



State of Utah

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Department of Administrative Services

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Division of Facilities Construction and Management

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Director

## ADDENDUM #1

Date: May 25, 2010

To: Contractors

From: Michael Ambre, Project Manager, DFCM

Reference: New Intramural Field Restroom Building  
Utah Valley University - Orem, Utah  
Project No.10004790

Subject: **Addendum No. 1**

Pages	Addendum Coversheet	1 page
	<u>Architects Addendum</u>	<u>29 pages</u>
	Total	30 pages

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

While we contend that SB220 should only be potentially applicable to a contract issued after the effective date of said bill, this is to clarify that for purposes of this contract, regardless of the execution or effective dates of this contract, the status of Utah Law and remedies available to the State of Utah and DFCM, as it relates to any matter referred to or affected by said SB220, shall be the Utah law in effect at the time of the issuance of this Addendum.

**1.1 SCHEDULE CHANGES** – There are no changes to the project schedule.

**1.2 GENERAL** – P+A Architects - Please see attached.

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Where ideas connect

ADDENDUM NO. 1

Date: May 24th, 2010

PROJECT:

Utah Valley University  
Intramural Field New Restroom Facility  
Orem, Utah

ARCHITECT:

P+A ARCHITECTS  
821 EAST KENSINGTON AVENUE  
SALT LAKE CITY, UT 84105

The original Contract Documents issued for the above noted project are amended as noted in this Addendum. It shall be the sole responsibility of the bidder to appropriately disseminate this information to all concerned prior to the assigned bid time and date, and to coordinate the Addendum with the Contract Documents.

This Addendum consists of a total of Seventeen (27) 8 ½"x11" documents, including this document and a total of Two (2) revised 24"x36" construction documents.

If there are still unresolved questions after examining this addendum, please submit those questions via telephone or facsimile as soon as possible so that an addendum can be issued to clarify those issues in a timely manner.

Architectural:

1. See specification section 02300.3.20.B. Specification states that surplus satisfactory soil is to be relocated to a designated storage location on the owner's property. Satisfactory surplus soil can be spread out at the project site and used as landscaping fill. If the surplus soil is found to be unsatisfactory for landscaping fill a change order will be generated for the removal of that soil. All existing sod that is removed shall be legally disposed of off the owner's property at the contractors expense.
2. See specification section 07920 "Sheet Metal Flashing and Trim". Plans and specifications call for 22 and 25 gauge-galvanized steel. Sheet metal flashing and trim shall be pre-finished as per specification, 24-gauge aluminum.
3. See specification section 02530 "Sanitary Sewer" noting ductile iron be used for the sewer line. Ductile iron will not be used for the sanitary sewer line. See revised drawing A-SP101 indicating type of PVC product to use for the sanitary sewer line.
4. See specification section 02510 "Water Distribution" indicating ductile piping to be used. See revised drawing A-SP101 indicating type of water piping to use. Note new location of water piping and new stop and waste valve to be provided as per revised reference notes # 18 and # 20 on this drawing.
5. Note revised drawing A-SP101 indicating revised water line location.
6. Note revised drawing A-SP101 indicating spot elevations for top of concrete.
7. Note revised drawing A-G1001 indicating deferred submittals to be provided. Deferred submittals as per attached mechanical and electrical specification sections as provided with this addenda.
8. All exterior concrete slabs shall be 3500 psi.

Mechanical:

- I. See attached mechanical addenda no. I. with attached specification section I5241 Vibration Isolation and Seismic Restraints to be included in the project specification.

Electrical:

- I. See attached electrical addenda no. I including attached specification section I6073 Hangers and Supports for Electrical Systems and specification section I6074 Vibration and Seismic Controls For Electrical Systems to be included in the project specification.

End of Addendum I

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## ADDENDUM

**DATE:** May 21, 2010  
**PROJECT NO:** 9432  
**PROJECT:** UVU Restroom

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1. See attached specifications – 15241 Vibration Isolation and Seismic Restraint

**SECTION 15241-SEISMIC RESTRAINT AND VIBRATION ISOLATION**

All isolation materials, flexible connectors and seismic restraints shall be of the same vendor and shall be selected and certified using published or factory certified data. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

**PART 1 - SEISMIC DESIGN**

**1.1 DESCRIPTION**

The work in this section consists of furnishing engineering and materials necessary for the required seismic design of supports and attachments for systems and equipment contained herein for the project.

Other sections of DIVISION 21, 22 & 23 form a part of this section. Refer to all sections for a complete description of the work.

Unless otherwise specified, all mechanical, electrical, fire protection and plumbing equipment, pipe, and duct shall be restrained to resist seismic forces. Restraints shall maintain equipment, piping, and duct work in a captive position.

The 2006 IBC/ASCE 7-05 requires that mechanical & electrical components be assigned a component importance factor. This importance factor is used to determine which equipment may or may not be exempt from seismic design force requirements. The component importance factor is determined as follows:

- $I_p = 1.5$  Life-safety component is required to function after an earthquake.
- $I_p = 1.5$  Component contains hazardous or flammable material.
- $I_p = 1.5$  Storage racks in occupancies open to the general public (e.g., warehouse retail stores).
- $I_p = 1.0$  All other components.

In addition, for structures in Occupancy Category IV (Buildings having essential facility required for post earthquake recovery, and those containing substantial quantities of hazardous substances as designated by local building officials),

- $I_p = 1.5$  For components needed for continued operation of the facility or whose failure could impair the continued operation of the facility.

SEE PROJECT DOCUMENTS FOR COMPONENT AND SYSTEM  $I_p$ 's AND ALL OTHER DESIGN INFORMATION.

**1.2 GENERAL SEISMIC DESIGN REQUIREMENTS:**

Per IBC 1613.1, the seismic restraint of nonstructural components shall meet the requirements of ASCE 7. If the component in question is exempted by Section 13.1.4 of ASCE 7, a submittal noting that seismic restraint of that particular component is not required.

The seismic restraint design must meet the requirements listed in Table 13.2-1 of ASCE 7. These requirements may be met by providing a project-specific design prepared by a registered design

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professional in the state where the project is being constructed, and a manufacturer's certification that the component is seismically qualified.

On projects with Seismic Design Category A or B, seismic design or restraint is not required.

On projects with Seismic Design Category C:

Components with  $I_p = 1.0$  do not require seismic design or restraint.

Duct: Where duct  $I_p > 1.0$ , brace all duct  $> 5$  lb/lf

Pipe: Where pipe  $I_p > 1.0$ , brace all pipe  $> 2$ " diameter.

Equipment: Where equipment  $I_p > 1.0$ , provide anchorage or restraint design for all floor, wall mounted or suspended equipment.

On projects with Seismic Design Category D:

Seismic anchorage design is not required for floor mounted mechanical, electrical, and plumbing components where  $I_p = 1.0$  and flexible connections between the components and associated duct work, piping and conduit are provided, the components are mounted at 4 feet (1219 mm) or less above a floor level and they weigh 400 pounds (1780 N) or less.

Seismic anchorage or bracing is not required for hanging, wall mounted, and flexibly supported mechanical, plumbing and electrical components that weigh 20 pounds (89 N) or less, where  $I_p = 1.0$  and flexible connections are provided between the components and associated duct work, piping and conduit.

Where equipment  $I_p > 1.0$ , provide anchorage or restraint design for all floor, wall mounted or suspended equipment.

Duct: Where duct  $I_p = 1.0$ , brace all rectangular duct  $>$  and equal 6 sqft, all round duct  $> 33$ " diameter.

Where duct  $I_p > 1.0$ , brace all duct  $> 5$  lb/lf

Pipe: Where pipe  $I_p = 1.0$ , brace all pipe  $> 3$ " diameter.

Where pipe  $I_p > 1.0$ , brace all pipe  $> 1$ " diameter.

Equipment items installed in-line and rigidly mounted at the inlet and outlet to the duct system (e.g. fans, heat exchangers and humidifiers) with an operating weight less than 75 pounds (334 N) need not be braced if the duct run it is attached to is braced. Equipment with an operating weight greater than 75 lbs must be braced and supported independent of the duct.

Regardless of Seismic Design Category:

Seismic restraints are not required on piping supported by individual clevis hangers where the distance, as measured from the top of the pipe to the supporting structure, is less than 12 inches (305mm) for the entire pipe run and the pipe can accommodate the expected deflections. Trapeze or double rod hangers, where the distance from the top of the trapeze or support to the structure is less than 12 inches for the entire run. HVAC ducts suspended from hangers that are 12 inches (305 mm) or less in length from the top of the duct to the supporting structure and the hangers are detailed to avoid significant bending of the hangers and their connections. Duct must be positively attached to hanger with minimum #10 screws within 2" from the top of the duct. Hanger rods shall not be constructed in a manner that would subject the rod to bending moments (swivel, eye bolt, or vibration isolation hanger connection to structure are required to prevent bending moments when utilizing this exclusion). Displacement of the component shall not cause damaging impact with other utilities or the structure. Flexible connections are required between unbraced systems

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and equipment to accommodate differential displacements. Where HVAC systems  $I_p > 1.0$ , this exclusion shall not apply (per ASCE 7, 13.6.7).

Brace spacing for low deformability piping and duct (e.g., cast iron, PVC, fiberglass, glass, etc.) shall not exceed one half of the brace spacing of high deformability piping or duct.

Wherever systems or components are vibration isolated, seismic restraints must be designed to prevent short circuiting of the isolation systems.

**ANCHORAGE REQUIREMENTS:**

All post installed anchors utilized in the seismic design must be qualified for use in cracked concrete and approved for use with seismic loads.

Expansion anchors shall not be used for anchorage of equipment with motors rated over 10hp with the exception of undercut expansion anchors. Spring or internally isolated equipment are exempt from this requirement.

All beam clamps utilized for vertical support must also incorporate retention straps.

All seismic brace arm anchorages to include concrete anchors, beam clamps, truss connections, etc., must be approved for use with seismic loads.

Calculations and restraint device submittal drawings shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors, and minimum distances of anchors from concrete edges. Concrete anchor locations shall not be near edges, stress joints, or an existing fracture. All bolts shall be ASTM A307 or better.

Gravity supports must be designed by a licensed engineer in the project state for systems subject to seismic requirements as listed above. Gravity supports include primary support and anchorage of all distributed systems, riser supports, and supports for floor mounted utilities. Design is to include seismic loads in conjunction with dead loads as required by the IBC/ASCE 7.

See Part 2 for additional seismic restraint requirements associated with vibration isolated systems and components.

**1.3 MANUFACTURER'S RESPONSIBILITIES:**

The following seismic restraint manufacturers are accepted: International Seismic Application Technology (ISAT), Amber / Booth, Mason Industries Inc. (M.I.), Kinetics Noise Control Inc. (K.N.C.), Vibration Mounting & Controls, Inc. (V.M.C.) and Vibro Acoustics.

Determine vibration isolation and seismic restraint sizes and locations.

Provide installation instructions and shop drawings for all materials supplied under this section of the specifications.

Provide calculations to determine restraint loads resulting from seismic forces presented in local building code or IBC, Chapter 16 latest edition. Seismic calculations shall be certified by the manufacturers engineer licensed in the state of Utah

Seismic restraint load ratings must be certified and substantiated by testing or calculations under direct control of a registered professional engineer. Copies of testing and calculations must be submitted as part of submittal documents. OSHPD pre-approved restraint systems are exempt from this requirement if their pre-approval is current and based upon the IBC 2006 (i.e. OPA-07 pre-approval numbers).

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1.4 QUALITY CONTROL

All seismic restraint components exposed to the weather shall be zinc or cadmium-plated, epoxy coat or PVC coated, and/or galvanized steel. Nuts, bolts and washers may be zinc-electroplated. Restraints for outdoor mounted components shall provide adequate restraint for the greater of either wind or seismic loads required by local codes or withstand a minimum of 30 lb. / sq. ft. applied to any exposed surface of the equipment.

Seismic restraint designer must provide, in writing, the special inspection requirements for all Designated Seismic Systems as indicated in Chapter 17 of the IBC.

1.5 SUBMITTALS

Each contractor responsible for the installation of Designated Seismic Systems (systems with component  $I_p > 1.0$ ) must submit a "Statement of Responsibility" as required by Section 1706.1 of the IBC 2006, prior to beginning work on the system or component.

Submittal documents must include a "Basis for Design" or "Design Criteria" which includes a statement from the registered design professional that the design complies with the requirements of the ASCE 7-05, Chapter 13 and IBC 2006 chapter 1912/ACI 318 (concrete anchors).

Submittals must include seismic bracing layout drawings indicating the location of all seismic restraints. The submittal package must include seismic restraint details providing specific information relating to the materials, type, size, and locations of anchorages; materials used for bracing; attachment requirements of bracing to structure and component; and locations of transverse and longitudinal sway bracing and rod stiffeners.

Catalog cut sheets and installation instructions shall be included for each type seismic restraint used on equipment or components being restrained.

Submit special inspection requirements as required under 1.4 at time of seismic submittals.

Submittal drawings and calculations must be stamped by a registered professional engineer in the State where the project is being constructed who is responsible for the seismic restraint design. All seismic restraint submittals not complying with this certification will be rejected.

1.6 SEISMIC CERTIFICATION OF EQUIPMENT

For equipment or components where  $I_p = 1.0$ .

Submittal documents must include a "Basis for Design" or "Design Criteria" which includes a statement from the registered design professional that the design complies with the requirements of the ASCE 7-05, Chapter 13 and IBC 2006 chapter 1912/ACI 318 (concrete anchors). In addition, the basis for compliance must also be noted, as listed below:

- Project specific design documentation prepared and submitted by a registered design professional (ASCE 7, 13.2.1.1)
- Submittal of the manufacturer's certification that the equipment is seismically qualified by:
  - o An engineered analysis conforming to the requirements of Chapter 13 of ASCE 7.

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- Testing by a nationally recognized testing standard procedure such as ICC-ES AC 156. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
- Experience data conforming to a nationally recognized procedure. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.

Special Certification requirements for Designated Seismic Systems (i.e.  $I_p > 1.0$ ):

Seismic Certificates of Compliance supplied by manufacturers shall be submitted for all components that are part of Designated Seismic Systems. In accordance with the ASCE 7, certification shall be via one of the following methods:

For active mechanical and electrical equipment that must remain operable following the design earthquake:

- Testing as detailed by part c above.
- Experience data as detailed by part c above.
- Equipment that is considered “rugged” per part c above.

Components with hazardous contents shall be certified by the manufacturer as maintaining containment following the design earthquake by:

- Testing as detailed by part c above.
- Experience data as detailed by part c above.
- Engineering analysis utilizing dynamic characteristics and forces. Tanks (without vibration isolators) designed by a registered design professional in accordance with ASME Boiler and Pressure Vessel Code, 2004 (BPVC 2004), and satisfying the force and displacement requirements of Sections 13.3.1 and 13.3.2 of ASCE 7-05 having an importance factor,  $I = 1.5$  and reviewed by DFCM shall be considered to satisfy the Special Seismic Certification requirements on the basis of ASCE 7-05 Section 13.6.9.

## 1.7 INSTALLATION

Comply with manufacturer/engineer’s instructions for the installation of seismic restraint materials and products.

## PART 2 - VIBRATION ISOLATION

See Part 1 for seismic design requirements. Additional seismic design requirements are outlined below where they pertain specifically to vibration isolated components or systems.

### 2.1 DESCRIPTION

The work in this section consists of furnishing engineering and materials necessary for vibration isolation for systems and equipment contained herein for the project.

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Other sections of DIVISION 22 & 23 form a part of this section. Refer to all sections for a complete description of the work.

All mechanical equipment .75 HP and over listed in the equipment schedule shall be mounted on vibration isolators to prevent the transmission of objectionable vibration and vibration induced sound to the building structure.

All isolation materials, flexible connectors and seismic restraints shall be of the same vendor and shall be selected and certified using published or factory certified data. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

The contractor and vendor of the isolation and seismic restraints for floor mounted equipment shall refer to the isolator and seismic restraint schedule which lists isolator types, isolator deflections and seismic restraint type. Vibration isolators shall be selected in accordance with the equipment, pipe or duct weight distribution so as to produce reasonably uniform deflections.

## 2.2 MANUFACTURER'S RESPONSIBILITIES:

Manufacturer of vibration and seismic restraint products shall have the following responsibilities:

Determine vibration isolation and seismic restraint sizes and locations.

Provide installation instructions and shop drawings for all materials supplied under this section of the specifications.

Provide calculations to determine equipment restraint loads resulting from seismic forces presented in local building code or IBC, Chapter 16 latest edition. Seismic calculations shall be certified by the manufacturers engineer licensed in the state of Utah.

Seismic restraint load ratings must be certified and substantiated by testing or calculations under direct control of a registered professional engineer.

Calculations and restraint device submittal drawings shall meet the requirements of Part 1, Seismic Design.

## 2.3 QUALITY CONTROL

The isolators and seismic restraint systems listed herein are as manufactured by International Seismic Application Technology (ISAT), Amber / Booth, Mason Industries Inc. (M.I.), Kinetics Noise Control Inc. (K.N.C.), California Dynamics (CalDyn), Vibration Mounting & Controls, Inc. (V.M.C.) and Vibro Acoustics.

Steel components shall be cleaned and painted with industrial enamel. All nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with zinc-chromate or metal etching primer.

All isolators, bases and seismic restraints exposed to the weather shall utilize weather resistant plating, epoxy coat or PVC coated springs and galvanized steel components. Nuts, bolts and washers may be zinc-electroplated. Isolators for outdoor mounted equipment shall provide adequate restraint for the greater of either wind loads required by local codes or withstand a minimum of 30 lb. / sq. ft. applied to any exposed surface of the equipment.

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Vibration isolation designer must provide a written special inspection plan as indicated in Chapter 17 of the IBC.

## 2.4 SUBMITTALS

Submit shop drawings of all isolators, seismic restraints and calculations provided.

The manufacturer of vibration isolation products shall submit the following data for each piece of isolated equipment: clearly identified equipment tag, quantity and size of vibration isolators and seismic restraints for each piece of rotating isolated equipment. Submittals for mountings and hangers incorporating springs shall include spring diameter and free height, rated deflections, and solid load. Submittals for bases shall clearly identify locations for all mountings as well as all locations for attachment points of the equipment to the mounting base. Submittals shall include seismic calculations signed and checked by a qualified licensed engineer in the state where the project is being constructed. Catalog cut sheets and installation instructions shall be included for each type of isolation mounting or seismic restraint used on equipment being isolated.

Submit special inspection requirements as required under 2.4 at time of isolator/seismic submittals. Submittal must be stamped by a registered Utah professional engineer who is responsible for the vibration isolation and seismic restraint design. All vibration isolation not complying with this certification will be rejected.

Submittal documents must include a "Basis for Design" or "Design Criteria" which includes a statement from the registered design professional that the design complies with the requirements of the ASCE 7-05, Chapter 13 and IBC 2006 chapter 1912/ACI 318 (concrete anchors). In addition, the basis for compliance must also be noted, as listed below:

- Project specific design documentation prepared and submitted by a registered design professional (ASCE 7, 13.2.1.1)
- Submittal of the manufacturer's certification that the isolation equipment is seismically qualified by:
  - o An engineered analysis conforming to the requirements of Chapter 13 of ASCE 7.
  - o Testing by a nationally recognized testing standard procedure such as ICC-ES AC 156. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
  - o Experience data conforming to a nationally recognized procedure. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.

## 2.5 VIBRATION ISOLATION PRODUCTS

### ISOLATORS

Specification W: a pad type mounting consisting of two layers of ribbed elastomeric pads with a ½" poro-elastic vibration absorptive material bonded between them. Pads shall be sized for approximate deflection of 0.10" to 0.18". Pads shall be Amber / Booth Type NRC or equal.

Specification A: an elastomeric mounting having a steel baseplate with mounting holes and a threaded insert at top of the mounting for attaching equipment. All metal parts shall be completely embedded in the

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elastomeric material. Mountings shall be designed for approximately 1/2" deflection, and incorporate a steel seismic snubber with all directional restraint. Mountings shall be Amber/Booth Type SRVD or equal.

Specification B: an adjustable, freestanding, open spring mounting with combination leveling and equipment fastening bolt. The spring shall be welded to the spring mounting baseplate and compression plate for stability. The isolator shall be designed for a minimum  $k_x/k_y$  (horizontal-to-vertical spring rate) of 1.0. An elastomeric pad having a minimum thickness of 1/4" shall be bonded to the baseplate. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. This type isolator must be used with specification SL seismic restraint (section 2.3.1). Isolators shall be Amber/Booth Type SW or equal.

Specification C: a unitized adjustable, stable open spring isolator with a seismic restraint housing which serves as a blocking device during equipment installation. The spring package shall include an elastomeric pad for high frequency absorption at the base of the spring. The springs shall be designed for a minimum  $k_x/k_y$  (horizontal-to-vertical spring rate) of 1.0. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. The spring assembly shall be removable with equipment in place and shall fit within a welded steel enclosure consisting of a top plate and rigid lower housing. Isolated seismic restraint bolts shall connect top plate to lower housing to resist seismic and wind forces in all directions and limit motion to a maximum of 1/4" movement before engaging. Surfaces that engage under seismic motion shall be cushioned with a resilient elastomeric pad or grommet to protect equipment. Top plate shall have adequate means for fastening to the equipment, and baseplate shall have adequate means for bolting to structure. Entire assembly shall be rated to exceed the applied seismic load (para 1.3.4.). Seismic isolator shall be Amber/Booth Type CTER or equal.

Specification D: an elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, 30 degree rod misalignment and an elastomeric isolation element designed for approximately 1/2" deflection. Hangers shall be Amber/Booth Type BRD or equal.

Specification E: a combination spring and elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, 30 degree rod misalignment, coil spring, spring retainers and elastomeric element designed for approximately 1/2" deflection. The spring shall be designed for a minimum  $k_x/k_y$  (horizontal-to-vertical spring rate) of 1.0. Spring hangers shall be Amber/Booth Type BSRA or equal.

Specification F: a set (two or more) of spring thrust resisting assemblies, which consist of coil springs, spring retainer, isolation washer, angle mounting brackets, and elastomeric tubing for isolating thrust resistor rod from fan discharge. Thrust restraints shall be Amber / Booth Type TRK or equal.

Specification SB: a unitized adjustable open spring isolator and a welded steel housing designed to resist seismic forces in all directions. Restraint surfaces which engage under seismic motion shall be cushioned with a resilient elastomer to protect equipment. Restraints shall allow a maximum of 1/4" movement before engaging and shall allow for the spring to be changed if required. Isolator shall be a stable spring with a minimum  $k_x/k_y$  of 1.0. The spring package shall include an elastomeric pad for high frequency absorption at the base of the spring. Nuts and bolts shall be zinc-electroplated to prevent corrosion. Bolting equipment to isolator with bolts smaller than main adjusting bolt will not be allowed.

Base plate shall provide means for bolting to the structure. Entire assembly shall be rated to exceed the applied seismic load. Mountings shall be Amber/Booth Type SWSR or equal.

#### BASES

Specification G: a welded integral structural steel fan and motor base with NEMA standard motor slide rails and holes drilled to receive the fan and motor slide rails. The steel members shall be adequately sized to prevent distortion and misalignment of the drive, and specifically, shall be sized to limit deflection of the beam on the drive side to 0.05" due to starting torque. Snubbers to prevent excessive motion on starting or stopping shall be furnished if required; however, the snubbers shall not be engaged under steady running conditions. Bases shall be Amber/Booth Type SFB or equal.

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Specification H: a welded WF (main member) structural steel base for increasing rigidity of equipment mounted thereon or for unitizing belt driven fans. Fan bases shall have holes drilled to match fan and located to provide required center distance between fan and supplied NEMA standard motor slide rails. The steel members shall have minimum depth of 1/12" of the longest span, but not less than 6" deep. Junior beams and junior channels shall not be used. Cross members shall be provided where necessary to support the equipment or to prevent twisting of the main members. Where height restrictions prevent the use of members having a depth of 1/12 of the longest span, beams of less depth may be used provided they have equal rigidity. Provide height-saving brackets for side mounting of the isolators. Brackets for use with Specification type B isolators having 2.5" deflection or greater shall be of the precompression type to limit exposed bolt length. Bases shall be Amber/Booth Type WSB or equal.

Specification J: a concrete inertia base consisting of perimeter structural steel concrete pouring form (CPF), reinforcing bars welded in place, bolting templates with anchor bolts and height-saving brackets for side mounting of the isolators. Brackets for use with Specification type B isolators having 2.5" deflection or greater shall be of the pre-compression type to limit exposed bolt length. The perimeter steel members shall have a minimum depth of 1/12 of the longest span, but not less than 6" deep. The base shall be sized with a minimum overlap of 4" around the base of the equipment and, in the case of belt-driven equipment, 4" beyond the end of the drive shaft. Fan bases are to be supplied with NEMA standard motor slide rails. The bases for pumps shall be sized to support the suction elbow of end suction pumps and both the suction and discharge elbows of horizontal split-case pumps. The bases shall be T-shaped where necessary to conserve space. Inertia bases shall be Amber/Booth Type CPF or equal.

#### PIPE GUIDES AND ANCHORS FOR ISOLATED PIPING

Specification M: For Pipe Guides where specifically shown on drawings to accommodate expansion loops and compensators, the vibration isolator manufacturer shall provide pipe guides consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum, half inch thickness of heavy duty neoprene and duck or elastomeric isolation material. Guides shall be Amber/ Booth type AG or equal.

Specification N: For anchors where specifically shown on drawings to accommodate expansion loops and compensators, the vibration isolator manufacturer shall provide all directional acoustical pipe anchors consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum half inch thickness of heavy duty neoprene and duck or elastomeric isolation material. All-directional anchors shall be Amber/Booth type AG or equal.

## 2.6 EXECUTION

Isolator and seismic restraints shall be installed as recommended by the manufacturer. Isolate all mechanical equipment 0.75 hp and over per the isolation schedule and these specifications.

#### PIPING ISOLATION

Horizontal Pipe Isolation: all HVAC pumped water, pumped condensate, glycol, and refrigerant piping size 1-1/4" and larger within mechanical rooms shall be isolated. Outside equipment rooms this piping shall be isolated for the greater of 50' or 100 pipe diameters from rotating equipment. For the first 3 support locations from externally isolated equipment provide specification E hangers or specification SB or SX floor mounts with the same deflection as equipment isolators (max 2"). All other piping within the equipment rooms shall be isolated with the same specification isolators with a 3/4" minimum deflection. Steam piping size 1-1/4" and larger which is within an equipment room and connected to rotating equipment shall be isolated for three (3) support locations from the equipment. Provide specification E or SB (SX) isolators with the same deflection as the equipment but a minimum of 3/4"

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Pipe Riser Isolation: All variable temperature vertical pipe risers 1-1/4" and larger, riser piping requiring isolation per para. 3.2.1 or 3.2.2 or where specifically shown and detailed on riser drawings shall be fully supported by specification B mounts with precompression plates. Steel spring deflection shall be 3/4-inch minimum except in those locations where added deflection is required due to pipe expansion and contraction. Spring deflection shall be a minimum of 4 times the anticipated deflection change. Springs shall be selected to keep the riser in tension. Pipe risers up through 16" shall be supported at intervals of every third floor of the building. Pipe risers 18" and over, every second floor. Wall sleeves for take-offs from riser shall be sized for insulation O.D. plus two times the anticipated movement to prevent binding. Horizontal take-offs and at upper and lower elbows shall be supported with spring isolators as required to accommodate anticipated movement. In addition to submittal data requirements previously outlined, riser diagrams and calculations shall be submitted for approval. Calculations must show anticipated expansion and contraction at each support point, initial and final loads on the building structure, and spring deflection changes. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist if installed per design proposed. Riser supports shall be Amber/Booth Type SWP or equal.

DUCT ISOLATION:

Isolate all duct work with a static pressure 2" W.C. and over in equipment rooms and to minimum of 50 feet from the fan or air handler. Use specification type E hangers or type SB (SX) floor mounts or equal.

2.7 INSTALLATION

Comply with manufacturer's instructions for the installation and load application of vibration isolation materials and products. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary support during installation or shipping.

Locate isolation hangers as near the overhead support structure as possible.

Adjust leveling devices as required to distribute loading uniformly on isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.

Install isolated inertia base frames and steel bases on isolator units as indicated so that a minimum of 2 inch clearance below base will result when supported equipment has been installed and loaded for operation.

Roof curbs shall be installed directly to building structural steel or concrete roof deck. Installation on top of steel deck or roofing material is not acceptable.

APPLICATION OF SEISMIC RESTRAINTS

All floor mounted isolated equipment shall be protected with type SB or type C unitized isolator and restraint or with separate type SL restraints (minimum of 4) in conjunction with type B isolators. For equipment with high center of gravity additional cable restraints shall be furnished, as required by isolation manufacturer, to limit forces and motion caused by rocking.

Floor mounted which are exempt (section 2.2.) shall be protected by properly sized anchor bolts with elastomeric grommets provided by the isolation manufacturer

Where riser pipes pass through cored holes, core diameters to be a maximum of 2" larger than pipe O.D. including insulation. Cored holes must be packed with resilient material or firestop as provided by other sections of this specification or local codes. Restrained isolators type C or SB shall support risers and

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provide longitudinal restraint at floors where thermal expansion is minimal and will not bind isolator restraints.

QUALITY ASSURANCE

Representative of vibration isolation system manufacturer to walk the project and provide documentation indicating conformance to vibration isolation design intent (see example below)

EQUIPMENT ISOLATION SCHEDULE (1)(4)									
EQUIPMENT	LOCATI ON								
	A' CRITIC AL (35'-50' SPAN)			B' UPPER STORY (20'-35' SPAN)			C' GRADE		
	ISOLA TOR TYPE	MINIM UM DEFLE CTION (IN)	BASE (1) TYPE	ISOLA TOR TYPE	MINIM UM DEFLE CTION (IN)	BASE (1) TYPE	ISOLA TOR TYPE	MINIM UM DEFLEC TION (IN)	BASE (1) TYPE
CENTRIFUGAL FANS CL. I & II UP TO 54-112" W.D.									
UPT015HP	SWISW SR	1.5	SFB	SWISW SR	0.75	SFB	SWISW SR	0.75	SFB
20-50 HP	SW	2.5	CPF	SWISW SR	1.5	CPF	SWISW SR	0.75	SFB
60 HP & OVER	SW	3.5	CPF	SW	2.5	CPF	SWISW SR	1.5	SFB
CL. I & II 60" W.D. & OVERI ALL CL. III FANS									
UPT015HP	SW	2.5	CPF	SWISW SR	1.5	CPF	SWISW SR	0.75	CPF
20-50 H P	SW	2.5	CPF	SW	2.5	CPF	SWISW SR	1.5	CPF
60 HP & OVER	SW	3.5	CPF	SW	2.5	CPF	SWISW SR	1.5	CPF
CABINET FANS, FANS SECTIONS (2)									
FLOOR MTD. UP TO 15 HP	SWSR	1.5		SWSR	0.75		SWSR	0.75	
20 HP & OVER SUSPENDED (4)	SW	2.5	CPF	SWSR	1.5		SWSR	0.75	
UP TO 15 HP	PBSRA	1.75		BSR A	1		BSRA	0.75	
20 HP & OVER	PBSRA	2.5	WSB	PBSR A	1.75		BSRA	1.75	

END OF SECTION 15241

## ADDENDUM

DATE: May 20, 2010  
PROJECT NO: 9432  
PROJECT: UVU Restroom

### DIVISION - 16

#### PRIOR APPROVALS

The following manufacturers, trade names and products are allowed to bid on a name brand only basis with the provision that they completely satisfy all and every requirement of the drawings, specifications and all addenda shall conform to the design, quality and standards specified, established and required for the complete and satisfactory installation and performance of the building and all its respective parts.

<u>Item</u>	<u>Manufacturer</u>	<u>Comments</u>
L1	SW-9-32-D-C-W-120/277-EL-16-30-AP-W	LC DOANE
L2	80-4-2-32-WG-8014-EB2-120/277-VBY(2)	HEWILLIAMS
L3	TL110A-PL-32-120/277-PCX	TRACELITE
L3E	TL110A-PL-32-120/277-PCX-EM(0 DEGREE STARTING TEMP.)	TRACELITE

Document1

SECTION 16073 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

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1.7 SUBMITTALS

- A. Deferred-Design Submittal: For hangers and supports for electrical systems details indicated to comply with performance requirements and design criteria, support calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Submittals shall be submitted to and approved by authorities having jurisdiction prior to submitting them to Architect.
  - 2. Shop Drawings shall be prepared by persons with the following qualifications:
    - a. Qualified Professional engineer licensed in the state of Utah.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  - 2. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  - 3. Toggle Bolts: All-steel springhead type.
  - 4. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

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PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
  - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27 complying with MSS SP-69 Spring-tension clamps.
  - 7. To Light Steel: Sheet metal screws.
  - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- C. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 PAINTING

- A. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

END OF SECTION 16073

SECTION 16074 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Isolation pads.
  - 2. Spring isolators.
  - 3. Restrained spring isolators.
  - 4. Channel support systems.
  - 5. Restraint cables.
  - 6. Hanger rod stiffeners.
  - 7. Anchorage bushings and washers.
- B. Related Sections include the following:
  - 1. Division 16 Section "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. SEISMIC RESTRAINT
  - 1. The work in this section consists of furnishing engineering and materials necessary for vibration isolation and seismic restraints for equipment contained herein for the project.
  - 2. Other sections of DIVISION 16 form a part of this section. Refer to all sections for a complete description of the work.
  - 3. All electrical equipment .75 HP and over listed in the equipment schedule shall be mounted on vibration isolators to prevent the transmission of objectionable vibration and vibration induced sound to the building structure.
  - 4. All isolation materials, flexible connectors and seismic restraints shall be of the same manufacturer and shall be selected and certified using published or factory certified data. Any variance or non-

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compliance with these specification requirements shall be corrected by the contractor in an approved manner.

5. The contractor and manufacturer of the isolation and seismic equipment shall refer to the isolator and seismic restraint schedule which lists isolator types, isolator deflections and seismic restraint type. Vibration isolators shall be selected in accordance with the equipment or conduit weight distribution so as to produce reasonably uniform deflections.
6. Unless otherwise specified, all electrical equipment and conduit shall be restrained to resist seismic forces. Restraints shall maintain equipment and conduit in a captive position. Restraint devices shall be designed and selected to meet the seismic requirements as defined in the latest issue of the IBC or local jurisdiction building code.
7. These exceptions are based on IBC 2006. Verify local code is the same. The 2006 IBC requires that electrical components be given an importance factor. This importance factor is used to determine which equipment may or may not be exempt from seismic design force requirements. The component importance factor is determined as follows:

$I_p = 1.5$	Life-safety component is required to function after an earthquake.
$I_p = 1.5$	Component contains hazardous or flammable material.
$I_p = 1.5$	Storage racks in occupancies open to the general public (e.g., warehouse retail stores).
$I_p = 1.0$	All other components.

8. In addition, for structures in Seismic Use Group IV (Buildings having essential facility required for post earthquake recovery, and those containing substantial quantities of hazardous substances as designated by local building officials),

$I_p = 1.5$	For components needed for continued operation of the facility or whose failure could impair the continued operation of the facility. This project shall use an $I_p = 1.5$ .
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**B. SEISMIC RESTRAINT SHALL NOT BE REQUIRED FOR THE FOLLOWING:**

1. Rigidly floor mounted electrical components in all seismic design categories, where  $I_p = 1.0$  and flexible connections between the components and associated conduit are provided, that are mounted at 4 feet (1219 mm) or less above a floor level and weight 400 pounds (1780 N) or less and are not critical to the continued operation of the structure. Suspended, wall mounted and flexibly mounted equipment are not included in this exclusion.
2. Hanging, wall mounted, and flexibly supported electrical components that weigh 20 pounds (89 N) or less, where  $I_p = 1.0$  and flexible connections are provided between the components and associated conduit.
3. Conduit supported by individual clevis hangers where the distance, as measured from the top of the conduit to the supporting structure, is less than 12 inches (305mm) for the entire conduit run and the conduit can accommodate the expected deflections. Trapeze or double rod hangers where the distance from the top of the trapeze or support to the structure is less than 12 inches for the entire run. Hanger rods shall not be constructed in a manner that would subject the rod to bending moments (swivel, eye bolt, or vibration isolation hanger connection to structure).
4. High deformability conduit (steel, aluminum with screwed connections) designated as having an  $I_p = 1.5$  and a nominal size of 1 inch (25 mm) or less where provisions are made to protect the conduit from impact or to avoid the impact of larger conduit, piping or other equipment. Note, any combination of conduit supported on a trapeze where the total weight exceeds 10 lb/ ft. must be braced.
5. High deformability conduit (steel, aluminum with screwed connections) and limited deformability conduit (PVC) designated with an  $I_p = 1.0$  and a nominal conduit size of 1 inch and less in the electrical equipment room, or 2" and less outside the electrical equipment room.

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6. Equipment items installed in-line with the mechanical duct system (e.g, fans, heat exchangers and humidifiers) with an operating weight less than 76 pounds (334 N). Equipment must be rigidly attached to duct at inlet and outlet.

C. MANUFACTURER'S RESPONSIBILITIES:

1. Manufacturer of vibration and seismic control products shall have the following responsibilities:
  - a. Determine vibration isolation and seismic restraint sizes and locations.
  - b. Provide conduit and equipment isolation systems and seismic restraints as scheduled or specified.
  - c. Provide installation instructions and shop drawings for all materials supplied under this section of the specifications.
  - d. Provide calculations to determine restraint loads resulting from seismic forces presented in local building code or IBC, Chapter 16 latest edition. Seismic calculations shall be certified by a licensed engineer in the employ of the seismic equipment manufacturer with a minimum 5 years experience. Provide calculations for all floor or roof mounted equipment 400lbs (1780 N) or greater (20lbs (89 N) or greater for  $I_p=1.5$ ), all suspended or wall mounted equipment 20lbs (89 N) or greater, and vibration isolated equipment 20lbs (89 N) or greater.
  - e. Seismic restraint load ratings must be certified and substantiated by testing or calculations under direct control of a registered professional engineer.
  - f. Calculations and restraint device submittal drawings shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors, and minimum distances of anchors from concrete edges. Concrete anchor locations shall not be near edges, stress joints, or an existing fracture. All bolts shall be ASTM A307 or better.

1.5 QUALITY ASSURANCE

- A. The isolators and seismic restraint systems manufacturer shall be a member of the Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).
- B. Steel components shall be cleaned and painted with industrial enamel. All nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with zinc-chromate or metal etching primer.
- C. All isolators, bases and seismic restraints exposed to the weather shall utilize cadmium-plated, epoxy coat or PVC coated springs and hot dipped galvanized steel components. Nuts, bolts and washers may be zinc-electroplated. Isolators for outdoor mounted equipment shall provide adequate restraint for the greater of either wind loads required by local codes or withstand a minimum of 30 lb. / sq. ft. applied to any exposed surface of the equipment.
- D. Provide a written quality control procedure that outlines complete compliance of attachment of cabling restraints to brackets. For swaged connections, provide a gage to verify swage. For screw/clamp connection, provide torque values for attachment fasteners.

1.6 SUBMITTALS

- A. Deferred-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, seismic calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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- 1) Submittals shall be submitted to and approved by authorities having jurisdiction prior to submitting them to Architect.
  - 2) Shop Drawings shall be prepared by persons with the following qualifications:
    - a) Qualified Professional engineer licensed in the state of Utah.
- B. The manufacturer of vibration isolation products shall submit the following data for each piece of isolated equipment: clearly identified equipment tag, quantity and size of vibration isolators and seismic restraints for each piece of rotating isolated equipment. Submittals for mountings and hangers incorporating springs shall include spring diameter and free height, rated deflections, and solid load. Submittals for bases shall clearly identify locations for all mountings as well as all locations for attachment points of the equipment to the mounting base. Submittals shall include seismic calculations signed and checked by a qualified licensed engineer in the employ of the manufacturer of the vibration isolators. Catalog cut sheets and installation instructions shall be included for each type of isolation mounting or seismic restraint used on equipment being isolated.
- C. Submit quality assurance procedures as required under 1.4.4 at time of isolator/seismic submittals. Submittal must be stamped by a registered professional engineer who is responsible for the seismic restraint design. All vibration isolation/seismic submittals not complying with this certification will be rejected.
- D. Provide shop drawings indicating location of all specification SC cable restraints required. Drawings must be stamped by manufacturer's registered professional engineer.
- E. Electrical equipment manufacturers shall provide certification that their equipment is capable of resisting expected seismic loads without failure. Equipment manufacturers shall provide suitable attachment points and/or instructions for attaching seismic restraints.
- F. Provide a certification from the seismic design engineer that the seismic restraints will comply with the applicable code requirements. Certification must be stamped by a registered profession engineer.
- G. Provide a Certificate of Completion from the manufacturer's representative upon completion of the job.

## PART 2 - PRODUCTS

### 2.1 VIBRATION ISOLATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Amber/Booth Company, Inc.
  2. Kinetics Noise Control.
  3. Mason Industries.
  4. Vibration Mountings & Controls, Inc.
  5. Vibro Acoustics
- B. Specification W: a pad type mounting consisting of two layers of ribbed elastomeric pads with a 1/2" porous elastic vibration absorptive material bonded between them. Pads shall be sized for approximate deflection of 0.10" to 0.18". Pads shall be Amber / Booth Type NRC.

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- C. Specification A: an elastomeric mounting having a steel baseplate with mounting holes and a threaded insert at top of the mounting for attaching equipment. All metal parts shall be completely embedded in the elastomeric material. Mountings shall be designed for approximately 1/2" deflection, and incorporate a steel seismic snubber with all directional restraint. Mountings shall be Amber/Booth Type SRVD.
- D. Specification B: an adjustable, freestanding, open spring mounting with combination leveling and equipment fastening bolt. The spring shall be welded to the spring mounting baseplate and compression plate for stability. The isolator shall be designed for a minimum  $k_x/k_y$  (horizontal-to-vertical spring rate) of 1.0. An elastomeric pad having a minimum thickness of 1/4" shall be bonded to the baseplate. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. This type isolator must be used with specification SL seismic restraint (section 2.3.1). Isolators shall be Amber/Booth Type SW.
- E. Specification C: a unitized adjustable, stable open spring isolator with a seismic restraint housing which serves as a blocking device during equipment installation. The spring package shall include an elastomeric pad for high frequency absorption at the base of the spring. The springs shall be designed for a minimum  $k_x/k_y$  (horizontal-to-vertical spring rate) of 1.0. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. The spring assembly shall be removable with equipment in place and shall fit within a welded steel enclosure consisting of a top plate and rigid lower housing. Isolated seismic restraint bolts shall connect top plate to lower housing to resist seismic and wind forces in all directions and limit motion to a maximum of 1/4" movement before engaging. Surfaces that engage under seismic motion shall be cushioned with a resilient elastomeric pad or grommet to protect equipment. Top plate shall have adequate means for fastening to the equipment, and baseplate shall have adequate means for bolting to structure. Entire assembly shall be rated to exceed the applied seismic load (para 1.3.4.). Seismic isolator shall be Amber/Booth Type CTER.
- F. Specification D: an elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, 30 degree rod misalignment and an elastomeric isolation element designed for approximately 1/2" deflection. Hangers shall be Amber/Booth Type BRD.
- G. Specification E: a combination spring and elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, 30 degree rod misalignment, coil spring, spring retainers and elastomeric element designed for approximately 1/2" deflection. The spring shall be designed for a minimum  $k_x/k_y$  (horizontal-to-vertical spring rate) of 1.0. Spring hangers shall be Amber/Booth Type BSRA.
- H. Specification F: a set (two or more) of spring thrust resisting assemblies, which consist of coil springs, spring retainer, isolation washer, angle mounting brackets, and elastomeric tubing for isolating thrust resistor rod from fan discharge. Thrust restraints shall be Amber / Booth Type TRK.
- I. Specification SB: a unitized adjustable open spring isolator and a welded steel housing designed to resist seismic forces in all directions. Restraint surfaces which engage under seismic motion shall be cushioned with a resilient elastomer to protect equipment. Restraints shall allow a maximum of 1/4" movement before engaging and shall allow for the spring to be changed if required. Isolator shall be a stable spring with a minimum  $k_y/k_y$  of 1.0. The spring package shall include an elastomeric pad for high frequency absorption at the base of the spring. Nuts and bolts shall be zinc-electroplated to prevent corrosion.
  - 1. Bolting equipment to isolator with bolts smaller than main adjusting bolt will not be allowed.
  - 2. Base plate shall provide means for bolting to the structure. Entire assembly shall be rated to exceed the applied seismic load. Mountings shall be Amber/Booth Type SWSR.

2.2 Bases

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- A. Specification G: a welded integral structural steel fan and motor base with NEMA standard motor slide rails and holes drilled to receive the fan and motor slide rails. The steel members shall be adequately sized to prevent distortion and misalignment of the drive, and specifically, shall be sized to limit deflection of the beam on the drive side to 0.05" due to starting torque. Snubbers to prevent excessive motion on starting or stopping shall be furnished if required; however, the snubbers shall not be engaged under steady running conditions. Bases shall be Amber/Booth Type SFB.
- B. Specification H: a welded WF (main member) structural steel base for increasing rigidity of equipment mounted thereon or for unitizing belt driven fans. Fan bases shall have holes drilled to match fan and located to provide required center distance between fan and supplied NEMA standard motor slide rails. The steel members shall have minimum depth of 1/12" of the longest span, but not less than 6" deep. Junior beams and junior channels shall not be used. Cross members shall be provided where necessary to support the equipment or to prevent twisting of the main members. Where height restrictions prevent the use of members having a depth of 1/12 of the longest span, beams of less depth may be used provided they have equal rigidity. Provide height-saving brackets for side mounting of the isolators. Brackets for use with Specification type B isolators having 2.5" deflection or greater shall be of the precompression type to limit exposed bolt length. Bases shall be Amber/Booth Type WSB.
- C. Specification J: a concrete inertia base consisting of perimeter structural steel concrete pouring form (CPF), reinforcing bars welded in place, bolting templates with anchor bolts and height-saving brackets for side mounting of the isolators. Brackets for use with Specification type B isolators having 2.5" deflection or greater shall be of the pre-compression type to limit exposed bolt length. The perimeter steel members shall have a minimum depth of 1/12 of the longest span, but not less than 6" deep. The base shall be sized with a minimum overlap of 4" around the base of the equipment and, in the case of belt-driven equipment, 4" beyond the end of the drive shaft. Fan bases are to be supplied with NEMA standard motor slide rails. The bases for pumps shall be sized to support the suction elbow of end suction pumps and both the suction and discharge elbows of horizontal split-case pumps. The bases shall be T-shaped where necessary to conserve space. Inertia bases shall be Amber/Booth Type CPF.

### 2.3 Seismic Restraints

- A. Specification SL: a restraint assembly for floor mounted equipment consisting of welded steel interlocking assemblies welded or bolted securely to the equipment or the equipment bases and to the supporting structure. Restraint assembly surfaces which engage under seismic motion shall be lined with a minimum 1/4" thick resilient elastomeric pad to protect equipment. Restraints shall be field adjustable and be positioned for 1/4" clearance as required to prevent interference during normal operation. Restraint assembly shall have minimum rating of 2 times the catalog rating at 1 G as certified by independent laboratory test. Restraint shall be Amber/Booth Type ER.
- B. Specification SC: a restraint assembly for suspended equipment or conduit consisting of high strength galvanized steel aircraft cable. Cable must have Underwriters Laboratories listed certified break strength, and shall be color-coded for easy field verification. Secure cable to structure and to braced component through bracket or stake eye specifically designed to exceed cable restraint rated capacity. Cable must be manufactured to meet or exceed minimum materials and standard requirements per AISI Manual for structural applications of steel cables and ASTM A603. Break strengths must be per ASTM E-8 procedures. Safety factor of 1.5 may be used when prestretched cable is used with end connections designed to meet the cable break strength. Otherwise safety factor 3.76 must be used. Cables shall be sized for a force as listed in section 1.3. Cables shall be installed to prevent excessive seismic motion and so arranged that they do not engage during normal operation. Restraint shall be type LRC.

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2.4 Conduit Guides and Anchors for Isolated Conduit

- A. Specification M: For conduit Guides where specifically shown on drawings to accommodate expansion loops and compensators, the vibration isolator manufacturer shall provide conduit guides consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum, half inch thickness of heavy duty neoprene and duck or elastomeric isolation material. Guides shall be Amber/ Booth type AG.
- B. Specification N: For anchors where specifically shown on drawings to accommodate expansion loops and compensators, the vibration isolator manufacturer shall provide all directional acoustical conduit anchors consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum half inch thickness of heavy duty neoprene and duck or elastomeric isolation material. All-directional anchors shall be Amber/Booth type AG.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Isolator and seismic restraints shall be installed as recommended by the manufacturer. Isolate and restrain all electrical equipment as required by these specifications.
- B. All floor mounted isolated equipment shall be protected with type SB or type C unitized isolator and restraint or with separate type SL restraints (minimum of 4) in conjunction with type B isolators. For equipment with high center of gravity additional cable restraints shall be furnished, as required by isolation manufacturer, to limit forces and motion caused by rocking.
- C. All suspended isolated equipment and vessels shall be protected with specification SC restraints. Cables shall be installed to prevent excessive seismic motion and so arranged that they do not engage during normal operation.
- D. Rigidly Mounted Equipment:
  - 1. Floor mounted which are exempt shall be protected by properly sized anchor bolts with elastomeric grommets provided by the isolation manufacturer.
  - 2. Suspended equipment shall be protected with type SC bracing.
- E. Conduit:
  - 1. All conduit shall be protected in all planes by SC restraints, designed to accommodate thermal movement as well as restrain seismic motion. (Spring-loaded control rods should be used on flexible connectors in system). Equipment connected conduit shall be restrained independently. Locations shall be as determined by the isolator/seismic restraint supplier and shall include, but

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not be limited to: (1) At a proximity to protect all drops to equipment connections. (2) At changes in direction of conduit as required to limit over stressing or movement that contacts other building material. (3) At horizontal runs not to exceed the spacing as presented in Amber/Booth design criteria. (4) SMACNA design criteria.

2. Where conduits pass through cored holes, core diameters to be a maximum of 2" larger than conduit O.D. including insulation. Cored holes must be packed with resilient material or firestop as provided by other sections of this specification or local codes. No additional horizontal seismic bracing is required. Restrained isolators type C or SB shall support risers and provide longitudinal restraint at floors where thermal expansion is minimal and will not bind isolator restraints. For risers in pipe shafts, specification SC cable restraints shall be installed at each level in a manner that does not interfere with thermal movement.

### 3.3 INSTALLATION

- A. Comply with manufacturer's instructions for the installation and load application of vibration isolation materials and products. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary support during installation or shipping.
- B. Locate isolation hangers as near the overhead support structure as possible.
- C. Adjust leveling devices as required to distribute loading uniformly on isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.
- D. Install isolated inertia base frames and steel bases on isolator units as indicated so that a minimum of 2 inch clearance below base will result when supported equipment has been installed and loaded for operation.

### 3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

### 3.5 FIELD QUALITY CONTROL

- A. Representative of seismic restraint system manufacturer to walk the project and provide documentation indicating conformance to ISAT shop drawing seismic restraint layout.

### 3.6 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.

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D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 16074

# UTAH VALLEY UNIVERSITY INTRAMURAL ATHLETIC FIELD RESTROOM IMPROVEMENTS

OREM, UTAH

DFCM PROJECT NO. 10004790

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Division of Facilities  
Construction & Management  
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CONSULTANT:  architecture  planning  design

## ABBREVIATIONS

Reference to materials or methods have been made on the drawings in accordance with the following abbreviations:

#	NUMBER	CMR	GYPSUM WALL BOARD
.	FEET	GP-1	GYPSUM WALL BOARD
∅	DIAMETER	HC	HANDICAPPED
∅	AND	HDW	HARDWARE
∅	AND	HTL	HORIZONTAL METAL
∅	AND	HOBZ	HORIZONTAL
ADJ	ADJUSTABLE	HR	HOOR
AFF	ADJUSTABLE FLOOR	HTL	HEIGHT
ALUM	ALUMINUM	HVAC	HEATING/VENTILATION/AIR CONDITIONING
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS	H/D	HYDRANT
ATS	AUTOMATIC TRANSFER SWITCH	INSUL	INSIDE DIAMETER
BD	BOARD	INSUL	INSULATION
BITUM	BITUMINOUS	LAV	LAVATORY
BLDG	BUILDING	LT	LIGHT
B.M.	BENCHMARK	MATL	MATERIAL
B.O.	BOTTOM OF	MAN	MANUFACTURER
B.TN	BENCH MARK	MFR.	MANUFACTURER
BRN	BROWN	MN.	MINIMUM
CBR	CERAMIC	MISC.	MISCELLANEOUS
CJ	CONSTRUCTION JOINT	M.O.	MASONRY OPENING
CLG	CEILING	M.L.	METAL
CLR	CLEAR	M.L.	NOT IN CONTRACT
CMU	CONCRETE MASONRY UNIT	NO.	NUMBER
COL	COLUMN	N.T.S.	NOT TO SCALE
CONC.	CONCRETE	O.C.	ON CENTER
CONC.	CONCRETE	O.D.	OUTSIDE DIAMETER
CONSTR.	CONSTRUCTION	OPR.	OPPOSITE
COORD.	COORDINATE	PART	PARTITION
CTJ	CONSTRUCTION JOINT	PERF.	PERFORATED
DBL	DOUBLE	P-1	POUNDS PER SQUARE INCH
DRN	DRAIN	PINTD	PAINTED
DIA	DIAMETER	PSI	POUNDS PER SQUARE INCH
DPS	DRIVEWAY PAVING	R.D.	ROOF DRAIN
DTL	DETAIL	R.O.	ROUGH OPENING
DWGS.	DRAWINGS	RAD.	RADIUS
EA	EXPANSION JOINT	REINFC	REINFORCED
EJ	ELEVATION	REINFC	REINFORCED
EQ.	EQUAL	RETI	RETURN
E.S.	EACH SIDE	REVS	REVERSED
EXST.	EXISTING	R.M.	ROOM
EXPN.	EXPANSION	R.O.	ROUGH OPENING
EXT.	EXTERIOR	SCHED	SCHEDULE
E.M.C.	ELECTRIC WATER COOLER	SHR	SHOWER
FDN	FOUNDATION	SHR	SHOWER
FDN	FOUNDATION	SHR	SHOWER
F.F.	FIRE EXTINGUISHER	SM	SMOKE
F.F.C.	FIRE EXTINGUISHER CABINET	SPCC	SPECIFICATION
F.F.	FINISH FLOOR	STR.	STRUCTURAL
FIN.	FINISH	SUSP	SUSPENDED
F.L.R.	FLOOR LINE	THRU	THROUGH
F.L.	FLOOR LINE	T.O.	TOP OF
FTG.	FOOTING	T.O.A	TOP OF ASPHALT
GA.	GAGE	T.O.C	TOP OF CURB
GALV.	GALVANIZED	T.O.F	TOP OF FOOTING
GR-CI	CONTRACTOR INSTALLED	T.O.S	TOP OF SLAB OR SIDEWALK
GR-CI	CONTRACTOR INSTALLED	T.O.W	TOP OF WALL
GR-CI	CONTRACTOR INSTALLED	TRP	TYPICAL
G1	GALVANIZED STEEL	TRP	TYPICAL
GRND.	GROUND	VEST.	VESTIBULE
GOVT.	GOVERNMENT	W/	WITH
		WD	WOOD

## DESIGN TEAM

<b>ARCHITECT</b>	P+A ARCHITECTS CONTACT: SCOTT PRIOR 821 EAST KENSINGTON AVENUE SALT LAKE CITY, UTAH 84114 PHONE: 801.484.1161 FAX: 801.485.4640	<b>ELECTRICAL</b>	VAN BOERUM FRANK AND ASSOCIATES CONTACT: STEVE T. SHERHERD 331 SOUTH 300 EAST SALT LAKE CITY, UTAH 84111 PHONE: 801.530.3150 FAX: 801.530.3150
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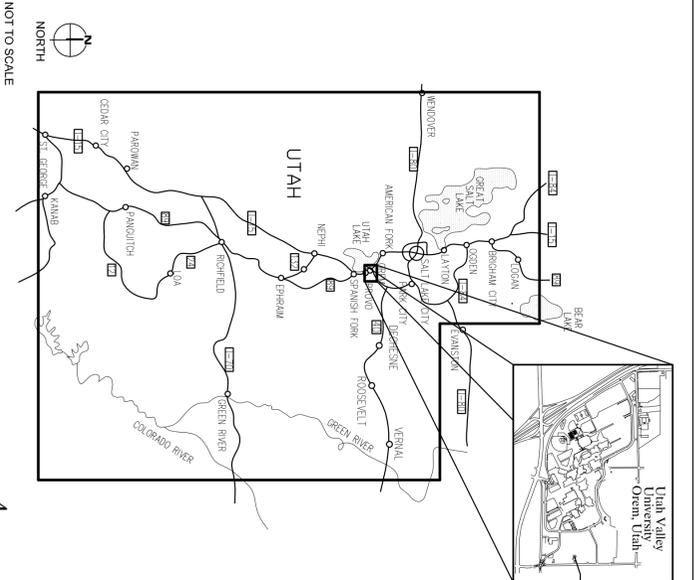
## LIST OF DRAWINGS

<b>GENERAL</b>	AG-1000 COVER SHEET AND GENERAL INFORMATION
<b>ARCHITECTURAL DRAWINGS</b>	A-S100 SITE SURVEY
	A-SP101 SITE PLAN
	A-SP102 SITE PLAN
	A-SP103 SITE PLAN
	A-PP100 FLOOR PLAN
	A-CP101 CEILING AND ROOF PLAN
	A-BE200 BUILDING ELEVATIONS
	A-BSS300 BUILDING SECTIONS, WALL SECTIONS AND BUILDING DETAILS
	A-DT300 FINISH SCHEDULES, DOOR SCHEDULES, WINDOW AND WINDOW DETAILS
	A-IE600 INTERIOR ELEVATIONS AND MOUNTING HEIGHT SCHEDULE
<b>STRUCTURAL</b>	S1 STRUCTURAL GENERAL NOTES
	S2 FOUNDATION AND ROOF FRAMING PLANS
	SD-1 STRUCTURAL DETAILS
	SD-2 STRUCTURAL DETAILS
<b>MECHANICAL</b>	M001 MECHANICAL SYMBOLS AND ABBREVIATIONS
	M002 MECHANICAL FLOOR PLAN, DETAILS AND SCHEDULES
	P100 PLUMBING FLOOR PLAN, DETAILS AND SCHEDULES
<b>ELECTRICAL</b>	E001 ELECTRICAL SCHEDULES AND GENERAL NOTES
	E100 ELECTRICAL SITE PLAN
	E200 ELECTRICAL FLOOR PLAN

## GRAPHIC KEY

	CONCRETE		ASPHALT PAVING		FINISH LUMBER
	GYPSUM WALL BOARD		STEEL STUD PARTITION		WOOD FRAMING
	HANDICAPPED		CERAMIC TILE		PL. WINDOW
	MASONRY		SECTION NUMBER		DETAIL NUMBER
	DETAIL NUMBER		ELEVATION VIEW		DETAIL NUMBER
	DETAIL NUMBER		INTERIOR ELEVATION		DETAIL NUMBER
	PARTITION TYPE		DOOR NUMBER		WINDOW TYPE

## VICINITY MAP



## DFCM DESIGN AND CODE CRITERIA

APPLICABLE CODES			
International Building Code	Year: 2006	National Electrical Code	Year: 2008
International Mechanical Code	2006	Uniform Code for Building Conservation	N/A
International Plumbing Code	2006	ADA Accessibility Guidelines	N/A
International Fire Code	N/A	Conservation Code	N/A

A. Occupancy and Group: S-2 Mixed Occupancy; Yes \_\_\_ No \_\_\_ X  
 B. Special Use and Occupancy (e.g. High Rise, Covered Mall): \_\_\_ No \_\_\_ X  
 C. Seismic Design Category: D Design Wind Speed: 90 mph  
 D. Type of Construction (circle one):  
 I \_\_\_ II \_\_\_ III \_\_\_ IV \_\_\_ V \_\_\_ VI \_\_\_ VII \_\_\_ VIII \_\_\_ IX \_\_\_ X \_\_\_ XI \_\_\_ XII \_\_\_  
 E. Fire Resistance Rating: Requirements for the Exterior Walls based on fire fire separation distance (in hours):  
 North: N/A, South: N/A, East: N/A, West: N/A  
 F. Mixed Occupancies: NO Nonseparated West: \_\_\_ NO \_\_\_  
 G. Sprinklers: NO Provided: \_\_\_ NO \_\_\_ Type of Sprinkler System: \_\_\_ N/A \_\_\_  
 H. Number of Stories: 1 Building Height: 12.28'  
 I. Tabular Area: 5500 SQUARE FEET  
 J. Actual Area per Floor (square feet): 950 SQUARE FEET  
 K. Area Modifications:  

$$A_a = A + \left[ \frac{A_1}{100} \right] + \left[ \frac{A_2}{100} \right] \quad I_1 = 100 \left[ \frac{F}{P} - 0.25 \right] W$$

$$A_a = A + \left[ \frac{A_1}{100} \right] + \left[ \frac{A_2}{100} \right] \quad I_1 = 100 \left[ \frac{F}{P} - 0.25 \right] W$$
 L. Sum of the Ratio Calculations for Mixed Occupancies:  
 Allowable Area ≤ 1  
 Total Allowable Area for:  
 1) One Story: A<sub>1</sub>(2) = \_\_\_  
 2) Two Story: A<sub>1</sub>(3) = \_\_\_  
 3) Three Story: A<sub>1</sub>(3) = \_\_\_  
 4) Unlimited Area Building: Yes \_\_\_ No \_\_\_ X Code Section: N/A  
 M. Fire Resistance Rating Requirements for Building Elements (hours):  

Element	Hours	Assembly	Hours	Assembly
Exterior Bearing Walls	0	Interior Bearing Walls	0	Interior Bearing Walls
Interior Bearing Walls	0	Exterior Nonbearing Walls	0	Exterior Nonbearing Walls
Structural Frame	0	Structural Frame	0	Structural Frame
Fire Partitions	0	Fire Partitions	0	Fire Partitions
Smoke Partitions	0	Smoke Partitions	0	Smoke Partitions

 N. Design Occupant Load: STORAGE = 1 PER 300  
 Exit Width Required: 3'-0" Exit Width Provided: 3'-0"  
 Minimum Number of Required Plumbing Facilities:  
 a) Water Closets - Required (m) 1/2/2/2 (1) 2/2/2 Provided (m) 1 (1) 3  
 b) Lavatories - Required (m) 1/2/2/2 (1) 2/2/2 Provided (m) 2 (1) 2  
 c) Bath Units or Showers: 2 PROVIDED  
 d) Drinking Fountains: 2 PROVIDED Service Sinks: 1 PROVIDED  
 O. Additional Code Information shall be provided at the discretion of the Building Code Accessibility Chapter, the more restrictive requirement shall govern.  
 P. Deferred Submittals As Listed Below To Be Submitted To Architect & Engineer:  
 1) Performance Based Criteria.  
 2) Fire Assembly Location Sheet.  
 3) Exterior and Interior Accessibility Route.  
 4) Fire Stopping, Including Tested Design Number.  
 5) Energy Efficient - and provide thermal, including nonstructural components that are permanently attached to the building structure.  
 6) Mechanical Items as per specification section 15241 "Vibration Isolation and Seismic Restraint"  
 7) Mechanical Items as per specification section 15242 "Vibration Isolation and Seismic Restraint"  
 8) Mechanical Items as per specification section 15243 "Vibration Isolation and Seismic Restraint"  
 9) Mechanical Items as per specification section 15244 "Vibration Isolation and Seismic Restraint"  
 10) Mechanical Items as per specification section 15245 "Vibration Isolation and Seismic Restraint"  
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 62) Mechanical Items as per specification section 15297 "Vibration Isolation and Seismic Restraint"  
 63) Mechanical Items as per specification section 15298 "Vibration Isolation and Seismic Restraint"  
 64) Mechanical Items as per specification section 15299 "Vibration Isolation and Seismic Restraint"  
 65) Mechanical Items as per specification section 15300 "Vibration Isolation and Seismic Restraint"

## PROJECT TITLE:

UTAH VALLEY UNIVERSITY  
RESTROOM BUILDING  
OREM, UTAH

## REVISIONS

1	5/10/10	
2	5/25/10	

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