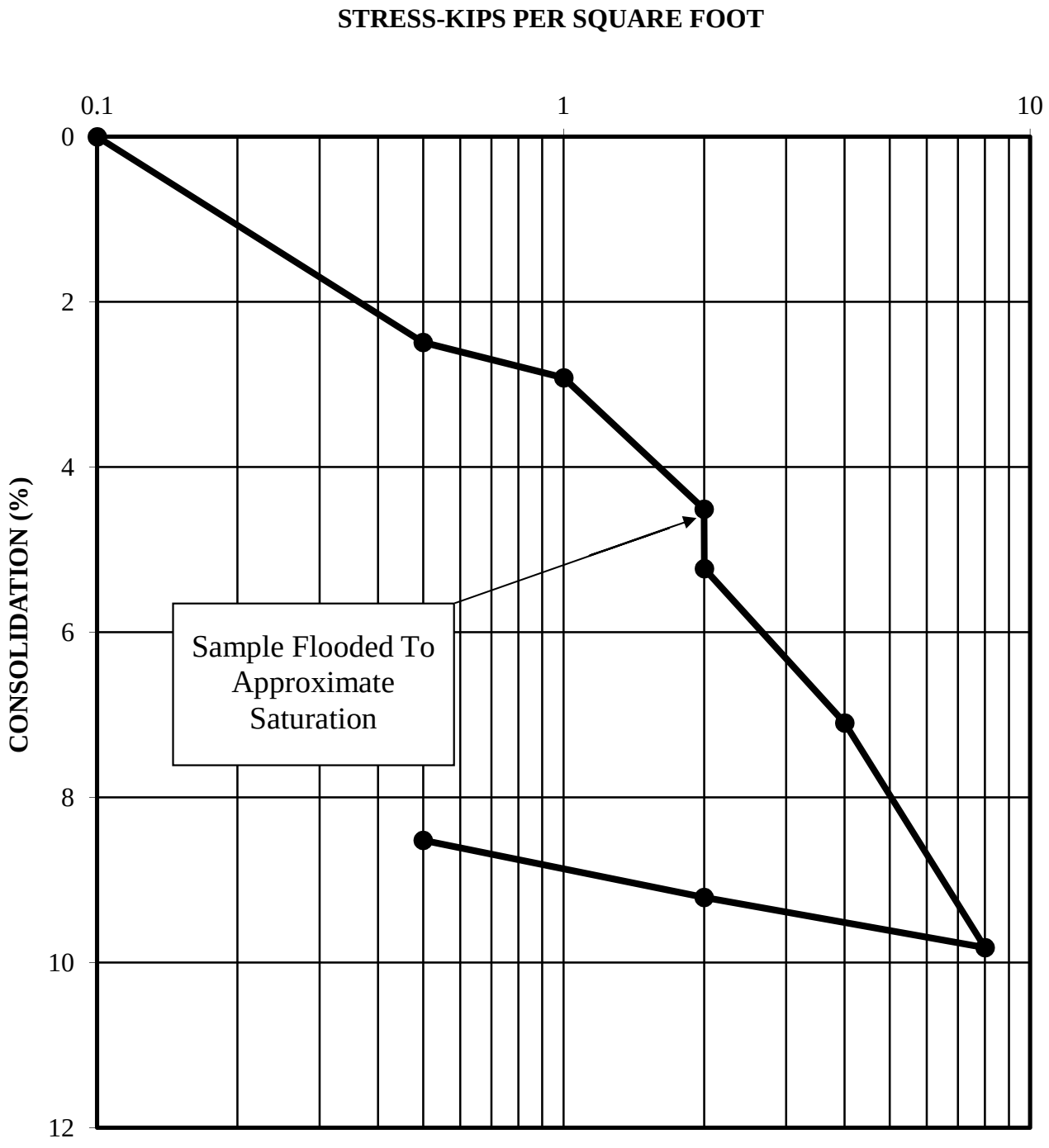


TEST HOLE NUMBER: 9
SAMPLE DEPTH: 2 FEET
SOIL DESCRIPTION: Silty SAND (SM)
MOISTURE CONTENT: 13.9 %
BULK UNIT WEIGHT: 107 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 18

CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER: 9
SAMPLE DEPTH: 5 FEET
SOIL DESCRIPTION: Silty SAND (SM)
MOISTURE CONTENT: 17.3 %
BULK UNIT WEIGHT: 106 pcf

PROJECT: Santa Fe CNG Facility in Santa Fe, New Mexico
PROJECT NO.: 15-1-036

FIGURE NO.: 19

SUMMARY OF LABORATORY TEST DATA

Test Hole	Depth (feet)	Unified Classification	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS-% PASSING BY WEIGHT										Description
					LL	PI	1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
1	8"- 2'			13.1													
1	2	SM	124	6.1				100	91	72	54	39	30	23	18	14.1	Silty SAND with gravel
1	5	SM	128	6.4	NV	NP		100	83	69	57	46	36	25	17	13.0	Silty SAND with gravel
1	15			11.0													
1	20	CL		19.9	37	23					100	99	98	94	88	78.5	Lean CLAY with sand
2	10" - 2'	SC		14.7	25	11		100	93	92	88	83	76	67	57	49.3	Clayey SAND
2	2	SM	121	16.7	NV	NP		100	81	76	73	67	59	49	39	30.0	Silty SAND with gravel
2	5	SW-SM	139	3.5				100	91	76	62	48	36	23	14	9.7	Well-graded SAND with silt and gravel
2	10			8.6													
2	15			10.2													
2	20			10.8													
3	8.5" - 2'			10.6													
3	2		118	8.3													
3	5	SC	109	15.2	35	21		100	99	97	95	92	89	83	78	71.2	Clayey SAND
3	10	SM		2.5	NV	NP		100	90	81	71	60	48	37	27	20.0	Silty SAND with gravel
3	15			7.2													
4	2	SC	121	7.7	23	8		100	90	86	81	73	63	51	51	31.9	Clayey SAND
4	5	SC	103	9.6				100	99	97	93	89	82	66	47	34.8	Clayey SAND
4	10			6.6													
4	15	SC		9.8	31	8			100	96	86	73	61	50	40	31.1	Clayey SAND

X8e Vinyard Project No.: 15-1-036

Project: Santa Fe CNG Facility - Santa Fe, NM **Table No.: 1**

SUMMARY OF LABORATORY TEST DATA

Test Hole	Depth (feet)	Unified Classification	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS-% PASSING BY WEIGHT										Description
					LL	PI	1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
5	2	SM	135	2.3			100	96	84	72	59	44	33	24	18	12.8	Silty SAND with gravel
5	5	GP-GM	140	1.1			100	90	63	53	43	36	29	20	13	9.4	Poorly graded GRAVEL with silt and sand
5	10	SM		3.6				100	86	78	71	62	52	37	26	18.3	Silty SAND with gravel
5	15			7.0													
6	2	SM		3.0				100	95	76	64	49	37	27	19	13.9	Silty SAND with gravel
6	5	SC-SM		5.0				100	96	85	76	63	50	36	24	17.1	Silty, clayey SAND with gravel
6	10	SM		8.4	NV	NP		100	87	76	64	52	42	33	24	17.5	Silty SAND with gravel
7	Grab	SM		7.4	16	2		100	84	76	68	60	52	44	36	29.4	Silty SAND with gravel
8	1			9.7													
8	2	SM		1.2	NV	NP		100	86	73	63	53	41	28	20	15.4	Silty SAND with gravel
9	2	SM	107	13.9	NV	NP		100	94	92	89	85	78	69	57	46.1	Silty SAND
9	5	SM	106	17.3	NV	NP		100	95	92	90	86	79	68	56	43.4	Silty SAND
9	10			3.0													
9	15	CL		18.8	37	22			100	97	93	89	86	81	76	68.6	Sandy lean CLAY
10	2	SC	108	15.9	29	13		100	93	88	82	77	74	68	56	44.0	Clayey SAND
10	5	ML	91	18.5	49	16		100	96	93	90	87	84	80	74	66.9	Sandy SILT
10	10			4.3													
10	15	SM		11.4	NV	NP		100	97	96	88	75	61	49	38	29.4	Silty SAND
11	1	SC		11.4	23	8		100	90	86	82	77	72	63	53	43.9	Clayey SAND
11	4			3.1													

X8e Vinyard Project No.: 15-1-036

Project: Santa Fe CNG Facility - Santa Fe, NM **Table No.: 1**

APPENDIX A
EARTHWORK PROCEDURES

APPENDIX
EARTHWORK PROCEDURES

General

The Geotechnical Engineer shall be the Owner's representative to observe and evaluate the earthwork operations. The Contractor shall cooperate with the Geotechnical Engineer in the performance of the Engineer's duties.

Clearing and Grubbing

Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled off-site or stockpiled for subsequent use in landscaped areas or nonstructural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

Site Preparation - Fill Areas

Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557. If vibratory compaction techniques pose a threat to the structural integrity of nearby facilities a static compactor shall be used. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.

Site Preparation - Cut Areas

Following excavation to rough grade, all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557. If vibratory compaction techniques pose a threat to the structural integrity of nearby facilities, a static compactor shall be used. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.

Foundation, Slab and Pavement Subgrade Preparation

Prior to placing reinforcement, footings, slabs, or pavement, the supporting soils shall be prepared, moisture conditioned, and compacted as described herein.

Structural Fill Material

Structural fill material shall be nonexpansive soil which may be gravel, sand, silt or clay, or a combination there of.

Sieve Size	Percent Passing By Weight
4”	100
1”	90-100
No. 4	70-100
No. 200	10-40

Structural fill material shall exhibit a plasticity index of ten or less. No organic, frozen or

decomposable material shall be utilized. All structural fill material shall be approved by the Geotechnical Engineer.

Structural Fill Placement

Structural fill material shall be blended as necessary to produce a homogeneous material. Fill material shall be spread in horizontal lifts no greater than eight inches in uncompacted thickness, but in no case thicker than can be properly compacted with the equipment to be utilized. If structural fill is to be placed on slopes steeper than 5:1 (horizontal:vertical) the natural ground shall be benched with minimum three foot wide benches at maximum two foot vertical intervals.

Moisture Conditioning

Structural fill material shall be dried or moistened as necessary, prior to compacting, to within ± three percent of optimum moisture content as determined by ASTM D-1557. Moisture shall be distributed uniformly throughout each lift.

Compaction

Structural fill shall be mechanically compacted to the following:

	Minimum Compaction ASTM D-1557
Foundation Support	95%
Slab Support	95%
Below Slab Utility Trenches	90%
General Site Grading	90%
Pavement Support	-
Upper 8” of Subgrade	95%
All other fill below pavement	90%

Aggregate Base Course shall be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Asphaltic concrete shall be compacted to a range of 93% to 97% of the maximum Theoretical Unit Weight in accordance with ASTM D2041.

Compaction by flooding and jetting is specifically prohibited unless authorized in advance by the Owner or his representative and the Geotechnical Engineer.

Observation and Testing

The Geotechnical Engineer or his representative shall perform field density tests with a frequency and at the locations he feels appropriate. The Geotechnical Engineer or his representative will perform Proctor tests on representative samples of all structural fill material for compliance to structural fill requirements on page A-1. To minimize delays, the Earthwork Contractor is encouraged to submit soil samples prior to use for proctor testing.

APPENDIX B
PERCOLATION TEST RESULTS

Environmental • Geotechnical • Materials Testing • Geosciences • Engineering

June 8, 2015

Huitt-Zollars, Inc.
6501 Americas Parkway, Suite 550
Albuquerque, New Mexico 87110

Attention: Mr. Innes R. Henderson, AIA, RIBA, LEED-AP BD+C

Subject: Percolation Rates at the CNG Facility in Santa Fe, New Mexico
X8e Vinyard Project No.: 15-1-036

Dear Mr. Henderson:

X8e Vinyard performed one percolation test to determine the percolation rate of the on-site soils. The percolation test was performed in the area where the proposed detention area will be constructed.

The following percolation rates were measured:

Boring	Percolation Rate (minutes/inch)	Approximate Depth (feet)
7	10.7	3

The State of New Mexico Environmental Department should be contacted for specific regulations affecting this site.

Should you have any questions regarding this letter or if we may be of further service, please call.

Sincerely,
X8e Vinyard

Andrew F. Brenner, E.I.T.

Ralph L. Abeyta, P.E., M. ASCE

APPENDIX C
SULFATE TEST RESULTS

8916-A Adams Street NE
Albuquerque, NM 87113
contactus@x8evinyard.com
Phone: 505.797.9743
Fax: 505.797.9749

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order: **1506449**
Date Reported: **6/15/2015**

CLIENT: X8E Vinyard
Project: Santa Fe CNG Facility
Lab Order: 1506449

Lab ID: 1506449-001
Collection Date: 6/2/2015
Client Sample ID: 1 at 2ft, 15-1-036
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Sulfate	4.9	1.5		mg/Kg	1	6/11/2015 12:11:59 PM	19681

Lab ID: 1506449-002
Collection Date: 6/2/2015
Client Sample ID: 3 at 2ft, 15-1-036
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Sulfate	66	1.5		mg/Kg	1	6/11/2015 12:36:48 PM	19681

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1506449**
15-Jun-15

Client: X8E Vinyard
Project: Santa Fe CNG Facility

Sample ID **MB-19681** SampType: **MBLK** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBS** Batch ID: **19681** RunNo: **26791**
Prep Date: **6/11/2015** Analysis Date: **6/11/2015** SeqNo: **799000** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	1.5								

Sample ID **LCS-19681** SampType: **LCS** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSS** Batch ID: **19681** RunNo: **26791**
Prep Date: **6/11/2015** Analysis Date: **6/11/2015** SeqNo: **799001** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	30	1.5	30.00	0	99.1	90	110			

Sample ID **1506449-002AMS** SampType: **MS** TestCode: **EPA Method 300.0: Anions**
Client ID: **3 at 2ft, 15-1-036** Batch ID: **19681** RunNo: **26791**
Prep Date: **6/11/2015** Analysis Date: **6/11/2015** SeqNo: **799012** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	100	1.5	30.00	65.85	118	37.4	146			

Sample ID **1506449-002AMSD** SampType: **MSD** TestCode: **EPA Method 300.0: Anions**
Client ID: **3 at 2ft, 15-1-036** Batch ID: **19681** RunNo: **26791**
Prep Date: **6/11/2015** Analysis Date: **6/11/2015** SeqNo: **799013** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	73	1.5	30.00	65.85	24.2	37.4	146	32.3	20	RS

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: X8E VINYARD Work Order Number: 1506449 RcptNo: 1

Received by/date: AT 06/10/15

Logged By: Celina Sessa 6/10/2015 9:15:00 AM Celina Sessa

Completed By: Celina Sessa 6/10/2015 10:06:56 AM Celina Sessa

Reviewed By: AT 06/10/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐ Not required
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	23.0	Good	Not Present			

Chain-of-Custody Record

Client: X8e Vinyards

Mailing Address: 8916-A Adams St. NE
Albuquerque, NM 87113

Phone #: 505-797-9743

email or Fax#: rlabeyta@X8eVinyard.com

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☐ Standard ☒ Rush 3 day

Project Name: Santa Fe CNG Facility

Project #: 15-1-036

Project Manager: Ralph Abeyta

Sampler:

On Ice: ☐ Yes ☒ No

Sample Temperature: 23.0°

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1506449	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Sulfates				Air Bubbles (Y or N)
6/2/15	—	soil	1 at 2ft, 15-1-036	bag	—	-001												X				
6/2/15	—	soil	3 at 2ft, 15-1-036	bag	—	-002												X				

Date	Time	Relinquished by	Received by	Date	Time
6/10/15	0915	Andrew F Brenner	[signature]	6/11/15	0915
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

STORMWATER BASIN SOIL INVESTIGATON

of

CNG Fuel Facility Upgrades
2931 Rufina Street
Santa Fe, New Mexico
X8eVinyard Project No.: 15-5-030

Prepared for:

Huitt-Zollars, Inc.
6501 Americas Parkway, Ste. 500
P.O. Box 1293
Albuquerque, NM 87710-8154

November 10, 2015

Prepared by:

8916-A Adams Street NE
Albuquerque, New Mexico 87113
Office: 505.797.9749
ContactUs@X8eVinyard.com

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1.0 INTRODUCTION	1
2.0 FIELD TASK FOR STORMWATER BASIN SOIL INVESTIGATION AND SAMPLING	2
3.0 QUALITY ASSURANCE / QUALITY CONTROL	3
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6.0 LIMITATIONS AND CLOSURE	6

ATTACHMENTS

Attachment 1 Figures

Attachment 2 Laboratory Data Package

Attachment 3 Photographs

1.0 INTRODUCTION

X8eVinyard is pleased to present this report for the investigation and sampling of soil in the storm water basin at 2931 Rufina St. in Santa Fe, New Mexico. X8eVinyard was contracted by Huitt-Zollars, Inc. to conduct this scope of work.

1.1 SITE HISTORY

Two wash pads are planned for construction to the northwest of the current transit yard detention cell as part of the CNG Fuel Facility Upgrades CIP Project. Expansion of the current detention cell is needed to accommodate additional storm-water runoff. Huitt Zollars estimated that the current cell would need to be expanded by approximately two feet in depth to accommodate the additional storm water from the two new wash pads. The current detention cell collects storm-water from the City of Santa Fe Transit Yard. Contaminants from the maintenance of City of Santa Fe transit vehicles may have washed into the storm-water basin. Characterization of the detention cell soil was necessary to assist in determining how to handle soil excavated from the detention cell expansion.

X8e proposed to do the following:

- Divide the detention cell into four quadrants and field screen a composite soil sample at the center point in each of four quadrants with a Photo Ionization Detector (PID). If a reading of greater than 100 units was identified with the PID, which is indicative of possible Volatile Organic Compounds then a soil sample would be submitted for laboratory analysis for Volatile and Semi-Volatile Organic Compounds using EPA methods 8260B and 8270C, respectively.

- Collect eight soil samples, two each in the four quadrants of the detention cell areas, one at the surface and one at the two-foot depth for laboratory analysis for Total Petroleum Hydrocarbons (TPH) gasoline, diesel and oil range organics using EPA method 8015D.

- Collect one composite sample at each quadrant for RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, selenium, and silver analysis using EPA method 6010B, and mercury using EPA method 7471).

- Prepare a report presenting the findings from the site investigation with photos.

2.0 FIELD TASKS FOR STORM WATER BASIN SOIL SAMPLING

X8e Vinyard Environmental Professional David Plante mobilized to the site on October 6, 2015. The storm water basin was divided into four quadrants and sample points were selected in the center of the four quadrants. Sample points were along a line running through the middle of the storm water basin from east to west. A drawing identifying the sample locations is attached.

Mr. Plante then collected a grab sample of soil at the four inch depth from the west end quadrant sample location for TPH laboratory analysis. A hand auger was used to auger down to approximately one foot. Significant resistance from rock was encountered past the one-foot mark. Rock was removed from the hole by hand and with a pry bar down to the two-foot depth. The hand auger was also used to remove rock and soil. Composite samples of soil were collected from soil between the four-inch and two-foot depth and placed in glass jars for RCRA 8 metals laboratory analysis and field analysis using the PID. A grab sample of soil at the two foot level was also collected for TPH laboratory analysis. Soil from the composite sample was field tested, using the field head space method with the PID.

Soil vapors were field screened using a calibrated MiniRAE photoionization detector (PID) with a 10.6 electron volt ultraviolet lamp. The field headspace method consists of approximately half filling a clean mason jar with soil, sealing the top with aluminum foil, and placing it on the dash of the vehicle where it is heated with the defroster. In addition, each soil sample jar is shaken vigorously for a minimum of one minute. After the jar is heated for approximately 15 minutes and shaken, the aluminum foil seal is pierced with the probe of the PID and the peak measurement for vapor phase volatile organic compounds (VOCs) is recorded. See Attachment 1 for PID field screening results.

Each instrument has an inherent range of error, and the PID may have indicated low concentrations of contaminants when those contaminants were not actually present (false positives). Conversely, the field instrument may not have detected low concentrations of vapor phase contaminants (false negatives). Field instruments are normally accurate to within approximately 3% of the reading. PIDs can also be sensitive to a range of compounds and, therefore, several compounds can cause interference patterns with the sensor readings. Since the PID is calibrated with isobutylene and VOCs detected in the field are likely to have a different ionization potential, PID measurements are recorded in “meter units” (mu) that vary relative to a compounds ionization potential. Since VOCs detected by a PID are not specifically identified, no conversions to parts per million (ppm) are made. PIDs are more sensitive to gasoline range vapor phase hydrocarbons than they are to heavier (diesel fuel, kerosene, motor oil, etc.) hydrocarbons, since heavier hydrocarbon molecules are not as easily ionized with the 10.6 electron volt lamp.

The field test sample with the PID for Soil Boring No. 1 found greater than 100 meter units. An additional composite soil sample was collected for laboratory analysis for

Volatile and Semi-Volatile Organic Compounds using EPA methods 8260B and 8270C. Upon completion of sample collection soil and rock from Soil Boring No. 1 was placed back in the hole. The hole was marked using an orange flag.

After completion of excavation and sampling for Soil Boring No. 1 was completed, Soil Boring No. 2 and No. 3 were investigated as to the extent of rock. Samples of soil at the four inch depth were collected for TPH laboratory analysis at each of the three remaining sample locations. It was decided that due to the significant amount of rock found at these locations, a mini excavator would be needed to obtain samples at the two foot depth in a reasonable time frame.

On October 9, 2015, X8e Vinyard Environmental Professional, David Plante and Equipment Operator, Alex Abeyta mobilized to the site with a mini excavator. Pot holes were dug down to two feet at the three remaining sample locations. Grab samples were collected at the two-foot depth for TPH laboratory analysis. Composite soil samples were collected for RCRA 8 metals laboratory analysis and field analysis for VOCs with the PID. Field analysis of composite soil samples with the PID from Soil Borings No. 2, 3 and 4 found less than 100 meter units (see Table 1 PID Field Screening Results). Therefore, composite samples were not collected for laboratory analysis for Volatiles or Semi-Volatiles from these locations. Excavated soil was replaced and compacted at each of the sample locations. Samples were placed in glass jars, labeled and placed in a container with blue ice.

Table 1 PID Field Screening Results

Location	Date and Time Collected	Field PID VOCs (meter units)
Soil Boring No. 1	October 6,2015 11:46 am	110 mu
Soil Boring No. 2	October 9, 2015 10:29 am	0.2 mu
Soil Boring No. 3	October 9, 2015 10:00 am	0.0 mu
Soil Boring No. 4	October 9, 2015 10:05 am	0.0 mu

3.0 QUALITY ASSURANCE / QUALITY CONTROL

Samples were placed in the appropriate, clean sampling containers provided by the analytical laboratory, cooled with blue ice, and transported to Hall Environmental Laboratory in Albuquerque, New Mexico under chain-of-custody.

Sampling personnel wore appropriate personal protection equipment such as disposable nitrile gloves during the sampling task. Disposable equipment was properly disposed and other equipment appropriately decontaminated, washed with non-

phosphate detergent and rinsed with deionized water, to reduce the potential for cross-contamination of the samples.

No laboratory, equipment blank, or split samples were collected during the storm water basin soil sampling.

The laboratory used in this investigation was National Environmental Laboratory Accreditation Program (NELAP)-certified. This provides an additional level of assurance that the data produced in the investigation are valid.

4.0 RESULTS AND DISCUSSION

One composite soil sample from Soil Boring No. 1 (west end of detention cell) was analyzed for VOCs, using EPA Method 8260B and semi-volatiles using EPA Method 8270C. Eight grab samples were analyzed for TPH diesel range organics (DRO) and gasoline range organics (GRO) using EPA Method 8015C. Four composite samples were analyzed for RCRA 8 total metals using EPA methods 6010B and 7471. Sample results for laboratory analytical samples can be found in Table 2 below.

Table 2 Laboratory Analytical Results (TPH and RCRA 8 Metals)

Location	Date Collected	TPH @ 4" (DRO, MRO, GRO) ND=Non-Detect	TPH @ 2' (DRO, MRO, GRO)	NMED Petroleum Contaminated Soil (PCS)	Total RCRA 8 Metals Lab Analytical Results (mg/Kg)	EPA RCRA TCLP Standard (mg/Kg)
Soil Boring No. 1	October 6, 2015	10 mg/Kg 72 mg/Kg ND	ND 83 mg/Kg ND	TPH-100 mg/Kg	Barium 100 Chrom. 8.1 Lead 7.1	Barium 100 Chrom. 5.0 Lead 5.0
Soil Boring No. 2	October 6 (4" TPH) and 9, 2015	280 mg/Kg 1400 mg/Kg ND	87 mg/Kg 300 mg/Kg ND	TPH-100 mg/Kg	Barium 120 Chrom.13.0 Lead 22.0	Barium 100 Chrom. 5.0 Lead 5.0
Soil Boring No. 3	October 6 (4" TPH) and 9, 2015	1300 mg/Kg 6500 mg/Kg ND	30 mg/Kg 120 mg/Kg ND	TPH-100 mg/Kg	Barium 29 Chrom. 2.7 Lead 4.1	Barium 100 Chrom. 5.0 Lead 5.0
Soil Boring No. 4	October 6 (4" TPH) and 9, 2015	ND 77 mg/Kg ND	ND ND ND	TPH-100 mg/Kg	Barium 99 Chrom. 6.6 Lead 4.7	Barium 100 Chrom. 5.0 Lead 5.0

TPHs were detected in seven of the eight soil samples submitted for TPH analysis. Diesel and motor oil range organics were identified in five of the seven samples which found TPH. No samples were found to contain TPH-Gasoline Range Organics (GRO). Sample results for TPH found that samples taken from the two soil borings (No. 1 and 4) on the edge of the basin were below the NMED standard of 100 mg/Kg and would

not meet the definition of Petroleum Contaminated Soil (PCS). Sample results for TPH for soil borings No. 2 and 3 were well above the PCS standard of 100 mg/Kg, particularly at the 4" depth. The sample result for TPH declined significantly at the two-foot level for soil borings No. 2 and 3 but still exceeded the PCS standard of 100 mg/Kg.

RCRA 8 metals (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver and Mercury) were analyzed in one composite sample from each of the soil borings. Only those metals identified in the analytical results are reported in Table 2. All other metals that were analyzed for were found to be not-detected (ND). The laboratory analytical results for each of the RCRA eight metals are reported as "totals" numbers for that substance in the sample.

In order to determine if the soil from each of the sample locations where the composite sample was taken would need to be considered hazardous waste for purpose of disposal under the Resource Conservation and Recovery Act (RCRA) a sample would have to undergo toxicity characteristic leaching procedure (TCLP) analysis. EPA does allow totals analysis to determine if TCLP analysis should be run to fully characterize a waste. If a total analysis of the waste demonstrates that individual constituents are not present in the waste or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run. A 100% solid sample can be evaluated by dividing each total constituent concentration by 20 and then comparing the resulting maximum theoretical concentration to the appropriate regulatory limit.

The EPA RCRA TCLP limits for the three metals identified from the totals analysis are: Barium-100 mg/Kg, Chromium-5.0 mg/Kg and Lead-5.0 mg/Kg. Soil Boring No. 1 RCRA 8 metals totals results are equal or slightly above the TCLP limits but would not be expected to fail TCLP analysis. Soil Boring No. 2 RCRA 8 metals totals results are above the TCLP limits but would not be expected to fail TCLP analysis. Soil Boring No. 3 RCRA 8 metals totals results were each below the RCRA TCLP limits. Soil Boring No. 4 RCRA 8 metals totals results were below the RCRA TCLP limits for Barium and Lead and slightly above the RCRA TCLP limit for Chromium and would not be expected to fail the RCRA TCLP analysis. Contractors should be made aware of these analytical results for worker protection purposes.

Volatile organics and semi-volatile organics were analyzed for one sample. The one sample was a composite sample from Soil Boring No. 1. This sample was found to be non-detect (ND) for volatile organics. Sample results for semi-volatile compounds were also ND with the exception of seven compounds (Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Fluoranthene, Indeno(1,2,3-cd)pyrene, and Pyrene). Sample results for the seven compounds identified were each at or slightly above the reporting detection limit (RL) for that particular constituent and significantly below the New Mexico Environment Department (NMED) Soil Screening Levels. See Table 3 below

Table 3 Laboratory Analytical Results (Semi-Volatiles)

Semi-Volatile Compound	Semi-Volatile Laboratory Analytical Result EPA Method 8270 C	Laboratory Analytical Reporting Detection Limit	NMED Soil Screening Level
Benzo(a)pyrene	0.20 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Benzo(b)fluoranthene	0.56 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Benzo(g,h,i)perylene	0.33 mg/Kg	0.20 mg/Kg	None Identified
Chrysene	0.27 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Fluoranthene	0.24 mg/Kg	0.24 mg/Kg	2.32 mg/Kg
Indeno(1,2,3-cd)pyrene	0.32 mg/Kg	0.20 mg/Kg	1.53 mg/Kg
Pyrene	0.21 mg/Kg	0.20 mg/Kg	None Identified

A USGS well approximately two miles east of the transit yard identified groundwater was 160.78 feet deep in October of 2015. Another USGS well approximately two miles south of the transit yard identified groundwater was 207.78 feet deep in October of 2015. It is unlikely that groundwater would be impacted by contaminants in the storm water basin.

5.0 CONCLUSIONS AND RECOMMENDATIONS

It is X8e Vinyard's opinion that, based upon the storm water basin analytical results, there is evidence of PCS in the lower bottom area of the storm water basin soil. This is the area where storm water drains in and collects in the basin to the west of the curb opening. The petroleum hydrocarbons are possibly from many years of storm water runoff, from the de minimis petroleum stains scattered around the transit yard, leaks, drips and spills and the operation of the transit yard maintenance shop in this area for many years. The soil excavated from the bottom of the basin from where it drains in at and to the west end would need to be sent to a New Mexico Special Waste landfill.

The owners may want to consider installation of a second oil/water separator where water from the transit yard drains into the storm water basin. Installation of silt screen across the opening in the curb would also help decrease contaminants from the transit yard from entering the storm water basin if a second oil/water separator is not feasible. The silt screen would have to be actively managed (cleaned out) after moisture events.

No further investigation is warranted at this time.

6.0 LIMITATIONS AND CLOSURE

This report has been prepared for the use of the City of Santa Fe Transit Yard and assigned parties to assist in an investigation of soil in a storm water basin at 2931

Rufina St. in Santa Fe, NM. Use of this report and/or its contents without the express written permission of X8eVinyard is prohibited.

Project tasks were performed in accordance with generally accepted environmental investigation and assessment practices within New Mexico. This report's conclusions and recommendations are based on field screening results, laboratory data, the observations of the Environmental Professional at the time of the site visits, and on information provided by persons familiar with the property. The information and conclusions in this report are subject to the accuracy, completeness, and availability of the information obtained during the project. This report is specific to the locations, depths, and times that samples were collected during this Investigation. This information may not be appropriate for assessing conditions at other locations or at other times.

Contaminant concentrations may vary between data points and with time. If conditions are encountered during development of this property which differ from those presented herein, this office should be contacted for additional evaluation and recommendations. The staff of X8eVinyard is available for additional consultation as necessary.

Decisions made in regard to the site are based upon the environmental data provided, are at the sole discretion of the Client and associates. No other warranty, expressed or implied, is given.

Thank You for the opportunity to assist Huitt-Zollars, Inc. with this project. Should you have any questions, please contact me at 505-797-9743.

X8eVinyard
Prepared by

David Plante
Environmental Professional

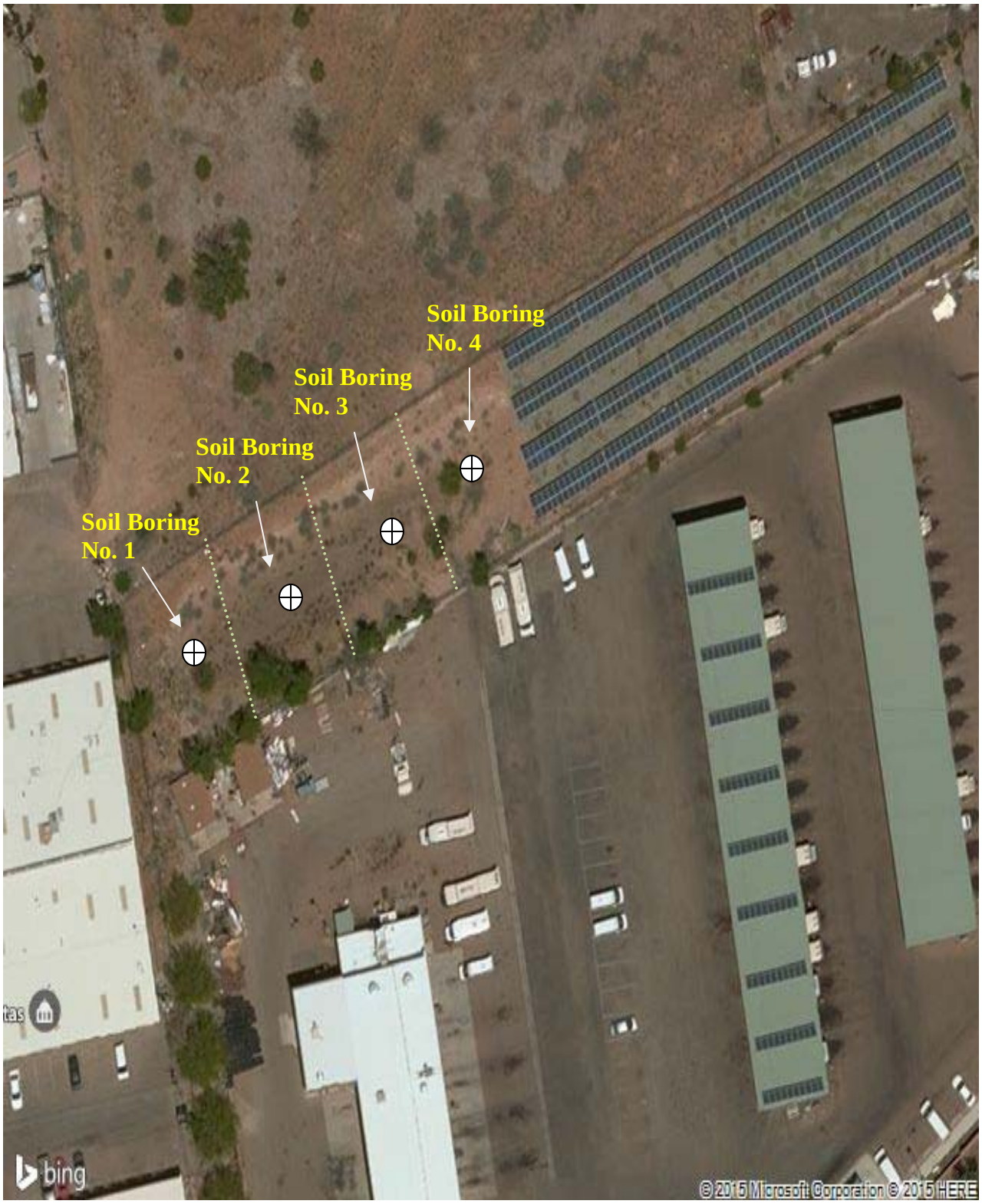
Reviewed by

Clifford K. Hillin, P.G.
Senior Geoscientist
Texas Professional Geologist #10500
Texas LPST CAPM #PM0000408

APPENDIX 1

FIGURES

Site Location Map



⊕ Soil Boring Locations

Storm Water Basin Soil Investigation, SF Transit Yard N
Site: 2931 Rufina St.
Santa Fe, New Mexico
Source: Google Earth Map

Client: Huitt-Zollars, Inc.
X8e Vinyard Project No. 15-5-030
Approximate Scale: No Scale
Figure 1

APPENDIX 2
LABORATORY DATA PACKAGE

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

October 22, 2015

David Plante
X8E Vinyard
8916 A Adams NE
Albuquerque, NM 87113
TEL: (505) 797-9743
FAX

RE: CNG Fuel Facility Upgrades OrderNo.: 1510297

Dear David Plante:

Hall Environmental Analysis Laboratory received 8 sample(s) on 10/7/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order **1510297**
Date Reported: **10/22/2015**

CLIENT: X8E Vinyard
Client Sample ID: Hole #1-01-4"
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-001
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	10	10		mg/Kg	1	10/14/2015 9:41:08 AM	21759
Motor Oil Range Organics (MRO)	72	50		mg/Kg	1	10/14/2015 9:41:08 AM	21759
Surr: DNOP	118	57.9-140		%REC	1	10/14/2015 9:41:08 AM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	10/9/2015 12:40:35 PM	21739
Surr: BFB	88.6	75.4-113		%REC	1	10/9/2015 12:40:35 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#1-02
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-002
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.032		mg/Kg	1	10/14/2015 4:51:36 PM	21825
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	13		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Barium	100	0.50		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Cadmium	ND	0.50		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Chromium	8.1	1.5		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Lead	7.1	1.3		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Selenium	ND	13		mg/Kg	5	10/15/2015 1:26:14 PM	21787
Silver	ND	1.3		mg/Kg	5	10/15/2015 1:26:14 PM	21787

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#1-03
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-003
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Toluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Ethylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Methyl tert-butyl ether (MTBE)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,4-Trimethylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,3,5-Trimethylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dichloroethane (EDC)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dibromoethane (EDB)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Naphthalene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1-Methylnaphthalene	ND	0.20		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Methylnaphthalene	ND	0.20		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Acetone	ND	0.74		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromodichloromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromoform	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Bromomethane	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Butanone	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Carbon disulfide	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Carbon tetrachloride	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chloroethane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chloroform	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Chloromethane	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Chlorotoluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
4-Chlorotoluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
cis-1,2-DCE	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
cis-1,3-Dichloropropene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dibromo-3-chloropropane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Dibromochloromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Dibromomethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,3-Dichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,4-Dichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Dichlorodifluoromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1-Dichloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1-Dichloroethene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2-Dichloropropane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,3-Dichloropropane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2,2-Dichloropropane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#1-03
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-003
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Hexachlorobutadiene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
2-Hexanone	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Isopropylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
4-Isopropyltoluene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
4-Methyl-2-pentanone	ND	0.50		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Methylene chloride	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
n-Butylbenzene	ND	0.15		mg/Kg	1	10/9/2015 1:04:23 PM	21739
n-Propylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
sec-Butylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Styrene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
tert-Butylbenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,1,2-Tetrachloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,2,2-Tetrachloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Tetrachloroethene (PCE)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
trans-1,2-DCE	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
trans-1,3-Dichloropropene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,3-Trichlorobenzene	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,4-Trichlorobenzene	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,1-Trichloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,1,2-Trichloroethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Trichloroethene (TCE)	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Trichlorofluoromethane	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
1,2,3-Trichloropropane	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Vinyl chloride	ND	0.050		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Xylenes, Total	ND	0.099		mg/Kg	1	10/9/2015 1:04:23 PM	21739
Surr: Dibromofluoromethane	110	70-130		%REC	1	10/9/2015 1:04:23 PM	21739
Surr: 1,2-Dichloroethane-d4	96.6	70-130		%REC	1	10/9/2015 1:04:23 PM	21739
Surr: Toluene-d8	94.3	70-130		%REC	1	10/9/2015 1:04:23 PM	21739
Surr: 4-Bromofluorobenzene	106	70-130		%REC	1	10/9/2015 1:04:23 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#1-04
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-004
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Acenaphthene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Acenaphthylene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Aniline	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Anthracene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Azobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benz(a)anthracene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(a)pyrene	0.20	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(b)fluoranthene	0.56	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(g,h,i)perylene	0.33	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzo(k)fluoranthene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzoic acid	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Benzyl alcohol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-chloroethoxy)methane	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-chloroethyl)ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-chloroisopropyl)ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Bis(2-ethylhexyl)phthalate	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Bromophenyl phenyl ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Butyl benzyl phthalate	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Carbazole	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Chloro-3-methylphenol	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Chloroaniline	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Chloronaphthalene	ND	0.25		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Chlorophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Chlorophenyl phenyl ether	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Chrysene	0.27	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Di-n-butyl phthalate	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Di-n-octyl phthalate	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Dibenz(a,h)anthracene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Dibenzofuran	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,2-Dichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,3-Dichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,4-Dichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
3,3´-Dichlorobenzidine	ND	0.25		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Diethyl phthalate	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Dimethyl phthalate	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4-Dichlorophenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4-Dimethylphenol	ND	0.30		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4,6-Dinitro-2-methylphenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4-Dinitrophenol	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#1-04
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-004
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
2,4-Dinitrotoluene	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,6-Dinitrotoluene	ND	0.50		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Fluoranthene	0.24	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Fluorene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachlorobutadiene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachlorocyclopentadiene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Hexachloroethane	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Indeno(1,2,3-cd)pyrene	0.32	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Isophorone	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1-Methylnaphthalene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Methylnaphthalene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Methylphenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
3+4-Methylphenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
N-Nitrosodi-n-propylamine	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
N-Nitrosodiphenylamine	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Naphthalene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Nitroaniline	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
3-Nitroaniline	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Nitroaniline	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Nitrobenzene	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2-Nitrophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
4-Nitrophenol	ND	0.25		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Pentachlorophenol	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Phenanthrene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Phenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Pyrene	0.21	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Pyridine	ND	0.40		mg/Kg	1	10/16/2015 3:52:08 PM	21817
1,2,4-Trichlorobenzene	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4,5-Trichlorophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
2,4,6-Trichlorophenol	ND	0.20		mg/Kg	1	10/16/2015 3:52:08 PM	21817
Surr: 2-Fluorophenol	69.3	9.93-124		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: Phenol-d5	82.4	28-119		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: 2,4,6-Tribromophenol	88.8	11.7-134		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: Nitrobenzene-d5	85.0	25-123		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: 2-Fluorobiphenyl	81.5	31.2-117		%REC	1	10/16/2015 3:52:08 PM	21817
Surr: 4-Terphenyl-d14	48.2	5.82-129		%REC	1	10/16/2015 3:52:08 PM	21817

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#1-05
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 10:30:00 AM
Lab ID: 1510297-005
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **KJH**	
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	10/14/2015 4:13:12 PM	21759
Motor Oil Range Organics (MRO)	83	51		mg/Kg	1	10/14/2015 4:13:12 PM	21759
Surr: DNOP	111	57.9-140		%REC	1	10/14/2015 4:13:12 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	10/9/2015 1:50:11 PM	21739
Surr: BFB	88.4	75.4-113		%REC	1	10/9/2015 1:50:11 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#2-01-4"
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 12:00:00 PM
Lab ID: 1510297-006
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	280	97		mg/Kg	10	10/14/2015 4:56:12 PM	21759
Motor Oil Range Organics (MRO)	1400	490		mg/Kg	10	10/14/2015 4:56:12 PM	21759
Surr: DNOP	0	57.9-140	S	%REC	10	10/14/2015 4:56:12 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	10/9/2015 2:13:25 PM	21739
Surr: BFB	89.1	75.4-113		%REC	1	10/9/2015 2:13:25 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole#3-01-4"
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 1:30:00 PM
Lab ID: 1510297-007
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	1300	100		mg/Kg	10	10/14/2015 5:39:11 PM	21759
Motor Oil Range Organics (MRO)	6500	510		mg/Kg	10	10/14/2015 5:39:11 PM	21759
Surr: DNOP	0	57.9-140	S	%REC	10	10/14/2015 5:39:11 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	10/9/2015 2:36:39 PM	21739
Surr: BFB	88.1	75.4-113		%REC	1	10/9/2015 2:36:39 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #4-01-4"
Project: CNG Fuel Facility Upgrades
Collection Date: 10/6/2015 1:45:00 PM
Lab ID: 1510297-008
Matrix: SOIL
Received Date: 10/7/2015 10:19:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	10/14/2015 6:22:09 PM	21759
Motor Oil Range Organics (MRO)	77	50		mg/Kg	1	10/14/2015 6:22:09 PM	21759
Surr: DNOP	89.5	57.9-140		%REC	1	10/14/2015 6:22:09 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	10/9/2015 2:59:44 PM	21739
Surr: BFB	86.5	75.4-113		%REC	1	10/9/2015 2:59:44 PM	21739

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21759** SampType: **MBLK** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS** Batch ID: **21759** RunNo: **29495**
Prep Date: **10/9/2015** Analysis Date: **10/13/2015** SeqNo: **897466** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	9.8		10.00		98.2	57.9	140			

Sample ID **LCS-21759** SampType: **LCS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS** Batch ID: **21759** RunNo: **29495**
Prep Date: **10/9/2015** Analysis Date: **10/13/2015** SeqNo: **897468** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	45	10	50.00	0	90.1	57.4	139			
Surr: DNOP	4.9		5.000		97.6	57.9	140			

Sample ID **1510297-001AMS** SampType: **MS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **Hole #1-01-4"** Batch ID: **21759** RunNo: **29524**
Prep Date: **10/9/2015** Analysis Date: **10/14/2015** SeqNo: **898989** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	39	9.7	48.69	10.16	59.6	42.3	146			
Surr: DNOP	5.7		4.869		117	57.9	140			

Sample ID **1510297-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **Hole #1-01-4"** Batch ID: **21759** RunNo: **29524**
Prep Date: **10/9/2015** Analysis Date: **10/14/2015** SeqNo: **898990** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	40	10	50.92	10.16	57.8	42.3	146	1.09	28.9	
Surr: DNOP	6.0		5.092		117	57.9	140	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21739** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS** Batch ID: **21739** RunNo: **29422**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895535** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	860		1000		85.9	75.4	113			

Sample ID **LCS-21739** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS** Batch ID: **21739** RunNo: **29422**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895536** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	97.8	79.6	122			
Surr: BFB	940		1000		94.1	75.4	113			

Sample ID **1510297-001AMS** SampType: **MS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **Hole #1-01-4"** Batch ID: **21739** RunNo: **29422**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895538** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	28	4.8	23.76	0	117	62.5	151			
Surr: BFB	930		950.6		97.3	75.4	113			

Sample ID **1510297-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **Hole #1-01-4"** Batch ID: **21739** RunNo: **29422**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895539** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	28	4.8	23.76	0	117	62.5	151	0.205	22.1	
Surr: BFB	920		950.6		96.5	75.4	113	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21739**	SampType: **MBLK**	TestCode: **EPA Method 8260B: Volatiles**			
Client ID: **PBS**	Batch ID: **21739**	RunNo: **29456**			
Prep Date: **10/8/2015**	Analysis Date: **10/9/2015**	SeqNo: **895576**	Units: **mg/Kg**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.050								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Methyl tert-butyl ether (MTBE)	ND	0.050								
1,2,4-Trimethylbenzene	ND	0.050								
1,3,5-Trimethylbenzene	ND	0.050								
1,2-Dichloroethane (EDC)	ND	0.050								
1,2-Dibromoethane (EDB)	ND	0.050								
Naphthalene	ND	0.10								
1-Methylnaphthalene	ND	0.20								
2-Methylnaphthalene	ND	0.20								
Acetone	ND	0.75								
Bromobenzene	ND	0.050								
Bromodichloromethane	ND	0.050								
Bromoform	ND	0.050								
Bromomethane	ND	0.15								
2-Butanone	ND	0.50								
Carbon disulfide	ND	0.50								
Carbon tetrachloride	ND	0.050								
Chlorobenzene	ND	0.050								
Chloroethane	ND	0.10								
Chloroform	ND	0.050								
Chloromethane	ND	0.15								
2-Chlorotoluene	ND	0.050								
4-Chlorotoluene	ND	0.050								
cis-1,2-DCE	ND	0.050								
cis-1,3-Dichloropropene	ND	0.050								
1,2-Dibromo-3-chloropropane	ND	0.10								
Dibromochloromethane	ND	0.050								
Dibromomethane	ND	0.050								
1,2-Dichlorobenzene	ND	0.050								
1,3-Dichlorobenzene	ND	0.050								
1,4-Dichlorobenzene	ND	0.050								
Dichlorodifluoromethane	ND	0.050								
1,1-Dichloroethane	ND	0.050								
1,1-Dichloroethene	ND	0.050								
1,2-Dichloropropane	ND	0.050								
1,3-Dichloropropane	ND	0.050								
2,2-Dichloropropane	ND	0.10								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21739** SampType: **MBLK** TestCode: **EPA Method 8260B: Volatiles**
Client ID: **PBS** Batch ID: **21739** RunNo: **29456**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895576** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	0.10								
Hexachlorobutadiene	ND	0.10								
2-Hexanone	ND	0.50								
Isopropylbenzene	ND	0.050								
4-Isopropyltoluene	ND	0.050								
4-Methyl-2-pentanone	ND	0.50								
Methylene chloride	ND	0.15								
n-Butylbenzene	ND	0.15								
n-Propylbenzene	ND	0.050								
sec-Butylbenzene	ND	0.050								
Styrene	ND	0.050								
tert-Butylbenzene	ND	0.050								
1,1,1,2-Tetrachloroethane	ND	0.050								
1,1,2,2-Tetrachloroethane	ND	0.050								
Tetrachloroethene (PCE)	ND	0.050								
trans-1,2-DCE	ND	0.050								
trans-1,3-Dichloropropene	ND	0.050								
1,2,3-Trichlorobenzene	ND	0.10								
1,2,4-Trichlorobenzene	ND	0.050								
1,1,1-Trichloroethane	ND	0.050								
1,1,2-Trichloroethane	ND	0.050								
Trichloroethene (TCE)	ND	0.050								
Trichlorofluoromethane	ND	0.050								
1,2,3-Trichloropropane	ND	0.10								
Vinyl chloride	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: Dibromofluoromethane	0.55		0.5000		110	70	130			
Surr: 1,2-Dichloroethane-d4	0.46		0.5000		92.9	70	130			
Surr: Toluene-d8	0.48		0.5000		95.7	70	130			
Surr: 4-Bromofluorobenzene	0.50		0.5000		100	70	130			

Sample ID **LCS-21739** SampType: **LCS** TestCode: **EPA Method 8260B: Volatiles**
Client ID: **LCSS** Batch ID: **21739** RunNo: **29456**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895577** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.95	0.050	1.000	0	95.2	70	130			
Toluene	0.96	0.050	1.000	0	95.7	70	130			
Chlorobenzene	0.98	0.050	1.000	0	98.4	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **LCS-21739** SampType: **LCS** TestCode: **EPA Method 8260B: Volatiles**
Client ID: **LCSS** Batch ID: **21739** RunNo: **29456**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895577** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloroethene	1.0	0.050	1.000	0	104	70	130			
Trichloroethene (TCE)	0.94	0.050	1.000	0	93.6	70	130			
Surr: Dibromofluoromethane	0.55		0.5000		109	70	130			
Surr: 1,2-Dichloroethane-d4	0.51		0.5000		101	70	130			
Surr: Toluene-d8	0.48		0.5000		95.6	70	130			
Surr: 4-Bromofluorobenzene	0.49		0.5000		97.4	70	130			

Sample ID **1510297-003ams** SampType: **MS** TestCode: **EPA Method 8260B: Volatiles**
Client ID: **Hole#1-03** Batch ID: **21739** RunNo: **29456**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895579** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.1	0.050	0.9921	0	106	70	130			
Toluene	1.1	0.050	0.9921	0	106	65	138			
Chlorobenzene	1.1	0.050	0.9921	0	108	70	130			
1,1-Dichloroethene	1.1	0.050	0.9921	0	113	72.6	149			
Trichloroethene (TCE)	1.1	0.050	0.9921	0	109	62.4	139			
Surr: Dibromofluoromethane	0.56		0.4960		113	70	130			
Surr: 1,2-Dichloroethane-d4	0.49		0.4960		99.5	70	130			
Surr: Toluene-d8	0.47		0.4960		94.6	70	130			
Surr: 4-Bromofluorobenzene	0.49		0.4960		98.5	70	130			

Sample ID **1510297-003amsd** SampType: **MSD** TestCode: **EPA Method 8260B: Volatiles**
Client ID: **Hole#1-03** Batch ID: **21739** RunNo: **29456**
Prep Date: **10/8/2015** Analysis Date: **10/9/2015** SeqNo: **895580** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.1	0.050	0.9940	0	106	70	130	0.163	20	
Toluene	1.0	0.050	0.9940	0	105	65	138	0.816	20	
Chlorobenzene	1.1	0.050	0.9940	0	112	70	130	4.00	20	
1,1-Dichloroethene	1.1	0.050	0.9940	0	108	72.6	149	4.22	20	
Trichloroethene (TCE)	1.0	0.050	0.9940	0	104	62.4	139	4.05	20	
Surr: Dibromofluoromethane	0.55		0.4970		110	70	130	0	0	
Surr: 1,2-Dichloroethane-d4	0.48		0.4970		97.4	70	130	0	0	
Surr: Toluene-d8	0.47		0.4970		94.5	70	130	0	0	
Surr: 4-Bromofluorobenzene	0.49		0.4970		98.7	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **mb-21817**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**			
Client ID: **PBS**	Batch ID: **21817**	RunNo: **29617**			
Prep Date: **10/13/2015**	Analysis Date: **10/16/2015**	SeqNo: **901588**	Units: **mg/Kg**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	0.20								
Acenaphthylene	ND	0.20								
Aniline	ND	0.20								
Anthracene	ND	0.20								
Azobenzene	ND	0.20								
Benz(a)anthracene	ND	0.20								
Benzo(a)pyrene	ND	0.20								
Benzo(b)fluoranthene	ND	0.20								
Benzo(g,h,i)perylene	ND	0.20								
Benzo(k)fluoranthene	ND	0.20								
Benzoic acid	ND	0.50								
Benzyl alcohol	ND	0.20								
Bis(2-chloroethoxy)methane	ND	0.20								
Bis(2-chloroethyl)ether	ND	0.20								
Bis(2-chloroisopropyl)ether	ND	0.20								
Bis(2-ethylhexyl)phthalate	ND	0.50								
4-Bromophenyl phenyl ether	ND	0.20								
Butyl benzyl phthalate	ND	0.20								
Carbazole	ND	0.20								
4-Chloro-3-methylphenol	ND	0.50								
4-Chloroaniline	ND	0.50								
2-Chloronaphthalene	ND	0.25								
2-Chlorophenol	ND	0.20								
4-Chlorophenyl phenyl ether	ND	0.20								
Chrysene	ND	0.20								
Di-n-butyl phthalate	ND	0.40								
Di-n-octyl phthalate	ND	0.40								
Dibenz(a,h)anthracene	ND	0.20								
Dibenzofuran	ND	0.20								
1,2-Dichlorobenzene	ND	0.20								
1,3-Dichlorobenzene	ND	0.20								
1,4-Dichlorobenzene	ND	0.20								
3,3´-Dichlorobenzidine	ND	0.25								
Diethyl phthalate	ND	0.20								
Dimethyl phthalate	ND	0.20								
2,4-Dichlorophenol	ND	0.40								
2,4-Dimethylphenol	ND	0.30								
4,6-Dinitro-2-methylphenol	ND	0.40								
2,4-Dinitrophenol	ND	0.50								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **mb-21817**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**			
Client ID: **PBS**	Batch ID: **21817**	RunNo: **29617**			
Prep Date: **10/13/2015**	Analysis Date: **10/16/2015**	SeqNo: **901588**	Units: **mg/Kg**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	ND	0.50								
2,6-Dinitrotoluene	ND	0.50								
Fluoranthene	ND	0.20								
Fluorene	ND	0.20								
Hexachlorobenzene	ND	0.20								
Hexachlorobutadiene	ND	0.20								
Hexachlorocyclopentadiene	ND	0.20								
Hexachloroethane	ND	0.20								
Indeno(1,2,3-cd)pyrene	ND	0.20								
Isophorone	ND	0.40								
1-Methylnaphthalene	ND	0.20								
2-Methylnaphthalene	ND	0.20								
2-Methylphenol	ND	0.40								
3+4-Methylphenol	ND	0.20								
N-Nitrosodi-n-propylamine	ND	0.20								
N-Nitrosodiphenylamine	ND	0.20								
Naphthalene	ND	0.20								
2-Nitroaniline	ND	0.20								
3-Nitroaniline	ND	0.20								
4-Nitroaniline	ND	0.40								
Nitrobenzene	ND	0.40								
2-Nitrophenol	ND	0.20								
4-Nitrophenol	ND	0.25								
Pentachlorophenol	ND	0.40								
Phenanthrene	ND	0.20								
Phenol	ND	0.20								
Pyrene	ND	0.20								
Pyridine	ND	0.40								
1,2,4-Trichlorobenzene	ND	0.20								
2,4,5-Trichlorophenol	ND	0.20								
2,4,6-Trichlorophenol	ND	0.20								
Surr: 2-Fluorophenol	2.5		3.330		74.1	9.93	124			
Surr: Phenol-d5	2.9		3.330		88.2	28	119			
Surr: 2,4,6-Tribromophenol	2.8		3.330		82.9	11.7	134			
Surr: Nitrobenzene-d5	1.4		1.670		85.5	25	123			
Surr: 2-Fluorobiphenyl	1.4		1.670		83.7	31.2	117			
Surr: 4-Terphenyl-d14	0.84		1.670		50.4	5.82	129			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **lcs-21817** SampType: **LCS** TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSS** Batch ID: **21817** RunNo: **29617**
Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901589** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	1.3	0.20	1.670	0	76.4	45.8	114			
4-Chloro-3-methylphenol	3.1	0.50	3.330	0	91.8	52.3	122			
2-Chlorophenol	3.1	0.20	3.330	0	92.3	49.9	115			
1,4-Dichlorobenzene	1.5	0.20	1.670	0	89.2	43.7	107			
2,4-Dinitrotoluene	1.1	0.50	1.670	0	64.6	36	106			
N-Nitrosodi-n-propylamine	1.5	0.20	1.670	0	89.4	39.5	110			
4-Nitrophenol	2.3	0.25	3.330	0	69.4	45.1	121			
Pentachlorophenol	2.4	0.40	3.330	0	72.0	23.7	111			
Phenol	3.1	0.20	3.330	0	92.5	52.7	119			
Pyrene	1.3	0.20	1.670	0	77.0	50.4	116			
1,2,4-Trichlorobenzene	1.6	0.20	1.670	0	98.4	40.1	114			
Surr: 2-Fluorophenol	2.9		3.330		86.9	9.93	124			
Surr: Phenol-d5	3.3		3.330		100	28	119			
Surr: 2,4,6-Tribromophenol	3.2		3.330		96.2	11.7	134			
Surr: Nitrobenzene-d5	1.6		1.670		96.5	25	123			
Surr: 2-Fluorobiphenyl	1.5		1.670		88.7	31.2	117			
Surr: 4-Terphenyl-d14	0.96		1.670		57.4	5.82	129			

Sample ID **1510297-004ams** SampType: **MS** TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **Hole#1-04** Batch ID: **21817** RunNo: **29617**
Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901593** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	1.0	0.20	1.668	0	60.4	27.5	117			
4-Chloro-3-methylphenol	2.3	0.50	3.327	0	69.0	26.3	116			
2-Chlorophenol	2.4	0.20	3.327	0	71.2	21.4	113			
1,4-Dichlorobenzene	1.1	0.20	1.668	0	64.7	25	105			
2,4-Dinitrotoluene	0.85	0.50	1.668	0	50.9	21.1	119			
N-Nitrosodi-n-propylamine	1.2	0.20	1.668	0	71.2	21.3	126			
4-Nitrophenol	2.1	0.25	3.327	0	62.2	21.3	120			
Pentachlorophenol	2.0	0.40	3.327	0	58.9	11.5	115			
Phenol	2.2	0.20	3.327	0	66.9	23	118			
Pyrene	1.1	0.20	1.668	0.2093	53.2	25.7	110			
1,2,4-Trichlorobenzene	1.4	0.20	1.668	0	81.0	31.1	107			
Surr: 2-Fluorophenol	2.2		3.327		65.6	9.93	124			
Surr: Phenol-d5	2.5		3.327		74.2	28	119			
Surr: 2,4,6-Tribromophenol	2.6		3.327		77.0	11.7	134			
Surr: Nitrobenzene-d5	1.3		1.668		80.7	25	123			
Surr: 2-Fluorobiphenyl	1.2		1.668		73.5	31.2	117			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **1510297-004ams** SampType: **MS** TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **Hole#1-04** Batch ID: **21817** RunNo: **29617**
Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901593** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Terphenyl-d14	0.70		1.668		41.9	5.82	129			

Sample ID **1510297-004AMSD** SampType: **MSD** TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **Hole#1-04** Batch ID: **21817** RunNo: **29617**
Prep Date: **10/13/2015** Analysis Date: **10/16/2015** SeqNo: **901594** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	0.88	0.20	1.659	0	52.9	27.5	117	13.7	25.4	
4-Chloro-3-methylphenol	2.0	0.50	3.309	0	60.2	26.3	116	14.1	30.4	
2-Chlorophenol	2.1	0.20	3.309	0	62.0	21.4	113	14.4	33.4	
1,4-Dichlorobenzene	0.91	0.20	1.659	0	55.0	25	105	16.7	20.9	
2,4-Dinitrotoluene	0.74	0.50	1.659	0	44.6	21.1	119	13.7	27.9	
N-Nitrosodi-n-propylamine	1.0	0.20	1.659	0	63.1	21.3	126	12.5	27.5	
4-Nitrophenol	1.8	0.25	3.309	0	54.6	21.3	120	13.6	33.7	
Pentachlorophenol	1.8	0.40	3.309	0	54.9	11.5	115	7.64	39.7	
Phenol	2.0	0.20	3.309	0	60.8	23	118	10.1	30.1	
Pyrene	0.92	0.20	1.659	0.2093	43.0	25.7	110	17.3	22.7	
1,2,4-Trichlorobenzene	1.2	0.20	1.659	0	70.3	31.1	107	14.7	27.8	
Surr: 2-Fluorophenol	1.9		3.309		56.0	9.93	124	0	0	
Surr: Phenol-d5	2.3		3.309		69.2	28	119	0	0	
Surr: 2,4,6-Tribromophenol	2.3		3.309		70.4	11.7	134	0	0	
Surr: Nitrobenzene-d5	1.2		1.659		70.3	25	123	0	0	
Surr: 2-Fluorobiphenyl	1.1		1.659		63.3	31.2	117	0	0	
Surr: 4-Terphenyl-d14	0.62		1.659		37.5	5.82	129	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID	**MB-21825**	SampType:	**MBLK**		TestCode:	**EPA Method 7471: Mercury**					
Client ID:	**PBS**	Batch ID:	**21825**		RunNo:	**29545**					
Prep Date:	**10/13/2015**	Analysis Date:	**10/14/2015**		SeqNo:	**899031**	Units:	**mg/Kg**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury		ND	0.033								

Sample ID	**LCS-21825**	SampType:	**LCS**		TestCode:	**EPA Method 7471: Mercury**					
Client ID:	**LCSS**	Batch ID:	**21825**		RunNo:	**29545**					
Prep Date:	**10/13/2015**	Analysis Date:	**10/14/2015**		SeqNo:	**899032**	Units:	**mg/Kg**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury		0.16	0.033	0.1667	0	97.4	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510297**
22-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21787** SampType: **MBLK** TestCode: **EPA Method 6010B: Soil Metals**
Client ID: **PBS** Batch ID: **21787** RunNo: **29499**
Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897295** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	2.5								
Barium	ND	0.10								
Cadmium	ND	0.10								
Chromium	ND	0.30								
Lead	ND	0.25								
Selenium	ND	2.5								
Silver	ND	0.25								

Sample ID **LCS-21787** SampType: **LCS** TestCode: **EPA Method 6010B: Soil Metals**
Client ID: **LCSS** Batch ID: **21787** RunNo: **29499**
Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897296** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	26	2.5	25.00	0	104	80	120			
Barium	26	0.10	25.00	0	106	80	120			
Cadmium	27	0.10	25.00	0	106	80	120			
Chromium	27	0.30	25.00	0	107	80	120			
Lead	26	0.25	25.00	0	104	80	120			
Selenium	25	2.5	25.00	0	98.3	80	120			
Silver	5.3	0.25	5.000	0	105	80	120			

Sample ID **MB-21787** SampType: **MBLK** TestCode: **EPA Method 6010B: Soil Metals**
Client ID: **PBS** Batch ID: **21787** RunNo: **29499**
Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897315** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Silver	ND	0.25								

Sample ID **LCS-21787** SampType: **LCS** TestCode: **EPA Method 6010B: Soil Metals**
Client ID: **LCSS** Batch ID: **21787** RunNo: **29499**
Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897316** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Silver	4.9	0.25	5.000	0	97.9	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: X8E VINYARD Work Order Number: 1510297 RcptNo: 1

Received by/date: 10/07/15

Logged By: Lindsay Mangin 10/7/2015 10:19:00 AM

Completed By: Lindsay Mangin 10/7/2015 10:27:12 AM

Reviewed By: CS 10/07/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.9	Good	Not Present			

Chain-of-Custody Record

Client: X8e Vinyard

Mailing Address: 8916-A Adams St.
Albuq., NM 87113

Phone #: 505-797-9743

email or Fax#: dplante@x8evinyard.com

QA/QC Package:
X Standard ☐ Level 4 (Full Validation)

Accreditation:
☒ NELAP ☐ Other _____
☐ EDD (Type) _____

Turn-Around Time:
☒ Standard ☐ Rush _____

Project Name: CNG Fuel Facility Upgrades

Project #: 15-5-029

Project Manager: David Plante

Sampler: D Plante

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.9-1.0cf=1.9

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1510297	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel) MRO	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles (Y or N)
10/6/15	10:30	Soil	Hole #1-01-4"	Glass	N/A	-001			X													
10/6/15	10:30	Soil	Hole #1-02	Glass	N/A	-002							X									
10/6/15	10:30	Soil	Hole #1-03	Glass	N/A	-003										X						
10/6/15	10:30	Soil	Hole #1-04	Glass	N/A	-004											X					
10/6/15	10:30	Soil	Hole #1-05	Glass	N/A	-005			X													
10/6/15	12:00	Soil	Hole #2-01-4"	Glass	N/A	-006			X													
10/6/15	1:30	Soil	Hole #3-01-4"	Glass	N/A	-007			X													
10/6/15	1:45	Soil	Hole #4-01-4"	Glass	N/A	-008			X													

Date	Time	Relinquished by	Received by	Date	Time
10/7/15	10:19	D Plante	[signature]	10/07/15	1019

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

October 28, 2015

David Plante
X8E Vinyard
8916 A Adams NE
Albuquerque, NM 87113
TEL: (505) 797-9743
FAX

RE: CNG Fuel Facility Upgrades OrderNo.: 1510515

Dear David Plante:

Hall Environmental Analysis Laboratory received 6 sample(s) on 10/9/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1510515**
Date Reported: **10/28/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #4-02-2'
Project: CNG Fuel Facility Upgrades
Collection Date: 10/9/2015 9:30:00 AM
Lab ID: 1510515-001
Matrix: SOIL
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	10/13/2015 6:21:36 PM	21759
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	10/13/2015 6:21:36 PM	21759
Surr: DNOP	103	57.9-140		%REC	1	10/13/2015 6:21:36 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	10/14/2015 1:47:03 AM	21799
Surr: BFB	90.0	75.4-113		%REC	1	10/14/2015 1:47:03 AM	21799

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #4-03
Project: CNG Fuel Facility Upgrades
Collection Date: 10/9/2015 9:20:00 AM
Lab ID: 1510515-002
Matrix: SOIL
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.032		mg/Kg	1	10/14/2015 10:39:08 AM	21824
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	4.9		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Barium	99	0.20		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Cadmium	ND	0.20		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Chromium	6.6	0.59		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Lead	4.7	0.49		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Selenium	ND	4.9		mg/Kg	2	10/19/2015 4:26:21 PM	21860
Silver	ND	0.49		mg/Kg	2	10/19/2015 4:26:21 PM	21860

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #3-02-2'
Project: CNG Fuel Facility Upgrades
Collection Date: 10/9/2015 10:00:00 AM
Lab ID: 1510515-003
Matrix: SOIL
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **KJH**	
Diesel Range Organics (DRO)	30	9.5		mg/Kg	1	10/14/2015 11:25:13 AM	21759
Motor Oil Range Organics (MRO)	120	48		mg/Kg	1	10/14/2015 11:25:13 AM	21759
Surr: DNOP	109	57.9-140		%REC	1	10/14/2015 11:25:13 AM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	10/14/2015 2:56:16 AM	21799
Surr: BFB	89.9	75.4-113		%REC	1	10/14/2015 2:56:16 AM	21799

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #3-03
Project: CNG Fuel Facility Upgrades
Collection Date: 10/9/2015 10:15:00 AM
Lab ID: 1510515-004
Matrix: SOIL
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.033		mg/Kg	1	10/14/2015 10:40:55 AM	21824
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	2.5		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Barium	29	0.10		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Cadmium	ND	0.10		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Chromium	2.7	0.30		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Lead	4.1	0.25		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Selenium	ND	2.5		mg/Kg	1	10/19/2015 4:22:38 PM	21860
Silver	ND	0.25		mg/Kg	1	10/19/2015 4:22:38 PM	21860

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #2-02-2'
Project: CNG Fuel Facility Upgrades
Collection Date: 10/9/2015 10:30:00 AM
Lab ID: 1510515-005
Matrix: SOIL
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst:	**KJH**
Diesel Range Organics (DRO)	87	10		mg/Kg	1	10/14/2015 1:44:36 PM	21759
Motor Oil Range Organics (MRO)	300	50		mg/Kg	1	10/14/2015 1:44:36 PM	21759
Surr: DNOP	189	57.9-140	S	%REC	1	10/14/2015 1:44:36 PM	21759
EPA METHOD 8015D: GASOLINE RANGE						Analyst:	**NSB**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	10/14/2015 3:19:21 AM	21799
Surr: BFB	89.5	75.4-113		%REC	1	10/14/2015 3:19:21 AM	21799

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: X8E Vinyard
Client Sample ID: Hole #2-03
Project: CNG Fuel Facility Upgrades
Collection Date: 10/9/2015 10:30:00 AM
Lab ID: 1510515-006
Matrix: SOIL
Received Date: 10/9/2015 2:00:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 7471: MERCURY						Analyst:	**JLF**
Mercury	ND	0.033		mg/Kg	1	10/14/2015 4:49:50 PM	21825
EPA METHOD 6010B: SOIL METALS						Analyst:	**MED**
Arsenic	ND	5.0		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Barium	120	0.20		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Cadmium	ND	0.20		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Chromium	13	0.60		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Lead	22	0.50		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Selenium	ND	5.0		mg/Kg	2	10/19/2015 4:34:44 PM	21860
Silver	ND	0.50		mg/Kg	2	10/19/2015 4:34:44 PM	21860

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**
28-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21759**	SampType: **MBLK**		TestCode: **EPA Method 8015M/D: Diesel Range Organics**		
Client ID: **PBS**	Batch ID: **21759**		RunNo: **29495**		
Prep Date: **10/9/2015**	Analysis Date: **10/13/2015**		SeqNo: **897466**	Units: **mg/Kg**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	9.8		10.00		98.2	57.9	140			

Sample ID **LCS-21759**	SampType: **LCS**		TestCode: **EPA Method 8015M/D: Diesel Range Organics**		
Client ID: **LCSS**	Batch ID: **21759**		RunNo: **29495**		
Prep Date: **10/9/2015**	Analysis Date: **10/13/2015**		SeqNo: **897468**	Units: **mg/Kg**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	45	10	50.00	0	90.1	57.4	139			
Surr: DNOP	4.9		5.000		97.6	57.9	140			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**
28-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21799** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS** Batch ID: **21799** RunNo: **29502**
Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897743** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	890		1000		88.8	75.4	113			

Sample ID **LCS-21799** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS** Batch ID: **21799** RunNo: **29502**
Prep Date: **10/12/2015** Analysis Date: **10/13/2015** SeqNo: **897744** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	5.0	25.00	0	101	79.6	122			
Surr: BFB	970		1000		96.8	75.4	113			

Sample ID **1510515-001AMS** SampType: **MS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **Hole #4-02-2'** Batch ID: **21799** RunNo: **29502**
Prep Date: **10/12/2015** Analysis Date: **10/14/2015** SeqNo: **897751** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	4.9	24.73	0	98.7	62.5	151			
Surr: BFB	950		989.1		96.5	75.4	113			

Sample ID **1510515-001AMSD** SampType: **MSD** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **Hole #4-02-2'** Batch ID: **21799** RunNo: **29502**
Prep Date: **10/12/2015** Analysis Date: **10/14/2015** SeqNo: **897752** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	4.9	24.41	0	102	62.5	151	2.03	22.1	
Surr: BFB	950		976.6		97.4	75.4	113	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**
28-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID **MB-21824** SampType: **MBLK** TestCode: **EPA Method 7471: Mercury**
Client ID: **PBS** Batch ID: **21824** RunNo: **29521**
Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **898146** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID **LCS-21824** SampType: **LCS** TestCode: **EPA Method 7471: Mercury**
Client ID: **LCSS** Batch ID: **21824** RunNo: **29521**
Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **898147** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.17	0.033	0.1667	0	102	80	120			

Sample ID **MB-21825** SampType: **MBLK** TestCode: **EPA Method 7471: Mercury**
Client ID: **PBS** Batch ID: **21825** RunNo: **29545**
Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **899031** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID **LCS-21825** SampType: **LCS** TestCode: **EPA Method 7471: Mercury**
Client ID: **LCSS** Batch ID: **21825** RunNo: **29545**
Prep Date: **10/13/2015** Analysis Date: **10/14/2015** SeqNo: **899032** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.16	0.033	0.1667	0	97.4	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1510515**
28-Oct-15

Client: X8E Vinyard
Project: CNG Fuel Facility Upgrades

Sample ID	**MB-21860**	SampType:	**MBLK**	TestCode:	**EPA Method 6010B: Soil Metals**
Client ID:	**PBS**	Batch ID:	**21860**	RunNo:	**29643**
Prep Date:	**10/14/2015**	Analysis Date:	**10/19/2015**	SeqNo:	**902568** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	2.5								
Barium	ND	0.10								
Cadmium	ND	0.10								
Chromium	ND	0.30								
Lead	ND	0.25								
Selenium	ND	2.5								
Silver	ND	0.25								

Sample ID	**LCS-21860**	SampType:	**LCS**	TestCode:	**EPA Method 6010B: Soil Metals**
Client ID:	**LCSS**	Batch ID:	**21860**	RunNo:	**29643**
Prep Date:	**10/14/2015**	Analysis Date:	**10/19/2015**	SeqNo:	**902569** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	25	2.5	25.00	0	102	80	120			
Barium	26	0.10	25.00	0	105	80	120			
Cadmium	26	0.10	25.00	0	105	80	120			
Chromium	27	0.30	25.00	0	106	80	120			
Lead	25	0.25	25.00	0	101	80	120			
Selenium	25	2.5	25.00	0	99.9	80	120			
Silver	5.2	0.25	5.000	0	104	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: X8E VINYARD Work Order Number: 1510515 RcptNo: 1

Received by/date: CS 10/09/15

Logged By: Ashley Gallegos 10/9/2015 2:00:00 PM

Completed By: Ashley Gallegos 10/9/2015 4:12:11 PM

Reviewed By: 10/12/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Samples were collected the same day and chilled.
6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	13.2	Good	Not Present			

Chain-of-Custody Record

Client: X8e Vinyard

Mailing Address: 8916 A Adams St.

Phone #: 505-797-9743

email or Fax#: dplante@x8evinyard.com

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:

☐ Standard ☐ Rush

Project Name: CNG Fuel Facility Upgrades

Project #: 15-5-029

Project Manager: David Plante

Sampler: David Plante

On Ice: X Yes ☐ No

Sample Temperature: 13.2°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1510515	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel) MRO	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles (Y or N)
10/9/15	9:30	Soil	Hole #4-02-2'	Glass	N/A	-001			X													
10/9/15	9:20	Soil	Hole #4-03	Glass	N/A	-002							X									
10/9/15	10:00	Soil	Hole #3-02-2'	Glass	N/A	-003			X													
10/9/15	10:15	Soil	Hole #3-03	Glass	N/A	-004							X									
10/9/15	10:30	Soil	Hole #2-02-2'	Glass	N/A	-005			X													
10/9/15	10:30	Soil	Hole #2-03	Glass	N/A	-006							X									

Date:	Time:	Relinquished by:	Received by:	Date	Time
10/9/15	0710 am	[signature]	Celina Sanchez	10/09/15	1400
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

APPENDIX 3
PHOTOGRAPHS

Project No. 15-5-030

Santa Fe Transit storm water basin looking east

Santa Fe Transit storm water basin looking west with flag for boring Number 3

Figure 2

Project No. 15-5-030

Hand auger in soil boring Number 1

Soil boring Number 1

Figure 3

Project No. 15-5-030

Soil boring Number 1 completed

Soil boring Number 2 with exposed rock

Figure 4

Project No. 15-5-030

Soil boring Number 2 at 1 foot depth

Soil boring Number 3 at 1 foot depth, extensive rock

Figure 5

Pot hole for sample location Number 2

Sample location Number 3 at two foot depth

Figure 6

Project No. 15-5-030

Sample location Number 4 at two foot depth

Figure 7