



Division of Wildlife Resources

Great Basin Research Center—Seed Warehouse Expansion

Final Report

494 West 100 South
Ephraim, Utah 84627

DFCM Project No. 09023520



July 16, 2009



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EXECUTIVE SUMMARY

INTRODUCTION

The Great Basin Research Center (GBRC) located in Ephraim, Utah, was constructed in 2003 for the Division of Wildlife Resource (DWR), Department of Natural Resources (DNR). The original facility was approximately 22,700 square feet (sf), with 13,500 sf warehouse area, along with 4,000 sf of open covered area, a greenhouse and related support and administrative areas such as restrooms, LAN, offices, conference room and a laboratory.

PROJECT JUSTIFICATION

The GBRC provides a valuable support function to the DWR / DNR operations in providing for seed cleaning, packing and storage for the re-seeding areas damaged by fires and other man-made or natural elements, minimizing erosion to the existing area and providing for quick re-growth. Due to the ongoing demands since its inception, the DWR / DNR has a current need to expand the warehouse area 9,000 sf, adding a warehouse addition that is approximately 90' x 100', inclusive of a new cold storage room. The new addition will also include covered outdoor areas for dock / handling and work areas, inclusive of a 2-Ton monorail crane system and utilities for welding.

PROGRAM OVERVIEW

This program is intended to provide the necessary information and requirements to allow the Division of Facilities Construction & Management (DFCM) to develop a Design/Build Request For Proposal (RFP) from design/ build teams.

Included in this programming study is an overview of the programming requirements by systems for the architectural, structural, mechanical, and electrical systems, a space summary and cost estimate and overall building schedule.

The appendix contains support information including the technical requirements / outline specifications, original and updated geotechnical information, an updated ALTA Survey, the Warranty Deed conveying the property to the east, and reference photos.

SCOPE

The scope of the work to be performed by the design/build teams will include the design and construction of the warehouse expansion, inclusive of the cold storage room, pallet racks, heating and ventilation, plumbing to exterior faucets and associated power, lighting and fire suppression, etc. Additionally, the design/build team will provide for site paving (concrete and asphalt), and finish grading of modified and disturbed areas.

SPECIAL PROJECT CONDITIONS

Building Access during Construction. The warehouse shall remain accessible during construction. Construction will need to be carefully coordinated in order to maintain access to the building and during demolition of the existing north wall and erection of the addition.

Building Heating during Construction. Temperature in the warehouse will need to be maintained at a sufficient temperature to avoid freezing of interior plumbing and fire suppression system.

Existing Facility Upgrades. Coordination will be required to maintain facility operation while providing ventilation and electrical upgrades to existing facility. Additionally, power interruptions will necessarily be minimized and shall be coordinated with owner.

SPACE & COST SUMMARY

The table below contains the Space and Cost Summary for the Seed Warehouse Expansion Project.

| SPACE COST SUMMARY | | | |
|--------------------------------|--------------|--------------|--------------|
| SPACE | NSF | GSF | NOTES |
| Site Improvements | | | |
| Open Warehouse Area | 9000 | 9000 | Note 1 |
| Cold Storage | 1500 | 1500 | Note 2 |
| Covered Delivery | 2250 | 2250 | |
| Covered Work Area | 3000 | 3000 | |
| Subtotal | 15750 | 15750 | |
| General Conditions @ 6.0% | | | |
| Bonding @ 1.2% | | | |
| Overhead & Profit @ 15% | | | |
| Total | 14250 | 14250 | |
| Note | | | |
| 1 Include Upgrades to Existing | | | |
| 2 S.F. Include in Warehouse | | | |

PROJECT SCHEDULE

The project schedule will be impacted by ongoing operations at the site. The DNR personnel have indicated that access must be maintained, particularly through the peak delivery season in the fall. It is anticipated that excavation may begin in late fall, with the structure being fully complete in early spring. It should be noted that this schedule is contingent upon being able to continue construction throughout the winter months. Given the current project constraints, it is anticipated that construction may be complete by the end of March 2010.

ARCHITECTURAL DESCRIPTION

The new DWR warehouse building addition located in Ephraim, Utah, shall consist of a complete insulated metal building system including the following agency requirements: concrete Semi-trailer drive-off areas, asphalt parking area, pallet storage racking, cold storage unit, covered shop area on west side, and covered overhang area on east side with rail-system hoist beam. Materials and finishes shall comply with State of Utah, DFCM Design Requirements, current edition. Refer to the following descriptions, outline specifications and schedule for this "Attachment A."

ARCHITECTURAL SPACE DESCRIPTION

SPACE

Function: Warehouse Area

Floor: Sealed Concrete – cleanable surface. Sawcut joints – filled with pourable sealant.
Floor load requirements for Pallet Racks is 325lbs/sq. inch.

Base: N/A.

Walls: Vapor Barrier over 6" batt insulation.

Door: Exterior doors shall be prefinished insulated metal panel.
Prefinished Insulated Sectional Overhead door relocated from original warehouse.
Install one door on north end and one door on west side.

Windows: N/A.

Ceiling: Vapor Barrier over 9" basket insulation.

Special Requirements: Thermostat controls for addition shall be located at main entrance to warehouse for central control. Cleanout existing saw cut joints and fill with pourable sealant.

SPACE

Function: Cleaning / Mixing Area (Existing)

Floor: Sealed Concrete – Existing.

Base: N/A.

Walls: Vapor Barrier over 6" batt insulation – Existing.

Door: Exterior doors shall be prefinished insulated metal panel – Existing.

Windows: N/A.

Ceiling: Vapor Barrier over 9" basket insulation – Existing.

Special Requirements: Upgrade current dust collection bagging system to include self-cleaning function. (Owner Provided)

SPACE

Function: Exterior Work Area – East Side

Floor: 10" Road Base

Base: N/A

Walls: N/A

Door: N/A

Windows: N/A.

Ceiling: Open to Structure

Special Requirements: Structure to accommodate 2-Ton monorail hoist crane. Rail beam to be sized to accommodate 4-ton loading to accommodate future addition of second 2-Ton hoist on same rail.

SPACE

Function: Cold Storage Area

Floor: Sealed Concrete.

Base: Rubber at perimeter wall.

Walls: Perimeter wall is painted gypsum board / metal studs assembly. Interior wall is 4" urethane with USDA white in and out. Wall panels, where exposed to fork lift and other traffic to include protection barriers, i.e., Jescogard double rail post system.

Door: Exterior doors shall be prefinished insulated metal panel.

Windows: N/A.

Ceiling: Vapor Barrier over 9" basket insulation.

Special Requirements: Cold storage unit assembly (insulated steel panel cold storage unit) to fit within cold storage area. Refrigeration equipment mounted on top of cold storage area to be located away from warehouse exterior west wall to maximize height clearance in space. Desired ceiling height is approximately 18'. Remote condensing unit located at building exterior immediately to north of cold storage room in doghouse weather protection cover.

SPACE

Function: Covered overhang at Dock Area – West Side.

Floor: Level Concrete or engineered fill (refer to Geotechnical Report for site prep.).

Base: N/A.

Walls: Prefinished metal building system.

Door: Exterior doors shall be prefinished insulated metal panel.

Windows: N/A.

Ceiling: Open to structure.

Special Requirements: Concrete-filled steel bollards at doors.

STRUCTURAL DESCRIPTION

The new DWR warehouse building addition located in Ephraim, Utah, shall consist of a complete insulated metal building system with a covered overhang area on east side that will support a rail-system hoist beam. The addition will be supported on a concrete foundation system.

METAL BUILDING SYSTEM

The new addition's structural system will consist of a pre-manufactured metal building designed by a qualified registered professional engineer licensed in the state of Utah. The designer shall provide the foundation engineer with the loads induced on the foundations by the metal building. The metal building shall be designed to all applicable codes and standards required by the local building officials.

FOUNDATION SYSTEM

The foundation system shall consist of a concrete footing and foundation system that will extend down below grade a minimum of 30" to frost depth. The foundations shall be designed to meet the requirements of the soils report. The foundations shall be designed by a registered professional engineer licensed in the state of Utah and shall be designed to all applicable codes and standards required by the local building officials.

SOIL REQUIREMENTS

The existing soils report indicated the presence of collapsible soils on the site. The soils engineer that provided the soils report for the main building shall be contacted to determine if the requirements of the existing soils report can be used for the new addition as well.

DESIGN CRITERIA

The following design criteria should be considered for the new structural system:

Gravity Loads

Dead Loads – actual loads of the building components plus any owner/user defined loadings.

Live Loads – snow loads as determined by the local building official plus any owner/user defined loadings.

Wind Loads – as determined by the building official and the IBC code.

Seismic loads – The Soils Engineer shall provide the following information in the soils report:

- Longitude of the site
- Latitude of the site
- S_s = Mapped spectral acceleration for short period
- S₁ = Mapped spectral acceleration for 1-second period
- F_a = Site coefficient for the design of short period acceleration
- F_v = Site coefficient for the design of 1 second period
- Soils Site Class

CODES AND STANDARDS

The structural systems shall be designed and built in accordance with the following codes and standards:

International Building Code (IBC) 2006 or current

ASCE 7-05 or current

DFCM Design Requirements

Applicable state and local codes

DNR SEED WAREHOUSE ADDITION
EPHRAIM, UTAH

Owner Project Requirements for

Mechanical, Plumbing and Fire Sprinkler Systems

A. General:

This new metal building addition is approximately 9,000 sq.ft. of warehouse space, 2,250 sq.ft. of covered dock area and 3,000 sq.ft. of covered work area. The new warehouse addition will be used to store pallets of seeds. The mechanical system will provide heating and ventilation as required. The new addition will not be air conditioned. This building should expect to be occupied from 6:00 a.m. to 7:00 p.m. The cold storage room will run 24 hours per day 7 days per week.

The mechanical system shall be designed to provide a safe, economical, energy efficient, low maintenance type system that is balanced with the projects sustainability goals. All mechanical systems shall have a proven track record of high quality, energy efficiency and environmental control.

B. Design Criteria:

The following design criteria should be considered for the new mechanical systems.

Design Temperatures:

| | <u>Winter</u> | <u>Summer</u> |
|--|--------------------|--------------------|
| <u>Outdoors</u> | -5 F db | 93 F db 66 F wb |
| <u>Indoors</u> | | |
| Warehouse Spaces (Ventilation only in summer) | 65 F db | 85 F db |
| Cold Storage Room | 40 F db (20%RH) | 40 F db (20%RH) |

C. Codes and Standards:

The mechanical systems shall be designed and built in accordance with the following codes and standards:

International Mechanical Code (IMC) 2006

International Plumbing Code (IPC) 2006

International Building Code (IBC) 2006

NFPA

DFCM Design Requirements

Applicable state and local codes

D. Mechanical Systems:

The new warehouse addition shall be heated with gas fired unit heaters.

The new warehouse addition shall also be ventilated. A new gas fired, rooftop makeup air unit, serving this area, shall provide the minimum amount of fresh outside air as required by the ANSI/ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality.

In addition, a minimum of two new rooftop exhaust fans with dampers and a minimum of two intake louvers with dampers shall be provided. Roof top exhaust fans shall be sized to provide for a minimum of six air changes per hour in the new warehouse addition. A two stage thermostat shall be set to start one fan and open one intake damper. On a rise in temperature the second fan will run and the second intake damper will open. The system shall be designed to allow for both fans to run during the night time to bring in cool night time to pre cool the space. The louvers shall be low on the outside wall and create a cross flow situation to move the air across the pallet of seeds and up and out the rooftop exhaust fans. The thermostat shall have a sub-base for manual override of the fans.

The cold storage unit shall be a factory fabricated unit with remote air cooled condenser located above the cold storage room at the highest point of the facility structure. The unit shall have an 8' x 8' door with plastic drops to keep the cold in when the door is open.

The existing open warehouse Room 112 shall have its ventilation improved. A new gas fired, rooftop makeup air unit, serving this area, shall provide the minimum amount of fresh outside air as required by the ANSI/ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality.

In addition, a minimum of two new rooftop exhaust fans with dampers and a minimum of two intake louvers with dampers shall be provided to supplement the existing exhaust fans already serving the existing open warehouse. The new roof top exhaust fans shall be sized so that the new plus existing exhaust fans provide for a minimum of six air changes per hour in the existing open warehouse. A two stage thermostat shall be set to start one fan and open one intake damper. On a rise in temperature the second, third and fourth fans will run in sequence and the second, third and fourth intake dampers will open with each respective exhaust fan. The system shall be designed to allow for all fans to run during the night time to bring in cool night time to pre cool the space. The new louvers shall be low on the outside wall and create a cross flow situation to move the air across the pallet of seeds and up and out the rooftop exhaust fans. The thermostat shall have a sub-base for manual override of the fans. Relocate any existing louvers and controls as necessary to accommodate the new warehouse addition.

E. Automatic Temperature Controls

The building automatic temperature controls shall match the controls installed in the existing portion of the building and shall provide the same functions, i.e. remote access, alarms, etc., as the existing controls.

F. Existing Utilities.

The building utilities will be connected into the nearby sewer, storm drainage, domestic water, fire line and gas piping. It is anticipated that utilities of adequate capacity are close. See Civil section for more discussion on site utilities.

G. Plumbing:

Systems will be designed in compliance with the applicable codes.

Plumbing Fixtures

All plumbing fixtures shall be in accordance with code requirements. ADA fixtures shall be provided where necessary.

A minimum of two outside non freeze wall hydrants shall be provided, one at the new covered area on the west and one at the new covered work area on the east.

Sanitary Sewer

Sanitary waste and vent systems will be provided for all areas. Cast iron piping shall be used for all above ground and underground waste. Vent piping may be cast iron or galvanized piping.

A floor sink shall be provided for condensate from the cooler.

Domestic Water

Domestic water shall be extended from the existing building domestic water system to serve all new fixtures. The new piping shall be tied to the existing piping in a location of adequate capacity. Copper piping shall be utilized for domestic water piping. Piping shall be insulated in accordance with code. Shutoff valves shall be located as necessary isolate the piping for repairs without unnecessarily shutting down large portions of the building.

Domestic Water Heating System.

The new addition does not have any domestic water requirements

Roof Drainage

See architectural narratives for roof drainage requirements.

Gas

New natural gas piping shall be run to the new gas fired equipment in the building as necessary. The new piping shall be connected to the existing piping in a location of adequate capacity. Provide shutoff valves to facilitate isolating the new work from the existing piping. Gas piping shall be black steel and shall be installed in accordance with the gas company regulations. Gas pressure regulating valves shall be provided where required.

The existing gas meter sizing shall be reviewed with the gas company and modifications shall be made as necessary.

H. Fire Protection:

The new building addition shall require a wet fire sprinkler system. The fire sprinkling system shall be designed to comply with NFPA, State Fire Marshal and County design standards and in accordance with the warehouse and storage requirements. It shall be connected to the existing fire sprinkler system at a location of adequate capacity.

Areas requiring fire sprinklers that are exposed to freezing conditions shall be provided with freeze proof heads, antifreeze loops or dry pipe systems as appropriate. The existing antifreeze systems shall be left as is due to the expense of changing them to a dry system.

SEED WAREHOUSE ADDITION ELECTRICAL PROGRAM

GENERAL

Each proposal shall include each system described herein for a complete and operable system. Each proposal shall comply with the State of Utah Division of Facilities construction and management Design Requirements current edition, State of Utah Information Technology Installation standards, National Electrical Code, and any applicable local codes and ordinances.

Codes and Standards

The electrical systems shall be designed and built in accordance with the following codes and standards:

ADA, Americans with Disabilities Act
ASHRAE 90.1 Energy Code
EIA/TIA, Electronics Industries Association/Telecommunications Industry Association
IBC 2006, International Building Code
IFC 2006, International Fire Code
IESNA, Illuminating Engineering Society of North America
NFPA, National Fire Protection Association (applicable sections including but not limited to):
NFPA 70, National Electrical Code
NFPA 72, National Fire Alarm Code
UL, Underwriters Laboratories
DFCM Design Requirements
Applicable state and local codes

Power

Provide a new service secondary to the building from the existing building transformer. Coordinate all required secondary connections at the transformer with Ephraim City Power. Provide a new service panel sized to the equivalent load of the new addition plus the load of the existing building. Provide a new 208Y/120V, 3-phase, 4-wire, Nema 3R main distribution panel on the exterior of the new addition to feed new panels in the new addition and back feed the existing service. Provide new grounding electrodes bonds at the new service entrance and remove the ground to neutral bond at the existing service entrance. Provide a new UFER ground in the slab of the new addition. The service entrance equipment shall be located on an outside wall on the exterior of the building, in an unobtrusive location that shall be protected with concrete filled pipe bollards. The electrical branch panels shall be located within the building in the warehouse area.

Seismic Restraints

All new electrical equipment installed shall be seismically restrained to meet the requirements of IBC and ASCE 7-05.

WAREHOUSE AREA

Lighting

The lighting system shall be designed with open industrial high bay T5HO fluorescent fixtures with wire guards, mounted to the structure support members on the building, not to the roof decking. This lighting system shall provide light to a level of 35 foot candles measured at the floor of the building. Lighting shall be located centered in the aisles areas between racks. The lighting shall be controlled at each of the man door entrances to the space specific to the zones with master control switches located at main entrance to warehouse from administrative area.

Power

A convenience outlet shall be placed adjacent to each man door within the warehouse space. These shall be circuited per the national electrical code. Provide power to each overhead door within the space. Each overhead door will include a "raise-lower-stop" button on the inside and the outside of the door. The outside push button shall be key lock protected. This shall be typical of all motor operated doors in the project. Provide power to unit heaters within the space. Provide power to roof top exhaust fans with wall switch and thermostatic controls for fans and dampers.

Communication

None is anticipated in this space.

Fire Alarm System

Extend the existing fire alarm system from the main part of the building to the addition. Provide new manual pull stations at the exits to the space, provide smoke detectors in the path of egress and audio/visual notification appliances throughout to comply with NFPA 72 and State Fire Marshal requirements. Provide NAC extender panels to extend the notification circuits. All equipment shall match the existing fire alarm system.

The existing building fire alarm system shall be upgraded with additional horn/strobes and smoke detectors in the path of egress to meet the requirements of NFPA 72 and the State Fire Marshal requirements.

COVERED DOCK AREA AND WORK AREA

Lighting

The covered exterior areas shall be lighted with fluorescent fixtures suitable for a damp location mounted to the structural steel of the awning roof. This lighting shall provide a minimum of 20 foot candles measured at the floor level. This lighting shall be controlled with a wall switch located adjacent to the man doors entering the building.

Power

Convenience outlets with ground fault protection and weatherproof-in-use cast metal covers shall be installed along the outer wall of the building under the awning at 20 foot on center. Each shall be fed with a dedicated 20 amp 120-volt circuit

At covered work area on east, provide two single-phase 208-volt outlets for 50-amp welders. Provide 120-volt outlets at 20' on center.

Provide new weatherproof 120-volt outlet on the on the east side of the building under the awning. All exterior outlets shall be ground fault protection and weatherproof-in-use cast metal covers.

COLD STORAGE

The cold storage unit will be provided as a factory unit shipped and assembled on the site. Contractor shall provide power to the lighting within the unit. Light switch shall be located adjacent to door. The contractor shall provide power to the door heaters of the unit. The contractor shall provide power to the interior evaporator coils of the unit with a disconnect switch located adjacent. The contractor shall provide power to the condensing unit supplied with unit with a disconnect switch adjacent. The contractor shall provide conduit between the unit and the condensing unit for controls. Contractor shall coordinate with unit shop drawings for final requirements and sizes of all control and power wiring.

EXISTING WAREHOUSE

Provide new 3-way and 4-way switching for the existing warehouse lighting. The 3-way or 4-way switches shall be provided at the entry to the warehouse from the administrative area as coordinated with the User. Re-circuit the warehouse lighting as required to accommodate the new switching arrangement.

There are various locations in the warehouse where junction boxes with multiple extension rings have been provided. Remove the extension rings and provide a larger junction box to replace the existing junction box with extension rings or provide additional individual junction boxes and additional conduit and wiring as required.

There are various conduit bodies that are heating up. The design contractor shall identify these locations, investigate the possible cause and propose a solution to the Owner for review and resolution. The design contractor shall incorporate that work within the scope of the project.

SPACE COST SUMMARY

| SPACE | NSF | GSF | NOTES |
|--------------------------|--------------|--------------|--------|
| <hr/> | | | |
| <hr/> | | | |
| <hr/> | | | |
| Site Improvements | | | |
| Open Warehouse Area | 9000 | 9000 | Note 1 |
| Cold Storage | 1500 | 1500 | Note 2 |
| Covered Delivery | 2250 | 2250 | |
| Covered Work Area | 3000 | 3000 | |
| <hr/> | | | |
| Subtotal | 15750 | 15750 | |
| <hr/> | | | |
| General Conditions @ 6.% | | | |
| Bonding @ 1.2% | | | |
| Overhead & Profit @ 15% | | | |
| <hr/> | | | |
| Total | 14250 | 14250 | |

Note

- 1 Include Upgrades to Existing
- 2 S.F. Include in Warehouse

Site Improvements

Detail Cost Estimate

SEED WAREHOUSE ADDITION

9000

2-Jul-09

| Item | Notes |
|---|------------------------------|
| Site Improvements | |
| Demolition - Miscellaneous | |
| Road Base | |
| Engineered Fill | |
| Asphalt Paving | |
| Concrete Slab, reinf., gravel base - 8" | Extend Exst. Conc. Truck Pad |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Total | |

Open Warehouse Area

Detail Cost Estimate

SEED WAREHOUSE ADDITION

9000

2-Jul-09

| Item | Notes |
|---|-----------------------------------|
| Open Warehouse Area | |
| Batt Insulation Wall 8" | |
| Batt Insulation Roof 10" | |
| Rigid Insulation Foundation 2" | |
| Concrete Floor Slab, reinf., gravel base - 8" | |
| Concrete Floor Sealer | |
| Concrete Foundation Wall, reinf., 8" | |
| Concrete contin. Footing, reinf., | |
| Concrete spot Footing, reinf., | |
| Mechanical (General Costs) | |
| Fire Protection | |
| Electrical (General Costs) | |
| Overhead Sectional Door - Motorized | Relocation of Existing |
| Hollow Metal Door, Hardware, Frame | |
| Hollow Metal Door (Relocate) | |
| General Metal Building | |
| Electrical - Existing Facility Corrections | Correction of Existing Conditions |
| Mechanical (Upgrade Existing) | Increase ventilation of Existing |
| | |
| Total | |

Cold Storage

Detail Cost Estimate

SEED WAREHOUSE ADDITION

1500

2-Jul-09

| Item | Notes |
|---|--------------------------|
| Cold Storage | |
| Steel Insulating Panelized Wall | |
| Concrete Floor Slab, reinf., gravel base - 8" | |
| Concrete Floor Sealer | |
| Suspended Ceiling System | |
| Rubber Base | |
| Double Rail Post System (Wall Protection) | |
| General Metal Building | |
| Manual Slide Door (8'x8') | |
| Mechanical Cooling Equipment | |
| Mechanical (General Costs) | |
| Fire Protection | |
| Electrical (General Costs) | Inc. Special Power Req's |
| Total | |

Covered Delivery

Detail Cost Estimate

SEED WAREHOUSE ADDITION

2250

2-Jul-09

| Item | Notes |
|---|-------|
| Covered Delivery | |
| Concrete Slab, reinf., gravel base - 8" | |
| Concrete spot Footing, reinf., | |
| Fire Protection | |
| Electrical (General Costs) | |
| General Metal Building | |
| | |
| Total | |

Covered Work Area

Detail Cost Estimate

SEED WAREHOUSE ADDITION

3000

2-Jul-09

| Item | Notes |
|---|-------|
| Covered Work Area | |
| Concrete Floor Slab, reinf., gravel base - 8" | |
| 10" Road Base | |
| Fire Protection | |
| Electrical (General Costs) | |
| General Metal Building | |
| Rail | |
| 2-Ton Hoist | |
| Total | |

A. Technical Requirements

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| 230890 | DUCTWORK..... | 2 |
| 230910 | DUCTWORK ACCESSORIES..... | 2 |
| 231940 | AIR OUTLETS AND INLETS..... | 2 |
| 232955 | MECHANICAL CONTROL SYSTEMS..... | 2 |
| 237433 | PACKAGED OUTDOOR HEATING AND COOLING MAKEUP AIR CONDITIONERS..... | 2 |

DIVISION 24 - 25 (NOT USED)

DIVISION 26 - ELECTRICAL

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| 260500 | COMMON WORK RESULTS FOR ELECTRICAL..... | 1 |
| 260519 | LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES..... | 2 |
| 260526 | GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS..... | 1 |
| 260529 | HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS..... | 1 |
| 260533 | RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS..... | 2 |
| 260548 | VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS..... | 1 |
| 260553 | IDENTIFICATION FOR ELECTRICAL SYSTEMS..... | 1 |
| 260923 | LIGHTING CONTROL DEVICES..... | 1 |
| 262416 | PANELBOARDS..... | 2 |
| 262713 | ELECTRICITY METERING..... | 2 |
| 262726 | WIRING DEVICES..... | 1 |
| 262813 | FUSES..... | 1 |
| 262816 | ENCLOSED SWITCHES AND CIRCUIT BREAKERS..... | 1 |
| 265100 | INTERIOR LIGHTING..... | 2 |

DIVISIONS 27-30 (NOT USED)

DIVISION 31 - EARTHWORK

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| 312000 | EARTH MOVING..... | 2 |
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DIVISION 32 - EXTERIOR IMPROVEMENTS

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| 321216 | ASPHALT PAVING..... | 2 |
| 321313 | CONCRETE PAVING..... | 1 |
| 321373 | CONCRETE PAVING JOINT SEALANTS..... | 1 |

DIVISIONS 33 - 40 (NOT USED)

DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT

| | | |
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| 412223 | MONORAIL HOIST..... | 1 |
|--------|---------------------|---|

DIVISIONS 42 - 49 (NOT USED)

END OF TABLE OF CONTENTS

SECTION 011000 - SUMMARY

1.1 SUMMARY

A. Work Covered by the Contract Documents:

1. Project Identification: Division of Wildlife Resources, Great Basin Research Center - Seed Warehouse Expansion. DFCM Project No. 09023520.
 - a. Project Location: 494 West, 100 South, Ephraim, Utah.
2. Owner: State of Utah, Division of Facilities Construction and Management (DFCM).
3. DFCM Project Coordinator: Jim Russell.
4. The Work consists of a new single story metal building addition to the existing building, and associated sitework.

B. Contract: Single Design/Build contract.

C. Use of Site: Limited to areas indicated.

D. Owner's Occupancy Requirements:

1. Owner will occupy the premises during entire construction period, with the exception of areas under construction.
2. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain Owner's access to existing building.
3. Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion.

E. Work Restrictions:

1. Work Hours: Coordinate with Owner.
2. Utility Interruptions: Coordinate with Owner.

END OF SECTION 011000

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

1.1 SUMMARY

- A. Minor Changes in the Work: AIA Document G710, "Architect's Supplemental Instructions".
- B. Proposal Requests: Owner's form.
- C. Change Orders: Owner's form.
- D. Construction Change Directives: Owner's form.

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

1.1 SUMMARY

A. Schedule of Values:

1. Format: Line items based on Project Manual table of contents, coordinated with Design/Builder's Construction Schedule. Owner's form.

B. Applications for Payment:

1. Payment Application Times: Indicated in the Agreement.
2. Payment Application Forms: Owner's form.
3. Special requirements for Initial Application for Payment, Application for Payment at Substantial Completion, and Final Payment Application.

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

1.1 COORDINATION DRAWINGS

- A. Prepare coordination drawings where space is limited or if required to integrate products.

1.2 REQUESTS FOR INFORMATION (RFIs)

- A. RFI Forms: Owner's form.
- B. RFI Log: Maintain a tabular log of RFIs.

1.3 PROJECT MEETINGS

- A. Schedule and conduct meetings.
- B. Preconstruction conference.
- C. Preinstallation Conferences: Before each construction activity that requires coordination with other construction.
- D. Progress Meetings: At weekly intervals, coordinated with preparation of payment requests.
- E. Coordination Meetings: As required, in addition to specific meetings held for other purposes.

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

1.1 SUMMARY

- A. Design/Builder's Construction Schedule.
- B. Daily construction reports.
- C. Material location reports.
- D. Field condition reports.
- E. Special reports.

1.2 QUALITY ASSURANCE

- A. Scheduling Specialist: Experienced in CPM scheduling and reporting.

1.3 DESIGN/BUILDER'S CONSTRUCTION SCHEDULE

- A. Comply with Owner's requirements.
- B. Schedule Type: CPM.
- C. Submit updated schedule with each application for payment.

1.4 REPORTS

- A. Daily Construction Reports: Submit at monthly intervals.
- B. Material Location Reports: At monthly intervals, a comprehensive list of materials delivered to and stored at Project site.
- C. Field Condition Reports: On discovery of a difference between field conditions and the Contract Documents, submitted with a request for information.
- D. Special Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

1.1 SUMMARY

- A. Preconstruction and periodic construction photographs.

1.2 PRODUCTS

- A. Photographic Media: Digital images, in uncompressed TIFF format.
- B. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties and buildings, including existing items to remain during construction, from different vantage points.
- C. Periodic Construction Photographs: Take minimum 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Video Recordings: Submit in digital video disc format acceptable to Owner.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

1.1 SUMMARY

- A. Action Submittals: Information that requires Architect's responsive action.
- B. Informational Submittals: Information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.2 PROCEDURES

- A. Action Submittals:
 - 1. Action Submittals:
 - a. Product Data.
 - b. Shop Drawings.
 - c. Samples.
 - d. Product schedule or list.
 - e. Construction Schedule.
 - f. Submittals Schedule.
 - g. Application for Payment.
 - h. Schedule of Values.
 - i. Subcontract list.
- B. Informational Submittals:
 - 1. Informational Submittals:
 - a. Coordination Drawings.
 - b. Construction Schedule.
 - c. Qualification data.
 - d. Welding certificates.
 - e. Installer certificates.
 - f. Manufacturer certificates.
 - g. Product certificates.
 - h. Material certificates.
 - i. Material test reports.
 - j. Product test reports.
 - k. Research/evaluation reports.
 - l. Schedule of tests and inspections.
 - m. Preconstruction test reports.
 - n. Compatibility test reports.
 - o. Field test reports.
 - p. Maintenance data.
 - q. Design data.

- r. Manufacturer's instructions.
 - s. Manufacturer's field reports.
 - t. Insurance certificates and bonds.
 - u. Construction photographs.
 - v. Material Safety Data Sheets.
- C. Delegated-design submittals.
- D. Contractor's Review:
- 1. Submittals: Marked with Contractor's approval stamp before submitting to Architect.
- E. Architect's Action:
- 1. Action Submittals: Stamped with an action stamp and returned.
 - 2. Informational Submittals: Reviewed but not returned, or rejected if it does not comply with requirements.
 - 3. Submittals Not Required: May not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

1.1 SUMMARY

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements.

1.2 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer.
 - 2. Manufacturer.
 - 3. Fabricator.
 - 4. Professional engineer.
 - 5. Specialists.
 - 6. Testing agency.
 - 7. Factory-authorized service representative.
- B. Preconstruction testing.
- C. Mockups: For each form of construction and finish required, using materials indicated for the completed Work. Mockups establish the standard by which the Work will be judged.
 - 1. Disposition: May become part of the Work.

1.3 QUALITY CONTROL

- A. Owner Responsibilities: Owner will engage a qualified testing agency to perform quality-control services indicated as Owner's responsibility.
- B. Tests and inspections not explicitly indicated as Owner's responsibility are the Design/Builder's responsibility.
 - 1. Where services are the Design/Builder's responsibility, engage a qualified testing agency to perform these quality-control services.
- C. Manufacturer's field services.

- D. Associated Services: Access to the Work, taking and storing samples, and delivery of samples to testing agency.
- E. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
- F. Test and inspection log.
- G. Repair and Protection: Design/Builder's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

1.1 SUMMARY

A. Temporary Facilities:

1. Common-Use Field Office: Prefabricated or mobile units, including meeting room.
2. Storage and fabrication sheds.

B. Temporary Utilities:

1. Electric Power Service: Available from existing system without charge.
2. Water Service: Available from existing system without charge.
3. Storm Sewer Service: Available from existing system without charge.
4. Sanitary Facilities: Toilets, wash facilities, and drinking water. Owner's facilities are not available for use by construction personnel.
5. Heating and cooling facilities.
 - a. Provide temporary heating of existing building during construction as required to prevent existing fire sprinkler system from freezing.
6. Ventilation and humidity control.
7. Lighting, including exterior-yard site lighting.
8. Telephone Service: At each field office and superintendent's cell phone.
9. Electronic communication service including electronic mail and fax.

C. Support Facilities:

1. Traffic controls.
2. Parking: Coordinate with Owner.
3. Dewatering facilities and drains.
4. Temporary signs.
5. Waste disposal facilities.
6. Lifts and hoists.

D. Security and Protection Facilities:

1. Environmental protection.
2. Temporary erosion and sedimentation control.
3. Stormwater control.
4. Security enclosure and lockup.
5. Barricades, warning signs, and lights.
6. Temporary enclosures.
7. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to separate areas occupied by Owner from dust and fumes.
8. Temporary Fire Protection: Fire extinguishers.

**DIVISION OF WILDLIFE RESOURCES
GREAT BASIN RESEARCH CENTER
SEED WAREHOUSE EXPANSION
EPHRAIM, UTAH**

**DFCM
PROJECT NO.: 09023520**

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

1.1 SUMMARY

- A. Product delivery, storage, and handling.
- B. Requirements for products used on Project.
- C. Construction guarantees and warranties.
- D. Product substitutions.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces.

1.3 PRODUCT REQUIREMENTS

- A. Product Requirements: Comply with Owner's requirements and design criteria.

1.4 CONSTRUCTION GUARANTEES AND WARRANTIES

- A. Guarantees and Warranties: Comply with Owner's requirements and design criteria.

1.5 PRODUCT SUBSTITUTIONS

- A. Conditions:
 - 1. Offers Owner a substantial advantage in cost, time, energy conservation after deducting additional responsibilities Owner must assume.
 - 2. Does not require extensive revisions to the Contract Documents.
 - 3. Consistent with the Contract Documents and will produce indicated results.
 - 4. Fully documented and properly submitted.
 - 5. Will not adversely affect Design/Builder's Construction Schedule.
 - 6. Has received necessary approvals of authorities having jurisdiction.
 - 7. Compatible with other portions of the Work.
 - 8. Provides specified warranty.

END OF SECTION 016000

SECTION 017300 - EXECUTION

1.1 SUMMARY

- A. Construction layout.
- B. General installation of products.
- C. Progress cleaning.
- D. Starting and adjusting.
- E. Protection of installed construction.
- F. Correction of the Work.

1.2 EXECUTION

- A. Existing Conditions: Investigate and verify existence and location of site improvements, utilities, and other construction affecting the Work.
- B. Construction Layout: Work laid out by land surveyor registered in Utah, using accepted surveying practices; record log maintained.
- C. Installation: Manufacturer's written instructions for installing products.
- D. Owner-Installed Products: Design/Builder coordinates the Work with work performed by Owner's construction forces.
- E. Progress Cleaning: Project site and work areas cleaned daily. Burying or burning waste materials on-site not permitted.
 - 1. Landfill receipts for hazardous waste disposal.
- F. Starting and Adjusting: Equipment and operating components started, adjusted, and tested to confirm proper operation. Malfunctioning units replaced with new units.
- G. Protection of Installed Construction: Maintained until time of Substantial Completion.
- H. Correction of the Work: Defective construction repaired or replaced.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

1.1 SUMMARY

- A. Cutting and patching required by the following:
 - 1. Installation of other materials.
 - 2. Finishing.
 - 3. Alterations.
 - 4. Tests and inspections.

1.2 QUALITY ASSURANCE

- A. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching.

1.3 EXECUTION

- A. Temporary support of Work being cut.
- B. Existing Utility Services: Services/systems bypassed before cutting to prevent interruption to occupied adjacent buildings.
- C. Cutting: Using hand or small power tools.
- D. Patching: With seams that are as invisible as possible.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.1 SUMMARY

- A. Disposing of nonhazardous demolition and construction waste.

1.2 WASTE DISPOSAL

- A. General: Remove waste materials from Project site.
 - 1. Burning: Do not burn waste materials.
 - 2. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

1.1 SUMMARY

- A. Inspection procedures.
- B. Warranties.
- C. Final cleaning.

1.2 PROCEDURES

A. Substantial Completion: Before inspection:

1. Comply with Owner's requirements for Substantial Completion.
 - a. Substantial Completion Form: Owner's form.
2. List of incomplete items (punch list).
3. Owner advised of insurance changeover.
4. Warranties submitted.
5. Releases, occupancy permits, and operating certificates obtained.
6. Project Record Documents submitted.
7. Spare parts and extra materials delivered.
8. Final changeover of locks performed.
9. Startup testing completed.
10. Test/adjust/balance records submitted.
11. Temporary facilities removed.
12. Owner advised of utility changeover.
13. Final cleaning performed.
14. Touchup performed.

B. Final Completion: Before final inspection:

1. Comply with Owner's requirements for Final Completion.
2. Final Application for Payment submitted.
3. List of incomplete items (punch list) endorsed by Architect as completed.
4. Evidence of continuing insurance coverage, if any, submitted.
5. Owner's personnel instructed in operation, adjustment, and maintenance of equipment and systems, including demonstration and training videotapes submitted.

C. Warranties:

1. Organized and bound in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, with paper dividers.

- D. Final Cleaning: Each surface or unit cleaned to condition expected in an average commercial building cleaning and maintenance program.
 - 1. Clean ducts, blowers, and coils for units and similar items operated without filters during construction.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

1.1 SUMMARY

- A. Emergency, operation, and maintenance manuals.

1.2 PRODUCTS

- A. Manuals: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, minimum four copies.
- B. Emergency Manuals: Types of emergencies, emergency instructions, and emergency procedures.
- C. Operation Manuals: System and equipment descriptions, operating procedures, wiring diagrams, control diagrams and sequence of operation, and piped system diagrams.
- D. Product Maintenance Manuals: Source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds.
- E. System and Equipment Maintenance Manuals: Source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

1.1 SUMMARY

- A. Record Documents: Comply with Owner's requirements.
- B. Record modifications including addenda, change orders, and other modifications.

1.2 SUBMITTALS

- A. Record Documents: One set submitted to Owner at completion of project.

1.3 PRODUCTS

- A. Record Documents: Marked weekly to record changes and selections made during construction.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

1.1 SUMMARY

- A. Demonstration and training in operation and maintenance of operation of systems and equipment.
- B. Demonstration and training videotapes.

1.2 INSTRUCTION PROGRAM

- A. Program Structure: Training modules for each system and equipment not part of a system, including the following:
 - 1. Basis of system design, operational requirements, and criteria.
 - 2. Documentation.
 - 3. Emergencies.
 - 4. Operations.
 - 5. Adjustments.
 - 6. Troubleshooting.
 - 7. Maintenance.
 - 8. Repairs.
- B. Facilitator to prepare instruction program and training modules.

END OF SECTION 017900

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

1.1 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area.
- B. Hazardous Materials: Not expected.

1.2 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.3 EXECUTION

- A. Utility Services and Mechanical/Electrical Systems: Maintained to occupied facilities.
 - 1. Shut Off: By Owner.
- B. Site Access and Temporary Controls: Minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities
- C. Temporary Facilities:
 - 1. Temporary barricades to prevent injury to people.
 - 2. Temporary weather protection.
 - 3. Protection of existing finish work to remain.
 - 4. Protection of furnishings and equipment.
- D. Temporary shoring.
- E. Removed and Salvaged Items: Removed and delivered to location as directed by Owner.
- F. Removed and Reinstalled Items: Cleaned, repaired, crated, stored, and reinstalled.
- G. Existing Items to Remain: Existing construction protected against damage.
- H. Disposal of Demolished Items:
 - 1. Burning: Not permitted.
 - 2. Disposal: Legally off Owner's property.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

1.1 SUMMARY

- A. Cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.

1.2 QUALITY ASSURANCE

- A. Quality Standard: ACI 301.

1.3 MATERIALS

- A. Form-facing materials.
 - 1. Smooth-Formed Finished Concrete: Class 1 medium density overlay (MDO) panels, mill-release agent treated and edges sealed.
 - 2. Rough-Formed Finished Concrete: Plywood, metal, or other approved material.
- B. Steel Reinforcement:
 - 1. Reinforcing Bars: Deformed, ASTM A615 grade 60 typical, ASTM A706 at concrete shear wall jambs.
 - 2. Welded Wire Reinforcement: Plain.
- C. Concrete Materials:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray, supplemented with fly ash, 10% maximum.
 - 2. Silica fume.
 - 3. Aggregate: ASTM C33 Normal weight typical.
 - 4. Water.
 - 5. Admixtures: Air entraining; water reducing; retarding; water reducing and retarding, high range, water reducing, high range, water reducing and retarding, plasticizing and retarding. Admixtures shall comply with ASTM C260 for air entrained concrete.
- D. Vapor Retarders: Class A engineered film under all interior slabs on grade.
- E. Floor and Slab Treatments at Exposed Concrete Floors: Penetrating liquid curing, sealing, and hardening floor treatment.
- F. Related Materials: Expansion- and isolation-joint-filler strips.

G. Repair Materials: Overlayment.

1.4 CONCRETE MIXTURES

A. Minimum compressive Strength (28 Days):

1. Footings: 3000 psi.
2. Foundation Walls: 4000 psi.
3. Slabs-on-Grade: 4000 psi.

B. Mixing: Ready mixed.

1.5 INSTALLATION

A. Formed-Surface Finish: Rough-formed at unexposed surfaces. Smooth-formed at exposed surfaces.

B. Floor and Slab Finishes:

1. Trowel: Surfaces exposed to view.
2. Medium Broom: Exterior concrete platforms, steps, and ramps.

1.6 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

B. Inspections: By Owner-engaged special inspector.

END OF SECTION 033000

SECTION 055000 - METAL FABRICATIONS

1.1 SUMMARY

- A. Miscellaneous metal framing and supports.
- B. Loose metal plates and shapes.
- C. Anchor bolts.
- D. Miscellaneous fabricated metal items.

1.2 PRODUCTS

- A. Materials: Steel plates, shapes, and bars. Steel tubing and pipe.
- B. Exterior Locations: Galvanize metal fabrications at exterior locations.
- C. Miscellaneous Framing and Supports:
 - 1. Steel framing and supports for items including; overhead doors, mechanical and electrical equipment, applications where framing and supports are not specified in other Sections.
- D. Steel weld plates and angles not specified in other Sections, for casting into concrete.
- E. Metal Bollards: Schedule 40 galvanized steel pipe. Filled with concrete.
- F. Pipe guards.

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

1.1 SUMMARY

- A. Aluminum pipe railings.

1.2 FABRICATION

- A. Connections: Welded.

1.3 FINISHES

- A. Aluminum: Powder-coat finish.

END OF SECTION 055213

SECTION 072100 - THERMAL INSULATION

1.1 SUMMARY

A. Applications:

1. Perimeter insulation under slabs-on-grade.
2. Perimeter wall insulation (supporting backfill).

1.2 MATERIALS

A. Insulation:

1. Extruded-Polystyrene Board: Type IV, 1.60 lb/cu. ft..

END OF SECTION 072100

SECTION 079200 - JOINT SEALANTS

1.1 SUMMARY

- A. Exterior Joints in Vertical Surfaces include:
 - 1. Perimeter joints around frames of doors, windows, and louvers.
- B. Exterior Joints in Horizontal Traffic Surfaces include:
 - 1. Isolation and contraction joints in cast-in-place concrete slabs.
- C. Interior Joints in Vertical Surfaces include:
 - 1. Perimeter joints of exterior openings.
- D. Interior Joints in Horizontal Traffic Surfaces include:
 - 1. Isolation joints and contraction joints in cast-in-place concrete slabs. Fill all floor joints in new and existing building.

1.2 QUALITY ASSURANCE

- A. Preconstruction compatibility, adhesion, and stain testing.
- B. Product testing.
- C. Preconstruction field-adhesion and stain testing.
- D. Stain Test: ASTM C 1248.

1.3 WARRANTY

- A. Installer: Two years.
- B. Manufacturer: Two years.

1.4 MATERIALS

- A. Elastomeric Joint Sealants: Liquid applied, chemically curing; ASTM C 920, applied to joints listed above.
 - 1. Nonsag urethane sealants.
 - 2. Pourable urethane sealants.
- B. Joint-Sealant Backing: Cylindrical.

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EPHRAIM, UTAH**

**DFCM
PROJECT NO.: 09023520**

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

1.1 SUMMARY

- A. Standard hollow metal doors and frames.

1.2 QUALITY ASSURANCE

- A. Standard Hollow Metal Quality Standard: ANSI/SDI A250.8.

1.3 PRODUCTS

- A. Standard Hollow Metal Doors:

- 1. Design: Flush panel.
- 2. Exterior Doors: Metallic-coated steel sheet faces.
 - a. Level 2 and Physical Performance Level B (Heavy Duty).
 - b. Model: 1 (Full Flush).
 - c. Thermal-Rating: U-factor 0.125 minimum.

- B. Standard Hollow Metal Frames:

- 1. Exterior Frames: Metallic-coated steel sheet; full profile welded.
 - a. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

- C. Finishes: Factory priming for field painting.

END OF SECTION 081113

SECTION 087100 - DOOR HARDWARE

1.1 SUMMARY

- A. Commercial door hardware for swinging doors.
- B. Comply with Owner's requirements.

1.2 WARRANTY

- A. Materials and Workmanship: Three years.

1.3 PRODUCTS

- A. Standard: BHMA Grade 1.
- B. Hardware includes:
 - 1. Hinges.
 - 2. Mortise Locks.
 - 3. Cylinders.
 - 4. Removable Cores (including construction cores).
 - 5. Keys.
 - 6. Closers.
 - 7. Stops.
 - 8. Door Gasketing.
 - 9. Thresholds.
 - 10. Finishes.
- C. Hardware Finish: Match existing.
- D. Hardware Keying: Key hardware in accordance with Owner's instructions.

1.4 GENERAL DOOR HARDWARE (CONFIRM EXACT HARDWARE REQUIREMENTS WITH OWNER)

- A. Exterior Doors:
 - 1. Hinges.
 - 2. Entrance lock (mortise).
 - 3. Closer.
 - 4. Stop.
 - 5. Weatherstripping.
 - 6. Threshold.

END OF SECTION 087100

SECTION 099113 - EXTERIOR PAINTING

1.1 SUMMARY

- A. Surface preparation and the application of paint systems on exterior substrates.

1.2 QUALITY ASSURANCE

- A. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specification Manual."

1.3 EXTERIOR PAINTING SCHEDULE

- A. Galvanized-Metal Substrates:
 - 1. Water-based Light Industrial Coating (over a water-based primer):
MPI EXT 5.3J.
- B. MPI System Grade: Premium.
- C. System Gloss Level: 5 (semi-gloss).

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

1.1 SUMMARY

- A. Surface preparation and the application of paint systems on interior substrates.

1.2 QUALITY ASSURANCE

- A. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specification Manual."

1.3 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
 - 1. Latex System: MPI INT 5.2Q.
- B. Galvanized-Metal Substrates:
 - 1. Latex System: MPI INT 5.3J.

END OF SECTION 099123

SECTION 104416 - FIRE EXTINGUISHERS

1.1 QUALITY ASSURANCE

- A. Fire Extinguishers: NFPA 10.

1.2 PRODUCTS

- A. Portable, Hand-Carried Fire Extinguishers:

- 1. Multipurpose dry-chemical type, steel container.

- a. Rating: Minimum 4A-60BC, 10 lb.
- b. Finish: Baked enamel.

- B. Mounting Brackets: Steel with identification lettering.

END OF SECTION 104416

SECTION 105600 - METAL STORAGE SHELVING AND PALLET RACKS

1.1 SUMMARY

- A. Metal storage shelving.
- B. Metal pallet racks.

1.2 QUALITY ASSURANCE

- A. Storage Shelving: SMA and ANSI MH 28.1.

1.3 PRODUCTS.

A. Metal Storage Shelving:

1. Type: Heavy-duty.
2. Posts: Offset Angle, roll-formed, vertically adjustable by 1 inch increments.
3. Braces: Sway
4. Adjustable shelving: Fully, no obstructions allowed.
5. Shelf Clip: Compression type, 14 gauge, positive four point connection. All clips for all posts uniform. Zinc plated finish.
6. Finish: Baked high-grade enamel over cleaned and phosphatized parts.

B. Metal Pallet Racks:

1. Rack Post: Medium-duty with tempered keyhole slots at 2 inches o.c.
2. Rack Beam: Medium-duty with step-down design, approximately 102 inches length.
3. Material: Steel.
4. Frame Depth: approximately 42 inches.
5. Capacity: Minimum 6,500 lb. beam capacity.
6. Minimum Clearances:
 - a. Top of pallet to next beam above: 4 inches.
 - b. Top of pallet to next beam above (higher loading): 6 inches.
 - c. Top of uppermost load to ceiling above: 18 inches or code.
 - d. Between pallet and pallet: 4 inches
 - e. Between pallet and post: 4 inches.
 - f. Frame Spacing (back-to-back): 9 inches.
7. Frame Construction: Fully welded.
8. Accessories: Footplate, Front-to-Back Bars, Three-point safety catch with beam locking key, "C" brace support, "K" brace and heavy-duty cross channel reinforcement, and identification lettering.

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- a. Rigid Row Spacer: Bolted type.
 - b. Mounting Anchor: Galvanized steel.
-
- 9. Finishes:
 - 10. Steel: Baked enamel

END OF SECTION 105600

SECTION 133419 - METAL BUILDING SYSTEMS

1.1 QUALITY ASSURANCE

- A. Manufacturer: AISC-certified for Category MB.

1.2 WARRANTY

- A. Metal Panel Finishes: 20 years.

1.3 METAL BUILDING SYSTEMS

- A. Description:

1. Primary-Frame Type: Match existing configuration.
2. End-Wall Framing: Not expandable.
3. Secondary-Frame Type: Match existing wall girt/column framing configuration.
4. Eave Height: Match existing (approximately 18 ft - 6 in).
5. Bay Spacing: Match existing (approximately 24 ft.).
6. Interior Vertical Clearance: Match existing.
7. Roof Slope: Match existing (approximately 2:12).
8. Roof System: Match existing panels.
9. Exterior Wall System: Match existing panels.

1.4 METAL BUILDING SYSTEM PERFORMANCE

- A. Delegated Design: By a qualified professional engineer licensed in State of Utah.
- B. Structural Performance:
 1. Design Loads: As required including monorail hoist loads as indicated.
 2. Deflection Limits: Secondary framing to accommodate deflection of primary building structure.
 3. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

1.5 MANUFACTURERS

- A. Manufacturers as listed on DFCM's current "APPROVED FABRICATOR LIST".

1.6 COMPONENTS

A. Structural-Steel Framing:

1. Frame Configuration: Match existing.
2. Exterior Column Type: Match existing.
3. Rafter Type: Match existing.
4. Purlins: C- or Z-shaped sections.
5. Girts: C- or Z-shaped sections.
6. Canopy Framing: Match existing.

B. Metal Roof and Wall Panels:

1. Material: Zinc-coated (galvanized) steel.
2. Thickness: Match existing.
3. Finish: Siliconized polyester.
4. Color: Match existing.

C. Thermal Insulation: Faced, metal building (R-19).

1. Thermal Blocks: R-5 minimum

D. Doors and Frames: Refer to Division 08.

E. Accessories Include:

1. Flashing and trim.
2. Gutters.
3. Downspouts.
4. Louvers.
5. Roof curbs.
6. Pipe flashing.

1.7 SOURCE AND FIELD QUALITY CONTROL

A. Testing and Inspection: By Owner.

END OF SECTION 133419

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

1.1 QUALITY ASSURANCE

- A. Quality Standards: NFPA 13 and NFPA 70.

1.2 PIPING MATERIALS

- A. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2 and Smaller:

- 1. Standard-weight, black-steel pipe with threaded ends and uncoated, gray-iron fittings.

- B. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2-1/2 to NPS 4:

- 1. Standard-weight, black-steel pipe with threaded ends and uncoated, gray-iron fittings.
- 2. Standard-weight, black-steel pipe with cut- or roll-grooved ends and uncoated fittings.

1.3 SPRINKLER MATERIALS

- A. Sprinkler Types:

- 1. Rooms without Ceilings: Upright sprinklers.
- 2. Wall Mounting: Sidewall sprinklers.
- 3. Spaces Subject to Freezing: Pendent, dry sprinklers Sidewall, dry sprinklers.

- B. Sprinkler Finishes:

- 1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
- 2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
- 3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.

1.4 COVER SYSTEM FOR SPRINKLER PIPING

1.5 LISTED FIRE-PROTECTION VALVES

- A. Ball Valves:

- 1. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
- 2. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
- 3. Valves NPS 3: Ductile-iron body with grooved ends.

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- B. Bronze butterfly valves.
- C. Iron butterfly valves.
- D. Check valves.
- E. Bronze OS&Y gate valves.
- F. Iron OS&Y gate valves.
- G. NRS gate valves:

SECTION 211313

SECTION 230000 - GENERAL MECHANICAL REQUIREMENTS

PART I - 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 work of this section.
 - 1. Sections of other Divisions which relate to mechanical work apply to the work of this section. See various Sections on sitework, underfloor work, structural work, finish materials, etc.

1.2 SUMMARY: This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 230000. It expands and supplements the requirements of Division 010000.

- A. This Division does not define, nor is it limited by, trade jurisdictions. All work described herein is a part of the General Contract and is required of the Contractor regardless.

1.3 DESCRIPTION OF PROJECT: The mechanical work described in these mechanical specifications is for a project located in Ephraim, Utah. Design weather conditions are: 93° db, 60° wb, and winter -2°F. Altitude readings, unless otherwise noted, are for an elevation of 5,400 feet above sea level. Make adjustment to manufacturer's performance data as needed.

1.4 CODES AND PERMITS, AUTHORITIES HAVING JURISDICTION:

- A. Perform the mechanical work in strict accordance with the applicable provisions of the various codes ordinances and adoptions pertaining to the project location in effect on the date of invitation for bids.
- B. Secure and pay for permits necessary for the prosecution of the work under this contract.
- C. Reference Standards:

1.5 DEFINITION OF PLANS AND SPECIFICATIONS:

1.6 ROUGH-IN:

1.7 MECHANICAL INSTALLATIONS:

1.8 ACCESSIBILITY:

1.9 CHANGE ORDERS:

1.10 ALTERNATIVE CONSTRUCTION/SUBSTITUTION:

1.11 CUTTING AND PATCHING:

1.12 SUBMITTALS:

- A. Shop Drawings: Submit seven (7) copies of the descriptive literature covering all equipment and materials to be used in the installation of mechanical systems for

this project.

1.13 OPERATION AND MAINTENANCE TRAINING:

1.14 GUARANTEE/WARRANTY:

- A. "Contractor guarantees that this installation is in accordance with the terms of the Contract and is free from mechanical defects. He agrees to replace or repair, to the satisfaction of the Owner's Representative, any part of this installation which may fail or be determined unacceptable within a period of one (1) year after final acceptance. See also the General Conditions of these specifications. Failed equipment in the repair or replacement shall be guaranteed for one full year from the date of recommission."

1.15 TESTS AND CERTIFICATIONS:

1.16 PERMITS, FEES, LICENSES: Refer to General Conditions.

1.17 CEILING SPACE COORDINATION:

PART II - GENERAL MECHANICAL MATERIALS AND METHODS

2.1 QUALITY OF MATERIALS AND EQUIPMENT:

2.2 PROTECTION OF MATERIALS AND EQUIPMENT:

2.3 QUALIFICATIONS OF WORKMEN:

2.4 FOREMAN:

2.5 USE OF COMMON VENDORS:

2.6 ROOF/WALL/FLOOR PENETRATIONS - FLASHINGS:

2.7 EXCAVATING AND BACKFILLING (GENERAL) INSIDE WORK:

2.8 HANGERS AND SUPPORTS (GENERAL):

2.9 MANUFACTURER'S DIRECTIONS:

2.10 LUBRICATION

2.11 ELECTRICAL WIRING AND CONTROL: Coordination between mechanical and electrical

- A. FLUSHING AND DRAINING OF SYSTEMS/CLEANING OF PIPING AND DUCTS:

2.12 JOBSITE CLEANUP:

2.13 ARCHITECTURAL ACCESS DOORS:

END OF SECTION

SECTION 23 0060 - GENERAL PIPES AND FITTINGS

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

A. Types of pipes and pipe fittings specified in this section include the following:

1. Steel Piping
2. Copper Piping
3. Cast-Iron Soil Piping
4. Miscellaneous Piping Materials/Products.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:
- B. Installer's Qualifications:
- C. Welding Certification:

1.4 SUBMITTALS:

- A. Product Data:
- B. Welding Certifications:
- C. Brazing Certifications:
- D. Maintenance Data:

1.5 REFERENCES:

- A. Codes And Standards:
 1. Welding:
 2. Brazing:

1.6 DELIVERY, STORAGE, AND HANDLING:

PART II - PRODUCTS

2.1 GENERAL:

- A. Piping Materials:
- B. Pipe/Tube Fittings:

2.2 STEEL PIPES AND PIPE FITTINGS:

- A. Black Steel Pipe:
- B. Galvanized Steel Pipe:
- C. Galvanized Seamless Steel Pipe:
- D. Electric-Resistance-Welded Steel Pipe:
- E. Electric-Fusion-Welded Steel Pipe:
- F. Cast-Iron Flanged Fittings:
- G. Cast-Iron Threaded Fittings:

- H. Malleable-Iron Threaded Fittings:
- I. Unions:
- J. Dielectric Unions:
- K. Threaded Pipe Plugs:

- L. Steel Flanges/Fittings:
 - 1. Material Group:
 - 2. End Connections:
 - 3. Facings:
 - 4. Steel Pipe Flanges For Waterworks Service:

- M. Forged-Steel and Threaded Fittings:
- N. Forged Branch-Connection Fittings:
- O. Pipe Nipples:

2.3 COPPER TUBE AND FITTINGS:

- A. Copper Tube: ASTM B 88; Type K, L (wall thickness) as indicated for each service; hard-drawn temper, except as otherwise indicated. Do not use Type M.
- B. DWV Copper Tube: ASTM B 306.
- C. ACR Copper Tube: ASTM B 280.
- D. Cast-Copper Solder-Joint Fittings: ANSI B16.18.
- E. Wrought-Copper Solder-Joint Fittings: ANSI B16.22.
- F. Cast-Copper Solder-Joint Drainage Fittings: ANSI B16.23.
- G. Wrought-Copper Solder-Joint Drainage Fittings: ANSI B16.29.
- H. Cast-Copper Flared Tube Fittings: ANSI B16.26.
- I. Bronze Pipe Flanges/Fittings: ANSI B16.24.
- J. Copper-Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4 CAST-IRON SOIL PIPES AND PIPE FITTINGS:

- A. Hubless Cast-Iron Soil Pipe:
- B. Cast-Iron Hub-and-Spigot Soil Pipe:
- C. Hubless Cast-Iron Soil Pipe Fittings:
- D. Cast-Iron Hub-and-Spigot Soil Pipe Fittings:
- E. Compression Gaskets:

2.5 MISCELLANEOUS PIPING MATERIALS/PRODUCTS:

- A. Welding Materials:
- B. Soldering Materials:
 - 1. Tin-Antimony Solder:
 - 2. Silver-Lead Solder:

- C. Brazing Materials:
- D. Gaskets for Flanged Joints:
- E. Piping Connectors for Dissimilar Non-Pressure Pipe:
- F. Strainers:
 - 1. Y pattern,

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- \
- a. Iron Body, Screwed Ends 2" and Smaller:
 2. Basket pattern:

END OF SECTION 23 0060

SECTION 23 0100 - VALVES

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

1.3 QUALITY ASSURANCE:

- A. Manufacturer=s Qualifications:
- B. Valve Types:
- C. Valve Identification:

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings:
- C. Maintenance Data:

1.5 REFERENCES:

- A. Codes and Standards:
 - 1. MSS Compliance:
 - 2. ANSI Compliance:

PART II - PRODUCTS

2.1 VALVES:

- A. General
- B. Sizes:
- C. Operators:
- D. Connections:

2.2 VALVES:

- A. Ball Valves:
 - 1. Steel piping, 3" and Smaller:

END OF SECTION 23 0100

SECTION 23 0140 - MECHANICAL SUPPORTING DEVICES

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

A. Types of supports and anchors specified in this section include the following:

1. Horizontal-Piping Hangers and Supports.
2. Vertical-Piping Clamps.
3. Hanger-Rod Attachments.
4. Building Attachments and In-Beds.
5. Saddles and Shields.
6. Miscellaneous Materials.
7. Anchors.
8. Equipment Supports.

1.3 QUALITY ASSURANCE:

A. Manufacturer=s Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings:
- C. Maintenance Data:

1.5 REFERENCES:

A. Codes and Standards:

1. Code Compliance:
2. UL and FM Compliance:
3. MSS Standard Compliance:

PART II - PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS:

- A. General:
- B. Adjustable Steel Clevises Hangers:
- C. Steel Double Bolt Pipe Clamps:
- D. Steel Pipe Clamps:
- E. Pipe Hangers:
- F. Adjustable Swivel Pipe Rings:
- G. Adjustable Steel Band Hangers: MSS
- H. Adjustable Band Hangers:
- I. Adjustable Swivel Rings, Band Type
- J. Split Pipe Rings:
- K. Extension Split Pipe Clamps:
- L. U-Bolts:

- M. Clips:
- 2.2 VERTICAL-PIPING CLAMPS:
 - A. General:
 - B. Two-Bolt Riser Clamps:
- 2.3 HANGER-ROD ATTACHMENTS:
 - A. General:
- 2.4 BUILDING ATTACHMENTS AND IN-BEDS:
 - A. General:
 - B. Concrete Inserts:
 - C. Top Beam C-Clamp:
 - D. Side Beam or Channel Clamps:
 - E. Center Beam Clamps
 - F. C-Clamps:
 - G. Top Beam Clamps:
 - H. Side Beam Clamps:
 - I. Steel Beam Clamps with Eye Nut:
 - J. Linked Steel Clamps with Eye Nut:
 - K. Malleable Beam Clamps:
 - L. Steel Brackets:
 - M. Side Beam Brackets:
 - N. Plate Lugs:
 - O. Horizontal Travelers:
- 2.5 SADDLES AND SHIELDS:
 - A. General
 - B. Protection Saddles:
 - C. Protection Shields:
 - D. Thermal Hanger Shields:
 - E. Manufacturer;
- 2.6 MANUFACTURERS OF HANGERS AND SUPPORTS:
 - A. Manufacturer:
- 2.7 OUTSIDE AREAS:
- 2.8 MISCELLANEOUS MATERIALS:
 - A. Metal Framing:
 - B. Steel Plates, Shapes and Bars:

END OF SECTION 23 0140

SECTION 23 0190 - MECHANICAL IDENTIFICATION

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

PART II - GENERAL MECHANICAL MATERIALS AND METHODS

2.1 EQUIPMENT IDENTIFICATION:

A. Equipment:

2.2 PANEL IDENTIFICATION:

END OF SECTION 23 0190

SECTION 23 0195 - OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- 1.2 SUMMARY:
- 1.3 OPERATION AND MAINTENANCE MANUAL FOR MECHANICAL SYSTEMS:
 - A. General:
 - B. Purpose:

PART II - MATERIALS AND METHODS

- 2.1 PAGE SIZE:
- 2.2 DRAWINGS:
- 2.3 BINDERS:
- 2.4 CONTENTS AND INDEXING:

END OF SECTION 23 0195

SECTION 23 0250 - MECHANICAL INSULATION

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

1.3 QUALITY ASSURANCE:

- A. Manufacturer=s Qualifications:
- B. Installer=s Qualifications:
- C. Flame/Smoke Ratings:

1.4 SUBMITTALS:

- A. Product Data:
- B. Maintenance Data:

1.5 DELIVERY, STORAGE AND HANDLING:

PART II - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- 1. Manufacturer:

2.2 PIPING INSULATION MATERIALS:

- A. Preformed Fiberglass Piping Insulation:
- B. Flexible, Unicellular Pipe Insulation:
- C. Pipe Coating:
- D. Jackets for Piping Insulation:
- E. PVC Jacketing:
- F. Staples, Bands, Wires, and Cement:
- G. Adhesives, Sealers, and Protective Finishes:

END OF SECTION 23 0250

SECTION 23 0410 - WATER DISTRIBUTION PIPING AND EQUIPMENT

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

- A. Water Supply Systems:
 - 1. Domestic Water
 - 2. Rough-in and Connect
- B. Related Sections:

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:
- B. Installer's Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Record Drawings: See
- C. Operation and Maintenance Information:

1.5 REFERENCES:

- A. Codes and Standards: Comply with applicable sections, follow recommended practices.
 - 1. State Boiler and Pressure Vessel Regulations
 - 2. ASME Codes for Boilers and Pressure Vessels
 - 3. State and Local Plumbing Code
 - 4. State and Local Mechanical Code
 - 5. State and Local Building Code
 - 6. ASHRAE/ASPE Handbooks
 - 7. HI Compliance:
 - 8. UL Compliance:
 - 9. UL and NEMA Compliance:

1.6 DELIVERY, STORAGE, AND HANDLING:

1.7 SEQUENCING AND SCHEDULING:

PART II - PRODUCTS

2.1 PIPE AND FITTINGS:

- A. Domestic Water Pipe: (except below slab/grade)
 - 1. Pipe Sizes 4" and Smaller: Copper tubing.
- B. Domestic Water Pipe Below Slab/Grade:

1. Copper Tube: ASTM B 88 (ASTM B 88M), Type AK@, seamless water tube, annealed temper.

2.2 VALVES:

2.3 PIPING SPECIALTIES:

- A. Water Hammer Arresters:
- B. Backflow Preventers:
- C. Strainers:

2.4 HOSE CONNECTIONS:

- A. Hose Bibb:
- B. Non-Freeze Wall Hydrant:

END OF SECTION 23 0410

SECTION 23 0420 - DRAINAGE AND VENT SYSTEMS AND EQUIPMENT

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:
- B. Installer's Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Record Drawings:
- C. Operation And Maintenance Information:

1.5 REFERENCES:

- A. Codes and Standards:
 - 1. State Boiler and Pressure Vessel Regulations
 - 2. ASME Codes for Boilers and Pressure Vessels
 - 3. State and Local Plumbing Code
 - 4. State and Local Mechanical Code
 - 5. State and Local Building Code
 - 6. ASHRAE/ASPE Handbooks

1.6 SEQUENCING AND SCHEDULING:

PART II - PRODUCTS

2.1 WASTE, DRAIN AND VENT SYSTEMS:

- A. Sanitary Soil Drain, Waste and Vent Piping: (Below Grade)
 - 1. Piping: Hubless, Hub and Spigot
 - 2. Joints for Hubless Pipe:
- B. Sanitary Soil Drain, Waste and Vent Piping: (Above Grade Only)
 - 1. Piping: Hubless and Hub and Spigot.
 - 2. Joints for Hubless Pipe:
 - 3. Joints for Hub and Spigot Pipe:
 - 4. Above Grade Piping and Vent Lines
 - a. PVC Schedule 40 solid plastic pipe.
 - b. Fittings - PVC Schedule 40 solid wall plastic pipe fittings.

2.2 BUILDING STORM DRAINAGE SYSTEMS: (Water tight integrity is a must.)

2.3 EQUIPMENT AND SYSTEM VENTS AND DRAINS:

- A. Piping: Schedule 40 galvanized steel or Type K or L copper.
- B. Valves: Provide valves appropriate for duty.
- C. Installation Notes:

2.4 DRAINAGE PIPING SPECIALTIES:

- A. Vent Flashing and Termination:

END OF SECTION 23 0420

SECTION 23 0675 – REFRIGERATED WALK-IN COOLER SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

1.02 SUMMARY:

1.03 QUALITY ASSURANCE:

A. The work shall be performed in accordance with the latest versions of the following publications.

| Agency | Section | Section Title |
|--------|---------|--|
| ARI | 420 | Unit Coolers for Refrigeration. |
| | 460 | Remote Mechanical-Draft Air Cooled Refrigerant Condensers. |
| | 495 | Refrigerant Liquid Receivers. |
| | 520 | Positive Displacement Refrigerant Compressors, Compressor Units and Condensing Units. |
| ASHRAE | 23 | Rating Positive Displacement Condensing Units.. |
| | 15 | Safety Code for Mechanical Refrigeration. |
| | 90.1 | Energy Efficient Design of New Buildings. |
| ASME | VIII | Boiler and Pressure Vessel Code: Section VIII Pressure Vessels, Division I. |
| ASTM | A123 | Zinc (Hot DipGalvanized) Coatings on Iron and Steel Products. |
| | A153 | Zinc Coated (Hot Dip) on iron and Steel Hardware. |
| | A653 | Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process |
| | B117 | Operating Salt Spray (Fog) Apparatus. |
| | D2996 | Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe. |
| | E84 | Surface Burning Characteristics of Building Materials |
| NEMA | ICS 1 | Industrial Control and Systems |
| | ICS 2 | Industrial Controls and Systems Controllers, Contactors and Overload. |
| | ICS-3 | Factory Built Assemblies. |
| | ICS 4 | Terminal Blocks. |
| | ICS 6 | Industrial Control and Systems Enclosures. |
| | MG 1 | Motors and Generators. |
| NFPA | NFPA 70 | National Electrical Code |
| UL | UL 70 | Refrigerant-Containing Components and Accessories, Nonelectrical. |
| | | |
| | | |

B. Safety

- C. Pressure Vessels: ASME Constructed

1.04 SUBMITTALS:

- A. The refrigeration contractor shall prepare complete shop drawings:

PART II – PRODUCTS

2.01 WALK-IN COOLERS:

- A. General: Provide Walk-in coolers complete with the components listed below.
1. Casing Construction: Wall and roof sections to be framed of kiln dried firm texture grade #2 hemfir, clad with 26ga. galvanized steel. Panels shall be tongue and groove design with extruded foam gasket sealed with acrylic adhesives. Wall sections to have three horizontal wood headers for support of cooler accessories, coordinate required accessories with owner prior to submittal process and show header positions, and accessories on submittal drawings. Panel fasteners shall be cam lock style with steel housing and hook, and zinc die cast cam. Standard panel width shall be 2'0" to provide for cooler construction flexibility. Corners shall be one piece design with vertical coved interior radius for ease in cleaning. Exterior I-beams be protected by coating with rust resistant painted finish. Casing insulation shall be 3.5" thick 2.2 lb/in² foamed in place urethane with a minimum K factor of .12. Interior and exterior finish to be 26 ga. G90 hot dipped stucco galvanized steel.
 2. Doors and Hardware: Cooler doors to be constructed of 26 ga. steel of same finish as cooler. Door gaskets to be neoprene closed cell sponge. Sheath door jambs for in fitting cooler doors with 14 ga. galvanized steel. Door hinges to be heavy duty cam lift type. Door sweeps to be constructed of neoprene impregnated fabric and shall be fully adjustable. Provide 18"x36" diamond plate kick plates on both interior and exterior sides of the door.
 3. Floor: Floor to be constructed utilizing a layer of 3-1/2" urethane foam insulation covered with 3/4" exterior grade plywood, and finished with 20 ga. galvanized steel.
 4. Unit Cooler: Unit coolers shall be forced circulation type, factory fabricated, assembled and tested, and packaged in accordance with ARI 420. Unit casings to be constructed of embossed aluminum with an additive alternate for Type 300 Series stainless steel. Direct drive statically and dynamically balanced propeller fans. Coils shall have copper tubes and aluminum fins. Provide water-tight, corrosion resistant drain pans. Note that units installed in spaces above 35 degrees F shall be defrosted with ambient air.

5. Remote Refrigeration System: Refrigeration system shall be remote mounted and shall contain fully hermetic scroll compressor, condenser coil, direct driven condenser fan, refrigerant valves and filters, control wiring, gauges, and switches, refrigeration piping package between cooler case and remote refrigeration system.

END OF SECTION 23 0675

SECTION 23 0885 - AIR FILTERS

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

- A. Air Filters.
 - 1. Extended surface self-supporting.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for filter rack assemblies indicating dimensions, materials, and methods of assembly of components.
- C. Maintenance Data:

1.5 REFERENCES:

- A. Codes and Standards:
 - 1. UL Compliance:
 - 2. ASHRAE Compliance:
 - 3. ARI Compliance:

PART II - PRODUCTS

2.0 AIR FILTERS:

- A. Manufacturers:
 - 1. Type 1: 1" for intake louver.
- B. Startup Set:

END OF SECTION 23 0885

SECTION 23 0890 - DUCTWORK

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

A. Types of ductwork required for the project include the following:

1. Round
2. Rectangular
3. Underground
4. Factory duct

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:
- B. Installer's Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings:
- C. Record Drawings:
- D. Maintenance Data:

1.5 REFERENCES:

- A. Codes and Standards:
 1. SMACNA Standards:
 2. ASHRAE Standards:
 3. NFPA Compliance:
 4. International Building Code/Uniform Mechanical Code:
- B. Field Reference Manual:

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Protection:
- B. Storage:

PART II - PRODUCTS

2.1 DUCTWORK - GENERAL:

- A. Standards: SMACNA Standards
- B. Sheet Metal:
- C. Exposed Ductwork Materials:

2.2 FITTINGS AND FABRICATION:

2.3 DUCT PRESSURE CLASSIFICATIONS:

- A. For all constant volume low pressure furnace systems:
 - 1. Rectangular supply air and return air ductwork: Low pressure rectangular ductwork, 3" w.g.
 - 2. Branch round supply air ductwork runout from rectangular ductwork to diffuser: Low pressure round ductwork, 1" w.g.
 - B. Low pressure exhaust ductwork systems, which include but are not necessarily limited to ceiling exhaust fan systems:
 - 1. Low pressure rectangular ductwork, 3" w.g.
- 2.4 LOW PRESSURE ROUND DUCTWORK: (1" SMACNA Pressure Class)
- A. 26 gauge galvanized steel sheets with snap-lock longitudinal seams and crimped and beaded joints.
- 2.5 LOW PRESSURE RECTANGULAR DUCTWORK: (3" SMACNA Pressure Class)
- A. Rectangular ductwork for use on supply systems up to 2" maximum duct static pressure and 2000 fpm maximum duct velocity shall be constructed of galvanized steel using construction for nominal 3" SMACNA rated systems. Seal all transverse and longitudinal joints with water based duct sealer.
 - B. Use radiused elbows, or square elbows with single blade turning vanes where space restrictions prohibit radiused elbows. Use 45° tapping takeoffs with downstream balance damper.
 - C. Duct dimensions are inside clear. Increase for acoustical lining.
 - D. For rectangular exhaust ducts, increase metal gauge by 2 (i.e. 20 to 18) for all sizes. Seal all joints.
- 2.6 FACTORY DUCT: (Flex Duct 3'-0" maximum length)
- A. Non-insulated: Wiremold 57; Flexmaster Type N145
 - B. Insulated: Flexmaster Type 4; Thermaflex M-KC
- 2.7 MISCELLANEOUS DUCTWORK MATERIALS:
- A. General:
 - B. Runout Fittings:
 - C. Duct Sealing Compound:
 - D. Acoustical Lining:
 - E. Duct Liner Adhesive:
 - F. Duct Liner Fasteners:
 - G. Ductwork Support Materials:

END OF SECTION 23 0890

SECTION 23 0910 - DUCTWORK ACCESSORIES

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

A. Types of ductwork accessories required for project include the following:

1. Dampers.
2. Low pressure manual dampers.
3. Outside air control dampers.
4. Backdraft damper.
5. Turning vanes.
6. Duct hardware.
7. Duct access doors.
8. Flexible connections.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings:
- C. Maintenance Data:

1.5 REFERENCES:

A. Codes and Standards:

1. SMACNA Compliance:
2. Industry Standards:
3. UL Compliance:
4. NFPA Compliance:

1.6 DELIVERY, STORAGE AND HANDLING:

- A. PROTECTION:
- B. STORAGE:

PART II - PRODUCTS

2.1 DAMPERS:

- A. Control dampers
- B. Balance Dampers

2.2 TURNING VANES:

2.3 DUCT HARDWARE:

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A. General:

1. Quadrant Locks:
2. Remote Quadrant Lock:

B. Manufacturer:

2.4 DUCT ACCESS DOORS

2.5 FLEXIBLE CONNECTIONS:

END OF SECTION 23 0910

SECTION 23 0940 - AIR OUTLETS AND INLETS

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 SUMMARY:

A. Types of outlets and inlets required for project include the following:

1. Ceiling air diffusers and grilles.
2. Wall registers and grilles.
3. Louvers.
4. Exhaust roof caps.
5. Floor air diffusers and grilles.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications:

1. Installer's Qualifications:

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings:
- C. Maintenance Data:

1.5 REFERENCES:

A. Codes and Standards:

1. ARI Compliance:
2. ASHRAE Compliance:
3. AMCA Compliance:
4. AMCA Seal:
5. NFPA Compliance:

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

PART II - PRODUCTS

2.1 GRILLES AND DIFFUSERS:

- A. General:
- B. Performance:
- C. Ceiling Compatibility:
- D. Types:
- E. Grilles and Diffusers:

1. Ceiling Supply Diffuser:
2. Sidewall Supply Register:
3. Perforated Return Register:
4. Sidewall Return Register:

5. Eggcrate Exhaust Register:

2.2 LOUVERS:

- A. Extent of Work:
- B. Material: Construction to match building construction.

2.3 EXHAUST ROOF CAPS:

END OF SECTION 23 0940

SECTION 23 0955 - MECHANICAL CONTROL SYSTEMS

PART I - GENERAL

1.1 RELATED DOCUMENTS:

1.2 DESCRIPTION OF WORK:

- A. Exhaust Fan
- B. Warehouse Ventilation
- C. Gas Unit Heaters

1.3 QUALITY ASSURANCE:

- A. Manufacturer=s Qualifications:
- B. Codes and Standards:
 - 1. Electrical Standards:
 - 2. NEMA Compliance:
 - 3. NFPA Compliance:
 - 4. "National Electric Code"

1.4 SUBMITTALS:

- A. Product Data:
- B. Shop Drawings:
- C. Samples:
- D. Maintenance Data:

1.5 DELIVERY, STORAGE, AND HANDLING

1.6 INSTRUCTION OF OWNER'S PERSONNEL:

1.7 WARRANTIES:

1.8 CLEANING AND LUBRICATION:

1.9 TESTING AND ADJUSTING OF SYSTEM:

PART II - PRODUCTS

2.1 CONTROL CABINETS

2.2 THERMOSTAT: (Warehouse Ventilation) (Unit Heaters)

- A. Programmable low voltage electric type

2.3 SUB-BASE: (Furnace Systems)

- A. 'Fan selector switch' with ON-AUTO modes for each fan system.
- 2.4 SENSOR: (Furnace Systems)
- 2.5 SENSOR GUARDS:
- 2.6 TRANSFORMER:
- 2.7 DAMPER ACTUATORS:
- 2.8 CONDUCTORS:
- 2.9 AUXILIARY RELAYS:

END OF SECTION 23 0955

SECTION 237433 - PACKAGED, OUTDOOR, HEATING AND COOLING MAKEUP AIR-CONDITIONERS

1.1 SUMMARY

- A. Cooling-only and heating rooftop replacement-air units.

1.2 WARRANTY

- A. Materials and Workmanship for Heat Exchangers: Five years.

1.3 MANUFACTURED UNITS

- A. Cabinet: Single-wall construction.

- 1. Exterior Casing: Galvanized steel.
- 2. Interior Casing: Galvanized steel.
- 3. Base Rails: Galvanized steel.
- 4. Internal Insulation: Duct lining, 1 inch thick.
- 5. Condensate Drain Pans: Stainless steel.
- 6. Roof Curb: 16 inches high.

- B. Supply-Air Fan: Forward-curved centrifugal, coated steel.

- 1. Motor: Totally enclosed, single speed.
- 2. V-belt drive.
- 3. Isolators: Restrained, type.

- C. Indirect-Fired Gas Furnace: Factory assembled, piped, and wired; aluminized steel with stainless-steel insert burners; natural gas; and electronically controlled electric spark with flame sensor and the following:

- 1. High-Altitude Model: For Project elevations more than 2000 feet above sea level.
- 2. Stainless-steel heat-exchanger drain pan.
- 3. Power vent.
- 4. Safety Controls:
 - a. Electronic-modulating gas control valve.
 - b. Gas train.

- D. Accessories:

- 1. Outdoor-air intake and dampers.
- 2. Filters: Disposable.

1.4 INSTALLATION

- A. Mounting: Rooftop replacement-air unit manufacturer's roof curb on roof structure.

END OF SECTION 237433

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

1.1 SUMMARY

- A. Electrical equipment coordination, sleeves and sleeve seals for raceways and cables, and common electrical installation requirements.

1.2 MATERIALS

- A. Sleeves for Raceways and Cables:

- 1. Steel pipe sleeves.
- 2. Cast-iron pipe sleeves.
- 3. Sleeves for rectangular openings.

- B. Sleeve Seals: Modular sealing devices with EPDM sealing elements, carbon-steel pressure plates, and carbon-steel connecting bolts and nuts.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

1.1 SUMMARY

- A. Building wires, cables, connectors, splices, and terminations for wiring systems rated 600 V and less; and sleeves and sleeve seals for cables.

1.2 QUALITY ASSURANCE

- A. Quality Standard: NFPA 70.

1.3 MATERIALS

- A. Conductors and Cables:
 - 1. Conductors: Copper.
 - 2. Conductor Insulation: Types THHN-THWN.
- B. Connectors and Splices: Factory fabricated.

1.4 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

1.5 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- F. Class 1 Control Circuits: Type THHN-THWN, in raceway.

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- G. Class 2 Control Circuits: Type THHN-THWN, in raceway.

1.6 FIELD QUALITY CONTROL

- A. Testing: By Contractor.
- B. Infrared Scanning: For each splice in cables and conductors No. 3 AWG and larger.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1.1 QUALITY ASSURANCE

- A. Quality Standard for Grounding Materials and Equipment: UL 467.

1.2 PRODUCTS

- A. Insulated Conductors: Copper wire or cable.
- B. Bare Copper Conductors:
 - 1. Solid conductors.
 - 2. Stranded conductors.
 - 3. Tinned conductors.
 - 4. Stranded bonding conductors.
 - 5. Copper tape, braided bonding jumpers.
 - 6. Tinned-copper tape, braided bonding jumpers.
- C. Connectors: Bolted and exothermic-welded type.
- D. Grounding Electrodes:
 - 1. Ground Rods: Copper-clad steel.

1.3 FIELD QUALITY CONTROL

- A. Ground-Resistance Testing: By Contractor.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1.1 PERFORMANCE REQUIREMENTS

- A. Rated Strength: Minimum structural safety factor of five times the applied force.

1.2 PRODUCTS

- A. Support, Anchorage, and Attachment Components:
 - 1. Steel slotted support systems with metallic coatings.
 - 2. Raceway and cable supports.
 - 3. Steel conduit and cable hangers, clamps, and associated accessories.
 - 4. Support for non-armored conductors and cables in vertical conduit risers.
 - 5. Structural steel for fabricated supports and restraints.
 - 6. Mounting, Anchoring, and Attachment Components:
 - a. Powder-actuated fasteners.
 - b. Mechanical-expansion anchors.
 - c. Concrete inserts.
 - d. Clamps for attachment to steel structural elements.
 - e. All steel, springhead toggle bolts.
 - f. Threaded hanger rods.
- B. Fabricated Metal Equipment Support Assemblies: Welded or bolted steel shapes.
- C. Concrete Bases: 1T3000-psi (20.7-MPa), 28-day compressive-strength concrete.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

1.1 SUMMARY

- A. Raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 MATERIALS

- A. Metal Conduit and Tubing:
 - 1. Conduit: Rigid steel PVC-coated steel.
 - 2. IMC.
 - 3. EMT.
 - 4. FMC: Zinc-coated steel.
 - 5. LFMC.
- B. Nonmetallic Conduit and Tubing: ENT.
- C. Metal Wireways: Sheet metal, NEMA Type 3R.
 - 1. Wireway Covers: Hinged type.
- D. Surface Raceways: Metal, galvanized steel.
- E. Boxes, Enclosures, and Cabinets:
 - 1. Outlet and Device Boxes: Cast metal.
 - 2. Pull and Junction Boxes: Cast metal.
 - 3. Cabinets: Galvanized steel.

1.3 INSTALLATION

- A. Raceway Applications:
 - 1. Outdoors:
 - a. Exposed: Rigid steel.
 - b. Concealed, Aboveground: EMT.
 - c. Underground: RNC, Type EPC-40-PVC, direct buried.
 - d. Connection to Vibrating Equipment: LFMC.
 - e. Boxes and Enclosures, Aboveground: NEMA Type 3R.
 - 2. Indoors:
 - a. Exposed: EMT.
 - b. Exposed and Subject to Severe Damage: Rigid steel.
 - c. Concealed: EMT.

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- d. Connection to Vibrating Equipment: FMC, except LFMC in damp or wet locations.
- e. Damp or Wet Locations: Rigid steel.
- f. Boxes and Enclosures: NEMA Type 1, except Type 4 in damp or wet locations.

END OF SECTION 260533

SECTION 260548 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

1.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: Coordinate with site conditions
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: Coordinate with Structural.
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: Coordinate with Structural.
 - c. Component Amplification Factor: Coordinate with Structural.
3. Design Spectral Response Acceleration at Short Periods (0.2 Second): Coordinate with Structural.
4. Design Spectral Response Acceleration at 1.0-Second Period: Coordinate with Structural.

1.2 PRODUCTS

A. Seismic-Restraint Devices:

1. Channel support systems.
2. Galvanized restraint cables.
3. Steel tube or steel slotted-support-system sleeve with internally bolted connections hanger rod stiffeners.
4. Bushings for floor-mounted equipment anchors.
5. Bushing assemblies for wall-mounted equipment anchorage.
6. Resilient isolation washers and bushings.
7. Mechanical anchors.
8. Adhesive anchors.

B. Factory Finishes: Standard.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 260548

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

1.1 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.

1.2 PRODUCTS

- A. Power Raceway Identification: Self-adhesive vinyl labels.
- B. Power and Control Cable Identification: Self-adhesive vinyl labels.
- C. Conductor Identification: Color-coding conductor tape.
- D. Floor Marking Tape: Pressure-sensitive vinyl tape.
- E. Underground-Line Warning Tape: Detectable three-layer laminate.
- F. Warning Labels and Signs: Metal-backed, butyrate warning signs.
- G. Instruction Signs: Engraved, laminated acrylic or melamine plastic.
- H. Equipment Identification Labels: Engraved, laminated acrylic or melamine plastic.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

1.1 PRODUCTS

- A. Time Switches: Electronic, solid-state programmable units, with 4 channels.
- B. Outdoor Photoelectric Switches: Solid state, with dry contacts, 15-second time delay, and metal-oxide varistor surge protection.
- C. Indoor Occupancy Sensors: Dual-technology type, solid-state units with separate, externally mounted relay unit.
- D. Lighting Contactors: Electrically operated and mechanically held, with fusible switch.
- E. Emergency Shunt Relay: Normally closed, electrically held, arranged for wiring in parallel with manual switching contacts.
- F. Control Cables:
 - 1. Power Cables: Not smaller than No. 12 AWG.
 - 2. Classes 2 and 3 Control Cables: Stranded-copper conductors, not smaller than No. 18 AWG.
 - 3. Class 1 Control Cables: Stranded-copper conductors, not smaller than No. 14 AWG.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

1.1 QUALITY ASSURANCE

- A. Quality Standards: NEMA PB 1 and NFPA 70.

1.2 PRODUCTS

A. General Requirements for Panelboards:

1. Constructed to withstand seismic forces.
2. Enclosures: Surface mounted.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - d. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 - e. Front: Hinged cover.
 - f. Optional Enclosure Features: Skirt for surface-mounted panelboards.
 - g. Directory card.
3. Incoming Mains Location: Top and bottom.
4. Phase, Neutral, and Ground Buses: Copper.
5. Conductor Connectors: Mechanical-type main and neutral lugs.
 - a. Optional Features: Mechanical-type sub-feed lugs.
6. Service equipment label for panelboards incorporating one or more main service disconnecting and overcurrent protective devices.
7. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

B. Distribution Panelboards:

1. Mains: Circuit breaker.
2. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

C. Lighting and Appliance Branch-Circuit Panelboards:

1. Mains: Circuit breaker or lugs only.
2. Branch Overcurrent Protective Devices: Bolt-on circuit-breaker type.

D. Disconnecting and Overcurrent Protective Devices:

1. Molded-Case Circuit Breaker: Interrupting capacity to meet available fault currents.

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- a. Circuit Breakers: Thermal-magnetic types.
- b. Features and Accessories:
 - 1) Lugs: Mechanical style.
 - 2) Appropriate for Application: Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

2. Fused Switch: NEMA KS 1, Type HD.

- a. Auxiliary contacts.

1.3 FIELD QUALITY CONTROL

- A. Testing: By Contractor.
- B. Tests: Infrared scanning.

1.4 ADJUSTING

- A. Load balancing.

END OF SECTION 262416

SECTION 262713 - ELECTRICITY METERING

1.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Utility-company-compliant current-transformer cabinets.
- B. Meter sockets: Provide as coordinated with Utility provider.

END OF SECTION 262713

SECTION 262726 - WIRING DEVICES

1.1 PRODUCTS

- A. Receptacles: Duplex, 125 V, 20 A.
 - 1. Straight Blade.
 - 2. GFCI: Non-feed through.
 - 3. Hazardous (classified) location receptacles.
 - 4. Twist-locking type.
- B. Pendant cord-connector devices.
- C. Cord and plug sets.
- D. Snap Switches: 120/277 V, 20 A.
 - 1. Pilot light switches.
 - 2. Key-operated switches.
 - 3. Single-pole, double-throw, momentary contact, center-off switches.
 - 4. Key-operated, single-pole, double-throw, momentary contact, center-off switches.
- E. Wall Plates:
 - 1. Material for Finished Spaces: Satin-finished stainless steel.
 - 2. Material for Unfinished Spaces: Galvanized steel.
 - 3. Material for Damp and Wet Locations: Cast aluminum.
- F. Finishes:
 - 1. Connected to Normal Power System: White.

END OF SECTION 262726

SECTION 262813 - FUSES

1.1 QUALITY ASSURANCE

- A. Quality Standards: NEMA FU 1 for cartridge.

1.2 PRODUCTS

- A. Cartridge Fuses: Nonrenewable.
- B. Plug Fuses: Nonrenewable.
- C. Plug-Fuse Adapters: For using Type S, rejection-base plug fuses in Edison-base fuseholders or sockets.
- D. Spare-Fuse Cabinet: Wall-mounted steel unit with fuse pullers for each size of fuse.

1.3 FUSE APPLICATIONS

- A. Cartridge Fuses:
 - 1. Motor Branch Circuits: Class RK5, time delay.
 - 2. Other Branch Circuits: Class RK5, time delay.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

1.1 PRODUCTS

A. Fusible Switches:

1. Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, Type HD.
2. Accessories:
 - a. Equipment ground kit.
 - b. Neutral kit.
 - c. Class R fuse kit.
 - d. Hookstick handle.
 - e. Lugs: Mechanical.

B. Nonfusible Switches:

1. Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, Type HD.
2. Accessories:
 - a. Equipment ground kit.
 - b. Neutral kit.
 - c. Lugs: Mechanical.
 - d. Accessory control power.

C. Enclosures:

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

1.2 FIELD QUALITY CONTROL

- A. Testing: By Contractor.
- B. Tests: Infrared scanning.

1.3 Adjusting

- A. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION 262816

SECTION 265100 - INTERIOR LIGHTING

1.1 QUALITY ASSURANCE

- A. Quality Standard for Fixtures in Hazardous Locations: FM Global.
- B. Quality Standard for Emergency Fluorescent Power Units: UL 924.
- C. Mockups.

1.2 WARRANTY

- A. Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years.

1.3 PRODUCTS

- A. Ballasts for Linear Fluorescent Lamps:
 - 1. General Requirements for Electronic Ballasts:
 - a. Sound Rating: Class A.
 - b. Total Harmonic Distortion Rating: Less than 10 percent.
 - c. Transient Voltage Protection: Category A or better.
 - d. Lamp Current Crest Factor: 1.7 or less.
 - e. BF: 0.88 or higher.
 - f. Power Factor: 0.95 or higher.
 - g. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
 - 2. Electronic Programmed-Start Ballasts for T5, T8, and T5HO Lamps:
 - a. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
 - b. Automatic lamp starting after lamp replacement.
- B. Ballasts for Compact Fluorescent Lamps: Electronic.
 - 1. Lamp end-of-life detection and shutdown circuit.
 - 2. Automatic lamp starting after lamp replacement.
 - 3. Sound Rating: Class A.
 - 4. Total Harmonic Distortion Rating: Less than 20 percent.
 - 5. Transient Voltage Protection: Category A or better.
 - 6. Operating Frequency: 20 kHz or higher.
 - 7. Lamp Current Crest Factor: 1.7 or less.
 - 8. BF: 0.95 or higher.
- C. Emergency Fluorescent Power Units:

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1. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast; emergency connector operates one fluorescent lamp(s) continuously at an output of 1100 minimum lumens each.
 2. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture.
- D. Ballasts for HID Lamps:
1. Electronic Type for Metal-Halide Lamps:
- E. Exit Signs: Internally lighted.
1. Lamps for AC Operations: 50,000-hour light-emitting diodes.
 2. Self-Powered Exit Signs (Battery Type): Sealed, maintenance-free, nickel-cadmium battery with fully automatic, solid-state charger with sealed transfer relay, integral self-test.
- F. Fluorescent Lamps:
1. T8 programmed rapid-start lamps, rated 32 W maximum.
 2. T5 rapid-start lamps, rated 28 W maximum.
 3. T5HO rapid-start lamps, rated 54 W maximum.
 4. Compact Fluorescent Lamps: T4 double tube, rated W.
- G. HID Lamps:
1. High-pressure sodium lamps.
 2. Metal-halide lamps.
 3. Pulse-start, metal-halide lamps.
 4. Ceramic, pulse-start, metal-halide lamps.
- H. Lighting fixture support components.

END OF SECTION 265100

SECTION 312000 - EARTH MOVING

1.1 SUMMARY

- A. Preparing subgrades for foundations, slabs-on-grade, walks, and pavements.
- B. Dewatering to protect excavated subgrades.
- C. Excavating and backfilling or filling for buildings and structures, including footings and foundations, and mechanical or electrical utility structures.
- D. Excavating and backfilling for utility trenches.
- E. Excavation: Unclassified.
- F. Grading.
- G. Subbase course for concrete walks and pavements.
- H. Subbase and base course for hot-mix asphalt pavement.
- I. Drainage course for cast-in-place concrete slabs-on-grade.

1.2 MATERIALS

- A. Soil Materials (unless indicated otherwise in geotechnical report):
 - 1. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GM, GP-GM, GW-GM, SM, SW.
 - 2. Unsatisfactory Soils: ASTM D 2487 soil classification groups SC, SP, GP, CL, CH, PT, OH, OL, ML, MH.
 - 3. Backfill and Fill: Satisfactory soil materials.
 - 4. Subbase and Base Course: Natural or crushed gravel, crushed stone, and natural or crushed sand.
 - 5. Engineered Fill: Natural or crushed gravel, crushed stone, and natural or crushed sand.
 - 6. Bedding Course: Natural or crushed gravel, crushed stone, and natural or crushed sand.
 - 7. Drainage Course: Crushed stone, or crushed or uncrushed gravel.
 - 8. Impervious Layer: Material as required to prevent surface water from reaching building footings. Locate approximately 2 ft. below surface and extend out from the building minimum 10 ft.
- B. Geotechnical Investigation Report: Comply with requirements in report.

1.3 EXCAVATION

- A. Explosives: Not permitted.
- B. Disposal of Surplus and Waste Materials: Legally off Owner's property.

1.4 FIELD QUALITY CONTROL

- A. Geotechnical Testing Agency: Owner engaged.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

1.1 SUMMARY

- A. Hot-mix asphalt paving.
- B. Pavement-marking paint.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with UDOT requirements, and the DFCM Design Requirements section of the Design Manual.

1.3 MATERIALS

A. Asphalt Materials:

- 1. Asphalt Binder: AASHTO M 320.
- 2. Asphalt Cement: ASTM D3381; viscosity AC 10 for moderate climates.
- 3. Prime Coat: Medium-curing cutback asphalt.
- 4. Tack Coat: Emulsified asphalt or cationic emulsified asphalt.

B. Auxiliary Materials:

- 1. Pavement-Marking Paint: State of Utah #780.
- 2. Wheel Stops: Precast concrete with galvanized-steel dowels.

C. Asphalt Mixes:

- 1. Untreated Base Course: 1-inch gradation complying with DFCM requirements.

| Untreated Base Course | |
|-----------------------|--------------------------|
| Size | % by Weight Paving Sieve |
| 1" | 100 |
| ½ " | 70 to 100 |
| #4 | 41 to 68 |
| #16 | 21 to 41 |
| #50 | 10 to 27 |
| #200 | 4 to 13 |

2. Surface Course (asphalt): 1/2-inch gradation complying with DFCM requirements.

| Surface Course (asphalt) | |
|---------------------------------|---------------------------------|
| Size | % by Weight Paving Sieve |
| 1/2 " | 100 |
| 3/8 " | 70 to 100 |
| #4 | 50 to 78 |
| #16 | 30 to 48 |
| #50 | 18 to 31 |
| #200 | 7 to 13 |

1.4 INSTALLATION

A. Hot-Mix Asphalt Paving:

1. Proof-roll subgrade at locations receiving full-depth asphalt pavement.
2. Base Course: 8 inches complying with DFCM requirements.
3. Surface Course: As recommended in geotechnical report, and complying with DFCM requirements, but not less than 3 inches (parking), or 4 inches (roadways)

1.5 FIELD QUALITY CONTROL

A. Testing: By owner.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

1.1 SUMMARY

- A. Curbs and gutters.
- B. Walkways.

1.2 QUALITY ASSURANCE

- A. Design mixture for concrete.
- B. Quality Standard: ACI 301, "Specification for Structural Concrete."

1.3 MATERIALS

- A. Reinforcement:
 - 1. Reinforcing Bars and Tie Bars: Deformed steel.
- B. Concrete:
 - 1. Portland Cement: ASTM C 150.
 - 2. Aggregate: Normal-weight aggregate.
 - 3. Admixture: Air entraining.
 - 4. Compressive Strength: 4000 psi at 28 days for non-traffic loaded concrete, 5000 psi at 28 days for traffic loaded concrete pavement.
- C. Membrane-Forming Curing Compound: ASTM C309, Type I, liquid membrane.
- D. Related Materials:
 - 1. Expansion- and Isolation-Joint-Filler Strips: Cellulosic fiber.

1.4 FINISHING

- A. Finishes: Medium-textured broom finish.

1.5 FIELD QUALITY CONTROL

- A. Testing: By Owner-engaged agency.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

1.1 SUMMARY

- A. Expansion and contraction joints within cement concrete pavement.
- B. Joints between cement concrete and asphalt pavement.

1.2 QUALITY ASSURANCE

- A. Preconstruction compatibility and adhesion testing.
- B. Product testing.

1.3 MATERIALS

- A. Cold-Applied Joint Sealants:
 - 1. Type SL Silicone Sealant for Concrete and Asphalt: Multi-component, self-leveling formulation.
- B. Joint-Sealant Backer Materials: Round backer rods.

END OF SECTION 321373

SECTION 412223 - MONORAIL HOIST

1.1 SUMMARY

- A. Motor operated monorail hoist with manual trolley.

1.2 QUALITY ASSURANCE

- A. Quality Standard: Hoist Manufacturer's Institute (HMI).
- B. Supplier to design, engineer, and fabricate monorail hoist and monorail runway beam to withstand specified loads.

1.3 PRODUCTS

- A. Monorail Runway Beam: Steel beam provided by hoist supplier. Beam engineered for 2 hoists running on beam at same time at any point or points.
- B. Hoist: Electric motor operated with bottom running manual trolley.
 - 1. Lift capacity for each hoist: 2 tons.
 - 2. Chain and latch-hook.
 - 3. Quantity: 2.

END OF SECTION 412223

B. Geotechnical- 2003

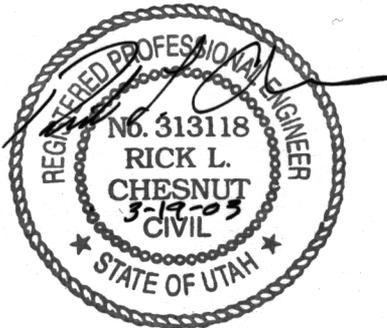
GEOTECHNICAL ENGINEERING REPORT

DIVISION OF WILDLIFE RESOURCES SEED BUILDING
500 WEST CENTER STREET
EPHRAIM, UTAH

Terracon Project No. 61035005
March 19, 2003

Prepared for:

DFCM
Salt Lake City, Utah



Prepared by:

TERRACON
12217 South Lone Peak Pkwy., Suite 100
Draper, Utah



12217 South Lone Peak Parkway, Suite 100
Draper, Utah 84020
(801) 545-8500 Fax: (801) 545-8600

March 19, 2003

DFCM
4110 State Office Building
Salt Lake City, UT 84114-1201

Attn: Mr. Dave McKay
Program Director

**Re: Geotechnical Engineering Report
Proposed Division of Wildlife Resources Seed Building
Ephraim, Utah
Terracon Project No. 61035005**

Gentlemen:

At your request, Terracon has performed a geotechnical exploration at the site of the proposed Division of Wildlife Resources Seed Building to be located at 500 West Center Street in Ephraim, Utah. This exploration was authorized by Mr. Dave McKay on March 4, 2003, and performed in general conformance with our Proposal for Geotechnical Engineering Services, dated February 17, 2003. The accompanying report describes the exploration, summarizes our findings and presents recommendations for design of foundations for the new building and asphalt pavement section design.

Subsurface soils at the site consist predominantly of stiff to very stiff lean clay, fat clay and sandy silt extending to the maximum depth explored of 14 feet. Laboratory test results indicated that the near surface clay and silt exhibited a collapse potential of about 3 to 4 percent under a 1,000psf load when water was applied to the sample.

Based on the results of our exploration the proposed building may be supported on lightly loaded shallow spread and strip footings founded on a minimum of 2 feet of compacted structural fill. A slab on grade may be utilized for the interior floor system provided that the native soils are properly prepared and all fill soils are properly placed and compacted. Special moisture control measures will be required to reduce the potential for collapsible soils to impact the structure. Further details are presented in the report.

Division of Wildlife Resources Seed Building
Ephraim, Utah
Terracon Project No. 61035005
March 19, 2003

Terracon

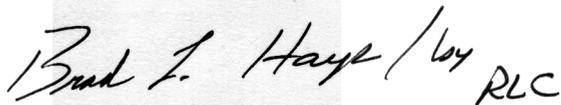
We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

TERRACON



Rick L. Chesnut, P. E.



Brad L. Hayes

N:\2002 Project Files\61035005\61035005 Report
Copies To: Addressee (3)

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**GEOTECHNICAL ENGINEERING REPORT
PROPOSED DIVISION OF WILDLIFE RESOURCES SEED BUILDING
EPHRAIM, UTAH**

**Terracon Project No. 61035005
March 19, 2003**

INTRODUCTION

This report presents the results of a geotechnical exploration for the site of the proposed Division of Wildlife Resources Seed Building to be located at 500 West Center Street in Ephraim, Utah. The general location of the site with respect to existing roads is presented on the Project Vicinity Map, included in Appendix A.

The purpose of this exploration was to evaluate subsurface conditions at the site, and provide geotechnical recommendations regarding design of foundations and associated earthwork for the proposed building and asphalt pavement section design. The scope of work included subsurface exploration, field and laboratory testing, engineering analysis, and the preparation of this report.

PROJECT DESCRIPTION

The project will consist of constructing a 17,550 square foot seed warehouse building and testing laboratory. The proposed building will be a single story metal frame structure with a concrete slab-on-grade floor. Retaining walls or subgrade structures are not anticipated. Structural loads are expected to be relatively light. For the purpose of this analysis, we have assumed that maximum wall and column loads will not exceed 4 kips per linear foot and 50 kips respectively. The maximum uniform floor slab load is anticipated to be 200 pounds per square foot (psf).

We anticipate that traffic associated with the parking and entrance areas will be relatively light, consisting mainly of automobile traffic and some delivery trucks. For design purposes, traffic loads of 10,000 Equivalent Single Axle Loads (ESALs) was assumed for the parking lots and 155,000 ESALs for the loading docks and other higher truck traffic areas.

Grading plans and the finished floor elevation of the proposed structure were not available at the time this report was prepared. However, based on our field observations, the site is relatively flat and is near the adjacent road elevation. It is anticipated that general site grading will be limited and will involve less than 2 feet of cut or fill.

Natural Water Content: The percentage of water in the soil at the sample location.

Percent Passing the No. 200 Sieve: Amount of combined clay and silt-sized particles in the soil sample.

Atterberg Limits: The consistency and range of moisture content within which the material is workable.

One-Dimensional Consolidation/Collapse: Measurement of soil compressibility upon loading and soil behavior upon wetting.

Results of the laboratory tests are summarized on the test pit logs in Appendix A, on the summary reports in Appendix B, and in the following sections of this report.

SITE CONDITIONS

The site is approximately 3 acres in size and consists of an undeveloped lot. The topography of the site is generally flat and has a gradual slope down to the southwest. A maximum relief of about 2 feet was observed between the test pit locations. The site is located about 1 to 2 feet below the adjacent road grades. The property is sparsely vegetated with weeds and grass. An irrigation ditch was observed along the north boundary of the site. At the time of our site visit the irrigation ditch did not contain water. The site is bound on the north by Center Street, on the south by 100 South Street, on the west by a developed parcel containing several sheds and to the east by undeveloped property.

SUBSURFACE CONDITIONS

Soil Conditions

Subsurface conditions encountered at the site are indicated on the logs of the test pits in Appendix A. The stratification lines shown on the logs represent the approximate boundary between the soil types encountered; the actual transition may be gradual.

Soil encountered at the site generally consisted of about 8 to 9 inches of topsoil underlain by silty to lean clay with silt layers extending to a depth of about 11 feet underlain by lean to fat clay extending to the maximum depth explored of about 14 feet.

The clay and silt in approximately the upper 11 feet of the soil profile were observed in the field to contain a pinhole texture, often characteristic of collapsible soils. The frequency of pinholes appeared to decrease with depth; only a slight pinhole texture was observed below a depth of about 8 feet. Test results indicate a collapse potential at a depth of 5 feet of about 3 to 4 percent when the soil samples were subjected to an increase in moisture content and a load of 1000psf. The consistency of the silt and clay in approximately the upper 11 feet is generally stiff to very stiff. Additional test results indicate liquid limits ranging between 23 and 31 percent, plasticity indexes ranging between 6 and 13 and moisture contents ranging between 7 and 10 percent. Dry unit weights in these soils ranged between 85 and 96pcf with sand contents between 13 and 34 percent at the test locations.

The clay encountered below a depth of about 11 feet was not observed to contain a pinhole texture. These soils are generally stiff in consistency. Test results indicate a liquid limit of 53 percent, a plasticity index of 31 percent and a moisture content of about 19 percent at the test location in this soil unit.

Groundwater Conditions

The test pits were monitored during excavation for the presence and level of groundwater. At the time of our field exploration, groundwater was not encountered within the depths explored. It should be recognized that fluctuations of the groundwater table may occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the test pits were performed. Evaluation of these factors is beyond the scope of this exploration.

ENGINEERING ANALYSIS AND RECOMMENDATIONS

Geotechnical Considerations

Based on the results of our investigation, it is our opinion that the site is suitable for the proposed construction. The proposed structure may be supported on conventional shallow strip and spread footings founded on a zone of properly placed and compacted structural fill as described below.

Laboratory test results indicate that portions of the near-surface soils exhibit a potential for collapse when subjected to an increase in moisture content. Care must be taken to not allow water to migrate below the structure during construction and throughout the life of the structure to reduce the potential for initiating collapse in the native soils and causing structural damage. If water is allowed to migrate below the building settlement and

subsequent cracking of concrete structural components and development of uneven floor slabs should be expected. The recommendations presented in this report are intended to reduce the potential for structural damage; however, even with implementing these measures some collapsible soils may remain in place below the structure which if wetted may collapse and may result in some structural damage. The degree of protection against the effects of collapsible soils may be increased if more expensive foundation systems such as drilled piers and structural floor slabs are used or if deeper excavations below foundations and floor slabs are completed. Terracon will provide additional information regarding alternate foundation systems upon request.

The potential for structural damage resulting from collapsible soils can be reduced significantly by implementing measures that reduce the potential for water penetrating the supporting soils. Such measures include constructing impermeable membranes or surfacing, such as concrete or asphalt within 10 feet of the building perimeter, maintaining positive drainage away from the building perimeter, extending roof drainage to discharge away from the building or to the storm drain system, using low permeability soil to backfill perimeter foundation excavations and trenches beneath and around the building, and avoiding landscape irrigation adjacent to the building. In addition, slabs should not be connected structurally to foundations to allow for differential movement. Adjustable supports or partition walls should be utilized where light loads are anticipated. Special care in design of interior plumbing, such as conduit or sleeves around pipes should be implemented to reduce the risk of leaks penetrating the underlying soils.

Foundation Systems

Lightly loaded, shallow strip and spread footings may be used to support the proposed building. With the implementation of proper moisture control measures, footings may be supported on a minimum of 24 inches of properly placed and compacted structural fill. The 24 inches of structural fill placed below foundations will not fully penetrate the collapsible soils. The remaining collapsible soils may impact the structure if they become wetted. Additional structural fill thickness below footings will result in the removal of more of the collapsible soils and will reduce the potential for such soils to affect the building should they become wetted. Structural fill placed beneath foundations should extend laterally beyond the footings a distance equal to or greater than two-thirds of the structural fill thickness.

Footings established as described above may be proportioned for a maximum net allowable bearing pressure of 2,000 psf. This bearing pressure value applies to the total of

dead load plus permanently and/or frequently applied live loads, and can be increased by 1/3 for short duration cyclic loads, such as wind or seismic.

Continuous and isolated column footings should have minimum dimensions of 16 inches and 24 inches, respectively. Exterior footing bottoms should be established a minimum of 30 inches below the lowest adjacent exterior grade for frost protection. Interior footings not subjected to frost should bear at least 12 inches below finished grade (proposed floor level).

Total settlements of footings are expected to be less than 1 inch for the recommended allowable bearing pressure. Differential settlement between similarly loaded footings is typically about 1/2 to 3/4 of the total settlement. If water is allowed to percolate below the zone of compacted structural fill, additional settlement may occur.

Lateral foundation loads may be resisted using the friction between the footing bottoms and underlying structural fill. Friction between the footing bottoms and underlying soil may be calculated using an ultimate friction coefficient of 0.5. A factor of safety of at least 1.5 should be used against sliding.

If areas of loose or soft soil (unsuitable for bearing) are encountered in footing excavations, the excavations should be extended deeper to suitable soils. Properly compacted structural fill should be used to replace the zone of overexcavation.

Floor Slab Design and Construction

We recommend that all slabs be placed on a minimum of 6 inches of crushed gravel underlain by a minimum of 12 inches of properly placed and compacted structural fill. The 12 inches of structural fill placed below floor slabs will not fully penetrate the collapsible soils. The remaining collapsible soils may impact the structure if they become wetted. Additional structural fill thickness below floor slabs will result in the removal of more of the collapsible soils and will reduce the potential for such soils to affect the building should they become wetted. Construction joints should be used to isolate the floor slab from walls and/or isolated columns to allow independent movement.

If moisture sensitive floor coverings or treatments are to be used in the building, or if there are other concerns about moisture vapor transmission through the concrete slab, a vapor barrier should be considered. The building designer is usually in the best position to make final decisions regarding the use of a vapor barrier, its method of placement, and its position relative to the base of the slab. We will be available at your request to discuss the

advantages and disadvantages of various methods of vapor barrier placement and related slab design and construction recommendations.

Seismic Considerations

Based on the results of our exploration, the shallow subsurface soil profile is best represented by Site Class D according to the 2000 International Building Code (IBC). A search of the National Seismic Hazard Map database indicates the following peak ground acceleration (PGA) and spectral accelerations (S_s) for 0.2 second and (S_1) 1.0 second periods for a 2% probability of exceedance (PE) in 50 years at the project site:

| | 2% PE in 50 yrs |
|------------|-----------------|
| PGA | 0.28g |
| 0.2 sec SA | 0.70g |
| 1.0 sec SA | 0.25g |

The soil conditions encountered in the test pits were generally stiff to very stiff clays and silts and were not saturated. These types of soil are generally not susceptible to liquefaction. Soils conditions deeper than 14 feet were not explored or assessed for liquefaction during this investigation.

Pavements

The pavement section presented below was determined in general accordance with the 1993 AASHTO "Guide for the Design of Pavement Structures". Design traffic consisting of 10,000 ESALs was assumed for parking lots and 155,000 ESALs for loading docks and other higher truck traffic areas. A California Bearing Ratio (CBR) of 5 was assumed to represent the clay subgrade soil. The following pavement sections, or an approved equivalent, may be used at the site:

| Pavement Area | Asphalt Pavement Section Thickness (in) | | | Total |
|---------------|---|----------------------|-------------------------|-------|
| | Asphalt | Granular Base Course | Granular Subbase Course | |
| Parking Lots | 3 | 6 | 0 | 9 |
| Truck Traffic | 4 | 6 | 6 | 16 |

The asphaltic concrete should be placed and compacted to at least 97 percent of the maximum density as determined by ASTM D 1559 (50 blows each end). Aggregates and asphaltic concrete should conform to UDOT specifications.

Earthwork

Topsoil, existing fill, disturbed native soils and other deleterious materials should be removed from beneath building and pavement areas. Following removal of these materials, the exposed native soils should be scarified to depths of 8 inches moisture conditioned to near optimum moisture content and compacted to 92 percent of the maximum density as determined by ASTM D 1557. Soft areas encountered during compaction should be over-excavated a minimum of 12 inches or more if necessary to support equipment, and replaced with structural fill properly placed and compacted as described below.

The near-surface soils encountered at the site are generally fine-grained and may be susceptible to disturbance or rutting under the weight of construction equipment if they become wet. In order to reduce the potential for disturbance or rutting, excessive water should not be applied to the surface during earthwork operations and construction should occur during dryer weather. If these soils are wet during construction, dump and spread procedures, and the use of geotextiles in combination with angular granular fill may be required to reduce the potential for disturbance of the soils. Soils that become excessively rutted, pumped or otherwise disturbed are not suitable for support of structural loads, floor slabs or pavements, and should be removed and replaced with structural fill.

Positive drainage away from the structure must be provided during construction and maintained throughout the life of the proposed project. Infiltration of water into utility or foundation excavations should be prevented during construction. It is very important that foundation soils are not allowed to become wetted. Roof runoff and surface drainage should be collected and discharged far away from the structure to prevent wetting of the foundation soils.

Structural fill beneath foundations or pavements should consist of well graded, granular soil with a maximum particle size of 3 inches, 25 to 60 percent passing the No. 4 sieve and having 10 to 30 percent fines. The recommended 6-inch thick layer of gravel beneath floor slabs should be 3/4-inch minus crushed aggregate.

All fill should be approved by the geotechnical engineer, should be moisture conditioned to near optimum water content, placed in uniform lifts not exceeding 9 inches in thickness,

and be compacted to the following minimum percentages of the maximum dry density as determined by ASTM D 1557 (Modified Proctor):

| Location | Percent of Maximum Dry Density ASTM D 1557 |
|--|---|
| Building areas | 95 |
| Pavement areas and other areas of fill and backfill | 92 |

It is the responsibility of the contractor to provide safe working conditions in connection with underground excavations. Temporary construction excavations should be properly sloped or shored. All excavations should be accomplished in accordance with applicable federal, state, and local standards.

It is anticipated that the majority of the excavations for the proposed construction can be accomplished with conventional earth moving equipment.

GENERAL COMMENTS

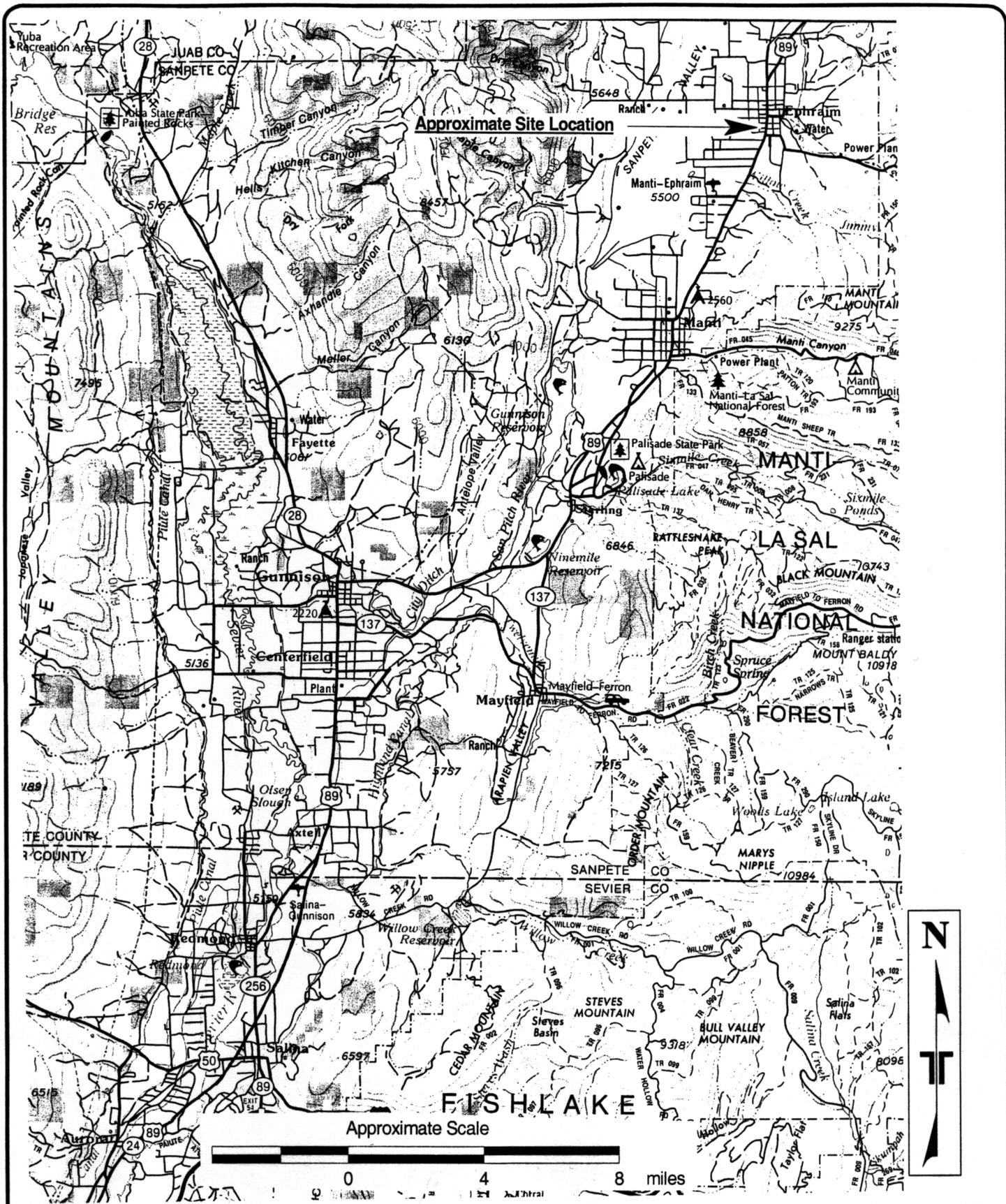
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide testing and observation during excavation, grading, foundation and construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

APPENDIX A

**PROJECT VICINITY MAP
TEST PIT LOCATION PLAN
LOGS OF TEST PITS**



PROJECT VICINITY MAP
 PROPOSED DIVISION OF WILDLIFE RESOURCES SEED BUILDING
 EPHRAIM, UTAH

Job No. 61035005

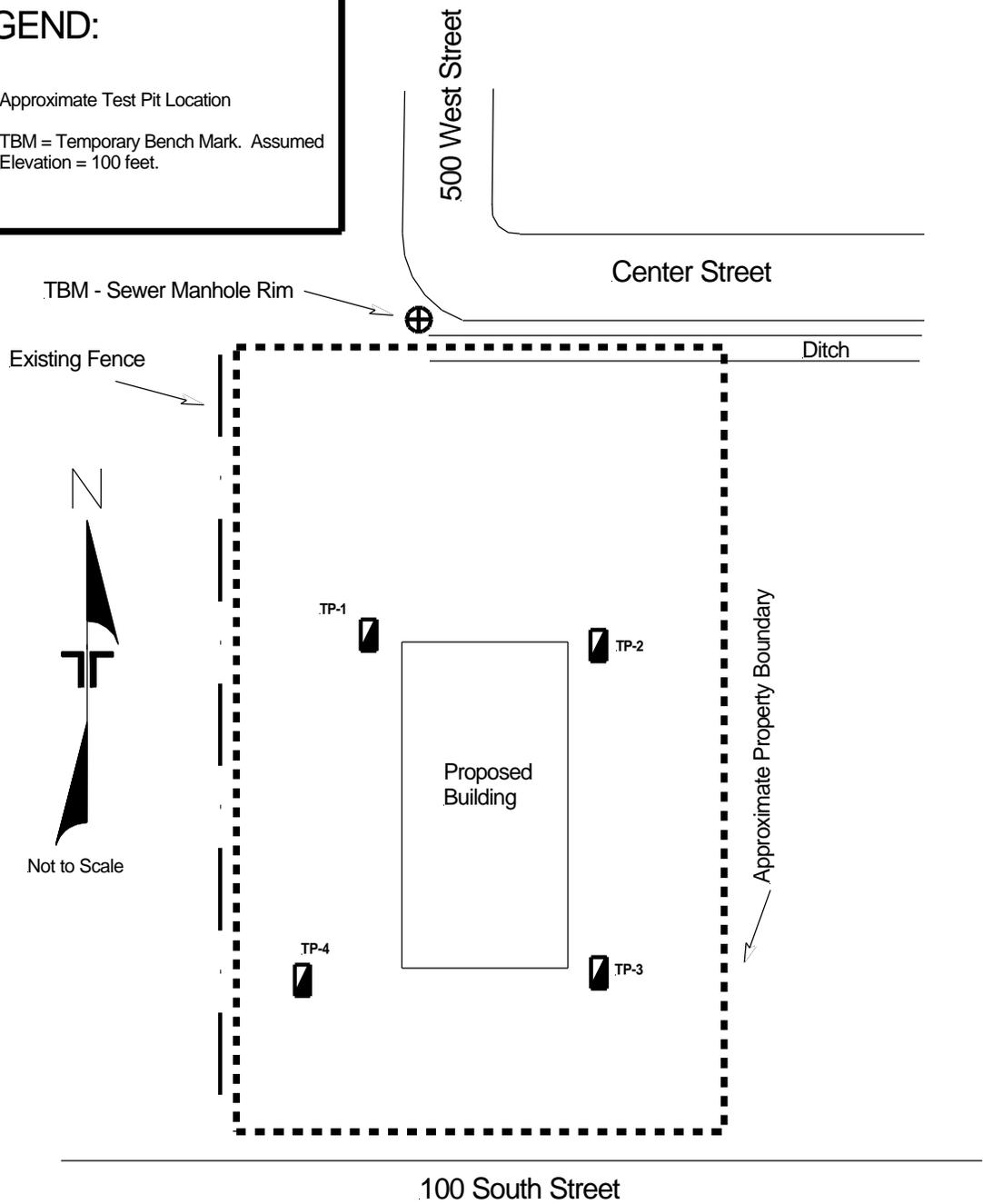
Date: March, 2003

Drawn By: rlc

Terracon

LEGEND:

-  Approximate Test Pit Location
-  TBM = Temporary Bench Mark. Assumed Elevation = 100 feet.



TEST PIT LOCATION PLAN

PROPOSED DIVISION OF WILDLIFE RESOURCES SEED BUILDING
EPHRAIM, UTAH

Job No. 61035005

Date: March, 2003

Drawn By: rlc



LOG OF TEST PIT NO. TP-1

| | | | | | | | | | | | | | |
|---|---|--|------------|-------------|--------|------|---------------|------------------------------------|------------------|----------------------|--------------|------------------|-------------------------|
| CLIENT Utah Division of Facilities Construction and Management | | | | | | | | | | | | | |
| SITE Ephraim, Utah | | PROJECT Division of Wildlife Resources Seed Building | | | | | | | | | | | |
| GRAPHIC LOG | Boring Location: Near NW Corner of Proposed Building | | SAMPLES | | | | | TESTS | | | | | |
| | Approx. Surface Elev.: 98 ft | | DEPTH, ft. | USCS SYMBOL | NUMBER | TYPE | RECOVERY, in. | PENETRATION RESISTANCE BLOWS / ft. | WATER CONTENT, % | DRY UNIT WEIGHT, PCF | LIQUID LIMIT | PLASTICITY INDEX | % PASSING NO. 200 SIEVE |
| DESCRIPTION | | | | | | | | | | | | | |
|  TOPSOIL: Clay, light brown. | | 0.7 | | | | | | | | | | | |
|  CLAY: Stiff to very stiff, light brown, fissured, with pinholes. | | 1 | | | | | | | | | | | |
|  SANDY SILT: Stiff to very stiff, tan, with pinholes. - fewer pinholes | | 5.5 | | | | | | | | | | | |
|  LEAN TO FAT CLAY: Stiff, grayish brown. | | 11 | | | | | | | | | | | |
|  Bottom of Test Pit | | 14 | | | | | | | | | | | |
| | | 1 | | | | | | | | | | | |
| | | 2 | | | | | | | | | | | |
| | | 3 | | | | | | | | | | | |
| | | 4 | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | |
| | | 6 | | | | | | | | | | | |
| | | 7 | | | | | | | | | | | |
| | | 8 | | | | | | | | | | | |
| | | 9 | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | |
| | | 11 | | | | | | | | | | | |
| | | 12 | | | | | | | | | | | |
| | | 13 | | | | | | | | | | | |
| | | 14 | | | | | | | | | | | |

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

| | | | |
|----|--------|--------|---|
| WL | ∇ None | 3/3/03 | ∇ |
| WL | ∇ | ∇ | ∇ |
| WL | | | |



| | | | |
|--------------------|---------|---------|----------|
| TEST PIT STARTED | | 3-3-03 | |
| TEST PIT COMPLETED | | 3-3-03 | |
| RIG | Backhoe | FOREMAN | rlc |
| APPROVED | rlc | JOB # | 61035005 |

GEO LOG 61035005.GPJ TERRACON.GDT 3/19/03

LOG OF TEST PIT NO. TP-2

| | | | | | | | | | | | | | | | | |
|--|---|--|--|--|--|-------------|--------|------|---------------|------------------------------------|------------------|----------------------|--------------|------------------|-------------------------|-------|
| CLIENT Utah Division of Facilities Construction and Management | | | | | | | | | | | | | | | | |
| SITE Ephraim, Utah | | | | | PROJECT Division of Wildlife Resources Seed Building | | | | | | | | | | | |
| GRAPHIC LOG | Boring Location: Near NE Corner of Proposed Building Approx. Surface Elev.: 99 ft DESCRIPTION | | | | DEPTH, ft. | SAMPLES | | | | | TESTS | | | | | |
| | | | | | | USCS SYMBOL | NUMBER | TYPE | RECOVERY, in. | PENETRATION RESISTANCE BLOWS / ft. | WATER CONTENT, % | DRY UNIT WEIGHT, PCF | LIQUID LIMIT | PLASTICITY INDEX | % PASSING NO. 200 SIEVE | OTHER |
| 0.8 | TOPSOIL: Clay, light brown, with roots. | | | | 1 | | | | | | | | | | | |
| 4 | CLAY: Stiff to very stiff, light brown, fissured, with pinholes, blocky. | | | | 2 | | 4 | BS | | | | | | | | |
| 4 | SILTY CLAY: With sand, stiff to very stiff, tan, with pinholes. | | | | 3 | | | | | | | | | | | |
| 5 | | | | | 4 | | | | | | | | | | | |
| 6 | | | | | 5 | BS | | | | | | | | | | |
| 6 | - With silty sand layers | | | | 5 | 6 | | | | | | | | | | |
| 7 | | | | | 6 | CL ML | ST | | | 7 | 85 | 23 | 6 | 75 | | |
| 7 | | | | | 6 | | | | | | | | | | | |
| 7 | | | | | 7 | | | | | | | | | | | |
| 7 | | | | | 8 | | | | | | | | | | | |
| 7 | | | | | 9 | | | | | | | | | | | |
| 7 | | | | | 10 | | | | | | | | | | | |
| 7 | | | | | 11 | | 7 | BS | | | | | | | | |
| 7 | | | | | 12 | | | | | | | | | | | |
| 7 | FAT CLAY: Stiff, grayish brown. | | | | 11 | | | | | | | | | | | |
| 7 | | | | | 12 | CH | 8 | BS | | 19 | 53 | 31 | | | | |
| 7 | | | | | 13 | | | | | | | | | | | |
| 7 | | | | | 14 | | | | | | | | | | | |
| 7 | Bottom of Test Pit | | | | 14 | | | | | | | | | | | |

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

| WATER LEVEL OBSERVATIONS, ft | | | |
|------------------------------|--------|--------|---|
| WL | ▼ None | 3/3/03 | ▼ |
| WL | ▼ | | ▼ |
| WL | | | |



| | | | |
|--------------------|---------|---------|----------|
| TEST PIT STARTED | | 3-3-03 | |
| TEST PIT COMPLETED | | 3-3-03 | |
| RIG | Backhoe | FOREMAN | rlc |
| APPROVED | rlc | JOB # | 61035005 |

GEO.LOG 61035005.GPJ TERRACON.GDT 3/19/03

LOG OF TEST PIT NO. TP-3

| | | | | | | | | | | | | | |
|--|---|---|------------|-------------|--------|------|---------------|-----------------------------------|------------------|----------------------|--------------|------------------|-------------------------|
| CLIENT Utah Division of Facilities Construction and Management | | | | | | | | | | | | | |
| SITE Ephraim, Utah | | PROJECT Division of Wildlife Resources Seed Building | | | | | | | | | | | |
| GRAPHIC LOG | Boring Location: Near SE Corner of Proposed Building | | SAMPLES | | TESTS | | | | | | | | |
| | Approx. Surface Elev.: 99 ft | | DEPTH, ft. | USCS SYMBOL | NUMBER | TYPE | RECOVERY, in. | PENETRATION RESISTANCE BLOWS / ft | WATER CONTENT, % | DRY UNIT WEIGHT, FCF | LIQUID LIMIT | PLASTICITY INDEX | % PASSING NO. 200 SIEVE |
| | 0.8 | TOPSOIL: Clay, brown. | | | | | | | | | | | |
| | 2 | CLAY: Stiff to very stiff, brown, with some roots, fissured, blocky, with pinholes. | | | | | | | | | | | |
| | | Sandy LEAN CLAY: Stiff to very stiff, tan, with pinholes. | | | | | | | | | | | |
| | | | 3 | CL | 9 | BS | | 7 | | 26 | 10 | 66 | |
| | | | 4 | | | | | | | | | | |
| | | | 5 | | | | | | | | | | |
| | | | 6 | | | | | | | | | | |
| | | | 7 | | | | | | | | | | |
| | | | 8 | | | | | | | | | | |
| | | | 9 | | | | | | | | | | |
| | | | 10 | | | | | | | | | | |
| | | | 11 | | | | | | | | | | |
| | 11 | LEAN TO FAT CLAY: Stiff, grayish brown. | | | | | | | | | | | |
| | | | 12 | | | | | | | | | | |
| | | | 13 | | | | | | | | | | |
| | | | 14 | | | | | | | | | | |
| | | Bottom of Test Pit | | | | | | | | | | | |

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

| | | | |
|------------------------------|------|--------|---|
| WATER LEVEL OBSERVATIONS, ft | | | |
| WL | None | 3/3/03 | ▼ |
| WL | | | ▼ |
| WL | | | ▼ |

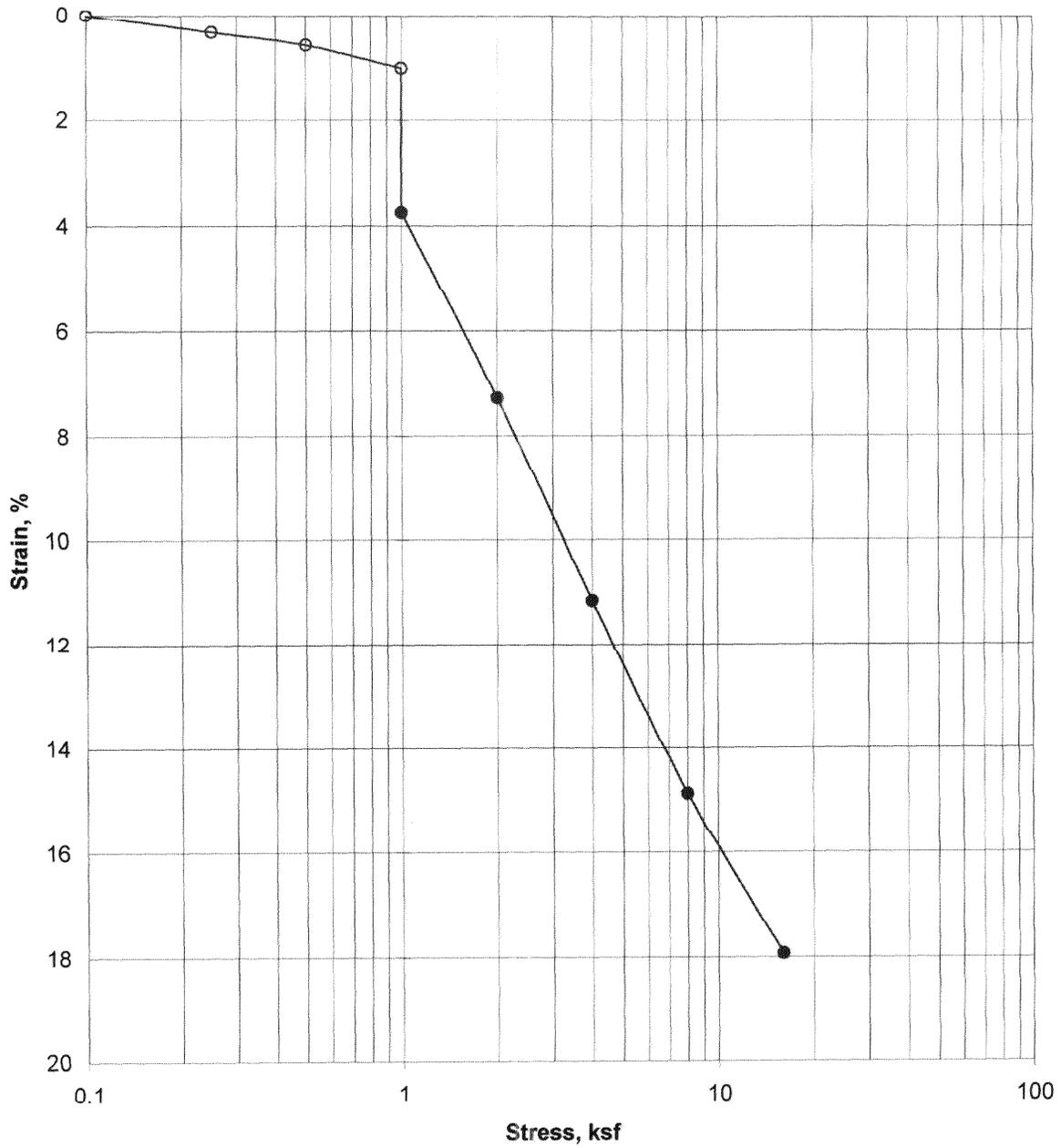


| | | | |
|--------------------|---------|---------|----------|
| TEST PIT STARTED | | 3-3-03 | |
| TEST PIT COMPLETED | | 3-3-03 | |
| RIG | Backhoe | FOREMAN | rlc |
| APPROVED | rlc | JOB # | 61035005 |

GEO LOG 61035005.GPJ TERRACON.GCT 3/19/03

APPENDIX B

CONSOLIDATION/COLLAPSE TEST RESULTS



| Specimen Identification | Classification | DD | MC% |
|-------------------------|----------------|----|-----|
| ● TP-4 @ 5 ft. | Lean Clay (CL) | 96 | 10 |
| • | | | |
| | | | |

Terracon

CONSOLIDATION TEST RESULTS

Project Name: Division of Wildlife Resources Seed Building
 Location: Ephraim, Utah
 Project No.: 61035005
 Date: 3/17/03

APPENDIX C

**GENERAL NOTES
UNIFIED CLASSIFICATION SYSTEM**

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

| | | | |
|-----|--|-----|---------------------------|
| SS: | Split Spoon - 1- ³ / ₈ " I.D., 2" O.D., unless otherwise noted | HS: | Hollow Stem Auger |
| ST: | Thin-Walled Tube - 3" O.D., unless otherwise noted | PA: | Power Auger |
| RS: | Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted | HA: | Hand Auger |
| DB: | Diamond Bit Coring - 4", N, B | RB: | Rock Bit |
| BS: | Bulk Sample or Auger Sample | WB: | Wash Boring or Mud Rotary |

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

| | | | | | |
|------|--------------|------|-----------------------|------|-----------------|
| WL: | Water Level | WS: | While Sampling | N/E: | Not Encountered |
| WCI: | Wet Cave in | WD: | While Drilling | | |
| DCI: | Dry Cave in | BCR: | Before Casing Removal | | |
| AB: | After Boring | ACR: | After Casing Removal | | |

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

| <u>Unconfined Compressive Strength, Qu, psf</u> | <u>Standard Penetration or N-value (SS) Blows/Ft.</u> | <u>Consistency</u> |
|---|---|--------------------|
| < 500 | <2 | Very Soft |
| 500 - 1,000 | 2-3 | Soft |
| 1,001 - 2,000 | 4-6 | Medium Stiff |
| 2,001 - 4,000 | 7-12 | Stiff |
| 4,001 - 8,000 | 13-26 | Very Stiff |
| 8,000+ | 26+ | Hard |

RELATIVE DENSITY OF COARSE-GRAINED SOILS

| <u>Standard Penetration or N-value (SS) Blows/Ft.</u> | <u>Ring Sampler (RS) Blows/Ft.</u> | <u>Relative Density</u> |
|---|--|-------------------------|
| 0 - 3 | 0-6 | Very Loose |
| 4 - 9 | 7-18 | Loose |
| 10 - 29 | 19-58 | Medium Dense |
| 30 - 49 | 59-98 | Dense |
| 50+ | 99+ | Very Dense |

RELATIVE PROPORTIONS OF SAND AND GRAVEL

| <u>Descriptive Term(s) of other constituents</u> | <u>Percent of Dry Weight</u> |
|--|----------------------------------|
| Trace | < 15 |
| With | 15 - 29 |
| Modifier | > 30 |

GRAIN SIZE TERMINOLOGY

| <u>Major Component of Sample</u> | <u>Particle Size</u> |
|--------------------------------------|--------------------------------------|
| Boulders | Over 12 in. (300mm) |
| Cobbles | 12 in. to 3 in. (300mm to 75 mm) |
| Gravel | 3 in. to #4 sieve (75mm to 4.75 mm) |
| Sand | #4 to #200 sieve (4.75mm to 0.075mm) |
| Silt or Clay | Passing #200 Sieve (0.075mm) |

RELATIVE PROPORTIONS OF FINES

| <u>Descriptive Term(s) of other constituents</u> | <u>Percent of Dry Weight</u> |
|--|----------------------------------|
| Trace | < 5 |
| With | 5 - 12 |
| Modifiers | > 12 |

PLASTICITY DESCRIPTION

| <u>Term</u> | <u>Plasticity Index</u> |
|-------------|-------------------------|
| Non-plastic | 0 |
| Low | 1-10 |
| Medium | 11-30 |
| High | 30+ |



UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

| | | | | Soil Classification | | |
|---|---|--|--|--------------------------------------|-----------------------------------|---------------------------------|
| | | | | Group Symbol | Group Name ^B | |
| Coarse Grained Soils More than 50% retained on No. 200 sieve | Gravels More than 50% of coarse fraction retained on No. 4 sieve | Clean Gravels Less than 5% fines ^C | $Cu \geq 4$ and $1 \leq Cc \leq 3^E$ | GW | Well-graded gravel ^F | |
| | | Gravels with Fines More than 12% fines ^C | $Cu < 4$ and/or $1 > Cc > 3^E$ | GP | Poorly graded gravel ^F | |
| | Sands 50% or more of coarse fraction passes No. 4 sieve | Clean Sands Less than 5% fines ^D | Fines classify as ML or MH | $Cu \geq 6$ and $1 \leq Cc \leq 3^E$ | GM | Silty gravel ^{F,G,H} |
| | | | Fines classify as CL or CH | $Cu < 6$ and/or $1 > Cc > 3^E$ | GC | Clayey gravel ^{F,G,H} |
| | | Sands with Fines More than 12% fines ^D | Fines classify as ML or MH | | SW | Well-graded sand ^I |
| | | | Fines classify as CL or CH | | SP | Poorly graded sand ^I |
| Fine-Grained Soils 50% or more passes the No. 200 sieve | Silt and Clays Liquid limit less than 50 | inorganic | $PI > 7$ and plots on or above "A" line ^J | CL | Lean clay ^{K,L,M} | |
| | | organic | Liquid limit - oven dried < 0.75 | ML | Silt ^{K,L,M} | |
| | | | Liquid limit - not dried | OL | Organic clay ^{K,L,M,N} | |
| | | Silt and Clays Liquid limit 50 or more | inorganic | PI plots on or above "A" line | CH | Fat clay ^{K,L,M} |
| | organic | | PI lots below "A" line | MH | Elastic Silt ^{K,L,M} | |
| | | | Liquid limit - oven dried < 0.75 | OH | Organic clay ^{K,L,M,P} | |
| | | | Liquid limit - not dried | OH | Organic silt ^{K,L,M,Q} | |
| | | | | PT | Peat | |

^ABased on the material passing the 3-in. (75-mm) sieve

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^DSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^KIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

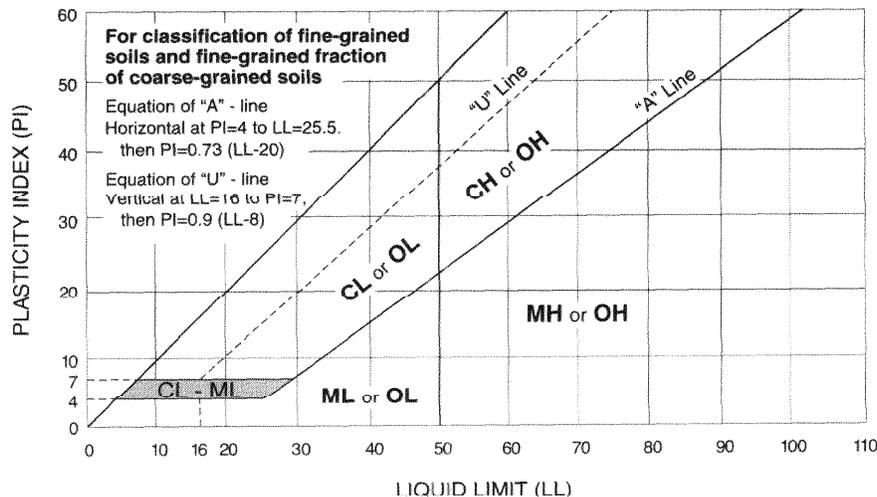
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



Terracon

C. Updated Geotechnical Information

Eric Tholen

From: Alan Spilker [alan@gshgeotech.com]
Sent: Thursday, July 16, 2009 8:46 AM
To: Eric Tholen
Subject: DWR Seed Warehouse (DFCM)

Eric,

As per your request, I have prepared the following discussion concerning the above mentioned project.

GSH completed a series of borings within the proposed addition to the DWR Seed Warehouse and are currently completing a laboratory program. The lab program is far enough along to be able to provide you with design data.

Surficial soils at the site generally consist of non-engineered fills that extend to depth of one to four and one-half feet. The non-engineered fills are not suitable for the support of the proposed structure, rigid pavements, or exterior flatwork areas, and must be completely removed under such. These non-engineered fills may remain under flexible pavements if the upper nine inches are scarified and compacted to the requirements of structural fill. Additional discussion concerning non-engineered fills in parking areas will be presented within the final report.

Underneath the non-engineered fills and extending to a depth of eight and one-half to nine feet within the borings (and potentially deeper) is silty clay with some fine sand. The silty clay contains a pinhole type structure and laboratory tests indicate that it is potentially collapsible if it becomes saturated or nearly saturated. GSH recommends that foundations/footings be placed overlying a minimum of two feet of select granular structural fill with a net bearing capacity of 2,000 pounds per square foot. Per these recommendations, select granular structural fill is defined as structural fill containing a minimum of 20 percent soil passing the No. 200 sieve, that is 20 percent fines. The reason for the minimum of 20 percent fines is to render the structural fill as impervious as possible. To reduce the potential for water intrusion, positive water control should be implemented. Water control must include stormwater and landscape water. GSH recommends that backfill be sloped away from the structure a minimum of 6 inches vertical in the first 10 feet horizontal. Additionally, all rain gutters and down spouts must be hard piped a minimum of 10 feet away from the structure and that landscape watering not be installed within 10 feet of the structure. GSH wanted to clarify that if underlying potentially collapsible soils become saturated, settlements are likely to occur.

GSH recommends that floorslabs be placed on a minimum of six inches of select granular structural fill extending to natural soils. Under no circumstances should floorslabs be placed overlying non-engineered fills.

Please call or email if you have any additional questions

Thanks,

Alan

--

Alan Spilker PE | Vice President

Gordon Spilker Huber Geotechnical Consultants, Inc.

4426 S Century Drive, Suite 100

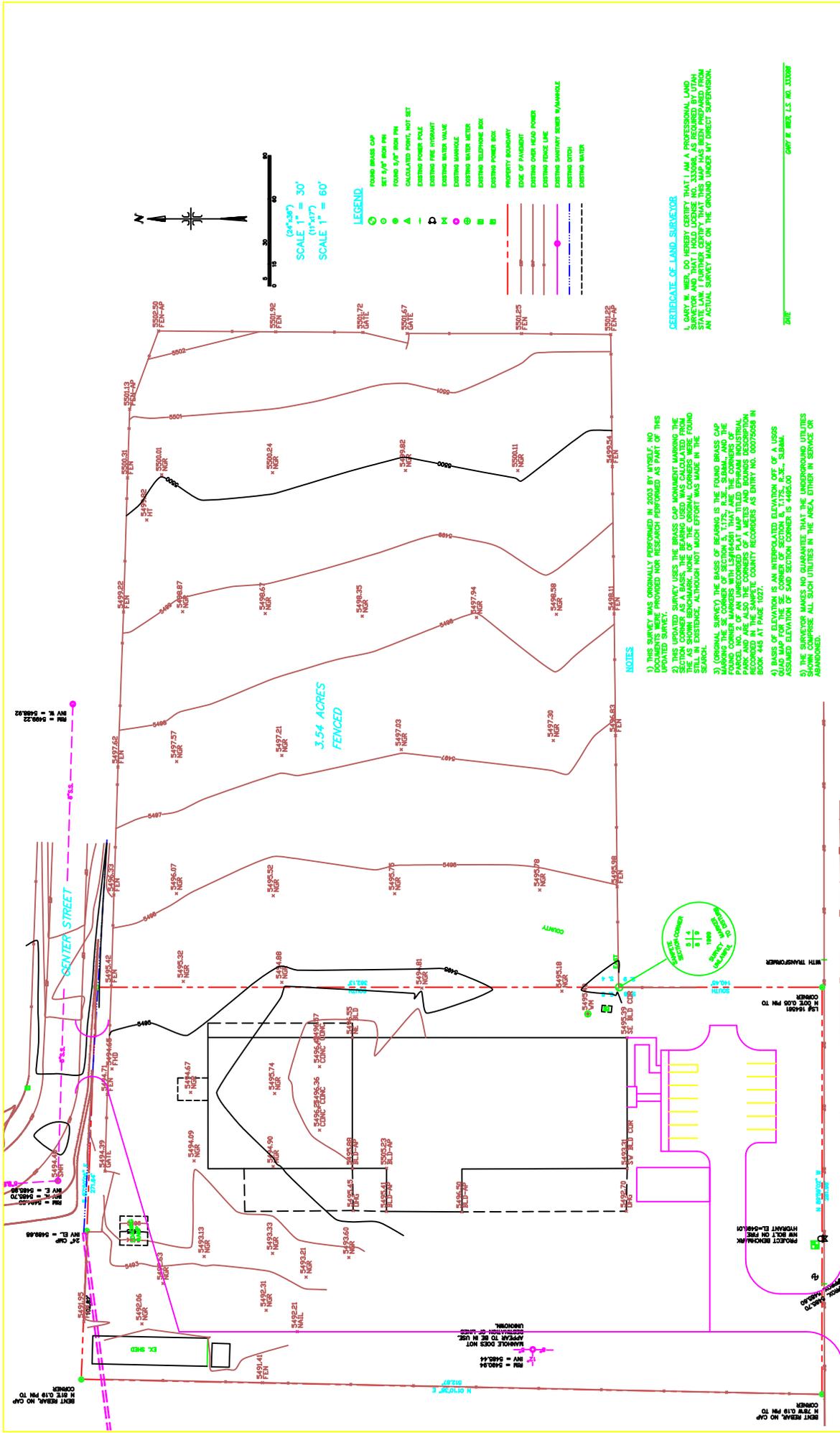
Salt Lake City, Utah 84123

T 801 685 9190 | F 801 685 2990 | C 801 891 9770
alan@gshgeotech.com | www.gshgeotech.com

Checked by AVG - www.avg.com

Version: 8.5.375 / Virus Database: 270.13.15/2239 - Release Date: 07/15/09 06:07:00

D. Updated ALTA Survey



SCALE 1" = 30'
SCALE 1" = 60'

- LEGEND**
- FOUND BRASS CAP
 - SET 5/8" IRON PIN
 - FOUND 5/8" IRON PIN
 - △ CALCULATED POINT, NOT SET
 - EXISTING POWER POLE
 - EXISTING FIRE HYDRANT
 - EXISTING WATER WALK
 - EXISTING MANHOLE
 - EXISTING WATER METER
 - EXISTING TELEPHONE BOX
 - EXISTING POWER BOX
 - PROPERTY BOUNDARY
 - EDGE OF PAVEMENT
 - EXISTING OVER HEAD POWER
 - EXISTING FENCE LINE
 - EXISTING SANITARY SEWER MANHOLE
 - EXISTING DITCH
 - EXISTING WATER

CERTIFICATE OF LAND SURVEYOR
I, GARY W. WER, DO HEREBY CERTIFY THAT I AM A PROFESSIONAL LAND SURVEYOR AND THAT I HOLD LICENSE NO. 333096, AS REQUIRED BY ITAA 117S, R.3.C., SLS68M., EPHRAM CITY, SAMPEETE COUNTY, UTAH. AN ACTUAL SURVEY MADE ON THE GROUND UNDER MY DIRECT SUPERVISION.

GARY W. WER, L.S. NO. 333096

- NOTES**
- 1) THIS SURVEY WAS ORIGINALLY PERFORMED IN 2003 BY MYSELF. NO UPDATED SURVEY PROVIDED NOR RESEARCH PERFORMED AS PART OF THIS UPDATED SURVEY.
 - 2) THIS UPDATED SURVEY USES THE BRASS CAP MONUMENT MARKING THE SECTION CORNER AS A BASIS. THE BEARING USED WAS CALCULATED FROM THE BEARING OF THE BRASS CAP MONUMENT MARKING THE SECTION CORNER. STILL IN EXISTENCE, ALTHOUGH NOT MUCH EFFORT WAS MADE IN THE SEARCH.
 - 3) (ORIGINAL SURVEY) THE BASIS OF BEARING IS THE FOUND BRASS CAP MONUMENT MARKING THE SECTION CORNER. THE BEARING OF THE FOUND CORNER MARKERS WITH LEASURES THAT ARE THE CORNERS OF PARCEL NO. 22 OF AN UNRECORDED PLY MAP TITLED EPHRAM INDUSTRIAL PARK, RECORDED IN THE SAMPEETE COUNTY RECORDS AS BARRY NO. 00072638 IN BOOK 445 AT PAGE 1027.
 - 4) BASIS OF ELEVATION IS AN INTERPOLATED ELEVATION OFF OF A USGS ASSUMED ELEVATION OF SAND SECTION CORNER IS 4492.00.
 - 5) THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED.

APEX JOB NO. 9-012
DPC# JOB NO. 02168620
TOPOGRAPHIC SURVEY
LOCATED IN THE NW 1/4 OF S-9 AND THE SW 1/4 S-4 T17S, R.3E, SLS68M., EPHRAM CITY, SAMPEETE COUNTY, UTAH

STATE OF UTAH
DWR SEED WAREHOUSE

LAND SURVEYORS INC.
1886 RIDGE CT
RIVERVIEW, UTAH 84066
(801) 302-3843



| NO. | DATE | BY | REVISION |
|-----|------|------|----------|
| 1 | DATE | DATE | DATE |
| 2 | DATE | DATE | DATE |
| 3 | DATE | DATE | DATE |
| 4 | DATE | DATE | DATE |
| 5 | DATE | DATE | DATE |

SMERLIT Proiects3-DIR EPHRAM\Mapa.swg - 5/29/2016 2:46:02 PM MDT

E. Warranty Deed

Mail Tax Notice to:
Grantee
1594 West North Temple, Suite 2110
Salt Lake City, Utah 84116

Ent 159337 Bk 579 Pg 293
Date: 05-NOV-2008 10:04AM
Fee: \$10.00 Check
Filed By: RDH
REED D HATCH, Recorder
SANPETE COUNTY CORPORATION
For: Central Utah Title

4-17-3E

CENTRAL UTAH TITLE
ORDER NO. 18981-SA

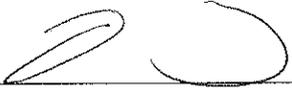
Warranty Deed

Oscar Lemus and Berenice Garcia, Grantors of Orem, State of Utah hereby **CONVEYS AND WARRANTS** TO: Division of Wildlife Resources, Grantees of Salt Lake City, State of Utah for the sum of (\$10.00) Ten Dollars and other good and valuable considerations the following described tract of land in Sanpete County, State of Utah, to-wit:

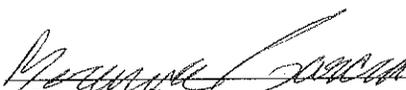
Beginning at the Southwest corner of Section 4, Township 17 South, Range 3 East, Salt Lake Base and Meridian, thence North 5.73 chains, thence South 86° East 7.45 chains, thence South 3°45' West 5.21 chains, thence West 7.10 chains to the point of beginning. Serial No. 760

Subject to all reservations, restrictions, easements, and rights-of-way of record and current property taxes.

WITNESS the hand of said Grantor, October 30, 2008, A. D.



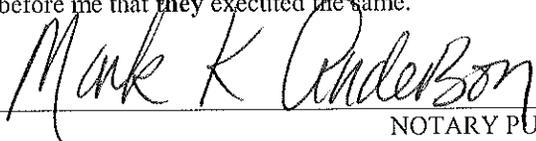
Oscar Lemus



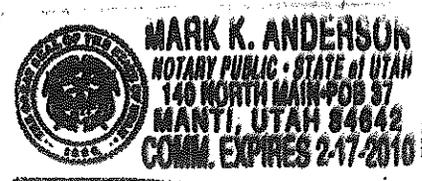
Berenice Garcia

State of Utah)
) ss.
County of Sanpete)

On the 30th day of October, 2008, personally appeared before me, Oscar Lemus and Berenice Garcia, the signers of the within instrument who duly acknowledged before me that they executed the same.



NOTARY PUBLIC
Residing in: Manti



F. Reference Photos



SOUTH SIDE OF BUILDING



WEST SIDE OF BUILDING



NORTHWEST CORNER OF BUILDING



NORTHWEST CORNER OF BUILDING



LOADING AREA AT NORTHWEST CORNER



EXPANSION AREA AT NORTHEAST CORNER



AISLE LOOKING NORTH



AISLE LOOKING NORTH



LOOKING NORTH AT SEED EQUIPMENT



STORAGE RACKS

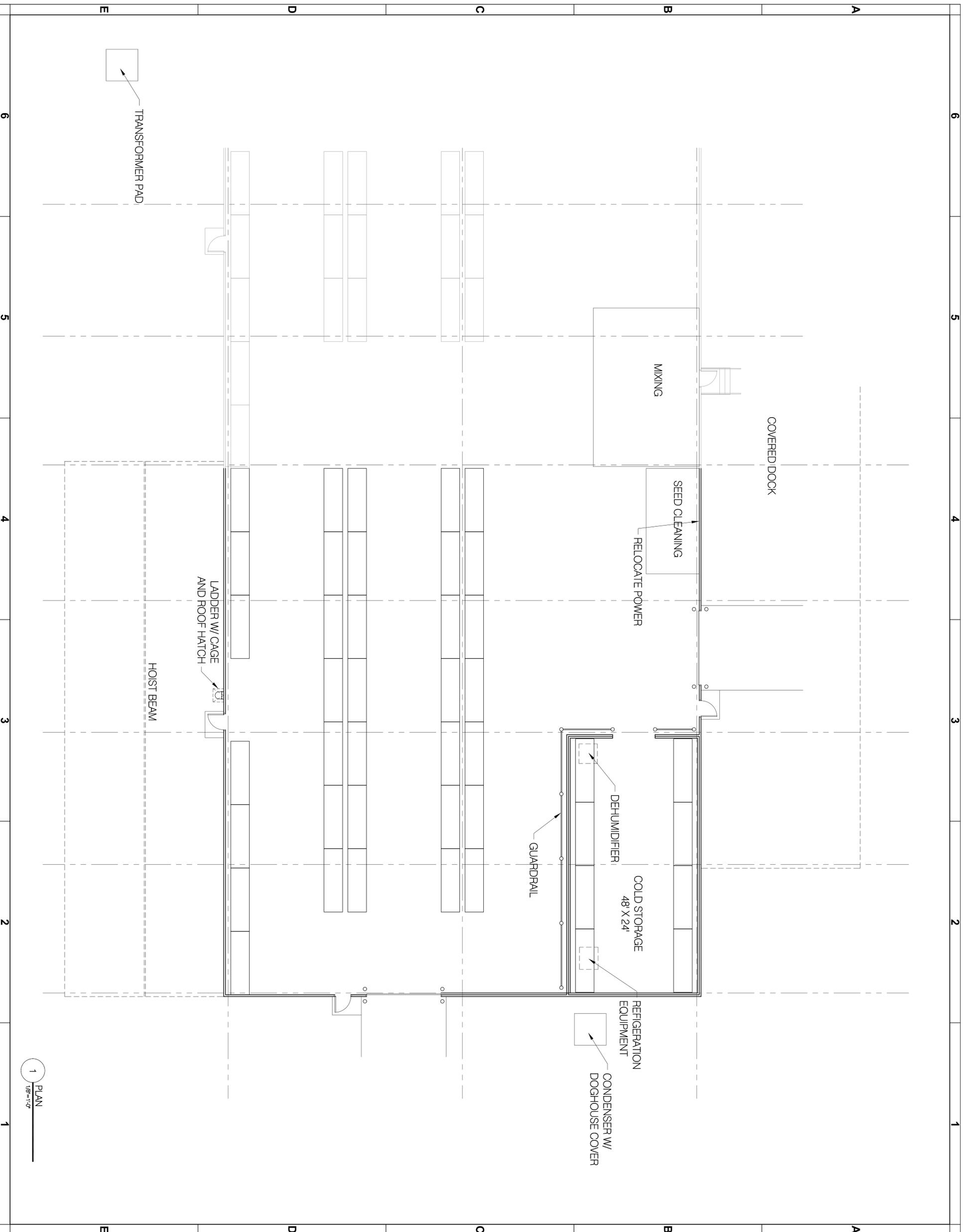


NORTH WALL



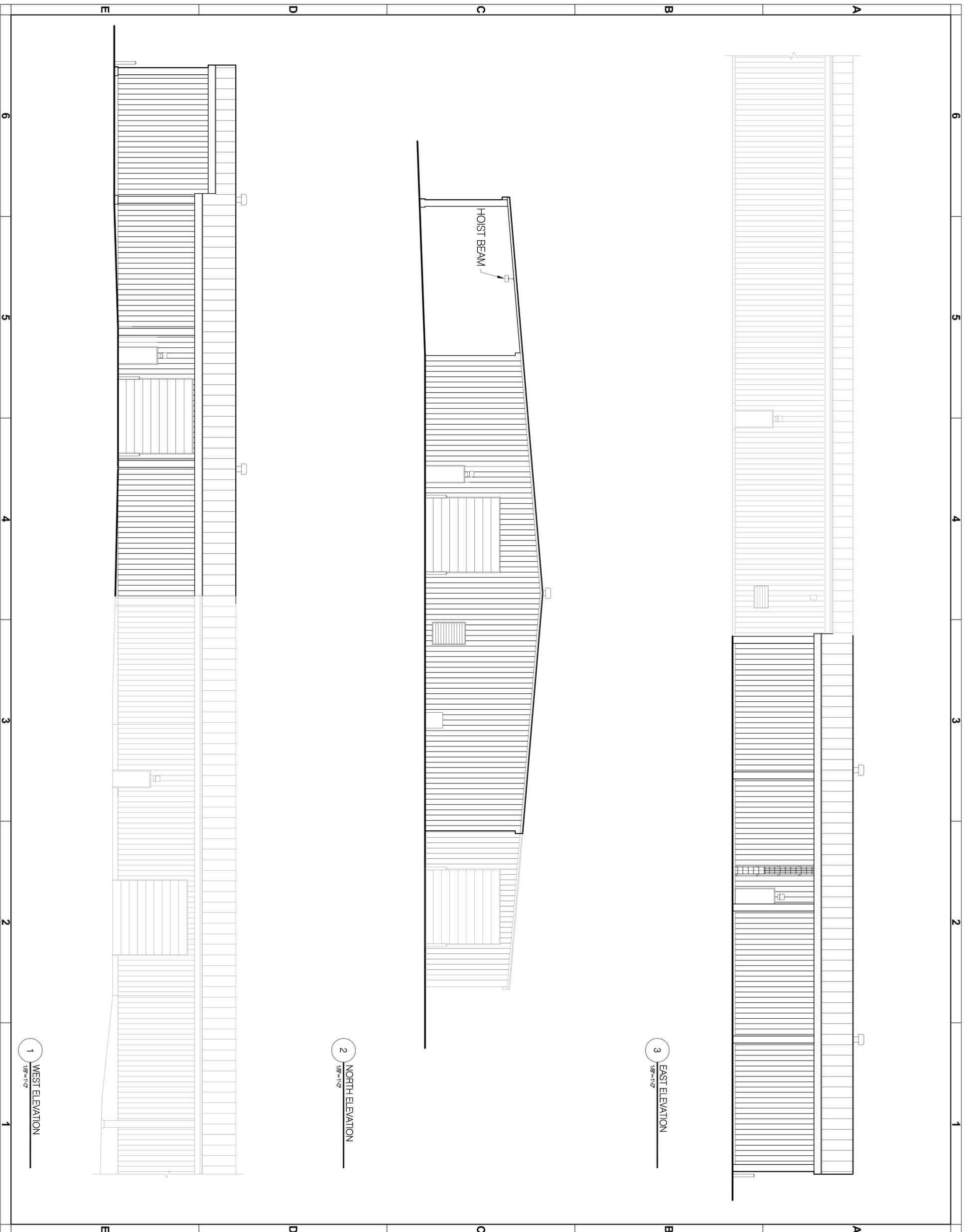
ROOF MOUNTED UNIT HEATER

G. Drawings



DWR SEED WAREHOUSE
 EPHRAIM, UTAH

| PLAN | | | |
|-------------|-------|-------|-------------|
| NO. | DATE | BY | DESCRIPTION |
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |
| DRWN BY | CRO | 09004 | CHECKED BY |
| PROJECT NO. | 09004 | | DATE |
| | | | 07/01/2009 |
| | | | A101 |



DWR SEED WAREHOUSE
 EPHRAIM, UTAH

ELEVATIONS

| NO. | DATE | BY | DESCRIPTION |
|-----|------|----|-------------|
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |

| | | |
|----------------------|---------------------|--|
| DRAWN BY CRO | CHECKED BY CHK | |
| PROJECT NO. 09004 | DRAWING NO. A201 | |
| DATE 07/01/2009 | | |