State of Utah

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Division of Facilities Construction and Management
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Addendum No. 1

Date: June 25, 2014

To: Contractors

From: Matt Boyer – Project Manager, DFCM

Reference: Valley Farm Covered Corral Facility
Southern Utah University
DFCM Project No. 13003730

Subject: **Addendum No. 1**

Pages	Addendum Cover Sheet	1	page
	General Items	90	pages
	Total	91	pages

Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.

1.1 SCHEDULE CHANGES: There are no Project Schedule changes.

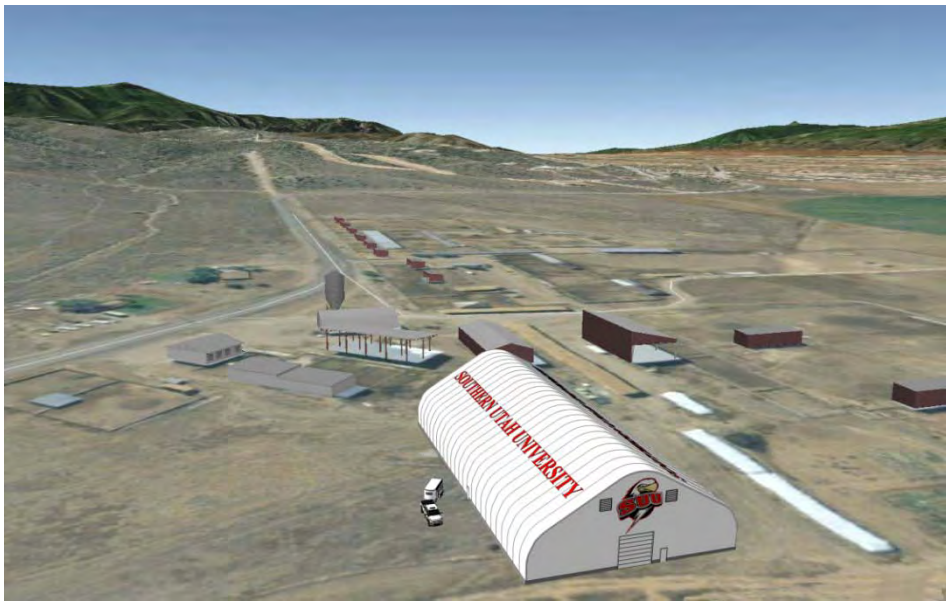
1.2 GENERAL ITEMS: Design-Build Program Document dated June 2014.

DESIGN-BUILD PROGRAM DOCUMENT

June 2014

SUU :: COVERED CORRAL FACILITY

DFCM Project Number: 13003730



SUU SOUTHERN UTAH UNIVERSITY

LEARNING LIVES FOREVER

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1.1 Project Description

Utilizing a design-build procurement approach, Southern Utah University (SUU) is seeking to realize a covered corral facility at SUU's Valley Farm. This facility will be used for the purpose of students and faculty exercising horses during inclement weather.

SUU requires a 100' X 200' clear span structure suitable for this intended purpose, which will allow natural light into the building, with a manufacturer's non-prorated warranty for at least fifteen (15) years.

For the purpose of this document, a tensioned fabric structure has been used as a basis of design however other suitable structures meeting the program requirements will be considered.

Additional requirements regarding the details of this project are outlined in this document.

Site Location

Southern Utah University is located in Cedar City, Utah approximately 250 miles south of Salt Lake City on Interstate 15, in Iron County. The project site itself is located at the SUU Valley Farm, west of the main campus of Southern Utah University (SUU), which is a public university. SUU's Valley Farm is located on Westview Drive. It was founded by the citizens of Cedar City in 1897 as an extension of the Agricultural College of Utah.

Area Map

General Location of Valley Farm Shown

Site Aerial Map

General Location of Covered Corral Shown

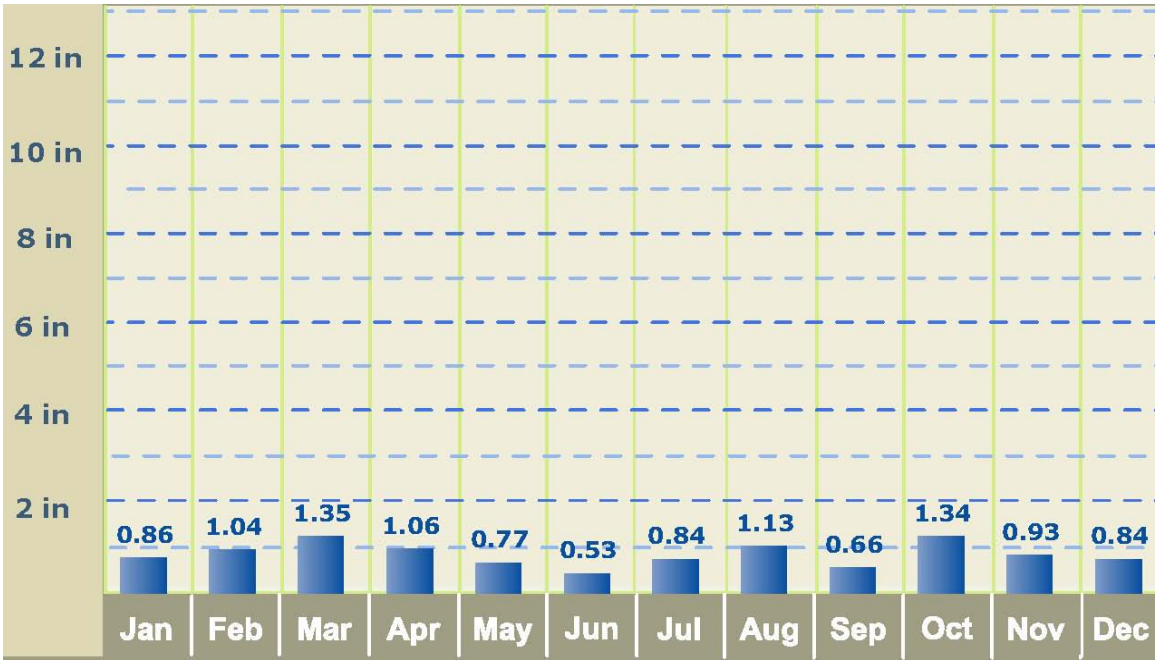
1.2 Physical Characteristics

Regional Climate

Project site is near Cedar City, UT and is positioned at: **37° 40' 17" N 113° 07' 35" W.** The elevation is: **5,546** feet above sea level.

Average Monthly Temperature

Average Monthly Precipitation



Views

The project site has virtually unobstructed views in all directions.

North

North East

South East

South

South West

West

North West

1.3 Existing Site Access and Circulation

Vehicular Access

The primary vehicular access to the site is directly from Westview Drive.

Pedestrian Access

There are currently no sidewalks for pedestrian access on either side of Westview Drive. This property is located in a very rural area, pedestrian access occurs along the shoulder of Westview Drive.

Aerial View of Site

1.4 Site Utilities

Water

There is no culinary water or fire hydrant(s) on or near the site. All water is provided by a well.

Natural Gas

No Natural Gas lines are located near the property.

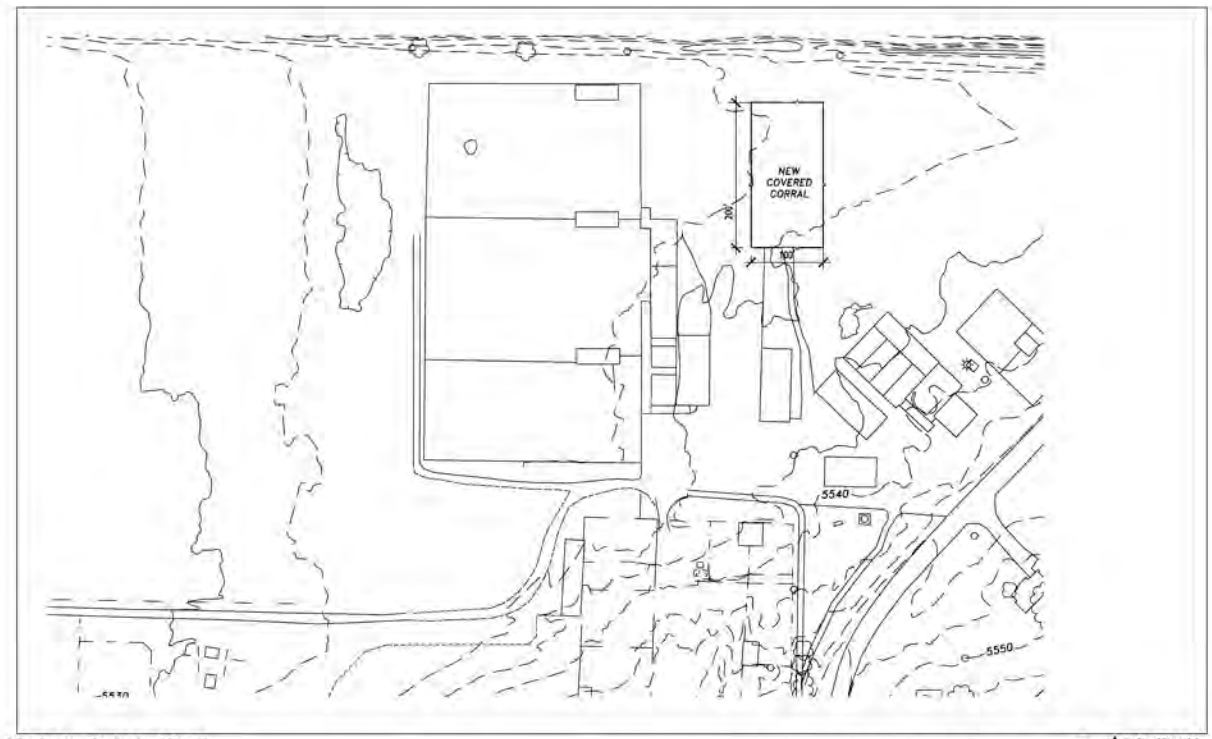
Sanitary Sewer

No Sanitary Sewer lines are located near the property.

Storm Drainage

This facility will be placed on existing, non vegetated area and will thus require stormwater runoff to be managed by grading new berms and or drainage swales around the new facility. The storm drainage shall be designed by the project civil engineer and coordinated with the project requirements.

PROPOSED SITE PLAN



2.1 Overview

The following portion of this report outlines the spaces needed for this facility based on discussions with Southern Utah University and State of Utah Division of Facilities Construction and Management (DFCM).

Building Forms

The program requirements of this facility are such that the building will be composed of one large covered horse ring to accommodate horse training/exercise activities**.**

The basis of design for the building is a fabric structure however, SUU will accept a pre-engineered structure metal building as an alternate building type for this project. Alternate building system must, at a minimum, meet all of the program requirements.

As is common with many of the available fabric coverings for a building such as this, the covering is anticipated to be made of a semi-translucent fabric, thereby providing natural lighting during the daylight hours. All buildings submitted must provide translucent lighting achieving a prescribed minimum level as no artificial lighting will be provided for nighttime use.

Building Expansion

Future expansion is not anticipated and is not a requirement of this program.

2.1.1 Codes, Regulations, and Safety

Codes and Regulations
2012 International Codes (I-Codes)
Code Analysis = Group "U" Utility and Miscellaneous

Construction Type = Type IIA (65' Height maximum)
Requires 1 hr. fire resistance protection (Intumescent Coating) for the Primary Building Frame

Allowable Area (tabular) = 19,000 SF+14,250 SF(4-side Frontage increase of 0.75)
= 33,250 SF Allowable Total

Occupancy Load = 67 Occupants - Based on 300 gross square foot/occupant
IBC Table 1004.1.2 Agricultural Building

Plumbing Fixture Count = none required for "U" agricultural building

ADA Accessibility – No special provisions required beyond 2 accessible mandoors

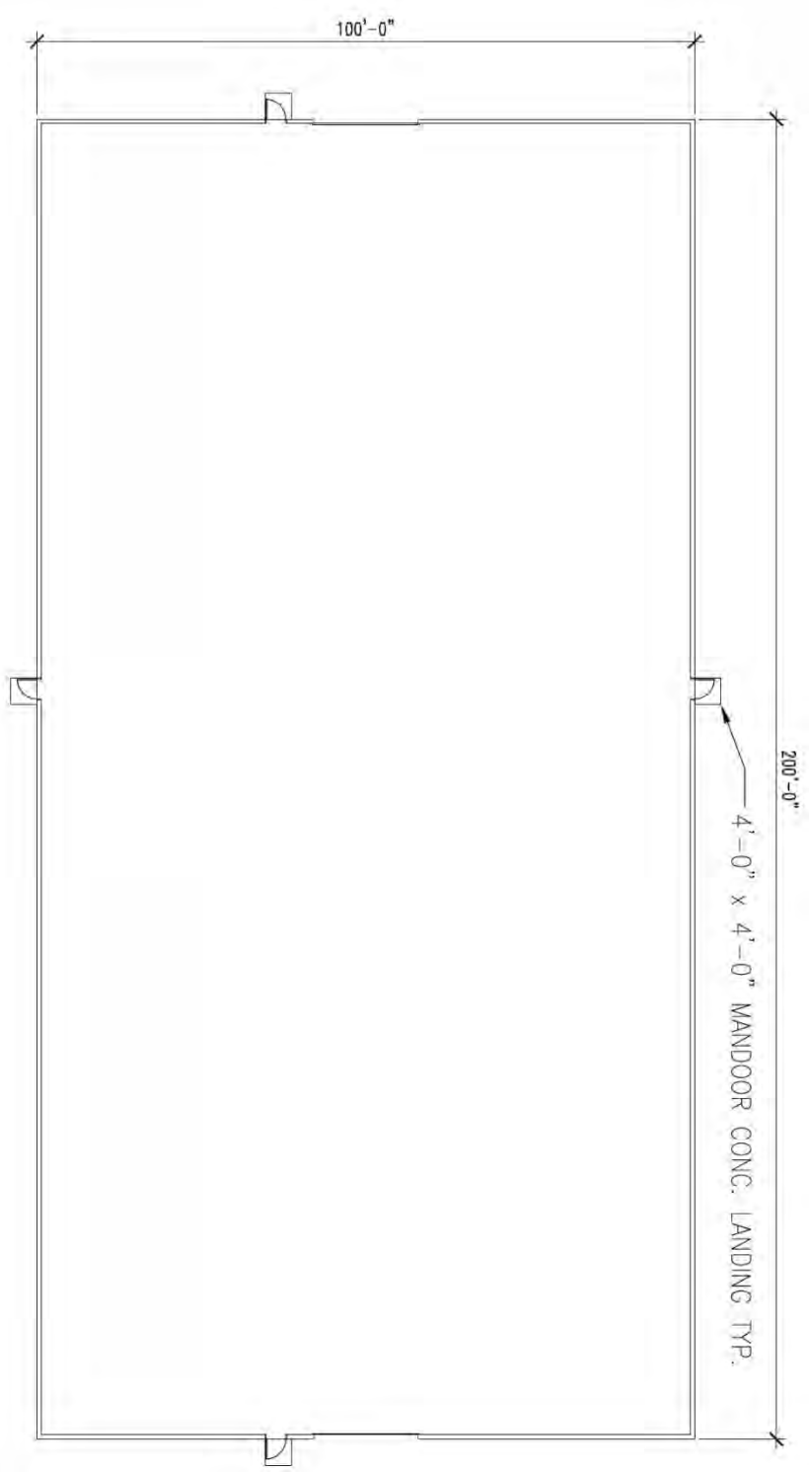
Egress Requirements: Exits required per IBC 2
Exits provided 4
Parking Requirements = none required

2.2 Space Requirements

ROOM DATA		Covered Corral
General Information	Uses/Function	Covered horse training/exercise ring
	Assignable Area	20,000 +/- sq. ft.
	Capacity	IBC Table 1004.1.2: 67 Occupants
	Key Dimensions	H: Varies (30' min.) x W: 100'-0" x L: 200'-0"
	Adjacencies	Greater than 30' separation distance all sides
	Access	No special provisions beyond 2 ADA mandoors
	Occupancy Type	U
Finishes/Treatments	Floor	Soil Substrate to support Final Footing (Final 8" Footing Top Soil to be provided and installed by User)
	Walls	Fabric Covered Structure mounted to 2' (above grade) stem wall; provide wall water deflection flashing continuously around base of fabric on top of stem wall
	Ceiling	Fabric Covered Structure
	Doors	16' w X 16' h overhead doors (2 req. 1 per end) 3' w X 7' h Access man doors (4 req. 1 per side) ADA min. 5'-0" x 4'-6" ext. conc. landing at each
	Light	Light transmittance through fabric structure during daylight hours only (minimum 20% transmittance distributed evenly over the building interior)
	Special Requirements	Clear Span Structure (Basis of Design – Norseman Structures Tensioned Fabric Structure); No Graphics are required (to be Owner Furnished)

Engineering Systems	Lighting	None
	Electrical	None
	Mechanical	None
	Ventilation	Manually Operated Louvers with pest screen (2 each at end of building - 4 total) minimum free area of 35 SF each
	Plumbing	None
	Fire Protection	1 hr. Primary Structural Frame Protection (Intumescent coating suggested)
	Security	Lockable doors
	Acoustics	No special provisions
Technology	Voice	None
	Data	None
	TV	None
	Other Technology	None
FFE	Fixed Equipment	None
	Movable Equipment	None

PROTOTYPE LAYOUT **TRAINING/EXERCISE AREA**

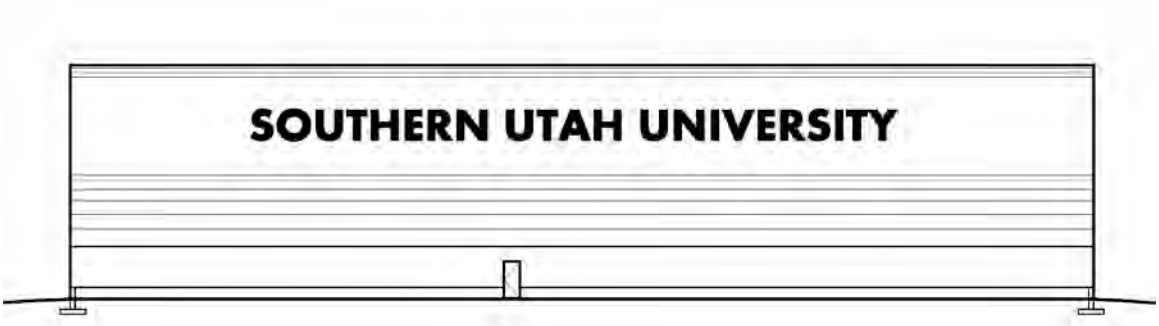


PROTOTYPE ELEVATIONS **TYPCAL END WALL**

Building End Walls

Graphics Shown for information only; to be owner furnished and installed

PROTOTYPE ELEVATIONS **TYPCAL SIDE WALL**



Building Side Walls

Graphics Shown for information only; to be owner furnished and installed

2.3 Building Design Requirements

2.3.1 Architectural

Architectural Information

This property is part of the SUU Valley Farm. The new covered corral will provide interior horse exercise space protected from the elements. The facility is intended to be utilized during daylight hours and no powered electrical or mechanical systems are included. SUU will be responsible for providing the final 8" finished footing material used inside the corral as well as any future irrigation piping and sprinklers to wet the floor. The Contractor's work will stop 8" below the future finished floor to allow for final footing to be placed by the User.

Building Orientation

Specific building location to be provided by SUU, the location is generally as shown in this document.

Functional Design

The specific requirements of this facility are outlined in the Room Data Sheets (Section 2.2 of this report). The one-story building will provide 20,000 square feet for horse training and exercise yard in a covered and enclosed space.

Exterior Materials

The building basis of design is a tensioned fabric structure for SUU.

Natural Lighting

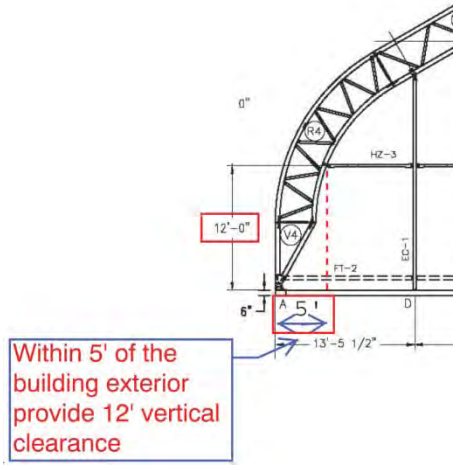
The translucent fabric cover plus the reflection from the white interior of the fabric increases the natural light within the building making specific orientation to gain sunlight exposure unnecessary (minimum 20% transmittance distributed evenly over the building interior).

Vertical Clearance

Provide minimum twelve feet (12') vertical clearance no more than five feet (5') from the building exterior throughout.

Building Height

Provide a building that is at least thirty feet (30') clear height at the peak with a clear span in all directions.



2.3.2 Civil

Civil / Environmental Overview

Storm drainage must be managed in such a way as to move water away from the structure in times of heavy rainfall keeping the interior free from the intrusion of water. Contractor must provide adequate drainage around new facility to actively direct storm water runoff a minimum of 10' away from the perimeter stemwall. This facility will be placed on existing, non vegetated area and will thus require stormwater runoff to be managed by new site grading, establishing a proper building floor elevation and providing drainage swales around the new facility.

The site is in an existing prairie dog habitat. Time-limited Prairie Dog Clearance has been obtained by SUU for this project area. If this clearance requires renewal, SUU will obtain the necessary extension.

2.3.3 Structural

Structural Overview

The structure basis of design is a pre-fabricated steel structure with a fabric skin designed by the supplier. Conventional concrete spread footings and foundation walls will support the pre-fabricated structure. Stem walls to be 24" above exterior finished grade minimum.

Structural/Service Coordination

Layout of the structural grid will be adjusted to correspond to the efficient component layout selected by the prefabricated building supplier with consideration of the doorway openings as required.

Codes and Standards

The building structure shall be designed in accordance with the 2012 International Building Code (IBC 2012) as a Risk Category I building.

Loading Criteria

The following minimum requirements should be anticipated when designing the structural system(s) unless present day code requirements are more stringent. The most stringent requirements shall apply:

- Wind: 105 MPH; Risk Category I; Exposure C
- Seismic: Ss=0.687, S1=0.216, Site Class D (SDs=0.572, SD1=0.284)
- Roof Live Loads: 5 psf (Unreducible)
- Snow Loads: 43 psf ground snow, I=1.0, Ct=1.2, Ce=0.9

Structural System Selection

The structural system for the building shall be selected based upon the specific requirements of the selected pre-fabricated building supplier's system.

Future Building Expansion

Future expansion is not anticipated and is not a requirement of this program. With the proposed anticipated use with the small occupant load, it is suggested that the building be a Risk Category I building which would have I=0.8 for Snow loads. Structural determinations are ultimately the responsibility of the selected Design-Build Team.

Testing and Inspections

The Project Architect/Engineer, and the selected testing lab, shall perform periodic construction observations, testing, and special inspections, as outlined in section 4.6 of the DFCM Design Criteria for Architects and Engineers as this is a State of Utah project. The A/E shall list all required special inspections on the contract drawings, and perform periodic construction observations as required by the typical DFCM A/E agreement. Costs for special inspections and testing services will be paid for directly by the Owner; the Design-Build Team is responsible for coordinating special inspections in an efficient and timely manner per DFCM requirements.

Geotechnical Criteria

A geotechnical report for the proposed building site has been completed by GEM Engineering Inc, dated May 10, 2011 and updated June 2013 (see detailed report in Section 6). The foundations of the building shall be designed and constructed in accordance with the parameters specified in the geotechnical report in Section 6.

2.3.4 Mechanical

Mechanical Overview

No active mechanical systems are required for this project. Passive Use Mechanical Louvers are required at each gable end wall with manual crank operation. These louvers are to provide a minimum of 35 SF of free area individually for a total of 70 SF minimum ventilation at each end wall of the structure. Louvers are to be provided with a pest screen.

2.3.5 Electrical

Electrical Overview

No Electrical is required for this project.

2.3.6 Plumbing

Plumbing Overview

No Plumbing is required for this project including restrooms as this is an agricultural "U" occupancy.

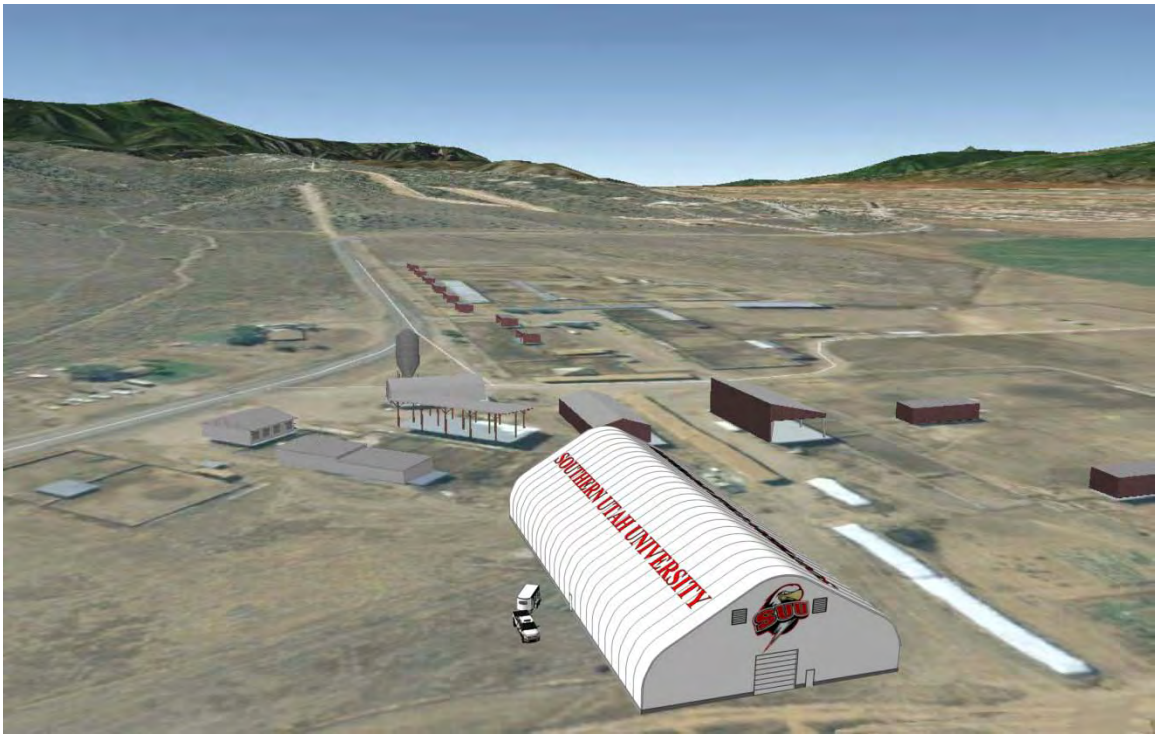
Fire Protection

No Fire Protection fire flow is available for this project.

2.3.7 Landscaping

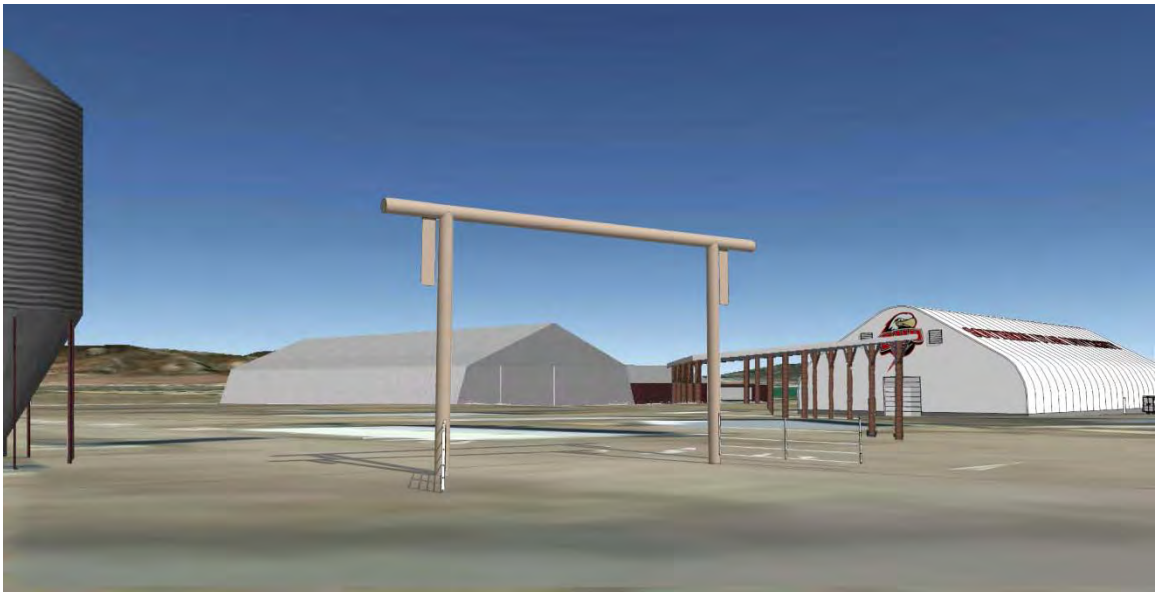
No landscaping is required for this project.

RENDERINGS **COVERED CORRAL**



Bird's Eye View

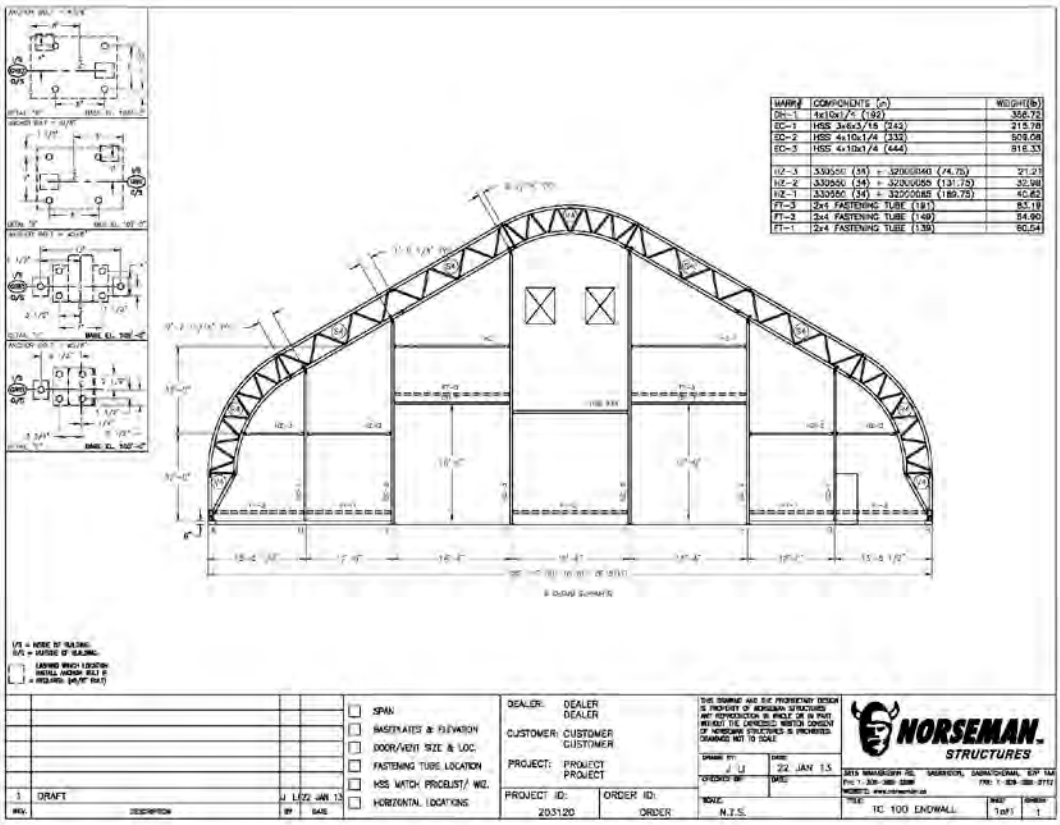
View from Westview Drive



View from Valley Farm Entrance Gate

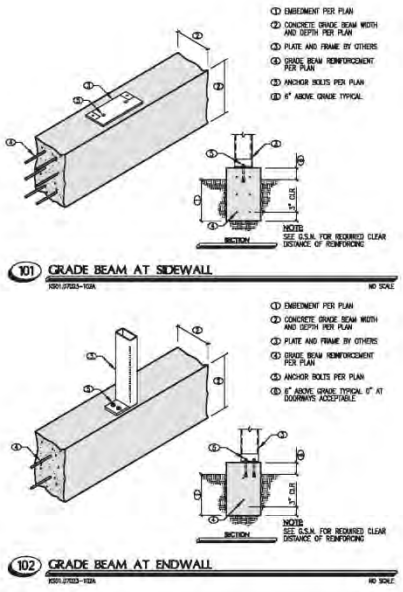
View from East Side of Corral

DRAWING **ENDWALL FRAME**



For General Information Only

DRAWING **FOUNDATION DETAILS**



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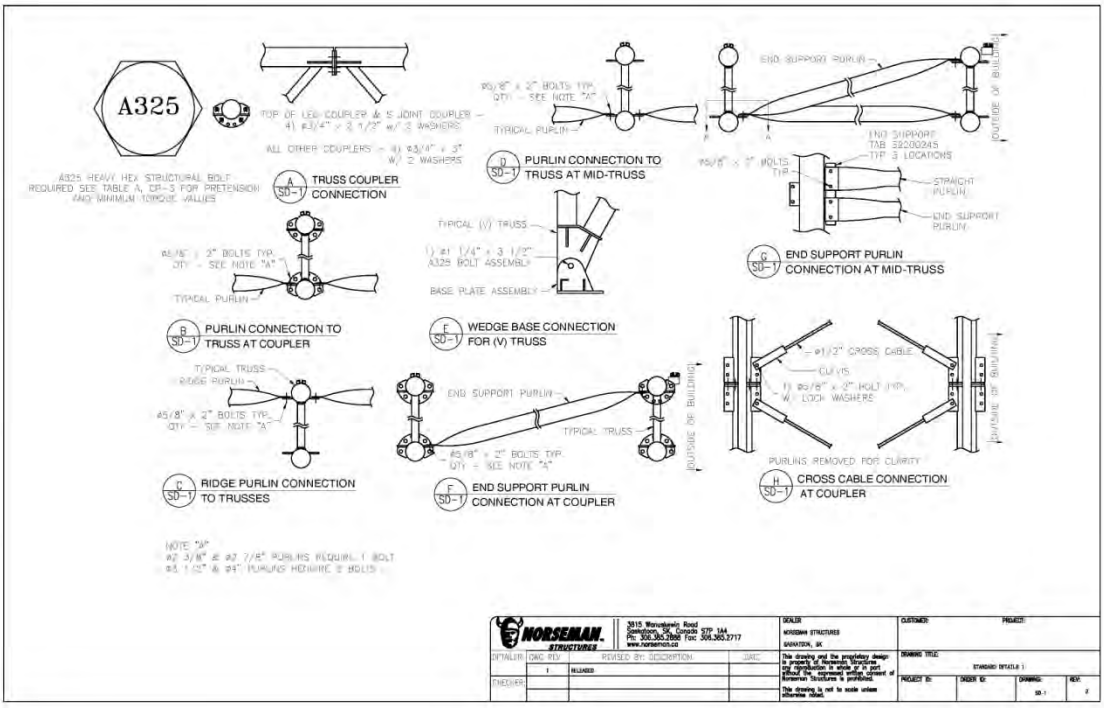
DRAWING **TYPICAL DETAILS**



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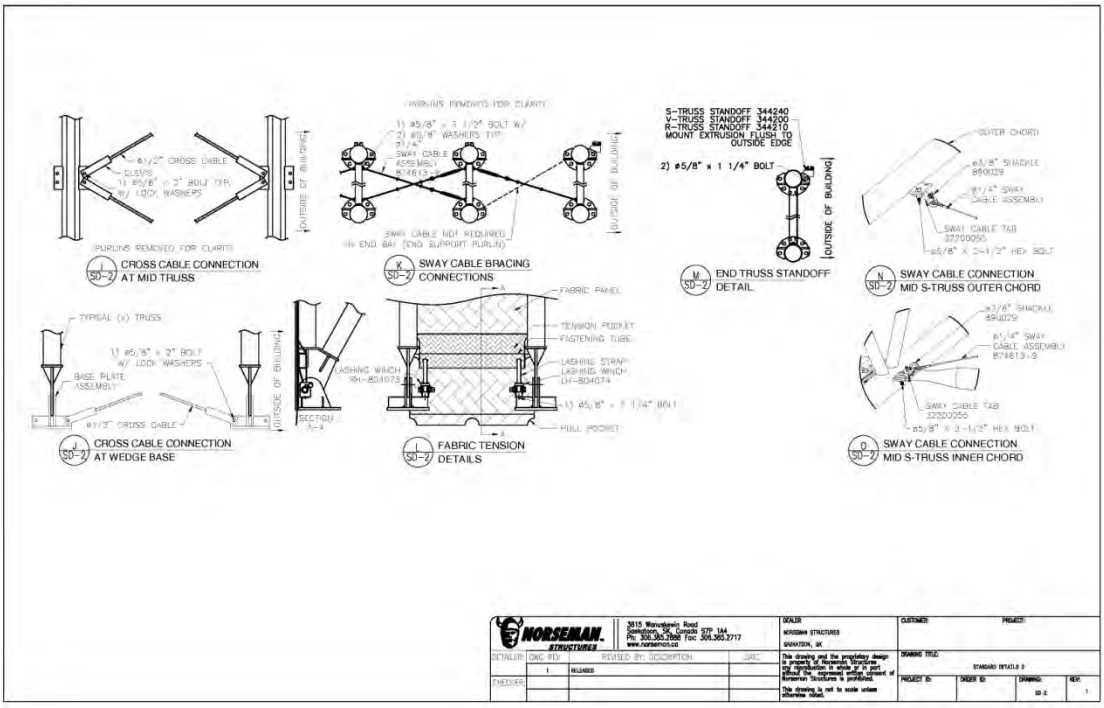
DRAWING **TYPICAL DETAILS**



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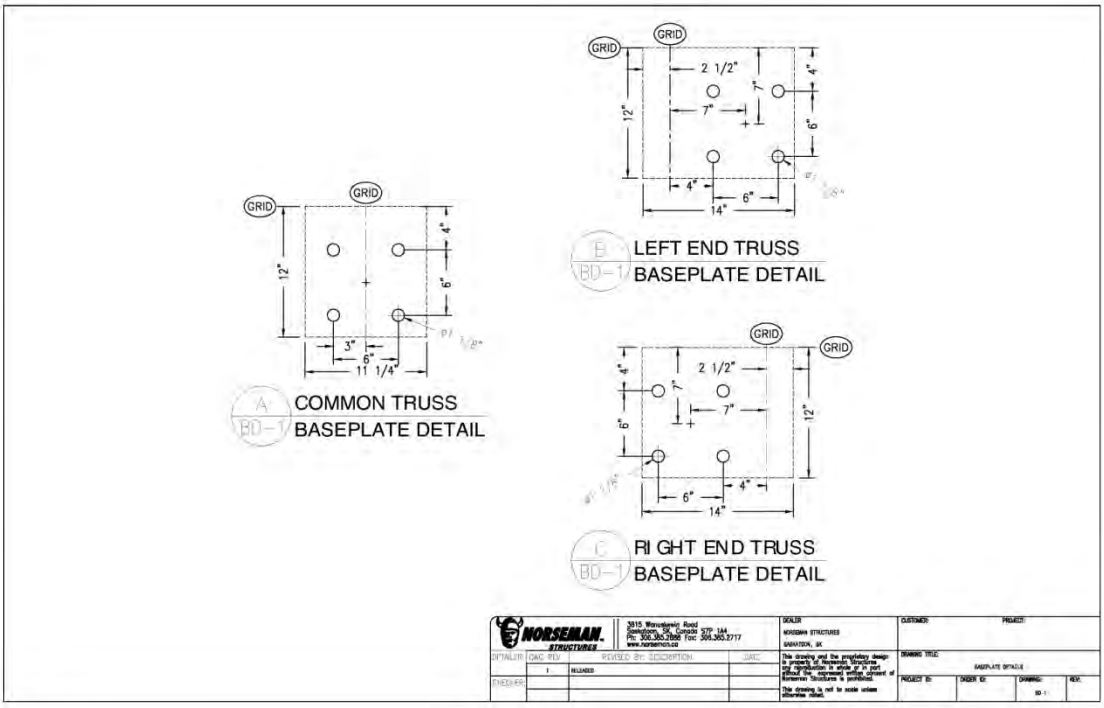
DRAWING **TYPICAL BASE PLATE DETAILS**



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3.1 Load Rating

SR203109 Norseman Structures

LOAD RATING EVALUATION SUMMARY PRELIMINARY

22-Jan-13

BUILDING INFORMATION:

Building Model:	TC
Leg Extension:	n/a
Building Width:	100 ft
Building Length:	200 ft
Truss Spacing:	8 ft
Wall Height:	0.5 ft

DESIGN CRITERIA

Applicable Building Code:	International Building Code 2009
Design Standard:	ASCE 7-05
Occupancy Category:	II - Standard
Exposure Category:	C - Fully Exposed
Enclosure Category:	Enclosed (Ct=1.2)

DEAD LOADS

i) Self Weight

ii) Collateral (Hanging) Load not to exceed 0.25 psf as an allowance for mechanical, electrical, ceiling, sprinklers, etc., or a combination thereof.

LIVE LOADS

Minimum roof live loads determined in accordance with ASCE 7-05 Chapter 4.

Maximum Roof Live Load, L_o:	12.00 psf	Design Roof Live Load, L_r:	12.00 psf
Reduction Factor, R_1:	1.00		
Reduction Factor, R_2:	1.00		

SNOW LOADS

Snow loads determined in accordance with ASCE 7-05 Chapter 7.

Ground Snow Load, p_g:	43.00 psf	Flat Roof Snow Load, p_f:	32.51 psf
Exposure Factor, C_e:	0.9	Roof Snow Load, p_s:	23.64 psf
Thermal Factor, C_t:	1.2		
Importance Factor, I_s:	1.0		
Slope Factor, C_s:	1.0 - (theta - 15)/55		

WIND LOADS

Wind loads determined in accordance with ASCE 7-05 Chapter 6.

Basic Wind Speed, V (3-sec Gust):	90.0 mph	Velocity Pressure, q_h:	17.34 psf
Velocity Pressure Exposure Coefficient, K_h:	0.98		
Topographic Factor, K_{zt}:	1.00		
Wind Directionality Factor, K_d:	0.85		
Importance Factor, I_w:	1.00		

MINIMUM ANCHORING REQUIREMENTS

Unfactored foundation loads for the criteria listed above are as follows:
(Foundation loads provided in the following table have not been combined with any other load case.)

	Gridline A			Gridline B		
Load Case	R_H (kip)	R_V (kip)	M (kip-in)	R_H (kip)	R_V (kip)	M (kip-in)
Dead	-0.80	-1.50	-5.20	0.80	-1.50	5.20
Collateral	-0.10	-0.10	-0.65	0.10	-0.10	0.65
Live	-2.90	-4.80	-18.85	2.90	-4.80	18.85
Unbalanced Live Left	-1.40	-3.60	-9.10	1.40	-1.20	9.10
Unbalanced Live Right	-1.50	-1.30	-9.75	1.50	-3.70	9.75
Snow	-5.90	-8.90	-38.35	5.90	-8.90	38.35
Unbalanced Snow Left	-5.00	-8.60	-32.50	5.00	-5.60	32.50
Unbalanced Snow Right	-5.00	-5.60	-32.50	5.00	-8.60	32.50
Perpendicular Wind	-2.10	1.20	-13.65	-3.40	0.40	-22.10
Parallel Wind	1.80	5.30	11.70	-1.70	5.40	-11.05
Internal Pressure	-0.30	-1.20	-1.95	0.30	-1.20	1.95

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3.2 Fabric Specification

STANDARD & FIRE RETARDANT (FR) PROPERTIES

The following data are nominal values based on ASTM standard tests. This data should not be considered specification.

Common Tests and Specifications: Standard and Fire Retardant (FR) Fabric		
Coating Thickness		4mil (94-95g/m²) average each side
Total Fabric Weight		12 oz/yd² (407 g/m²) +/- 5%
Thickness	ASTM D-1777	Standard: 23mil (0.59mm)
		Fire Retardant: 23mil (0.59mm)
Grab Tensile	ASTM D-5034	Standard: Warp: 370 lb. (1664 N), Weft: 345 lb. (1532N)
		Fire Retardant: Warp: 360 lb. (1598N), Weft: 350 lb. (1555N)
Tongue Tear	ASTM D-2261	Standard: Warp: 110 lb. (488N), Weft: 100 lb. (444N)
		Fire Retardant: Warp: 120 lb. (533N), Weft: 110 lb. (489N)
Strip Tensile	ASTM D-5035	Standard: Warp: 275 lb/in. (2444N/5cm), Weft: 245 lb/in. (2178N/5cm)
	CSA-S367	Fire Retardant: Warp: 275 lb/in. (2444N/5cm), Weft: 250 lb/in. (2222N/5cm)
Mullen Burst	ASTM D-3786	Standard: 655 psi (4512 kPa)
		Fire Retardant: 675 psi (4657 kPa)
Low Temp. Bend	ASTM D-2136	Pass: -60° C (-76° F)
Light Transmission %	ASTM E-903	White/White: Standard: 20.9%, Fire Retardant: 11.4%
Water Vapor Transmission	ASTM E-96	0.038 grains/h/ft²/inHg (perms) 2.16 ng/Pa/s/m²
UV & Weathering	ASTM G-151	>90% strength retention after 2000hrs @ 0.77 W/m²/nm
UV & Weathering	ASTM G-154	>90% strength retention after 1200hrs @ 1.35 W/m²/nm
UV & Weathering	CSA-S367	>75% strength retention after 5000hrs @ 0.77 W/m²/nm
Trapezoidal Tear	ASTM D-4533	Standard: Warp: 95 lb. (422N), Weft: 90 lb. (400N)
		Fire Retardant: Warp: 100 lb. (444N), Weft: 90 lb. (401N)

Fire Test Results: Fire Retardant Fabric (FR)			
Base Fabric	HDPE Scrim using FR inhibitors and UV protection		
Surface Type	Modified LDPE coating using FR inhibitors and UV protection		
California Fire Marshal	FA-51405		
NFPA 701-1989 (Large Scale Test)	04-02-725(A)	Char: 1.4in. Av.	Drip: No
NFPA 701-1989 (Small Scale Test)	04-02-725(A)	Char: 3.5in. Av.	Drip: No
ASTM E-84-08	08-002-695	FSI: 10	SD: 110
NFPA 701-2010 Test Method 1	11-002-50637	Mass Loss: 1.6 Av.	Drip: 0.8
NFPA 701-2010 Test Method 2	11-002-637(B)	Char: 268mm (10.6in.) Av.	
CAN/ULC S109-03 (Small Flame)	06-02-866	Char: 98mm Av.	
CAN/ULC S109-03 (Large Flame)	06-02-866	Char: 104mm Av.	Drip: No
CAN/ULC S102-03	05-02-609	FSCI: 5	SD: 95
UBC 31-1	16421-108891	Char: 8.69in. Av.	Drip: No
UL	Listed-R15076		
ULC	Listed-R20040		
EN 13501-1	Fire Behavior: B	Smoke: s1	Droplets: d0

Fire Test Results: Standard Fabric			
Base Fabric	HDPE Scrim with UV protection		
Surface Type	Modified LDPE coating with UV protection		
ASTM E84-01	03-02-586 (A)	FSI: 10	SD: 65
CAN/ULC-S102-07	08-002-394	FSCI: 15	SD: 100

FIRE TESTING NOTE: Results of the fire tests demonstrate the fabrics will not support combustion nor contribute fuel to a fire. If the source of the fire is removed, the fabrics self extinguish and combustion ceases.

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3.3 Project Specifications

SUU COVERED CORRAL FACILITY
Cedar City, UT

February 2013

SECTION 03 3000 - CAST-IN-PLACE 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 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Exterior flat work including mandoor landings.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Qualification Data: For Installer, manufacturer, testing agency.

1.5 QUALITY ASSURANCE

A. 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.

CAST-IN-PLACE CONCRETE 03 3000 - 1

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. 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.

D. 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 (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed

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:

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II, supplement with the following:

a. Fly Ash: ASTM C 618, Class F

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal for footings, 3/4 inch (19 mm) nominal for all other types of concrete elements.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

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.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of fly ash as follows:

1. Fly Ash: 20 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.7 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Concrete Compressive Strength: For all types of concrete used on the project, provide concrete compressive strengths as indicated in the Structural General Notes in the structural drawings.

B. Exposure Categories and Classes: For all types of concrete used on the project, provide concrete mix designs which comply with the ACI 318 requirements for the Exposure Categories and Classes indicted in the General Notes.

C. Maximum Water-Cementitious Materials Ratio: For all types of concrete used on the project, provide Maximum Water-Cementitious Materials Ratios as indicated in the Structural General Notes in the structural drawings.

D. Slump Limit: For all types of concrete used on the project, provide Slump Limits as indicated in the Structural General Notes in the structural drawings.

E. Air Content: For all types of concrete used on the project, provide Air Content as indicated in the Structural General Notes in the structural drawings.

2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
2. Class B, 1/4 inch (6 mm) Class C, 1/2 inch (13 mm) Class D, 1 inch (25 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Chamfer exterior corners and edges of permanently exposed concrete.

H. Form openings, chases, sleeves, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

E. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. 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 to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.5 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.

3.6 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.7 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 (1 kg/sq. m 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. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. 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 (300-mm) lap over adjacent absorptive covers.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

END OF SECTION

SUU COVERED CORRAL FACILITY
Cedar City, UT February 2013

SECTION 09 9000 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of structural supports and other items and surfaces exposed to the non-conditioned corral environment.
1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, provide custom color as selected by the Architect.
1. Painting includes field-painting exposed bare and covered pipes and ducts (including color coding), steel doors and frames, hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
2. Painting includes touch-up of factory primed surfaces prior to application of finish coats.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
1. Prefinished items not to be painted include the following factory-finished components:
   a. Architectural woodwork and casework unless otherwise noted.
   b. Finished mechanical and electrical equipment.
   c. Light fixtures.
   d. Switchgear.
   e. Distribution cabinets.
   f. Concrete slab or stem walls.
2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:
   a. Foundation spaces.
   b. Furred areas.
   c. Pipe spaces.
   d. Duct shafts.
   e. Concrete stemwalls.
3. Finished metal surfaces not to be painted include:
   a. Anodized aluminum.
   b. Stainless steel.
4. Operating parts not to be painted include moving parts of operating equipment, such as the following:
   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.
5. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

PAINTING 09 9000 - 1

D. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 13 3123 Section "Tensioned Fabric Structures".

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each paint system specified, including block fillers and primers.
1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples for initial color selection in the form of manufacturer's color charts.
1. After color selection, the Architect will furnish color chips for surfaces to be coated.

D. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
1. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
3. Submit samples on the following substrates for the Architect's review of color and texture only:
a. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a

minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

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. ICI Dulux Paints (ICI).
2. PPG Industries, Pittsburgh Paints (PPG).
3. Pratt and Lambert (P & L).
4. The Sherwin-Williams Company (S-W).
5. KWAL Howells.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide custom color selections made by the Architect.

2.3 PRIMERS

A. Primers: Provide the manufacturer's recommended factory-formulated primers that are compatible with the substrate and finish coats indicated.

B. Available Products: Subject to compliance with requirements, prime coat materials that may be incorporated in the Work include, but are not limited to, the following:

1. Ferrous Metal Primers: Synthetic, quick-drying, rust-inhibiting primers.
   a. ICI: 4160 Devguard Tank & Structural Metal Primer.
   b. PPG: 6-208 Red Inhibitive Metal Primer.
   c. P & L: Effecto Rust-Inhibiting Primer.
   d. S-W: Kem Kromik Metal Primer B50N2/B50W1.
2. Ferrous Metal Primers: Alkyd-type primers.
   a. ICI: 4160 Devguard Tank & Structural Metal Primer..
   b. PPG: 6-612 Speedhide Inhibitive White Primer.
   c. P & L: Effecto Primer Red or White.
   d. S-W: Kem Kromik Metal Primer B50N2/B50W1.
3. Galvanized Metal Primers:
   a. ICI: 4120 All purpose Metal & Galvanized Primer.
   b. PPG: 6-215/216 Speedhide Galvanized Steel Primer.
   c. P & L: P & L Interior Trim Primer.
   d. S-W: Galvite B50W3.

2.4 UNDERCOAT MATERIALS

A. Undercoat Materials: Provide the manufacturer's recommended factory formulated undercoat materials as required in lieu of one of two finish coats that are compatible with the substrate and finish coats indicated.

B. Available Products: Subject to compliance with requirements, undercoat materials that may be incorporated in the Work include, but are not limited to, the following:

1. Interior & Exterior Enamel Undercoat: Ready-mixed enamel.
   a. ICI: 1120 Ultra Hide Alkyd Int. undercoater.
   b. PPG: 6-6 Speedhide Quick-Dry Enamel Undercoater.
   c. P & L: Interior Trim Primer.
   d. S-W: Pro-Mar 200 Alkyd Semi-Gloss Enamel B34W200.

2.5 FINISH PAINT MATERIAL

A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

B. Available Products: Subject to compliance with requirements, finish coat materials that may be incorporated in the Work include, but are not limited to, the following:

1. Alkyd Gloss Enamel: Weather-resistant, air-drying, high-gloss enamel.
   a. ICI: 4308 Devguard Alkyd Industrial gloss Enamel.
   b. PPG: 54 Line Quick-Dry Enamel.
   c. P & L: Effecto Enamel.
   d. S-W: Industrial Enamel B-54 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and re-prime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
   2. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).
      a. Blast steel surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 6.
      b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
      c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
   3. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based

solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Provide finish coats that are compatible with primers used.
3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
10. Sand lightly between each succeeding enamel or varnish coat.
11. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.
1. Brushes: Use brushes best suited for the material applied.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Block Fillers: Apply block fillers to concrete at a rate to ensure complete coverage with pores filled.

G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates indicated excluding of pre-finished metal building components. Sherwin-Williams products are listed below to indicate paint system types, but are not intended to limit the choice of manufacturers.

B. Ferrous Metal: Primer is not required on shop-primed items.
1. Full-Gloss Alkyd Enamel: Two finish coats over primer.
a. Primer: Synthetic rust-inhibiting primer.
1) Kem Kromik Metal Primer B50N2/B50W1.

2) ICI: 4160 Devguard Tank & Structural Metal Primer.
b. First and Second Coats: Gloss alkyd enamel.
1) Industrial Enamel B-54 Series.
2) ICI: 4308 Devguard Alkyd Industrial gloss Enamel.

C. Zinc-Coated Metal:
1. High-Gloss Alkyd Enamel: Two finish coats over primer.
a. Primer: Galvanized metal primer.
1) Galvite B50W3.
2) ICI: 4120 All purpose Metal & Galvanized Primer.
b. First and Second Coats: Gloss alkyd enamel.
1) Industrial Enamel B-54 Series.
2) ICI: 4308 Devguard Alkyd Industrial gloss Enamel.

END OF SECTION 09900

SUU COVERED CORRAL FACILITY
Cedar City, UT February 2013

SECTION 13 3123 - TENSIONED FABRIC STRUCTURES (TFS)

PART 1 – GENERAL

1.1 SUMMARY

A. The Tensioned Fabric Structure Manufacturer (hereafter referred to as "TFS Manufacturer") shall be responsible for the design, engineering, fabrication, supply and installation of the work specified herein. The intent of this specification is to have single source responsibility for the above functions.

B. Performance Requirements: The TFS Manufacturer shall be responsible for the configuration, fabrication and erection of the tensioned membrane structure. All materials provided shall be new and unused.

C. Erection of the complete system shall be the responsibility of the same firm designing and manufacturing the building.

D. The fabric structure shall be a cable and/or frame supported tensioned membrane structure. The fabric shall have low elongation characteristics under tension and shall assume an anticlastic configuration.

E. Provide a structure as shown in the drawings and described in this specification. Foundations and anchoring for the structure shall be the responsibility of General Contractor or the TFS Manufacturer. See related concrete specifications.

1.2 SUBMITTALS

A. Data: Manufacturer product data, including specifications and installation instructions for each component of the TFS. Include laboratory test reports and other data, where applicable.

B. Engineering drawings: 11" x 17", dimensioned drawings for the TFS signed and sealed by a Utah licensed civil or structural engineer. Include plan view, elevations, details, sections, connections, and anchorage/footings.

C. Samples: Fabric, 8 ½" x 11" minimum.

D. Structural calculations: Signed and sealed by a registered Utah structural or civil engineer specializing in TFS design and engineering.

1.3 REFERENCES

A. AWS D1.1 – American Welding Society Structural Welding Code

B. AWS D1.2 – American Welding Society Structural Welding Code, Aluminum

C. NFPA 701 – National Fire Protection Association Fire Test for Flame Propagation of Textiles and Films

D. ASCE 7 – American Society of Civil Engineers, Minimum Design Loads for Buildings and other structures

E. ASTM A 500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

1.4 QUALITY ASSURANCE

A. TFS Manufacturer must provide proof of the following certifications:

1. Have been in continuous operation as a professional fabric Tension Structure manufacturer for a minimum of ten (10) years prior to this contract.
2. Hold a valid general contractor's license for a minimum of five (5) years.
3. Welder Qualifications: The personnel manufacturing the metal awning frames must be certified welders.
4. Provide written Welding Procedure Specifications.
5. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where project is located and who is experienced in providing engineering services for installing Tensioned Fabric Structures similar to those indicated for this project and with a record of successful in service performance.
6. OSHA 10 Hour Construction Industry Certified Training.
7. OSHA Fall Protection Training.
8. Job site installation crew must include one CPR trained member on the job site at all times of the installation.
9. The installation crews must have a copy of the awning company's Code of Safety practices at the job site during times of installation.
10. Hold daily Safety Tail Gate Meetings before start of installation work.
11. When forklifts are used at the job site, the operator must be Fork Lift Operation Trained.
12. The Tensioned Fabric Structure fabricator must provide proof they have an ongoing written Quality Assurance program for 5 years or more.
13. The Tension Structure fabricator must provide proof of full-time Quality Assurance manager.
14. The Tension Structure manufacturer must provide proof of $2 million general liability insurance coverage.
15. The Tension Structure manufacturer must provide proof of Worker's Compensation Insurance Coverage.
16. General contractors license in the state of Utah.
17. Vehicle insurance certification.

1.5 **WARRANTY**

A. Warrant frame materials and workmanship against defects for a period of 1 year from date of substantial completion of the work.

B. Warrant fabric materials and workmanship against defects for a period of 15 Years on a non-prorated basis, from the date of substantial completion of the work.

1.6 DESIGN

A. The structural design shall comply with applicable codes and regulations.

B. Design Engineering documentation of complete tensioned membrane structure will meet all applicable codes.

C. The structure shall be designed in accordance with the IBC Building Code with the design wind speed to be 105 MPH minimum.

D. Engineering:

1. Based on the structural calculations as defined in this section, prepare structural design drawings defining the complete structure, precise interface geometry determination, reaction loads imposed on foundations, anchoring loads, connection details, interfaces and seam layouts.

2. Structural calculations for the fabric structure shall include:

a. Large deflection numerical shape generation that will insure a stable, uniformly stressed, three dimensionally curved shape that is in static equilibrium with the internal prestress forces and is suitable to resist all applied loads.

b. Large deflection finite element method structural analysis of the membrane system under all applicable wind, seismic and snow loads.

c. Finite element method structural analysis of the support frame system.

d. Member sizing calculations of all primary structural members.

e. Connection design including bolt, weld and ancillary member sizing.

f. Biaxial Fabric test specification, interpretation and fabric compensation determination.

g. Accurate generation of the two dimensional compensated fabric templates required to generate the three dimensional equilibrium shapes.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire resistance ratings for Tensioned Fabric Structure covering.

B. Life Safety: All fabric structures shall be designed so no life safety issue is created in the event of a loss of the fabric. The structural support members shall not rely on the fabric for structural stability.

C. **All pre-engineered steel fabricators and manufacturers and/or steel building fabricators/manufacturers must be on the DFCM Approved fabricators' list. Refer to DFCM Building Official requirements for more information.**

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer. Store materials in accordance with manufacturer's instructions, in a clean, dry, well ventilated area, above ground on blocking, and do not allow materials to become wet, stained, or dirty.

B. Handling: Handle materials so as to protect materials, coatings, and finishes during transportation and installation to prevent damage or staining. Handle fabric in accordance with manufacturer's instructions. Use care in handling of fabric to avoid damage to fabric material and coating. Do not damage, crush, or kink cables where occurs.

PART 2 – PRODUCTS

2.1 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products (EPP) to the greatest extent possible.

B. Provide products and materials that promote stewardship of the earth's resources, promote good indoor environmental quality, and promote efficiencies in operational performance.

C. EPP's include products that have low VOC content and high recycled content.

2.2 MATERIALS

A. APPROVED ARCHITECTURAL FABRIC MEMBRANE MATERIALS

1. Products other than those that follow will be considered if all performance and warranty criteria are met.

2. PTFE (Polytetrafluoroethylene) coated Fiberglass
   a. Base Fabric: Woven "EC6" glass.
   b. Coating: PTFE.
   c. Tensile Strength: as required by engineer
   d. Combustibility: Non-combustible substrate when tested in accordance with ASTM E 136.
   e. Intermittent Flaming: Class A, when tested in accordance with ASTM E 108.
   f. Flame Spread: Class A, when tested in accordance with ASTM E 84.
   g. Light Transmission: 8% minimum.
   h. Seams: Welded, with sufficient strength to develop 90 percent of full strength of fabric.
   i. Expected Service Life: 20 to 25 years - 15 year non-prorated warranty.
   j. Color After Exposure to Sunlight: White.
   k. Composure: Solid and water repellent.
   l. Neoprene gaskets will be used to protect PTFE against contact with metal components.
3. HDPE (High Density Polyethylene)
   a. Mesh fabric made from UV stabilized HDPE.
   b. Sewn with PTFE thread in a zig-zag stitch to prevent failure under tension.
   c. Color: As approved by architect/owner from available selection.
   d. Light Transmission: 8% minimum.
   e. 15 year non-prorated warranty.
4. EPTFE (Expanded Polytetrafluoroethylene)
   a. Tear strength: as required by engineer.
   b. Light Transmission: 8% minimum.
   c. Color: White.
   d. Flame spread: Class A (ASTM E84).
   e. Composure: Solid and water repellent.

f. Seams: RF Sealed with sufficient strength to develop 90 percent of full strength of fabric.

g. 25 year expected life - 15 year non-prorated warranty.

h. Recyclable material construction.

B. STRUCTURAL STEEL FRAMING

1. Structural frame shall be fabricated from structural steel using standard shapes. The steel shall be minimum ASTM A36 for standard profiles and A500 Grade B for structural tubes.

2. The fabrication of the steel shall be in accordance with guidelines set forth in the AISC steel design manual and the AWS code of structural welding. All welds shall be in accordance with manufacturers design and performed prior to shipping. No welding shall be performed in the field unless authorized in writing by the Owner or Owner's representative.

3. The structural members shall be fabricated in as large segments as possible to minimize field joints.

4. All segments of the assembly will be welded or stamped with the appropriate part number in a manner that will still be visible after powder coating is applied.

5. Grind all corners and sharp edges.

6. Steel Finish Options:

a. Polyester Powder Coat Painted: The steel shall be polyester powder painted to a minimum of 3 mils. Steel will require abrasive blasting and primer before application of the polyester powder paint finish.

b. Hot dipped galvanizing in accordance with: *ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.*

c. Field or Shop Painted in accordance with Section 09 9000 PAINTING.

d. Or pre-approved equal.

7. Fire Protection Intumescent Coating: as required to achieve 1 hour protection for primary structural members supporting roof construction min. 20' tall.

C. ALUMINUM MEMBRANE PLATES AND CLAMPS.

1. Aluminum shall conform to alloy 6061-T6

2. All components will be welded or stamped with the appropriate part number in a manner that will still be visible after powder coating is applied.

3. The aluminum shall be polyester powder painted to a minimum of 3 mils.

D. CABLES AND END FITTINGS

1. Galvanized Cables and Fittings:
   a. All structural wire rope shall be made from Wire Rope conforming to AISI Steel Cable Manual requirements with a Class A galvanized coating or approved substitute. The cable should be IWRC improved plow steel. All cable terminations and connectors shall be hot-dipped galvanized for corrosion protection. Cables should be designed with a minimum safety factor of 2 on breaking strength.
   b. Cables which are designated to be pre-stretched shall be pre-stretched per ASTM A603 for wire rope. Cables of the same type shall have the same modulus of elasticity.
   c. All cables and end fittings shall be delivered clean and dry.
   d. All swaged and speltered fittings shall be designed and attached to develop the full breaking strength of the cable. Thimble end fittings shall develop a minimum of 110% of the cable breaking strength.
   e. Swaged end fittings, pins, nuts and washers shall be electro-galvanized.
   f. Speltered end fittings shall be hot dipped galvanized.
   g. Attach a tag indicating the cable length and mark number to each cable assembly.
   h. The design load is the load in the cable under pre-stressed load condition per the recommendation of the engineer on record
   i. Cables shall be tensioned to double the design load before length is cut
   j. Cables shall be tensioned to the design load when measuring the cut length that is indicated on the shop drawings
2. Stainless Steel Cables and Fittings:
   a. Cables shall be 1x19 Stainless Steel Open Strands, Grade 316
   b. Cables and fittings will be fabricated per the standard operating procedures of the manufacturer
   c. Attach a tag indicating the cable length and mark number to each cable assembly.
   d. The design load is the load in the cable under pre-stressed load condition per the recommendation of the engineer on record
   e. Cables shall be tensioned to double the design load before length is cut
   f. Cables shall be tensioned to the design load when measuring the cut length that is indicated on the shop drawings

E. BOLTS AND RELATED FASTENERS

1. Fasteners and hardware accessories shall be of types and sizes best suited for the purpose as recommended by the engineer on record.

2. Fasteners used on main structural members shall be hot-dipped galvanized high strength bolts including nuts and washers, and conforming with ASTM A325 or A490 as applicable. All other fasteners shall be adequately sized and treated for corrosion protection.

3. Concrete anchor bolts shall conform to A307 and be Hot-dipped Galvanized.

2.3 FABRICATION

A. In accordance with the approved manufacturer's standard procedures and to match approved samples.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine the conditions under which this work is to be performed and correct unsatisfactory conditions.

B. Correct unsatisfactory conditions before proceeding with installation

3.2 ERECTION

A. TFS Manufacturer will prepare a full and comprehensive assembly procedure guide prior to installation.

B. Comply with the TFS Manufacturer recommendations, the approved shop drawings and the applicable Code requirements.

C. Weather Conditions: Proceed with installation of the fabric and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers recommendations. The Tensioned Fabric Structure shall not be installed when wind conditions are deemed in excess of manufacturer's determination of safe wind speed erection conditions. It shall be the manufacturer's sole discretion to determine acceptable and safe wind condition for installation.

D. Framing and structural members: Anchor bolts shall be accurately set. Uniform bearing under base plates shall be provided using non shrink grouting compound where applicable. Members shall be accurately set to assure proper fitting and covering. As erection progresses, the work shall be securely fastened to resist the dead load and wind and erection stresses. Erected structural frame work shall be adequately guyed and secured to resist all possible loads due to wind and the installation process.

E. Fabric: Prior to start of installation; check all surfaces of framing members and other rigid construction elements to be in contact with fabric to ensure that all edges are smooth and well rounded. Remove any potential causes for snagging or tearing of the fabric. Properly install all connections and provide all materials and equipment required for the erection and stressing of the fabric. Unroll the fabric in such a

manner as to avoid snagging or dragging the fabric over sharp objects during installation. Adequate fabric pre-stress shall be confirmed by the fabric structure manufacturer and the appearance of the fabric membrane roof shall be smooth and wrinkle free. Creasing or folding the fabric around sharp corners shall be avoided at all times.

F. Fabric tensioning system: Cables shall be free of all kinks and bends. Care shall be taken not to damage cables during installation. Bolt holes shall be 1/16" larger then the bolt, unless otherwise indicated.

G. After installation, restore marred or abraded surfaces to original condition using same paint or coating as factory-applied finishes, when the results are acceptable to the Architect, otherwise replace damaged equipment.

END OF SECTION

4.1 Building Construction Cost Summary

SUU Covered Corral Budget Estimate			
8/1/2013			
	Riding Arena Norseman (formerly Cover-All)		
	100' X 200' 20,000 SF		
Pre-Engineered Building FR fabric 8' oc truss spacing - Risk Category I			$ 344,000.00
Earthwork Footings & Foundation 2' Stemwall			$ 50,000.00
Earthwork to finish grade			$ 14,000.00
4 Man doors, steel			$ 3,600.00
2-16x 16 metal roll up doors			$ 20,000.00
4 Vents-pull chain louvers			$ 5,000.00
Subtotal			$ 436,600.00
Sales tax (Assume $0)			$ -
Shipping			$ 15,000.00
Building Sub-total			$ 451,600.00
Building Installation			$ 60,000.00
D-B A/E services for DFCM requirements			$ 12,000.00
Engineering-building			$ 3,500.00
Building Total			$ 527,100.00

5.1 Prairie Dog Mediation

The site is in an existing prairie dog habitat. Time-limited Prairie Dog Clearance has been obtained by SUU for this project area. If this clearance requires renewal, SUU will obtain the necessary extension. This process can be further explained by SUU or by contacting the Division of Wildlife Resources in Cedar City.

6.1 Geotechnical Investigation Update Letter

GEM ENGINEERING, INC.
485 North Aviation Way ♦ Cedar City, UT 84721
Phone (435) 867-6478 ♦ Fax (435) 867-4372
www.gemengineeringinc.com

June 10, 2013

Archiplex Group
1135 S. West Temple, Suite A
Salt Lake City, UT 84101

Attention: **Ralph Stanislaw**

Subject: **SUU Covered Corral**
At Approximately 400 S and West View Drive,
Cedar City, UT

In May 2011 GEM Engineering was requested to perform a Geotechnical Investigation for a SUU Farm Building located at approximately 3775 W 400 S near Cedar City UT. As a result of this investigation Report RG1115 was written. In May 2013 GEM Engineering was requested to review report RG1115 and determine if the information contained within the report was applicable to for the construction of a covered corral located roughly 1000 feet northeast of the original excavation.

In order to verify the validity of the report for the new location GEM Engineering performed a exploratory excavation. Representative soil samples from the exploration were tested in the laboratory to verify the field classifications and to evaluate other pertinent engineering characteristics. The soil samples were tested for solubility, Atterberg limits, maximum density and consolidation behavior.

Based on the soil types, and laboratory consolidation tests, the required depth of overexcavation is larger than that which was required in RG1115. For the site of the Covered Corral, soils shall be **overexcavated a minimum of 5 feet** below the bottom of footing elevation or **5 feet** below the existing site grade, whichever is greater. Overexcavations should extend laterally at least 5 feet beyond the edge of footing on each side.

All other requirements, stipulations, limitations and recommendations from the original geotechnical investigation report (RG1115) apply and shall be followed.

LIMITATIONS

The recommendations contained in this letter and the Geotechnical Investigation Report RG1115 are based on the field explorations, laboratory tests, and our understanding of the proposed construction. The subsurface data used in the preparation of this report were obtained from the explorations made for this investigation. It is possible that variations in the soil and groundwater

conditions could exist between the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site, which are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, our firm should also be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, express or implied, is made. GEM Engineering does not accept responsibility for the uncontrolled action of water at the subject project.

It is the Client's responsibility to see that all parties to the project, including the Designer, Contractor, Subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please contact us at your convenience.

Sincerely,

Joel A. Myers, P.E.,
President

6.1 Geotechnical Investigation Previous Report

Engineering, Inc.

Geotechnical Investigation

SUU Farm Building
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah

Prepared For:

Sargent Design Group
36 North 300 West, Suite B
Cedar City, UT 84720

May 10, 2011

Report Number: RG1115

GEM ENGINEERING, INC. ♦ 485 North Aviation Way ♦ Cedar City, UT 84721
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May 10, 2011

Sargent Design Group
36 North 300 West, Suite B
Cedar City, UT 84720

Subject: SUU Farm Building
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah

Enclosed is our geotechnical investigation report for the subject SUU Farm Building to be constructed at the subject site near Cedar City, Utah.

The report details our field exploration and laboratory testing program and presents our analysis, opinions and recommendations for the proposed project.

Collapsible/compressible soils were encountered which will need to be overexcavated and recompacted as outlined in this report.

We appreciate this opportunity to be of service on this phase of the project and look forward to being of service as the project progresses. If you have any questions, please contact this office at your convenience.

Sincerely,
GEM Engineering, Inc.

Joel A. Myers, P.E.
President

LICENSED PROFESSIONAL ENGINEER
5-10-11
No. 179058
JOEL A. MYERS

RG1115 GEM ENGINEERING, INC. i

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APPENDICES

Appendix A

1.0 INTRODUCTION

1.1 General

This report presents the results of a geotechnical investigation performed for a SUU Farm Building at approximately 3775 West 400 South near Cedar City, Iron County, Utah. The study was conducted in accordance with the client's authorization.

The purposes of this investigation were to: (1) evaluate the general nature and engineering properties of the subsurface soils at the site; (2) identify the general site geologic conditions and (3) provide recommendations and opinions regarding general site grading and the design and construction of foundations, concrete slabs-on-grade and asphaltic concrete pavements. The investigation included a site reconnaissance, subsurface exploration, representative soil sampling, laboratory testing, engineering analyses, review of existing geologic studies performed in the area and preparation of this report.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of the report. We recommend that all individuals reading this report read the limitations section of this document.

1.2 Project Description

We understand that a SUU Farm Building will be constructed at the location described near Cedar City, Utah. Structural loads are expected to be relatively low to moderate.

The site plan on Plate 1 shows the approximate trench location with respect to the approximate property lines and proposed structure location.

2.0 FIELD EXPLORATION

The subsurface soil conditions were explored by excavating, with a backhoe, 1 exploratory trench to a depth of approximately 8 feet below the existing site grade. The approximate location of this exploration is shown on Plate 1. Soils and subsurface conditions encountered in the exploration were classified, logged and recorded at the time of excavation by our field geologists. The results of the exploration are presented on the enclosed Plate 2. A key to soil symbols and terms is found on Plate 3.

3.0 LABORATORY TESTING

Representative soil samples from the exploration were tested in the laboratory to verify the field classifications and to evaluate other pertinent engineering characteristics. The soil samples were tested for solubility, Atterberg limits, maximum density and consolidation behavior. Results are presented on Plates 4 and 5.

4.0 GEOLOGIC AND SEISMIC CONDITIONS

4.1 Geologic Setting

The Cedar Valley lies along the border between the Basin and Range and the Colorado Plateau physiographic provinces. Structurally, parts of the valley and the eastern upland represent a zone of transition between the two provinces, with some structural features of both. A small area of thrust faults is present in the southwest, but the valley is characterized by normal fault-block structure common to the Basin and Range Province. The uplands east of the valley have been elevated by displacement along the Hurricane fault zone. The fault zone is several miles wide and includes several structural units separated by major normal faults trending northward to northeastward. East of the fault zone, rock strata dip gently eastward; gently inclined strata characterize much of the Colorado Plateau Province (Geology of Eastern Iron County, Utah, Utah Geological and Mineralogical Survey, Bulletin No. 37, 1950). More locally the Fiddlers Canyon area lies upon alluvial fan deposits. The alluvial deposits consist of material ranging from Permian age Kaibab Formation up through Tertiary age Claron Formation and basalt flow debris of Quaternary age (GEM Engineering, field investigation.).

The geologic units exposed in the area attain a maximum total thickness of more than 16,000 feet. The oldest formation exposed is the Kaibab Limestone of Permian age. Formations overlying the Kaibab Limestone span geologic periods from Triassic through Tertiary. Igneous laccoliths of Tertiary age intrude formations west of Cedar City Valley. Deposits of alluvium, as valley fill, with some interbedded lava flows attain thicknesses of more than 1,000 feet in the Cedar City Valley (Bjorklund and others, 1977). Alluvial deposits, placed as valley fill derived from the adjacent hills and upland areas, range in size from clay to boulders. As the streams enter the valley and lose velocity with decreasing gradient, alluvial materials are deposited. Coarser material is deposited in the higher valley areas and progressively finer material is deposited toward the valley bottoms. Stream discharge and amounts are irregular and vary over a wide range. (Technical Publication No. 60, State of Utah Department of Natural Resources, 1978).

4.2 Faulting

The Cedar Valley lies within a zone of pronounced seismic activity. The Hurricane Fault Zone, a prominent north-south trending fault zone with suspected Quaternary displacement, extends through the eastern portion of Cedar City. This zone of fracture is about 200 miles long within which the displacement of the sedimentary beds ranges from 1,500 feet to as much as 8,000 feet (Geological and Mineralogical Survey, Bulletin No. 37, 1950). The Hurricane Fault lies beneath the alluvial material very near the site most likely within 1/2 mile west of the proposed site.

4.3 Seismicity

The Cedar City Valley lies near the southern end of a zone of pronounced earthquake activity that extends from southwestern Utah to northwestern Montana (Christenson and Deen, 1983). A magnitude 5.9 earthquake occurred in 1992 approximately 5 miles southeast of Washington, Utah. An earthquake of at least that size could occur in this area.

The soil meets the 2009 International Building Code (IBC) requirements for a site class D.

4.4 Geologic Hazards

GEM Engineering reviewed the location for the presence of geologic hazards as required by the Iron County Geologic Condition Reporting Ordinance Chapter 17.59. The following table summarizes our findings based upon excavations, visual site observations and geologic hazard maps produced and/or provided by Iron County.

Geologic Condition	Determination	Method	Site Within Hazard Area
Surface-Fault Ruptures	No evidence of know faults was found within 500 feet of the proposed structure location.	Visual observation and USGS Fault Maps	No
Landslide / Slope Instability	Evidence of landslide and/or slope instability was not encountered in the vicinity of the site.	Visual observation, aerial photograph(s) and Landslide Map of Utah	No
Rock Fall	No evidence of past rock falls was observed and proposed structure location is not within 22 degree shadow angle of rock-fall source area	Visual observation	No
Debris Flow	Structure is not located within a mapped debris flow study area.	Iron County Debris Flow Map	No
Liquefaction	Structure is not located within a mapped area where groundwater is within 50 feet of surface.	Iron County Groundwater Map and exploratory excavation	No
Land Subsidence & Earth Fissure	No know earth-fissures or land subsidence are located within ½ mile of proposed structure location.	Iron County Earth Fissures Map	No

At the time of GEM Engineering's review and investigation the proposed site was not found to lie within a designated geologic hazard study area therefore, in accordance with the Iron County Ordinance, a Geologic Hazards Report is not required. It is GEM Engineering's opinion that the site is suitable to build upon provided all the recommendations and requirements contained within this geotechnical investigation report are followed.

Although some potential geologic hazards may be indentified in this Geotechnical Investigation Report, this is NOT a Geologic Hazards Report and should not be regarded as such.

5.0 SITE CONDITIONS

5.1 Surface Conditions

As stated previously the site is located at approximately 3775 West 400 South near Cedar City, Iron County, Utah, as shown on Plate 1. At the time of our investigation the site was vacant. The proposed site is located within the SUU Farm complex. There are several farming structures and corrals in the surronding area. The site slopes down towards the west.

5.2 Subsurface Conditions

The on site soils encountered in the excavation generally consisted of soft to very stiff sandy silt to a depth of approximately 4 feet below existing grade. This material was underlain by very stiff sandy clay-silt which extended to the bottom of the trench. Ocassional gravel and pinhole voids were observed within the upper sandy silt layer. Caliche was observed within matrix within the sandy clay-silt layer.

Numerous factors contribute to fluctuations in groundwater levels and locations. The evaluation of these factors was beyond the scope of this study. However, groundwater was not encountered during the exploration. The soils were in a moist condition throughout the depths explored.

The encountered subsurface conditions are described in detail on the enclosed trench log, Plate 2. Due to the nature and depositional characteristics of the native soils, care should be taken in extrapolating subsurface conditions beyond the exploration location.

The laboratory tests results indicated that the on-site soils exhibited a relatively low solubility, low to moderate plasticity and a moderate collapse potential.

6.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

6.1 General

Based on our investigation there are loose, soft and/or collapsible soils located at the site which will require stabilization and/or overexcavation prior to the placement of structural fill. However, it is our opinion that the subject site is suitable for the proposed construction provided that the recommendations contained in this report are followed.

The following sections of this report present our recommendations to reduce the potential for structural damage. They contain specific opinions and recommendations concerning construction considerations, site preparation and grading, structural fill, foundation design, retaining walls, concrete slabs-on-grade, soil corrosion, moisture protection and structural pavement sections.

One of the most critical recommendations to follow in order to reduce potential for structural damage is to set the finished floor slab elevations high enough to facilitate proper drainage away from the structure.

6.2 Construction Considerations

6.2.1 Foundation Systems

After overexcavation and recompaction are completed, the structures can be supported by conventional strip and/or spread footings founded on properly placed and compacted structural fill.

6.3 Earthwork

6.3.1 Site Preparation and Grading

Within the areas to be graded, existing vegetation, loose soils, and debris, should be removed and hauled off the site. Any undocumented fill soils, and soft, loose,

collapsible and/or disturbed native soils should be excavated to expose competent, dense or medium dense native soils.

Based upon soil types and laboratory consolidation tests, the required depth of overexcavation is as follows: A minimum of 2 feet below the bottom of footing elevation or 2 feet below the existing site grade, whichever is greater. Overexcavations should extend laterally at least 5 feet beyond the edge of footing on each side or to a distance equal to the depth of overexcavation, whichever is greater. In some circumstances, after review of the excavation, GEM Engineering may approve a width of lateral overexcavation less than 5 feet but in no case shall this width be less than the required depth of overexcavation.

Slabs-on-grade, exterior concrete flatwork, and pavements should be supported by a zone of properly placed and compacted structural fill. Overexcavations on the order of 12 inches below the supportive gravel layer or 12 inches below the existing site grade, whichever is greater, are required. As an alternative to the above, 8 inches of Type 1 pit run gravel can be substituted for the 12 inches of recompacted native soils. Excavations shall extend laterally at least 2 feet beyond exterior flatwork and pavement areas.

If loose soft or pumping soils are encountered at the bottom of the overexcavations, stabilization and/or additional overexcavation will be required prior to the placement of structural fill. Overexcavations may be terminated if competent, medium-dense granular soils are encountered. A GEM Engineering representative should observe excavation and determine if it is acceptable to terminate the excavation or reduce the overexcavation depth.

The majority of on-site soils, free of organics and debris, should be suitable for reuse as structural fill. If using on-site soils for backfill or structural fill a shrinkage factor of up to 15 percent can be expected.

Following excavation of the unsuitable soils as described above, a representative of this office should observe the excavation bottoms prior to the continuance of grading to verify that unsuitable materials have been removed and that competent soils have been exposed. The native soils exposed after overexcavation should be scarified to a depth of 6 inches, brought to within 2 percent of the optimum moisture content for granular soils and slightly above optimum for fine-grained soils, and compacted to at least 90 percent of the maximum dry density for granular soils and 85 percent of the maximum dry density for fine grained soils as determined by ASTM D-1557. The site should then be brought to the proper grade with structural fill as described in the Structural Fill section.

Subgrade materials supporting slabs-on-grade, exterior concrete flatwork, and pavements should be kept moist and not be allowed to dry out and crack. If the subgrade has been disturbed or dried out prior to placement of aggregate base, the exposed soils should be moisture-conditioned and recompacted as outlined in the Structural Fill section of this report.

We recommend that a GEM Engineering representative be allowed to review the grading plans when prepared to evaluate their compatibility with the recommendations of this report.

6.3.2 Excavations

The majority of the soils encountered in our explorations should be excavatable with conventional earthwork equipment. It is also possible that soft pumping soils may be encountered. Pumping soils will need to be stabilized prior to placing of structural fill. Safety of construction personnel is the responsibility of the Contractor.

6.3.3 Material Volume Changes

There will be shrinkage losses when excavating and compacting the on-site soils. An estimated average shrinkage factor of 15 percent is applicable for the loose to

medium-dense near-surface native soils. A subsidence factor of 0.1 should be used in all areas where the surficial soils are scarified and recompacted to a depth of 6 inches.

6.3.4 Structural Fill

All fill placed for the support of slabs-on-grade, exterior concrete flatwork, and pavements should be structural fill. Structural fill may consist of approved excavated on-site or imported fill materials. Structural fill should have a swell potential less than 4 percent under a 60 psf surcharge, have a solubility of less than 3 percent, be free of organics, salts, or inert materials larger than 4 inches nominal size, and be similar in gradation to the on-site soils.

Structural fill should be placed in maximum eight-inch loose lifts and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer. Soils in compacted fills should be compacted to at least 90 percent of the maximum dry density as determined by ASTM-D1557 for fine grained soils and 95 percent for granular soils. The moisture content should be within 2 percent of optimum for granular soils and at least 2 percent above optimum for fine-grained soils. Any imported fill materials should be approved prior to importing. Also, prior to placing any fill, the excavations should be observed by a GEM Engineering representative to observe that unsuitable materials have been removed.

6.4 Foundations

6.4.1 Conventional Foundations

General: Conventional shallow foundations consisting of strip and/or spread footings can be utilized for the support of the proposed building provided that overexcavation is completed in accordance with the requirements and recommendations of this report as described in the Earthwork section.

For frost protection the bottom of exterior conventional spread and strip footings shall be at least 30 inches below the lowest adjacent final compacted subgrade.

Foundations for structures constructed on soils, prepared in accordance with the recommendations and requirements of this report, may be designed for an allowable net bearing pressure of 1700 psf. This bearing pressure may be increased by one-third for load combinations containing seismic or wind loads.

The net allowable bearing pressure can be increased to 2000 psf if pit run gravel is utilized beneath the structure instead of the native soils. The pit run gravel must have a maximum dry density of at least 135 pcf utilizing ASTM D1557. The pit run gravel must also meet all of the requirements contained in the Structural Fill section of this report.

Prior to constructing the foundations, the footing excavations should be observed by a GEM Engineering representative to confirm that the soil preparation has been completed in accordance with the requirements and recommendations of this report.

Settlement: Foundations established in accordance with the recommendations and requirements of this report are estimated to subject to 1 ½" or less of settlement if the soils beneath the overexcavation do not become moistened. Estimated differential settlement could be on the order of ½ the total settlement.

Lateral Earth Pressures: The following lateral earth pressure equivalent fluid densities shall be used in the design of the structure.

Properly Compacted On-Site Soils	
Active Pressure	36 pcf
At Rest Pressure	55 pcf
Passive Pressure	254 pcf

Equivalent fluid densities presented above assume that there will be no build-up of hydrostatic pressure. Any surcharge from adjacent structures or traffic loads should be added to this pressure. When passive pressure is used for resistance to lateral loads the top one foot of soil should be neglected. The maximum allowable passive pressure for lateral load resistance should not exceed 1,600 psf.

The seismic lateral earth pressure coefficient (k_h) is 0.10.

Lateral Load Resistance: Horizontal loads acting on foundations will be resisted by friction acting at the base of foundations and/or passive earth pressures acting against the side of footings and concrete walls. If design makes use of passive earth pressures, it is important that a GEM Engineering representative be present during backfill placement.

The friction force acting along the base of footings founded on suitable foundation soils may be calculated using a coefficient of friction of 0.40.

Lateral loads acting on buried utility lines may be resisted by thrust blocks reacting against undisturbed native soil or properly placed and compacted structural fill. The passive lateral earth pressure equivalent fluid density and coefficient of friction, previously listed, may be used for thrust block design.

6.5 Concrete Slabs-On-Grade

Satisfactory support for concrete slabs-on-grade and exterior concrete flatwork may be provided by a 6 inch layer of compacted gravel overlying properly placed and compacted structural fill as recommended in the Site Grading section of this report. The layer of

compacted gravel may consist of road base or pit-run gravel with a 2-inch maximum particle size and not more than 12% fines passing the No. 200 sieve. The gravel layer should be compacted to at least 95% of the maximum dry density as determined by ASTM D1557.

All concrete slabs should be designed to minimize cracking as a result of shrinkage. Reinforcement requirements shall be provided by the Structural Engineer. Reinforcement should be installed at the mid-height of the slab unless directed otherwise by the Structural Engineer.

Special precautions must be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could lead to excessive shrinkage, cracking or curling in the slabs. All concrete placement and curing operations shall be performed in accordance with the American Concrete Institute (ACI) Manual.

6.6 Soil Corrosion

Based on similar studies performed in the area, the on-site soils contain salts in sufficient concentration to be considered corrosive to both concrete and metal. Therefore, all concrete in contact with the on-site soils and used in stem walls should contain Type V or equivalent sulfate-resistant cement, and should be placed with a maximum four inch slump. Furthermore concrete shall meet requirements specified in Tables 4.3.1 & 4.2.1 of ACI 318-08 for severe sulfate exposure. Special protection to buried metal pipes and water lines should be considered for long term performance of these underground utilities. Consideration should be given to cathodic protection of buried metal pipes, or to the use of PVC pipe where permitted by local building codes.

6.7 Moisture Protection and Drainage

It is imperative that precautions are taken during and after construction to eliminate, or at least minimize, wetting of foundation soils. Drainage and grading shall be constructed in accordance with the requirements of section 1804.3 of the 2009 International Building

Code (IBC). Positive drainage shall be established away from the exterior walls of the structure. The required minimum slope is five percent (5%) in landscape areas and two percent (2%) in pavement areas, for a minimum distance of 10 feet from the structure. Roof runoff and other sources of moisture should not be allowed to infiltrate the soils in the vicinity of, or upslope from, the structure. No roof moisture should infiltrate the soils beneath the foundations.

All utility trenches leading into the structures should be backfilled with compacted non-pervious fill. Special care should be taken during installation of sub floor sewer and water lines to reduce the possibility of future subsurface saturation.

Landscape watering adjacent to the structure should be eliminated. As an additional protection a concrete slab could be placed around the structure to facilitate drainage away from the structure as described above. Any planters adjacent to the structure should have sealed bottoms. It is recommended that desert landscaping techniques be utilized.

6.8 Asphaltic Concrete Pavements

Asphaltic concrete pavement sections were developed for non-dedicated areas. In developing our recommendations, we have assumed that: (1) a minimum of 6 inches of Type 1 gravel (3-inch minus pit run) will be provided beneath the pavement section: (2) a Traffic Index value of 5.5 for automobile traffic and parking areas is appropriate; and (3) an R-value of 25 is representative of recompacted native soils. The following table presents the minimum recommended structural pavement sections:

Asphaltic Concrete Pavements

Traffic Condition	Assumed Traffic Index (T.I.)	Asphalt Thickness (in)	Road Base Thickness (in)	Compacted Type 1 Gravel (in)
Light Traffic/Parking	5.5	2.5	6	6

Asphalt and aggregate base material should conform to local requirements. All base material should be compacted to at least (95%) of the maximum dry density (ASTM D-1557). Asphalt should be compacted to minimum of (96%) of the Marshall maximum density. Asphaltic concrete and base materials should be tested prior to delivery to the site and during placement to determine conformance with the project specifications.

It is important that parking area grades be set to provide positive drainage to suitable drainage structures. A desirable slope for drainage in paved areas is two percent.

7.0 CLOSURE

7.1 Limitations

The recommendations contained in this report are based on the field exploration, laboratory tests, and our understanding of the proposed construction. The subsurface data used in the preparation of this report were obtained from the exploration made during this investigation. It is possible that variations in the soil and groundwater conditions could exist elsewhere on the site. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at the site which are different from those described in this report, GEM Engineering should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, GEM Engineering should likewise be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. Although some potential geologic hazards may be indentified in this Geotechnical Investigation Report, this is NOT a Geologic Hazards Report and should not be regarded as such. No warranty, express or implied, is made. It is the Client's responsibility to see that all parties to the project, including the Designer, Contractor, Subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk. GEM Engineering will not accept the responsibility for damage caused by the uncontrolled action of water at the site.

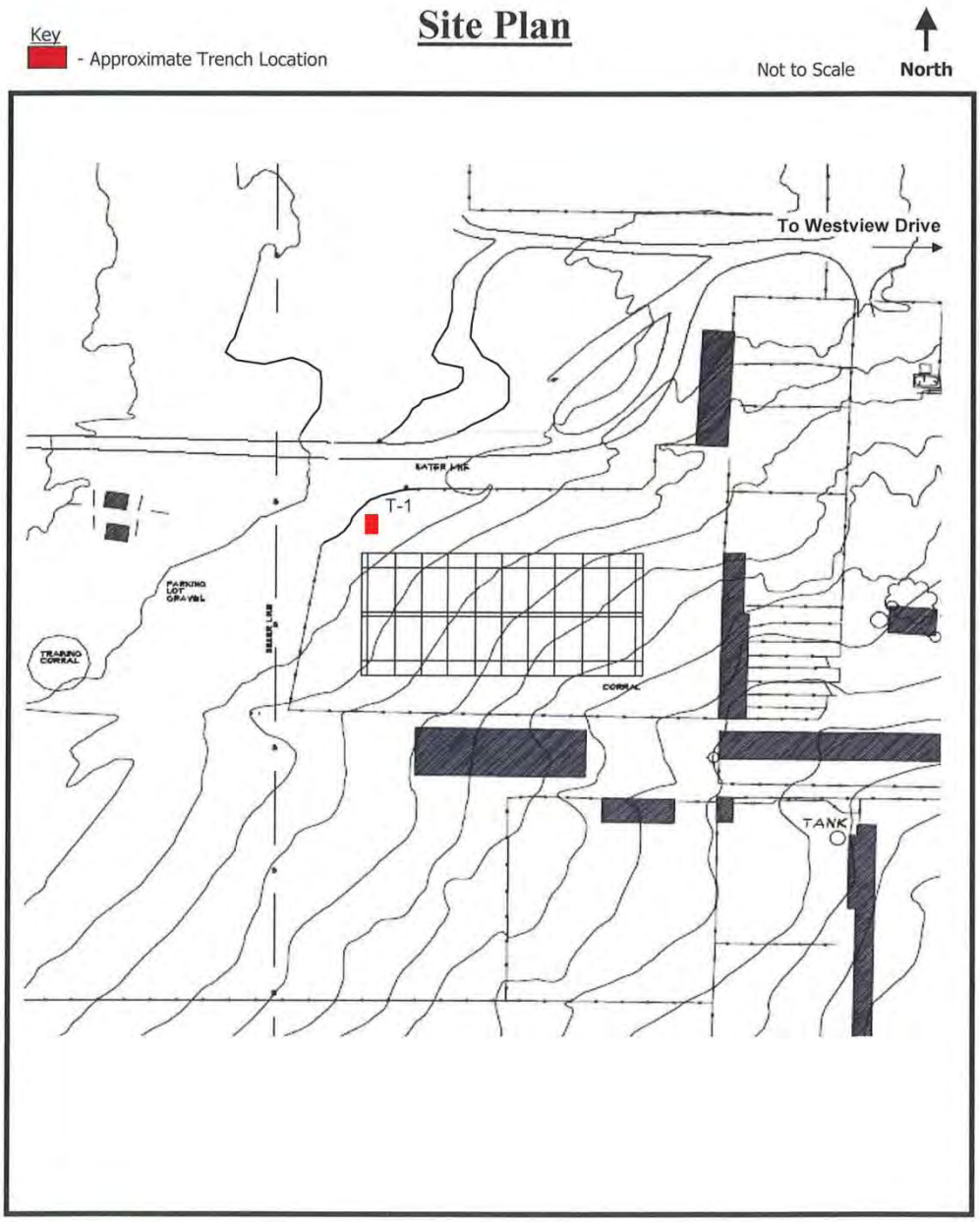
7.2 Additional Services

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during the construction to verify compliance with the recommendations. These tests and observations should include, but not necessarily be limited to, the following:

- Observations and testing during site preparation, earthwork and structural fill placement
- Observations of footing excavations
- Consultation as may be required during construction

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

Appendix A


Site Plan
Key
- Approximate Trench Location
Not to Scale
North
To Westview Drive
T-1
TANK
SUU Farm
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah
Plate: 1
GEM
ENGINEERING, INC.

Trench No. 1

Date Excavated: 4/20/2011 — Elevation: Not measured
Location: see plate 1

Depth (ft.)	Field Moisture %	Dry Density (pcf)	Other Tests *	Samples	SYMBOL +	SOIL DESCRIPTION	MOISTURE	CONSISTENCY
0	11.8	103.0	SOL AT,C	■	ML	(ML) - Sandy Silt. - Ocassional gravel observed within layer. - Pinhole voids observed within layer. - Light Red Brown	Moist	Soft Stiff to Very Stiff
5	15.8		SOL P SOL AT		CL-ML	(CL-ML) - Sandy Clay-Silt. - Some caliche observed within matrix about 5 feet. - Light Red Brown		Very Stiff
10						Bottom @ 8 feet.		
15								
20								

* Other Tests: C = Consolidation, AT = Atterberg, S = Shear, G = Grain Size, E = Expansion, SOL = Solubility, DS = Direction Shear, P = Proctor

■ = Drive Sample
□ = Bulk Sample
⊠ = No Recovery

Notes:
- No groundwater encountered.
- No caving of sidewalls.

GEM ENGINEERING, INC.

SUU Farm Building
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah

Plate: 2

The Unified Soil Classification System

MAJOR DIVISIONS			Group	Symbol	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% of material is larger than the No. 200 sieve.	GRAVELS More than 50 % of coarse part is larger than the No. 4 sieve.	CLEAN GRAVELS	GW		Well graded gravels, gravel sand mixtures, little or no fines
		Little or no fines	GP		Poorly graded gravels/gravel sand mixtures
		GRAVELS WITH FINES	GM		Silty gravels, gravel-sand-silt mixtures
		Appreciable amount of fines	GC		Clayey gravels, gravel-clay-sand mixtures
	SANDS More than 50 % of coarse part is smaller than the No. 4 sieve.	CLEAN SANDS	SW		Well graded sands, gravely sands, little or no fines
		Little or no fines	SP		Poorly graded sands or gravely sands, little or no fines
		SANDS WITH FINES	SM		Silty sands, sand-silt mixtures
		Appreciable amount of fines	SC		Clayey sands, sand clay mixtures
FINE GRAINED SOILS More than 50% of material is smaller than the No. 200 sieve.	SILTS AND CLAYS Liquid limit less than 50		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with low plasticity
			CL-ML		Inorganic clay-silt mixture and very fine sand, silty or clayey fine sands or clayey silts with low plasticity.
			CL		Inorganic clays of low to medium plasticity, gravely Claus, sandy clays, silty clays, lean clays
			OL		Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays or medium to high plasticity, organic silts
	HIGHLY ORGANIC SOILS		PT		Peat and other highly organic silts

GEM ENGINEERING, INC.

SUU Farm Building
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah

Plate: 3

Laboratory Test Results

Table #1 - Solubility Analysis

Sample Location	Soil Classification / Description	Percent Soluble by Weight
T-1 @ 3 feet	Sandy Clay	< 1
T-1 @ 5 feet	Sandy Clay-Silt	< 1
T-1 @ 7 feet	Sandy Clay-Silt	< 1

Table #2 - Atterberg Limits

Sample Location	UCS Type	Percent Passing #4 Sieve	Percent Passing #10 Sieve	Percent Passing #40 Sieve	Percent Passing #200 Sieve	Liquid Limit	Plastic Limit	Plasticity Index
T-1 @ 3'	ML	97.0	93.9	90.0	52.6	20	18	2
T-1 @ 7'	CL-ML	90.3	85.3	78.2	50.9	24	18	7

Table #3 - Maximum Density Test Summary

Sample Location	Soil Classification / Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
T-1 @ 5 feet	Sandy Clay-Silt	127.0	8.5%

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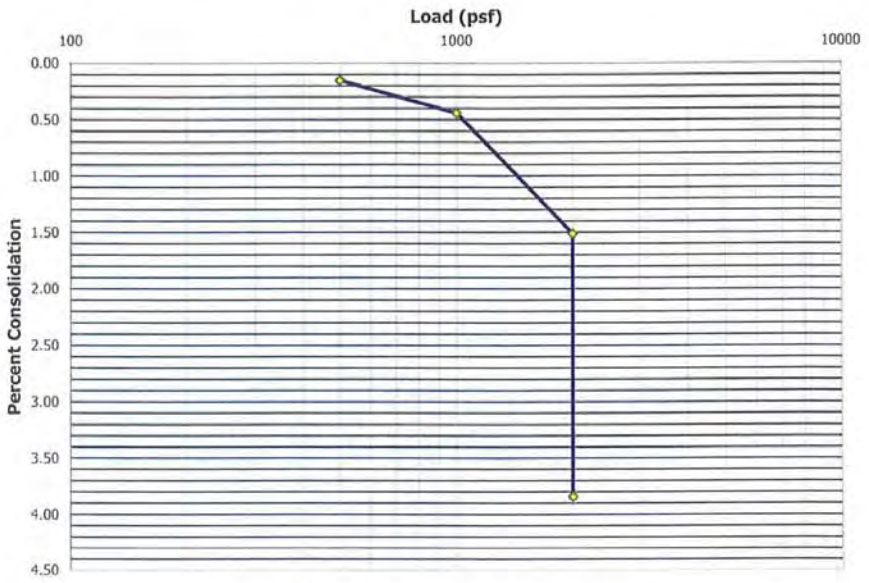
SUU Farm Building
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah

Plate: 4

Consolidation Test Data



SAMPLE LOCATION T-1 @ 3', Water added at 2000 psf

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SUU Farm Building
Approximately 3775 West 400 South
Near Cedar City, Iron County, Utah

Plate: 5

END OF PROGRAM DOCUMENT